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Environmental Restoration Project
A Department of Energy Environmental Cleanup Program

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Table I-4.0-9

Water Quality Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
NA*	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Cyanide, Total	10	µg1	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Cyanide, Total	10	µg1	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Cyanide, Total	10	µg1	U
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Bicarbonate	99200	µg1	nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Boron	1340	µg1	nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Bromide	110	µg1	nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Carbonate	0	µg1	nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Cesium	2	µg1	U,nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Chlorate	20	µg1	U,nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Chloride	19700	µg1	nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Conductivity	280	UMHOS	nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Fluoride	640	µg1	nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Iodide	20	µg1	nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Lithium	10	µg1	U,nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Molybdenum	10	µg1	U,nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Nitrogen, Ammonium (Expressed as NH4)	40	µg1	nv
16 021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Nitrogen, Nitrate (Expressed as NO3)	10700	µg1	nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Nitrogen, Nitrite (Expressed as NO2)	20	µg1	U,nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	pH	7.14	SU	nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Phosphorus, Orthophosphate (Expressed as PO4)	130	µg1	nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Rubidium	5	µg1	nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Silicon	18200	µg1	nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Silicon Dioxide	38900	µg1	nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Solids, Total Dissolved	249468	µg1	nv

Table I-4.0-9 (continued)

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Strontium	100	µg/l	nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Sulfate	15400	µg/l	nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Thiosulfate	10	µg/l	U,nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Tin	5	µg/l	U,nv
16-021(c)	16-2650	0316-97-3002	31-Mar-97	Filtered	WGI	Titanium	67	µg/l	nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Bicarbonate	79200	µg/l	nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Boron	40	µg/l	nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Bromide	40	µg/l	nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Carbonate	0	µg/l	nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Cesium	2	µg/l	U,nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Chlorate	20	µg/l	U,nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Chloride	18000	µg/l	nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	NAV*	Conductivity	218	UMHOS	nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Fluoride	210	µg/l	nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Iodide	10	µg/l	U,nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Lithium	10	µg/l	U,nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Molybdenum	10	µg/l	U,nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Nitrogen, Ammonium (Expressed as NH4)	40	µg/l	nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Nitrogen, Nitrate (Expressed as NO3)	3830	µg/l	nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Nitrogen, Nitrite (Expressed as NO2)	20	µg/l	U,nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	pH	7.44	SU	nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Phosphorus, Orthophosphate (Expressed as PO4)	170	µg/l	nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Rubidium	7	µg/l	nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Silicon	25500	µg/l	nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Silicon Dioxide	54600	µg/l	nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Solids, Total Dissolved	215229	µg/l	nv

Table I-4.0-9 (continued)

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Strontium	100	µg/l	nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Sulfate	9410	µg/l	nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Thiosulfate	10	µg/l	U,nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Tin	5	µg/l	U,nv
16-021(c)	16-2651	0316-97-3005	31-Mar-97	Filtered	WGI	Titanium	57	µg/l	nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Bicarbonate	78100	µg/l	nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Boron	20	µg/l	nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Bromide	70	µg/l	nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Carbonate	0	µg/l	nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Cesium	2	µg/l	U,nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Chlorate	20	µg/l	U,nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Chloride	17800	µg/l	nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Conductivity	213	UMHOS	nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Fluoride	220	µg/l	nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Iodide	10	µg/l	U,nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Lithium	10	µg/l	U,nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Molybdenum	10	µg/l	U,nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Nitrogen, Ammonium (Expressed as NH4)	40	µg/l	nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Nitrogen, Nitrate (Expressed as NO3)	3540	µg/l	nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Nitrogen, Nitrite (Expressed as NO2)	20	µg/l	U,nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	pH	7.34	SU	nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Phosphorus, Orthophosphate (Expressed as PO4)	230	µg/l	nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Rubidium	7	µg/l	nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Silicon	28700	µg/l	nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Silicon Dioxide	61400	µg/l	nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Solids, Total Dissolved	220878	µg/l	nv

Table I-4.0-9 (continued)

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Strontium	100	µg1	nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Sulfate	9300	µg1	nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Thiosulfate	10	µg1	U,nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Tin	5	µg1	U,nv
16-021(c)	16-2652	0316-97-3008	31-Mar-97	Filtered	WGI	Titanium	74	µg1	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Bicarbonate	99800	µg1	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Boron	1320	µg1	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Bromide	110	µg1	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Carbonate	0	µg1	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Cesium	2	µg1	U,nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Chlorate	20	µg1	U,nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Chloride	19600	µg1	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Conductivity	280	UMHOS	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Fluoride	630	µg1	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Iodide	20	µg1	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Lithium	10	µg1	U,nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Molybdenum	0	µg1	U,nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Nitrogen, Ammonium (Expressed as NH4)	40	µg1	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Nitrogen, Nitrate (Expressed as NO3)	9830	µg1	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Nitrogen, Nitrite (Expressed as NO2)	20	µg1	U,nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	pH	7.09	SU	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Phosphorus, Orthophosphate (Expressed as PO4)	120	µg1	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Rubidium	100	µg1	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Silicon	28700	µg1	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Silicon Dioxide	61400	µg1	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Solids, Total Dissolved	274110	µg1	nv

Table I-4.0-9 (continued)

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Strontium	110	µg/l	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Sulfate	15300	µg/l	nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Thiosulfate	10	µg/l	U,nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Tin	5	µg/l	U,nv
16-021(c)	16-2650	0316-97-3009	31-Mar-97	Unfiltered	WGI	Titanium	91	µg/l	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Bicarbonate	80200	µg/l	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Boron	40	µg/l	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Bromide	70	µg/l	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Carbonate	0	µg/l	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Cesium	2	µg/l	U,nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Chlorate	20	µg/l	U,nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Chloride	17900	µg/l	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Conductivity	219	UMHOS	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Fluoride	220	µg/l	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Iodide	10	µg/l	U,nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Lithium	10	µg/l	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Molybdenum	10	µg/l	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Nitrogen, Ammonium (Expressed as NH4)	40	µg/l	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Nitrogen, Nitrite (Expressed as NO2)	20	µg/l	U,nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Nitrogen, Nitrite (Expressed as NO2)	3340	µg/l	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	pH	7.37	SU	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Phosphorus, Orthophosphate (Expressed as PO4)	140	µg/l	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Rubidium	14	µg/l	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Silicon	29400	µg/l	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Silicon Dioxide	62900	µg/l	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Solids, Total Dissolved	227980	µg/l	nv

Table I-4.0-9 (continued)

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Strontium	100	µg/l	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Sulfate	9240	µg/l	nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Thiosulfate	10	µg/l	U,nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Tin	5	µg/l	U,nv
16-021(c)	16-2651	0316-97-3010	31-Mar-97	Unfiltered	WGI	Titanium	110	µg/l	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Bicarbonate	78300	µg/l	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Boron	20	µg/l	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Bromide	60	µg/l	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Carbonate	0	µg/l	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Cesium	2	µg/l	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Chlorate	20	µg/l	U,nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Chloride	17200	µg/l	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Conductivity	213	UMHOS	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Fluoride	190	µg/l	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Iodide	10	µg/l	U,nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Lithium	10	µg/l	U,nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Molybdenum	10	µg/l	U,nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Nitrogen, Ammonium (Expressed as NH4)	40	µg/l	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Nitrogen, Nitrate (Expressed as NO3)	3140	µg/l	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Nitrogen, Nitrite (Expressed as NO2)	20	µg/l	U,nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	pH	7.25	SU	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Phosphorus, Orthophosphate (Expressed as PO4)	150	µg/l	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Rubidium	13	µg/l	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Silicon	27700	µg/l	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Silicon Dioxide	59300	µg/l	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Solids, Total Dissolved	218820	µg/l	nv

Table I-4.0-9 (continued)

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Strontium	100	µg/l	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Sulfate	9070	µg/l	nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Thiosulfate	10	µg/l	U,nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Tin	5	µg/l	U,nv
16-021(c)	16-2652	0316-97-3011	31-Mar-97	Unfiltered	WGI	Titanium	98	µg/l	nv
16-021(c)	16-2650	0316-97-3014	27-Jun-97	Filtered	WGI	Alkalinity, Total (Methyl- Orange [pH=4.5] end point)	95000	µg/l	nv
16-021(c)	16-2650	0316-97-3014	27-Jun-97	Filtered	WGI	Boron	1800	µg/l	nv
16-021(c)	16-2650	0316-97-3014	27-Jun-97	Filtered	WGI	Bromide	200	µg/l	U,nv
16-021(c)	16-2650	0316-97-3014	27-Jun-97	Filtered	WGI	Chloride	20000	µg/l	nv
16-021(c)	16-2650	0316-97-3014	27-Jun-97	Filtered	WGI	Conductivity	339	UMHOS	nv
16-021(c)	16-2650	0316-97-3014	27-Jun-97	Filtered	WGI	Fluoride	600	µg/l	nv
16-021(c)	16-2650	0316-97-3014	27-Jun-97	Filtered	WGS	pH	7.2	SU	nv
16-021(c)	16-2650	0316-97-3014	27-Jun-97	Filtered	WGI	Silicon	23400	µg/l	nv
16-021(c)	16-2650	0316-97-3014	27-Jun-97	Filtered	WGI	Solids, Total Dissolved	220000	µg/l	nv
16-021(c)	16-2650	0316-97-3014	27-Jun-97	Filtered	WGI	Solids, Total Suspended	40000	µg/l	U,nv
16-021(c)	16-2650	0316-97-3014	27-Jun-97	Filtered	WGI	Sulfate	19000	µg/l	nv
16-021(c)	16-2650	0316-97-3014	27-Jun-97	Filtered	WGI	Turbidity	3.8	NTU	nv
16-021(c)	16-2650	0316-97-3015	27-Jun-97	Unfiltered	WGI	Alkalinity, Total (Methyl- Orange [pH=4.5] end point)	87000	µg/l	nv
16-021(c)	16-2650	0316-97-3015	27-Jun-97	Unfiltered	WGI	Boron	1800	µg/l	nv
16-021(c)	16-2650	0316-97-3015	27-Jun-97	Unfiltered	WGI	Bromide	200	µg/l	U,nv
16-021(c)	16-2650	0316-97-3015	27-Jun-97	Unfiltered	WGI	Chloride	21000	µg/l	nv
16-021(c)	16-2650	0316-97-3015	27-Jun-97	Unfiltered	WGI	Conductivity	335	UMHOS	nv
16-021(c)	16-2650	0316-97-3015	27-Jun-97	Unfiltered	WGI	Fluoride	700	µg/l	nv
16-021(c)	16-2650	0316-97-3015	27-Jun-97	Unfiltered	WGS	pH	8	SU	nv
16-021(c)	16-2650	0316-97-3015	27-Jun-97	Unfiltered	WGI	Silicon	23300	µg/l	nv
16-021(c)	16-2650	0316-97-3015	27-Jun-97	Unfiltered	WGI	Solids, Total Dissolved	240000	µg/l	nv
16-021(c)	16-2650	0316-97-3015	27-Jun-97	Unfiltered	WGI	Solids, Total Suspended	40000	µg/l	U,nv
16-021(c)	16-2650	0316-97-3015	27-Jun-97	Unfiltered	WGI	Sulfate	20000	µg/l	nv

Table I-4.0-9 (continued)

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3015	27-Jun-97	Unfiltered	WGI	Turbidity	1	NTU	nv
16-021(c)	16-2652	0316-97-3018	27-Jun-97	Filtered	WGI	Alkalinity, Total (Methyl- Orange [pH=4.5] end point)	66000	µg1	nv
16-021(c)	16-2652	0316-97-3018	27-Jun-97	Filtered	WGI	Boron	47.9	µg1	nv
16-021(c)	16-2652	0316-97-3018	27-Jun-97	Filtered	WGI	Bromide	200	µg1	U,nv
16-021(c)	16-2652	0316-97-3018	27-Jun-97	Filtered	WGI	Chloride	13000	µg1	nv
16-021(c)	16-2652	0316-97-3018	27-Jun-97	Filtered	WGI	Conductivity	189	UMHOS	nv
16-021(c)	16-2652	0316-97-3018	27-Jun-97	Filtered	WGI	Fluoride	200	µg1	nv
16-021(c)	16-2652	0316-97-3018	27-Jun-97	Filtered	WGS	pH	7.3	SU	nv
16-021(c)	16-2652	0316-97-3018	27-Jun-97	Filtered	WGI	Silicon	21300	µg1	nv
16-021(c)	16-2652	0316-97-3018	27-Jun-97	Filtered	WGI	Solids, Total Dissolved	150000	µg1	nv
16-021(c)	16-2652	0316-97-3018	27-Jun-97	Filtered	WGI	Solids, Total Suspended	62000	µg1	nv
16-021(c)	16-2652	0316-97-3018	27-Jun-97	Filtered	WGI	Sulfate	7000	µg1	nv
16-021(c)	16-2652	0316-97-3018	27-Jun-97	Filtered	WGI	Turbidity	10.5	NTU	nv
16-021(c)	16-2652	0316-97-3019	27-Jun-97	Unfiltered	WGI	Alkalinity, Total (Methyl- Orange [pH=4.5] end point)	67000	µg1	nv
16-021(c)	16-2652	0316-97-3019	27-Jun-97	Unfiltered	WGI	Boron	31	µg1	nv
16-021(c)	16-2652	0316-97-3019	27-Jun-97	Unfiltered	WGI	Bromide	200	µg1	U,nv
16-021(c)	16-2652	0316-97-3019	27-Jun-97	Unfiltered	WGI	Chloride	13000	µg1	nv
16-021(c)	16-2652	0316-97-3019	27-Jun-97	Unfiltered	WGI	Conductivity	188	UMHOS	nv
16-021(c)	16-2652	0316-97-3019	27-Jun-97	Unfiltered	WGI	Fluoride	200	µg1	nv
16-021(c)	16-2652	0316-97-3019	27-Jun-97	Unfiltered	WGS	pH	7.3	SU	nv
16-021(c)	16-2652	0316-97-3019	27-Jun-97	Unfiltered	WGI	Silicon	20900	µg1	nv
16-021(c)	16-2652	0316-97-3019	27-Jun-97	Unfiltered	WGI	Solids, Total Dissolved	150000	µg1	nv
16-021(c)	16-2652	0316-97-3019	27-Jun-97	Unfiltered	WGI	Solids, Total Suspended	40000	µg1	U,nv
16-021(c)	16-2652	0316-97-3019	27-Jun-97	Unfiltered	WGI	Sulfate	8000	µg1	nv
16-021(c)	16-2652	0316-97-3019	27-Jun-97	Unfiltered	WGI	Turbidity	7.3	NTU	nv
16-021(c)	16-2651	0316-97-3022	27-Jun-97	Filtered	WGI	Alkalinity, Total (Methyl- Orange [pH=4.5] end point)	55000	µg1	nv
16-021(c)	16-2651	0316-97-3022	27-Jun-97	Filtered	WGI	Boron	35.9	µg1	nv

Table I-4.0-9 (continued)

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3022	27-Jun-97	Filtered	WGI	Bromide	200	µg/l	U,nv
16-021(c)	16-2651	0316-97-3022	27-Jun-97	Filtered	WGI	Chloride	13000	µg/l	nv
16-021(c)	16-2651	0316-97-3022	27-Jun-97	Filtered	WGI	Conductivity	189	UMHOS	nv
16-021(c)	16-2651	0316-97-3022	27-Jun-97	Filtered	WGI	Fluoride	200	µg/l	nv
16-021(c)	16-2651	0316-97-3022	27-Jun-97	Filtered	WGS	pH	7.7	SU	nv
16-021(c)	16-2651	0316-97-3022	27-Jun-97	Filtered	WGI	Silicon	20700	µg/l	nv
16-021(c)	16-2651	0316-97-3022	27-Jun-97	Filtered	WGI	Solids, Total Dissolved	150000	µg/l	nv
16-021(c)	16-2651	0316-97-3022	27-Jun-97	Filtered	WGI	Solids, Total Suspended	40000	µg/l	U,nv
16-021(c)	16-2651	0316-97-3022	27-Jun-97	Filtered	WGI	Sulfate	8000	µg/l	nv
16-021(c)	16-2651	0316-97-3022	27-Jun-97	Filtered	WGI	Turbidity	7.4	NTU	nv
16-021(c)	16-2651	0316-97-3023	27-Jun-97	Unfiltered	WGI	Alkalinity, Total (Methyl- Orange [pH=4.5] end point)	69000	µg/l	nv
16-021(c)	16-2651	0316-97-3023	27-Jun-97	Unfiltered	WGI	Boron	50.7	µg/l	nv
16-021(c)	16-2651	0316-97-3023	27-Jun-97	Unfiltered	WGI	Bromide	200	µg/l	U,nv
16-021(c)	16-2651	0316-97-3023	27-Jun-97	Unfiltered	WGI	Chloride	13000	µg/l	nv
16-021(c)	16-2651	0316-97-3023	27-Jun-97	Unfiltered	WGI	Conductivity	190	UMHOS	nv
16-021(c)	16-2651	0316-97-3023	27-Jun-97	Unfiltered	WGI	Fluoride	200	µg/l	nv
16-021(c)	16-2651	0316-97-3023	27-Jun-97	Unfiltered	WGS	pH	7.6	SU	nv
16-021(c)	16-2651	0316-97-3023	27-Jun-97	Unfiltered	WGI	Silicon	21300	µg/l	nv
16-021(c)	16-2651	0316-97-3023	27-Jun-97	Unfiltered	WGI	Solids, Total Dissolved	160000	µg/l	nv
16-021(c)	16-2651	0316-97-3023	27-Jun-97	Unfiltered	WGI	Solids, Total Suspended	40000	µg/l	U,nv
16-021(c)	16-2651	0316-97-3023	27-Jun-97	Unfiltered	WGI	Sulfate	8000	µg/l	nv
16-021(c)	16-2651	0316-97-3023	27-Jun-97	Unfiltered	WGI	Turbidity	8.2	NTU	nv
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Alkalinity, Total (Methyl- Orange [pH=4.5] end point)	73000	µg/l	nv
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Bromide	2000	µg/l	U,nv
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Chloride	13000	µg/l	nv
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Conductivity	240	UMHOS	nv
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Fluoride	300	µg/l	nv
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	pH	7.37	SU	nv

Table I-4.0-9 (continued)

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Silicon	19000	µg/l	nv
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Solids, Total Dissolved	200000	µg/l	nv
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Solids, Total Suspended	5000	µg/l	U,nv
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Sulfate	17000	µg/l	nv
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Turbidity	22	NTU	nv
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Alkalinity, Total (Methyl- Orange [pH=4.5] end point)	61000	µg/l	nv
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Bromide	2000	µg/l	U,nv
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Chloride	18000	µg/l	nv
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Conductivity	180	UMHOS	nv
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Fluoride	200	µg/l	nv
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	pH	7.19	SU	nv
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Silicon	20000	µg/l	nv
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Solids, Total Dissolved	150000	µg/l	nv
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Solids, Total Suspended	5000	µg/l	U,nv
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Sulfate	13000	µg/l	nv
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Turbidity	17	NTU	nv
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Alkalinity, Total (Methyl- Orange [pH=4.5] end point)	64000	µg/l	nv
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Bromide	2000	µg/l	U,nv
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Chloride	19000	µg/l	nv
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Conductivity	200	UMHOS	nv
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Fluoride	200	µg/l	nv
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	pH	7.21	SU	nv
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Silicon	19000	µg/l	nv
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Solids, Total Dissolved	140000	µg/l	nv
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Solids, Total Suspended	5000	µg/l	U,nv
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Sulfate	12000	µg/l	nv
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Turbidity	12	NTU	nv

Table I-4.0-9 (continued)

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Alkalinity, Total (Methyl- Orange [pH=4.5] end point)	57000	µg/l	nv
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Bromide	2000	µg/l	U,nv
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Chloride	18000	µg/l	nv
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Conductivity	200	UMHOS	nv
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Fluoride	200	µg/l	nv
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	pH	7.38	SU	nv
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Silicon	21000	µg/l	nv
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Solids, Total Dissolved	170000	µg/l	nv
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Solids, Total Suspended	7000	µg/l	U,nv
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Sulfate	15000	µg/l	nv
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Turbidity	23	NTU	nv
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Alkalinity, Total (Methyl- Orange [pH=4.5] end point)	61000	µg/l	nv
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Bromide	2000	µg/l	U,nv
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Chloride	16000	µg/l	nv
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Conductivity	180	UMHOS	nv
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Fluoride	200	µg/l	nv
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	pH	7.39	SU	nv
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Silicon	20000	µg/l	nv
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Solids, Total Dissolved	160000	µg/l	nv
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Solids, Total Suspended	5000	µg/l	U,nv
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Sulfate	13000	µg/l	nv
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Turbidity	16	NTU	nv
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Alkalinity, Total (Methyl- Orange [pH=4.5] end point)	66000	µg/l	nv
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Boron	1500	µg/l	nv
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Chloride	11000	µg/l	nv
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Conductivity	230	UMHOS	nv
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Fluoride	600	µg/l	nv

Table I-4.0-9 (continued)

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	pH	7.52	SU	nv
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Solids, Total Dissolved	230000	µg/l	nv
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Solids, Total Suspended	5000	µg/l	nv
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Sulfate	17000	µg/l	nv
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Turbidity	42	NTU	nv
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Bromide	2000	µg/l	U,nv
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Chloride	22000	µg/l	nv
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Cyanide, Total	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Fluoride	800	µg/l	nv
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Nitrogen, Nitrate + Nitrite (Expressed as N)	5000	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Sulfate	21000	µg/l	nv
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Bromide	2000	µg/l	U,nv
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Chloride	19000	µg/l	nv
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Cyanide, Total	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Fluoride	800	µg/l	nv
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Nitrogen, Nitrate + Nitrite (Expressed as N)	5000	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Sulfate	29000	µg/l	nv
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Bromide	2000	µg/l	U,nv
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Chloride	13000	µg/l	nv
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Cyanide, Total	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Fluoride	100	µg/l	nv
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Nitrogen, Nitrate + Nitrite (Expressed as N)	1500	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Sulfate	2000	µg/l	nv
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Bromide	8000	µg/l	UA,nv
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Chloride	13000	µg/l	nv
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Cyanide, Total	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Fluoride	100	µg/l	U,nv

Table I-4.0-9 (concluded)

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Nitrogen, Nitrate + Nitrite (Expressed as N)	1200	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Sulfate	12000	µg/l	nv
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Bromide	8000	µg/l	UA,nv
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Chloride	13000	µg/l	nv
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Cyanide, Total	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Fluoride	100	µg/l	U,nv
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Nitrogen, Nitrate + Nitrite (Expressed as N)	50	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Sulfate	9000	µg/l	nv
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Bromide	4000	µg/l	UA,nv
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Chloride	13000	µg/l	nv
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Cyanide, Total	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Fluoride	100	µg/l	U,nv
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Nitrogen, Nitrate + Nitrite (Expressed as N)	1400	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Sulfate	5000	µg/l	nv

- NA = Not applicable.
- NAv = Not available.

Table I-4.0-10
High Explosive Chemicals in Springs Samples

Prs Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
Not Applicable	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Amino-2,6-Dinitro-toluene[4-]	0.317	µg/l	none
Not Applicable	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Amino-4,6-Dinitro-toluene[2-]	0.236	µg/l	none
Not Applicable	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Dinitro-benzene [1,3-]	0.048	µg/l	U
Not Applicable	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Dinitro-toluene[2,4-]	0.046	µg/l	none
Not Applicable	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Dinitro-toluene[2,6-]	0.048	µg/l	U
Not Applicable	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	HMX	1.8	µg/l	none
Not Applicable	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Nitrobenzene	0.051	µg/l	U
Not Applicable	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Nitrotoluene[2-]	0.088	µg/l	U
Not Applicable	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Nitrotoluene[3-]	0.105	µg/l	U
Not Applicable	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Nitrotoluene[4-]	0.106	µg/l	U
Not Applicable	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	RDX	23.4	µg/l	none
Not Applicable	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Tetryl	0.055	µg/l	U
Not Applicable	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Trinitrobenzene [1,3,5-]	0.65	µg/l	none
Not Applicable	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Trinitrotoluene [2,4,6-]	0.052	µg/l	U
Not Applicable	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Amino-2,6-Dinitro-toluene[4-]	0.939	µg/l	none
Not Applicable	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Amino-4,6-Dinitro-toluene[2-]	0.589	µg/l	none
Not Applicable	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Dinitro-benzene [1,3-]	0.074	µg/l	none

Table I-4.0-10 (continued)
High Explosive Chemicals in Springs Samples

Prs Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
Not Applicable	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Dinitro-toluene[2,4-]	0.058	µg/l	none
Not Applicable	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Dinitro-toluene[2,6-]	0.048	µg/l	U
Not Applicable	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	HMX	2.57	µg/l	none
Not Applicable	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Nitrobenzene	0.051	µg/l	U
Not Applicable	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Nitrotoluene[2-]	0.088	µg/l	U
Not Applicable	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Nitrotoluene[3-]	0.105	µg/l	U
Not Applicable	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Nitrotoluene[4-]	0.106	µg/l	U
Not Applicable	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	RDX	49.9	µg/l	none
Not Applicable	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Tetryl	0.072	µg/l	none
Not Applicable	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Trinitrobenzene [1,3,5-]	0.111	µg/l	none
Not Applicable	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Trinitrotoluene [2,4,6-]	0.052	µg/l	U
Not Applicable	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Amino-2,6-Dinitro-toluene[4-]	3.03	µg/l	none
Not Applicable	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Amino-4,6-Dinitro-toluene[2-]	2.32	µg/l	none
Not Applicable	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Dinitro-benzene [1,3-]	0.048	µg/l	U
Not Applicable	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Dinitro-toluene[2,4-]	0.13	µg/l	none
Not Applicable	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Dinitro-toluene[2,6-]	0.048	µg/l	U
Not Applicable	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	HMX	17.7	µg/l	none
Not Applicable	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Nitrobenzene	0.051	µg/l	U
Not Applicable	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Nitrotoluene[2-]	0.088	µg/l	U
Not Applicable	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Nitrotoluene[3-]	0.105	µg/l	U

Table I-4.0-10 (continued)
High Explosive Chemicals in Springs Samples

Prs Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
Not Applicable	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Nitrotoluene[4-]	0.106	µg/l	U
Not Applicable	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	RDX	157	µg/l	none
Not Applicable	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Tetryl	0.683	µg/l	none
Not Applicable	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Trinitrobenzene [1,3,5-]	1.44	µg/l	none
Not Applicable	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Trinitrotoluene [2,4,6-]	0.075	µg/l	none
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Amino-2,6-Dinitro-toluene[4-]	0.25	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Amino-4,6-Dinitro-toluene[2-]	0.25	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Dinitrobenzene [1,3-]	0.25	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Dinitrotoluene[2,4-]	0.25	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Dinitrotoluene[2,6-]	0.25	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	HMX	1	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Nitrobenzene	1	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Nitrotoluene[2-]	1	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Nitrotoluene[3-]	1	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Nitrotoluene[4-]	1	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	RDX	5.5	µg/l	none
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Tetryl	1	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Trinitrobenzene [1,3,5-]	0.26	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Trinitrotoluene [2,4,6-]	0.25	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Amino-2,6-Dinitro-toluene[4-]	0.25	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Amino-4,6-Dinitro-toluene[2-]	0.25	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Dinitrobenzene [1,3-]	0.25	µg/l	U

Table 1-4.0-10 (continued)
High Explosive Chemicals in Springs Samples

Prs Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	0.25	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	0.25	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	HMX	1	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Nitrobenzene	1	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Nitrotoluene[2-]	1	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Nitrotoluene[3-]	1	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Nitrotoluene[4-]	1	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	RDX	4.23	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Tetryl	1	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Trinitrobenzene[1,3,5-]	0.26	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Trinitrotoluene[2,4,6-]	0.25	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Amino-2,6-Dinitro-toluene[4-]	0.25	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Amino-4,6-Dinitro-toluene[2-]	0.25	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Dinitro-benzene [1,3-]	0.25	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Dinitro-toluene[2,4-]	0.25	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Dinitro toluene[2,6-]	0.25	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	HMX	1	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Nitrobenzene	1	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Nitrotoluene[2-]	1	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Nitrotoluene[3-]	1	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Nitrotoluene[4-]	1	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	RDX	1.97	µg/l	none
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Tetryl	1	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Trinitrobenzene [1,3,5-]	0.26	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Trinitrotoluene [2,4,6-]	0.25	µg/l	U

Table I-4.0-10 (continued)
High Explosive Chemicals in Springs Samples

Prs Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Amino-2,6-Dinitro-toluene[4-]	0 25	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Amino-4,6-Dinitro-toluene[2-]	0 25	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Dinitro-benzene [1,3-]	0 25	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	0 25	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Dinitro toluene[2,6-]	0 25	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	HMX	1	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Nitrobenzene	1	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Nitrotoluene[2-]	1	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Nitrotoluene[3-]	1	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Nitrotoluene[4-]	1	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	RDX	1.5	µg1	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Tetryl	1	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Trinitrobenzene [1,3,5-]	0 26	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Trinitrotoluene [2,4,6-]	0 25	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Amino-2,6-Dinitro-toluene[4-]	0 25	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Amino-4,6-Dinitro-toluene[2-]	0 25	µg1	U
16 021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Dinitro-benzene [1,3-]	0 25	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Dinitro-toluene[2,4-]	0.25	µg1	U
16 021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Dinitro toluene[2,6-]	0 25	µg1	U
16 021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	HMX	1	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Nitrobenzene	1	µg1	U
16 021(c)	16-2652	0316 97-3006	31-Mar-97	Filtered	WGI	Nitrotoluene[2-]	1	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Nitrotoluene[3-]	1	µg1	U
16 021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Nitrotoluene[4-]	1	µg1	U
16 021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	RDX	1	µg1	none

Table I-4.0-10 (continued)
High Explosive Chemicals in Springs Samples

Prs Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Tetryl	1	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Trinitrobenzene [1,3,5-]	0.26	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Trinitrotoluene [2,4,6-]	0.25	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Amino-2,6-Dinitro-toluene[4-]	0.25	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Amino-4,6-Dinitro-toluene[2-]	0.25	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Dinitro-benzene [1,3-]	0.25	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	0.25	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	0.25	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	HMX	1	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Nitrobenzene	1	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Nitrotoluene[2-]	1	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Nitrotoluene[3-]	1	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Nitrotoluene[4-]	1	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	RDX	1.2	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Tetryl	1	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Trinitrobenzene [1,3,5-]	0.26	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Trinitrotoluene [2,4,6-]	0.25	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Amino-2,6-Dinitro-toluene[4-]	2.6	µg/l	none
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Amino-4,6-Dinitro-toluene[2-]	1.98	µg/l	none
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Dinitro-benzene [1,3-]	0.048	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Dinitro-toluene[2,4-]	0.103	µg/l	none
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Dinitro-toluene[2,6-]	0.048	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	HMX	16.6	µg/l	none
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Nitrobenzene	0.054	µg/l	U

Table I-4.0-10 (continued)
High Explosive Chemicals in Springs Samples

Prs Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Nitrotoluene[2-]	0.095	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Nitrotoluene[3-]	0.104	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Nitrotoluene[4-]	0.096	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	RDX	132	µg/l	none
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Tetryl	0.055	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Trinitrobenzene [1,3,5-]	0.535	µg/l	none
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Trinitrotoluene [2,4,6-]	0.05	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Amino-2,6-Dinitro-toluene[4-]	2.83	µg/l	none
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Amino-4,6-Dinitro-toluene[2-]	2.11	µg/l	none
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Dinitrobenzene [1,3-]	0.048	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Dinitrotoluene[2,4-]	0.126	µg/l	none
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Dinitrotoluene[2,6-]	0.048	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	HMX	16.9	µg/l	none
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Nitrobenzene	0.054	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Nitrotoluene[2-]	0.095	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Nitrotoluene[3-]	0.104	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Nitrotoluene[4-]	0.096	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	RDX	135	µg/l	none
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Tetryl	0.055	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Trinitrobenzene [1,3,5-]	0.995	µg/l	none
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Trinitrotoluene [2,4,6-]	0.051	µg/l	none
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Amino-2,6-Dinitro-toluene[4-]	0.23	µg/l	none
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Amino-4,6-Dinitro-toluene[2-]	0.168	µg/l	none
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Dinitrobenzene [1,3-]	0.048	µg/l	U

Table I-4.0-10 (continued)
High Explosive Chemicals in Springs Samples

Prs Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Dinitro-toluene[2,4-]	0.039	µg/l	none
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Dinitro-toluene[2,6-]	0.048	µg/l	U
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	HMX	1.56	µg/l	none
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Nitrobenzene	0.054	µg/l	U
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Nitrotoluene[2-]	0.095	µg/l	U
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Nitrotoluene[3-]	0.104	µg/l	U
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Nitrotoluene[4-]	0.096	µg/l	U
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	RDX	15	µg/l	none
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Tetryl	0.055	µg/l	U
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Trinitrobenzene [1,3,5-]	0.484	µg/l	none
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Trinitrotoluene [2,4,6-]	0.05	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Amino-2,6-Dinitro-toluene[4-]	0.234	µg/l	none
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Amino-4,6-Dinitro-toluene[2-]	0.165	µg/l	none
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Dinitro-benzene [1,3-]	0.048	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	0.036	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	0.048	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	HMX	1.68	µg/l	none
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Nitrobenzene	0.054	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Nitrotoluene[2-]	0.095	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Nitrotoluene[3-]	0.104	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Nitrotoluene[4-]	0.096	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	RDX	14.1	µg/l	none
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Tetryl	0.055	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Trinitrobenzene [1,3,5-]	0.337	µg/l	none
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Trinitrotoluene [2,4,6-]	0.05	µg/l	U

Table I-4.0-10 (continued)
High Explosive Chemicals in Springs Samples

Prs Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Amino-2,6-Dinitro-toluene[4-]	0.663	µg/l	none
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Amino-4,6-Dinitro-toluene[2-]	0.423	µg/l	none
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Dinitro benzene [1,3-]	0.048	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Dinitro-toluene[2,4-]	0.042	µg/l	none
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Dinitro-toluene[2,6-]	0.048	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	HMX	2.26	µg/l	none
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Nitrobenzene	0.054	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Nitrotoluene[2-]	0.095	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Nitrotoluene[3-]	0.111	µg/l	none
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Nitrotoluene[4-]	0.096	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	RDX	31.7	µg/l	none
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Tetryl	0.055	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Trinitrobenzene [1,3,5-]	0.14	µg/l	none
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Trinitrotoluene [2,4,6-]	0.05	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Amino-2,6-Dinitro-toluene[4-]	0.725	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Amino-4,6-Dinitro-toluene[2-]	0.451	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Dinitro benzene [1,3-]	0.048	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	0.051	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	0.048	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	HMX	2.23	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Nitrobenzene	0.054	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Nitrotoluene[2-]	0.095	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Nitrotoluene[3-]	0.104	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Nitrotoluene[4-]	0.096	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	RDX	32	µg/l	none

Table I-4.0-10 (continued)
High Explosive Chemicals in Springs Samples

Prs Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Tetryl	0.055	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Trinitrobenzene [1,3,5-]	0.068	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Trinitrotoluene [2,4,6-]	0.05	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Amino-2,6-Dinitro-toluene[4-]	1.3	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Amino-4,6-Dinitro-toluene[2-]	1.3	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Dinitro-benzene [1,3-]	1.3	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Dinitro-toluene[2,4-]	1.3	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Dinitro-toluene[2,6-]	1.3	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	HMX	5	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Nitrobenzene	5	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Nitrotoluene[2-]	5	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Nitrotoluene[3-]	5	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Nitrotoluene[4-]	5	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	RDX	45	µg/l	none
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Tetryl	5	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Trinitrobenzene [1,3,5-]	1.3	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Trinitrotoluene [2,4,6-]	1.3	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Amino-2,6-Dinitro-toluene[4-]	0.25	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Amino-4,6-Dinitro-toluene[2-]	0.25	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Dinitro-benzene [1,3-]	0.25	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	0.25	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	0.25	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	HMX	1.9	µg/l	J-
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Nitrobenzene	1	µg/l	U

Table I-4.0-10 (continued)
High Explosive Chemicals in Springs Samples

Prs Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Nitrotoluene[2-]	1	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Nitrotoluene[3-]	1	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Nitrotoluene[4-]	1	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	RDX	13	µg/l	J-
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Tetryl	1	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Trinitrobenzene [1,3,5-]	0.26	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Trinitrotoluene [2,4,6-]	0.25	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Amino-2,6-Dinitro-toluene[4-]	0.25	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Amino-4,6-Dinitro-toluene[2-]	0.25	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Dinitro-benzene [1,3-]	0.25	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Dinitro-toluene[2,4-]	0.25	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Dinitro-toluene[2,6-]	0.25	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	HMX	1.3	µg/l	none
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Nitrobenzene	1	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Nitrotoluene[2-]	1	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Nitrotoluene[3-]	1	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Nitrotoluene[4-]	1	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	RDX	12	µg/l	none
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Tetryl	1	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Trinitrobenzene [1,3,5-]	0.26	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Trinitrotoluene[2,4,6-]	0.25	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Amino-2,6-Dinitro-toluene[4-]	2.5	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Amino-4,6-Dinitro-toluene[2-]	2.5	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Dinitro benzene [1,3-]	2.5	µg/l	U

Table I-4.0-10 (continued)
High Explosive Chemicals in Springs Samples

Prs Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	2.5	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	2.5	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	HMX	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Nitrotoluene[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Nitrotoluene[3-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Nitrotoluene[4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	RDX	86	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Tetryl	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Trinitrobenzene [1,3,5-]	2.6	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Trinitrotoluene [2,4,6-]	2.5	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Amino-2,6-Dinitro-toluene[4-]	2.5	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Amino-4,6-Dinitro-toluene[2-]	2.5	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Dinitro-benzene [1,3-]	2.5	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Dinitro-toluene[2,4-]	2.5	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Dinitro-toluene[2,6-]	2.5	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	HMX	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Nitrotoluene[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Nitrotoluene[3-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Nitrotoluene[4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	RDX	84	µg/l	none
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Tetryl	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Trinitrobenzene [1,3,5-]	2.6	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Trinitrotoluene [2,4,6-]	2.5	µg/l	U

Table I-4.0-10 (continued)
High Explosive Chemicals in Springs Samples

Prs Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Amino-2,6-Dinitro-toluene[4-]	1.3	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Amino-4,6-Dinitro-toluene[2-]	1.3	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Dinitro-benzene [1,3-]	1.3	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	1.3	µg/l	J-
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	1.3	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	HMX	7.2	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Nitrobenzene	5	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Nitrotoluene[2-]	5	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Nitrotoluene[3-]	5	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Nitrotoluene[4-]	5	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	RDX	51	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Tetryl	5	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Trinitrobenzene [1,3,5-]	1.3	µg/l	J-
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Trinitrotoluene [2,4,6-]	1.3	µg/l	J-
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Amino-2,6-Dinitro-toluene[4-]	3.9	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Dinitro-benzene [1,3-]	2	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Dinitro-toluene[2,4-]	2	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Dinitro-toluene[2,6-]	2	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	HMX	17	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Nitrobenzene	2	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Nitrotoluene[2-]	7.8	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Nitrotoluene[3-]	7.8	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Nitrotoluene[4-]	23	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	RDX	76	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Tetryl	5.8	µg/l	U

Table I-4.0-10 (continued)
High Explosive Chemicals in Springs Samples

Prs Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Trinitrobenzene [1,3,5-]	2	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Trinitrotoluene [2,4,6-]	2	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Amino-2,6-Dinitro-toluene[4-]	5.2	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Dinitro-benzene [1,3-]	2	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	2	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	2	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	HMX	9.4	µg/l	J
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Nitrobenzene	2	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Nitrotoluene[2-]	7.8	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Nitrotoluene[3-]	7.8	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Nitrotoluene[4-]	23	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	RDX	120	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Tetryl	5.8	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Trinitrobenzene [1,3,5-]	2	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Trinitrotoluene [2,4,6-]	2	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Amino-2,6-Dinitro-toluene[4-]	3.9	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Dinitro-benzene [1,3-]	2	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Dinitro-toluene[2,4-]	2	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Dinitro-toluene[2,6-]	2	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	HMX	17	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Nitrobenzene	2	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Nitrotoluene[2-]	7.8	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Nitrotoluene[3-]	7.8	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Nitrotoluene[4-]	23	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	RDX	40	µg/l	none

Table I-4.0-10 (continued)
High Explosive Chemicals in Springs Samples

Prs Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Tetryl	5.8	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Trinitrobenzene [1,3,5-]	2	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Trinitrotoluene [2,4,6-]	2	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Amino-2,6-Dinitro-toluene[4-]	3.9	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Dinitro-benzene [1,3-]	2	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	2	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	2	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	HMX	17	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Nitrobenzene	2	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Nitrotoluene[2-]	7.8	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Nitrotoluene[3-]	7.8	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Nitrotoluene[4-]	23	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	RDX	39	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Tetryl	5.8	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Trinitrobenzene [1,3,5-]	2	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Trinitrotoluene [2,4,6-]	2	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Amino-2,6-Dinitro-toluene[4-]	3.9	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Dinitro-benzene [1,3-]	2	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Dinitro-toluene[2,4-]	2	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Dinitro-toluene[2,6-]	2	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	HMX	17	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Nitrobenzene	2	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Nitrotoluene[2-]	7.8	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Nitrotoluene[3-]	7.8	µg/l	U

Table 1-4.0-10 (completed)
High Explosive Chemicals in Springs Samples

Prs Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Nitrotoluene[4-]	23	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	RDX	21	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Tetryl	5.8	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Trinitrobenzene [1,3,5-]	2	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Trinitrotoluene [2,4,6-]	2	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Amino-2,6-Dinitro-toluene[4-]	3.9	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Dinitro-benzene[1,3-]	2	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	2	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	2	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	HMX	17	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Nitrobenzene	2	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Nitrotoluene[2-]	7.8	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Nitrotoluene[3-]	7.8	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Nitrotoluene[4-]	23	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	RDX	20	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Tetryl	5.8	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Trinitrobenzene [1,3,5-]	2	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Trinitrotoluene [2,4,6-]	2	µg/l	U

Table I-4.0-11

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Acetone	18	µg/l	J
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Benzene	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Bromobenzene	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	BromoChloro-methane	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Bromodi-Chloro-methane	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Bromoform	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Bromomethane	4	µg/l	J
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Butanone[2-]	20	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Butyl-benzene[n-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Butyl-benzene[sec-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Butyl-benzene[tert-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Carbon Disulfide	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Carbon Tetrachloride	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Chloro-benzene	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Chloro-Dibromo-methane	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Chloro-ethane	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Chloro-form	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Chloro methane	30	µg/l	none
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Chloro-toluene[2-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Chloro-toluene[4-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Dibromo--3-Chloro-propane[1,2-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Dibromo-ethane[1,2-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Dibromo-methane	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro benzene[1,2-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-benzene[1,3-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-benzene[1,4-]	5	µg/l	U

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-d fluoro--methane	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-ethane[1,1-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-ethane[1,2-]	6	µg/l	none
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-ethene[1,1-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-ethene[cis-1,2-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-ethene [trans-1,2-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro propane[1,2-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-propane[1,3-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-propane[2,2-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-propene[1,1-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-propene [cis-1,3-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-propene[trans-1,3-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Ethylbenzene	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Hexanone[2-]	20	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Iodomethane	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Isopropylbenzene	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Isopropyltoluene[4-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Methyl--2-pentanone[4-]	20	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Methyl-ene Chloride	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Propylbenzene[1-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Styrene	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	TetraChloro-ethane[1,1,1,2-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	TetraChloro-ethane[1,1,2,2-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	TetraChloro-ethene	5	µg/l	U

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Toluene	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	TriChloro--1,2,2-trifluoroethane[1,1,2-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	TriChloro-ethane[1,1,1-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	TriChloro-ethane[1,1,2-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	TriChloro-ethene	2	µg/l	J
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	TriChloro-fluoromethane	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	TriChloro-propane[1,2,3-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Trimethylbenzene[1,2,4-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Trimethylbenzene[1,3,5-]	5	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Vinyl Chloride	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Xylene (Total)	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Acetone	12	µg/l	J
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Benzene	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Bromobenzene	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	BromoChloro-methane	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Bromod Chloro-methane	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Bromoform	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Bromomethane	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Butanone[2-]	20	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Butyl benzene[n-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Butyl benzene[sec-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Butyl-benzene[tert-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Carbon Disulfide	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Carbon Tetrachloride	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Chloro-benzene	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Chloro-DiBromo-methane	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Chloro-ethane	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Chloro-form	5	µg/l	U

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Chloro-methane	12	µg/l	none
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Chloro-toluene[2-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Chloro-toluene[4-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Dibromo--3-Chloro-propane[1,2-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Dibromo-ethane[1,2-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Dibromo-methane	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	DiChloro-benzene[1,2-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	DiChloro-benzene[1,3-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	DiChloro-benzene[1,4-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	DiChloro-difluoro--methane	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	DiChloro-ethane[1,1-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	DiChloro-ethane[1,2-]	3	µg/l	J
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	DiChloro-ethene[1,1-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	DiChloro-ethene[cis-1,2-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	DiChloro-ethene[trans-1,2-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	DiChloro-propane[1,2-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	DiChloro-propane[1,3-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	DiChloro-propane[2,2-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	DiChloro-propene[1,1-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	DiChloro-propene[cis-1,3-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	DiChloro-propene[trans-1,3-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Ethylbenzene	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Hexanone[2-]	20	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Iodomethane	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Isopropylbenzene	5	µg/l	U

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Isopropyltoluene[4-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Methyl--2-pentanone[4-]	20	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Methylene Chloride	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Propylbenzene[1-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Styrene	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	TetraChloro-ethane[1,1,1,2-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	TetraChloro-ethane[1,1,2,2-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	TetraChloro ethene	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Toluene	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	TriChloro--1,2,2-trifluoroethane[1,1,2-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	TriChloro ethane[1,1,1-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	TriChloro ethane[1,1,2-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	TriChloro ethene	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	TriChloro-fluoromethane	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	TriChloro-propane[1,2,3-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Trimethylbenzene[1,2,4-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Trimethylbenzene[1,3,5-]	5	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Vinyl Chloride	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Xylene (Total)	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Acetone	18	µg/l	J
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Benzene	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Bromobenzene	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	BromoChloro-methane	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	BromodiChloro-methane	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Bromoform	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Bromomethane	10	µg/l	U

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Butanone[2-]	20	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Butyl-benzene[n-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Butyl-benzene[sec-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Butyl-benzene[tert-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Carbon Disulfide	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Carbon Tetrachloride	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Chloro-benzene	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Chloro-Dibromo-methane	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Chloro-ethane	10	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Chloro-form	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Chloro-methane	16	µg/l	none
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Chloro-toluene[2-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Chloro-toluene[4-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Dibromo--3-Chloro-propane[1,2-]	10	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Dibromo-ethane[1,2-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Dibromo-methane	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	DiChloro-benzene[1,2-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	DiChloro-benzene[1,3-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	DiChloro-benzene[1,4-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	DiChloro-difluoro--methane	10	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	DiChloro-ethane[1,1-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	DiChloro-ethane[1,2-]	5	µg/l	none
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	DiChloro-ethene[1,1-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	DiChloro-ethene[cis-1,2-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	DiChloro-ethene[trans-1,2-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	DiChloro-propane[1,2-]	5	µg/l	U

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	DiChloro-propane[1,3-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	DiChloro-propane[2,2-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	DiChloro-propene[1,1-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	DiChloro-propene[cis-1,3-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	DiChloro-propene[trans-1,3-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Ethylbenzene	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Hexanone[2-]	20	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Iodomethane	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Isopropylbenzene	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Isopropyltoluene[4-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Methyl--2-pentanone[4-]	20	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Methyl ene Chloride	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Propylbenzene[1-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Styrene	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	TetraChloro-ethane[1,1,1,2-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	TetraChloro-ethane[1,1,2,2-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	TetraChloro-ethene	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Toluene	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	TriChloro--1,2,2-trifluoroethane[1,1,2-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	TriChloro-ethane[1,1,1-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	TriChloro ethane[1,1,2-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	TriChloro ethene	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	TriChloro-fluoromethane	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	TriChloro-propane[1,2,3-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Trimethylbenzene[1,2,4-]	5	µg/l	U

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Trimethylbenzene[1,3,5-]	5	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Vinyl Chloride	10	µg/l	U
NA	16-2650	0316-96-3002	20-Dec-96	Unfiltered	WGS	Xylene (Total)	5	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Acetone	39	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Benzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Bromobenzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	BromoChloro-methane	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Bromodi-Chloro-methane	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Bromoform	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Bromomethane	10	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Butanone[2-]	20	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Butyl-benzene[n-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Butyl-benzene[sec-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Butyl-benzene[tert-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Carbon Disulfide	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Carbon Tetrachloride	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Chloro-benzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Chloro-Dibromo-methane	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Chloro-ethane	10	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Chloro-form	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Chloro-methane	12	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Chloro-toluene[2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Chloro-toluene[4-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Dibromo--3 Chloro-propane[1,2-]	10	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Dibromo-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Dibromo-methane	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro-benzene[1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro-benzene[1,4-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro difluoro-methane	10	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro-ethane[1,1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro-ethene[1,1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro ethene[cis-1,2-]	10	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro-ethene[trans-1,2-]	10	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro-propane[1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro propane[1,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro-propane[2,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro-propene[1,1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro-propene[cis-1,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro propene[trans-1,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Ethylbenzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Hexanone[2-]	20	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Iodomethane	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Isopropylbenzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Isopropyltoluene[4-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Methyl-2-pentanone[4-]	20	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Methylene Chloride	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Propylbenzene[1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Styrene	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	TetraChloro ethane[1,1,1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	TetraChloro-ethane[1,1,2,2-]	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	TetraChloro-ethene	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Toluene	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	TriChloro--1,2,2-trifluoroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	TriChloro-ethane[1,1,1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	TriChloro ethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2650	0316 97-3001	31-Mar-97	Unfiltered	WGI	TriChloro-ethene	5	µg/l	none
16-021(c)	16 2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	TriChloro-fluoromethane	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	TriChloro-propane[1,2,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Trimethylbenzene[1,2,4-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Trimethylbenzene[1,3,5-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Vinyl Chloride	10	µg/l	none
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Xylene (Total)	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Acetone	20	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Benzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Bromobenzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	BromoChloro-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	BromodiChloro-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Bromoform	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Bromomethane	10	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Butanone[2-]	20	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Butyl-benzene[n-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Butyl-benzene[sec-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Butyl-benzene[tert-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Carbon Disulfide	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Carbon Tetrachloride	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Chloro benzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Chloro-Dibromo-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Chloro-ethane	10	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Chloro-form	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Chloro-methane	10	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Chloro-toluene[2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Chloro-toluene[4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Dibromo--3 Chloro-propane[1,2-]	10	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Dibromo-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Dibromo-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro benzene[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro benzene[1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro benzene[1,4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro-difluoro--methane	10	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro-ethane[1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro ethene[1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro ethene[cis-1,2-]	10	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro ethene[trans-1,2-]	10	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro-propane[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro-propane[1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro-propane[2,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro-propene[1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro propene[cis-1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro-propene[trans-1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Ethylbenzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Hexanone[2-]	20	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Iodomethane	5	µg/l	none

Table I-4.0-11 (continued)
Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Isopropylbenzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Isopropyltoluene[4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Methyl--2-pentanone[4-]	20	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Methylene Chloride	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Propylbenzene[1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Styrene	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	TetraChloro-ethane[1,1,1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	TetraChloro-ethane[1,1,2,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	TetraChloro-ethene	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Toluene	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	TriChloro--1,2,2-trifluoroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	TriChloro-ethane[1,1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	TriChloro-ethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	TriChloro-ethene	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	TriChloro-fluoromethane	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	TriChloro-propane[1,2,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Trimethylbenzene[1,2,4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Trimethylbenzene[1,3,5-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Vinyl Chloride	10	µg/l	none
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Xylene (Total)	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Acetone	26	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Benzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Bromobenzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	BromoChloro-methane	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	BromodiChloro-methane	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Bromoform	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Bromomethane	10	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Butanone[2-]	20	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Butyl-benzene[n-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Butyl benzene[sec-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Butyl-benzene[tert-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Carbon Disulfide	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Carbon Tetrachloride	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Chloro-benzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Chloro-Dibromo-methane	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Chloro-ethane	10	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Chloro-form	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Chloro-methane	10	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Chloro-toluene[2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Chloro-toluene[4-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Dibromo--3 Chloro-propane[1,2-]	10	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Dibromo-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Dibromo-methane	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro-benzene[1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro benzene[1,4-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro-difluoro--methane	10	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro ethane[1,1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro ethane[1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro-ethene[1,1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro ethene[cis-1,2-]	10	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro ethene[trans-1,2-]	10	µg/l	none

Table I-4.0-11 (continued)
Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro-propane[1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro-propane[1,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro-propane[2,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro-propene[1,1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro-propene[cis-1,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro-propene[trans-1,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Ethylbenzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Hexanone[2-]	20	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Iodomethane	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Isopropylbenzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Isopropyltoluene[4-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Methyl--2-pentanone[4-]	20	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Methylene Chloride	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Propylbenzene[1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Styrene	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	TetraChloro-ethane[1,1,1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	TetraChloro-ethane[1,1,2,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	TetraChloro-ethene	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Toluene	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	TriChloro--1,2,2-trifluoroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	TriChloro-ethane[1,1,1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	TriChloro-ethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	TriChloro-ethene	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	TriChloro-fluoromethane	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	TriChloro-propane[1,2,3-]	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Trimethylbenzene[1,2,4-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Trimethylbenzene[1,3,5-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Vinyl Chloride	10	µg/l	none
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Xylene (Total)	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Acetone	23	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Benzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Bromobenzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	BromoChloro-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Bromodi Chloro-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Bromoform	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Bromomethane	10	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Butanone[2-]	20	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Butyl benzene[n-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Butyl-benzene[sec-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Butyl-benzene[tert-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Carbon Disulfide	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Carbon Tetrachloride	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Chloro benzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Chloro-Dibromo-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Chloro-ethane	10	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Chloro-form	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Chloro-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Chloro-toluene[2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Chloro-toluene[4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Dibromo--3 Chloro-propane[1,2-]	10	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Dibromo ethane[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Dibromo-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro benzene[1,2-]	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-benzene[1,4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-difluoro-methane	10	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-ethane[1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-ethane[1,2-]	4	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-ethene[1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-ethene[cis-1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-ethene[trans-1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-propane[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-propane[1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-propane[2,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-propene[1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-propene[cis-1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-propene[trans-1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Ethylbenzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	HexaChloro-butadiene	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Hexanone[2-]	20	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Iodomethane	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Isopropylbenzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Isopropyltoluene[4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Methyl-2-pentanone[4-]	20	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Methylene Chloride	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Naphthalene	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Propylbenzene[1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Styrene	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	TetraChloro-ethane[1,1,1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	TetraChloro-ethane[1,1,2,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	TetraChloro-ethene	2.8	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Toluene	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	TriChloro--1,2,2-trifluoroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	TriChloro-benzene[1,2,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	TriChloro-benzene[1,2,4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	TriChloro-ethane[1,1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	TriChloro-ethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	TriChloro-ethene	2	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	TriChloro-fluoromethane	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	TriChloro-propane[1,2,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Trimethylbenzene[1,2,4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Trimethylbenzene[1,3,5-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Vinyl Chloride	10	µg/l	none
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Xylene (Total)	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Acetone	29	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Benzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Bromobenzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	BromoChloro-methane	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	BromodChloro-methane	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Bromoform	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Bromomethane	10	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Butanone[2-]	20	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Butyl benzene[n-]	5	µg/l	none

Table I-4.0-11 (continued)
Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Butyl benzene[sec-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Butyl benzene[tert-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Carbon Disulfide	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Carbon Tetrachloride	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Chloro-benzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Chloro-Dibromo-methane	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Chloro-ethane	10	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Chloro-form	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Chloro-methane	10	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Chloro-toluene[2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Chloro-toluene[4-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Dibromo--3 Chloro-propane[1,2-]	10	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Dibromo-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Dibromo-methane	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	DiChloro-benzene[1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	DiChloro-benzene[1,4-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	DiChloro-difluoro--methane	10	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	DiChloro-ethane[1,1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	DiChloro-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	DiChloro-ethene[1,1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	DiChloro-ethene[cis-1,2-]	10	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	DiChloro-ethene[trans-1,2-]	10	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	DiChloro-propane[1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	DiChloro-propane[1,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	DiChloro-propane[2,2-]	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	DiChloro-propene[1,1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	DiChloro-propene[cis-1,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	DiChloro-propene[trans-1,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Ethylbenzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Hexanone[2-]	20	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Iodomethane	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Isopropylbenzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Isopropyltoluene[4-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Methyl-2-pentanone[4-]	20	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Methylene Chloride	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Propylbenzene[1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Styrene	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	TetraChloro-ethane[1,1,1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	TetraChloro-ethane[1,1,2,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	TetraChloro ethene	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Toluene	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	TriChloro-1,2,2-trifluoroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	TriChloroethane[1,1,1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	TriChloroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	TriChloro-ethene	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	TriChloro-fluoromethane	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	TriChloro-propane[1,2,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Trimethylbenzene[1,2,4-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Trimethylbenzene[1,3,5-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Vinyl Chloride	10	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Xylene (Total)	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Acetone	36	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Benzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Bromobenzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	BromoChloro-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Bromod.Chloro-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Bromoform	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Bromomethane	10	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Butanone[2-]	20	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Butyl-benzene[n-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Butyl-benzene[sec-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Butyl-benzene[tert-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Carbon Disulfide	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Carbon Tetrachloride	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Chloro-benzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Chloro-Dibromo-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Chloro-ethane	10	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Chloro-form	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Chloro-methane	10	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Chloro-toluene[2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Chloro-toluene[4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Dibromo--3-Chloro-propane[1,2-]	10	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Dibromo-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Dibromo-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-benzene[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-benzene[1,4-]	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-difluoro--methane	10	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-ethane[1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-ethene[1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-ethene[cis-1,2-]	10	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-ethene[trans-1,2-]	10	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-propane[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-propane[1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-propane[2,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-propene[1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro propene[cis-1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-propene[trans-1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Ethylbenzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Hexanone[2-]	20	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Iodomethane	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Isopropylbenzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Isopropyltoluene[4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Methyl--2-pentanone[4-]	20	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Methylene Chloride	5	µg/l	none
16-021(c)	16-2651	0316-97-3103	22-Sep-97	Unfiltered	WGI	Propylbenzene[1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Styrene	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	TetraChloro-ethane[1,1,1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	TetraChloro-ethane[1,1,2,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	TetraChloro-ethene	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Toluene	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	TriChloro--1,2,2-trifluoroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	TriChloro-ethane[1,1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	TriChloro ethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	TriChloro-ethene	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	TriChloro-fluoromethane	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	TriChloro-propane[1,2,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Trimethylbenzene[1,2,4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Trimethylbenzene[1,3,5-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Vinyl Chloride	10	µg/l	none
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Xylene (Total)	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Acetone	34	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Benzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Bromobenzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	BromoChloro-methane	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	BromodiChloro-methane	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Bromoform	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Bromomethane	10	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Butanone[2-]	20	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Butyl-benzene[n-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Butyl-benzene[sec-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Butyl-benzene[tert-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Carbon Disulfide	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Carbon Tetrachloride	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Chloro-benzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Chloro-Dibromo-methane	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Chloro-ethane	10	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Chloro-form	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Chloro-methane	10	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Chloro-toluene[2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Chloro-toluene[4-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Dibromo--3-Chloro-propane[1,2-]	10	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Dibromo-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Dibromo-methane	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-benzene[1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-benzene[1,4-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-d fluoro--methane	10	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-ethane[1,1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-ethene[1,1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-ethene[cis-1,2-]	10	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-ethene[trans-1,2-]	10	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-propane[1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-propane[1,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-propane[2,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-propene[1,1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-propene[cis-1,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-propene[trans-1,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Ethylbenzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Hexanone[2-]	20	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Iodomethane	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Isopropylbenzene	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Isopropyltoluene[4-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Methyl--2-pentanone[4-]	20	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Methylene Chloride	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Propylbenzene[1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Styrene	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	TetraChloro-ethane[1,1,1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	TetraChloro-ethane[1,1,2,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	TetraChloro-ethene	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Toluene	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	TriChloro--1,2,2-trifluoroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	TriChloroethane[1,1,1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	TriChloroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	TriChloro-ethene	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	TriChloro-fluoromethane	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	TriChloro-propane[1,2,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Trimethylbenzene[1,2,4-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Trimethylbenzene[1,3,5-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Vinyl Chloride	10	µg/l	none
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Xylene (Total)	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Acetone	20	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Benzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Bromobenzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	BromoChloro-methane	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	BromodiChloro-methane	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Bromoform	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Bromomethane	10	µg/l	none

Table 1-4.0-11 (continued)
Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Butanone[2-]	20	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Butyl-benzene[n-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Butyl-benzene[sec-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Butyl-benzene[tert-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Carbon Disulfide	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Carbon Tetrachloride	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Chloro-benzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Chloro-Dibromo-methane	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Chloro-ethane	10	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Chloro-form	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Chloro-methane	10	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Chloro-toluene[2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Chloro-toluene[4-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Dibromo--3-Chloro-propane[1,2-]	10	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Dibromo-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Dibromo-methane	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-benzene[1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-benzene[1,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-benzene[1,4-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-difluoro--methane	10	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-ethane[1,1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-ethene[1,1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-ethene[cis-1,2-]	10	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-ethene[trans-1,2-]	10	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-propane[1,2-]	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-propane[1,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-propane[2,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-propene[1,1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-propene[cis-1,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-propene[trans-1,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Ethylbenzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Hexanone[2-]	20	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Iodomethane	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Isopropylbenzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Isopropyltoluene[4-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Methyl-2-pentanone[4-]	20	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Methylene Chloride	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Propylbenzene[1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Styrene	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	TetraChloro-ethane[1,1,1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	TetraChloro-ethane[1,1,2,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	TetraChloro-ethene	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Toluene	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	TriChloro-1,2,2-trifluoroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	TriChloro-ethane[1,1,1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	TriChloro-ethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	TriChloro-ethene	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	TriChloro-fluoromethane	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	TriChloro-propane[1,2,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Trimethylbenzene[1,2,4-]	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Trimethylbenzene[1,3,5-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Vinyl Chloride	10	µg/l	none
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Xylene (Total)	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Acetone	55	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Benzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Bromobenzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	BromoChloro-methane	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Bromod-Chloro-methane	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Bromoform	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Bromomethane	10	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Butanone[2-]	20	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Butyl-benzene[n-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Butyl-benzene[sec-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Butyl-benzene[tert-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Carbon Disulfide	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Carbon Tetrachloride	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Chloro-benzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Chloro-Dibromo-methane	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Chloro-ethane	10	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Chloro-form	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Chloro-methane	11	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Chloro-toluene[2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Chloro-toluene[4-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Dibromo--3-Chloro-propane[1,2-]	10	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Dibromo-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Dibromo-methane	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-benzene[1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-benzene[1,4-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-difluoro-methane	10	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-ethane[1,1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-ethane[1,2-]	7.7	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-ethene[1,1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-ethene[cis-1,2-]	10	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-ethene[trans-1,2-]	10	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-propane[1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-propane[1,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-propane[2,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-propene[1,1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-propene[cis-1,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-propene[trans-1,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Ethylbenzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Hexanone[2-]	20	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Iodomethane	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Isopropylbenzene	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Isopropyltoluene[4-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Methyl-2-pentanone[4-]	20	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Methylene Chloride	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Propylbenzene[1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Styrene	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	TetraChloro-ethane[1,1,1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	TetraChloro-ethane[1,1,2,2-]	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	TetraChloro-ethene	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Toluene	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	TriChloro-1,2,2-trifluoroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	TriChloroethane[1,1,1-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	TriChloroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	TriChloro-ethene	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	TriChloro fluoromethane	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	TriChloro-propane[1,2,3-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Trimethylbenzene[1,2,4-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Trimethylbenzene[1,3,5-]	5	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Vinyl Chloride	10	µg/l	none
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Xylene (Total)	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Acetone	26	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Benzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Bromobenzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	BromoChloro-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	BromodChloro methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Bromoform	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Bromomethane	10	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Butanone[2-]	20	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Butyl benzene[n-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Butyl-benzene[sec-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Butyl-benzene[tert-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Carbon Disulfide	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Carbon Tetrachloride	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Chloro benzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Chloro-Dibromo methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Chloro ethane	10	µg/l	none

Table I-4.0-11 (continued)
Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Chloro-form	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Chloro-methane	10	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Chloro-toluene[2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Chloro-toluene[4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Dibromo-3-Chloro-propane[1,2-]	10	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Dibromo-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Dibromo-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Di-Chloro-benzene[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Di-Chloro-benzene[1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Di-Chloro-benzene[1,4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Di-Chloro-di-fluoro-methane	10	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Di-Chloro-ethane[1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Di-Chloro-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Di-Chloro-ethene[1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Di-Chloro-ethene[cis-1,2-]	10	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Di-Chloro-ethene[trans-1,2-]	10	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Di-Chloro-propane[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Di-Chloro-propane[1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Di-Chloro-propane[2,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Di-Chloro-propene[1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Di-Chloro-propene[cis-1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Di-Chloro-propene[trans-1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Ethylbenzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Hexanone[2-]	20	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Iodomethane	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Isopropylbenzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	Isopropyltoluene[4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	Methyl--2-pentanone[4-]	20	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	Methyl ene Chloride	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Propylbenzene[1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	Styrene	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	TetraChloro-ethane[1,1,1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	TetraChloro-ethane[1,1,2,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	TetraChloro-ethene	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	Toluene	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	TriChloro--1,2,2-trifluoroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	TriChloroethane[1,1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	TriChloroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	TriChloro-ethene	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	TriChloro-fluoromethane	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	TriChloro-propane[1,2,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	Trimethylbenzene[1,2,4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	Trimethylbenzene[1,3,5-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	Vinyl Chloride	10	µg/l	none
16-021(c)	16-2651	0316-97-3187	19 Dec-97	Filtered	WGI	Xylene (Total)	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Acetone	23	µg/l	none
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Benzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Bromobenzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	BromoChloro-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	BromodChloro-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Bromoform	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Bromomethane	10	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Butanone[2-]	20	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Butyl-benzene[n-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Butyl-benzene[sec-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Butyl-benzene[tert-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Carbon Disulfide	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Carbon Tetrachloride	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Chloro-benzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Chloro-Dibromo-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Chloro-ethane	10	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Chloro-form	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Chloro-methane	10	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Chloro-toluene[2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Chloro-toluene[4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Dibromo--3-Chloro-propane[1,2-]	10	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Dibromo-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Dibromo-methane	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	DiChloro-benzene[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	DiChloro-benzene[1,4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	DiChloro-difluoro--methane	10	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	DiChloro-ethane[1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	DiChloro-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	DiChloro-ethene[1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	DiChloro-ethene[cis-1,2-]	10	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	DiChloro-ethene[trans-1,2-]	10	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	DiChloro-propane[1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	DiChloro propane[1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	DiChloro-propane[2,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	DiChloro-propene[1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	DiChloro-propene[cis-1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	DiChloro propene[trans-1,3-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Ethylbenzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Hexanone[2-]	20	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Iodomethane	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Isopropylbenzene	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Isopropyltoluene[4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Methyl--2-pentanone[4-]	20	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Methylene Chloride	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Propylbenzene[1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Styrene	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	TetraChloro-ethane[1,1,1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	TetraChloro-ethane[1,1,2,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	TetraChloro-ethene	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Toluene	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	TriChloro--1,2,2-trifluoroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	TriChloro-ethane[1,1,1-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	TriChloro-ethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	TriChloro-ethene	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	TriChloro-fluoromethane	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	TriChloro-propane[1,2,3-]	5	µg/l	none

Table I-4.0-11 (continued)
Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Trimethylbenzene[1,2,4-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Trimethylbenzene[1,3,5-]	5	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Vinyl Chloride	10	µg/l	none
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Xylene (Total)	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Acetone	25	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Benzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Bromobenzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	BromoChloro-methane	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Bromod:Chloro-methane	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Bromoform	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Bromomethane	10	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Butanone[2-]	20	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Butyl-benzene[n-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Butyl-benzene[sec-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Butyl-benzene[tert-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Carbon Disulfide	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Carbon Tetrachloride	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Chloro benzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Chloro-Dibromo-methane	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Chloro-ethane	10	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Chloro-form	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Chloro-methane	10	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Chloro-toluene[2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Chloro-toluene[4-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Dibromo--3-Chloro-propane[1,2-]	10	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Dibromo-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Dibromo-methane	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	DiChloro benzene[1,2-]	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	DiChloro-benzene[1,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	DiChloro-benzene[1,4-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	DiChloro difluoro-methane	10	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	DiChloro-ethane[1,1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	DiChloro-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	DiChloro-ethene[1,1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	DiChloro ethene[cis-1,2-]	10	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	DiChloro-ethene[trans-1,2-]	10	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	DiChloro-propane[1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	DiChloro propane[1,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	DiChloro propane[2,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	DiChloro-propene[1,1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	DiChloro-propene[cis-1,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	DiChloro propene[trans-1,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Ethylbenzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Hexanone[2-]	20	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Iodomethane	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Isopropylbenzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Isopropyltoluene[4-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Methyl--2-pentanone[4-]	20	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Methyl-ene Chloride	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Propylbenzene[1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Styrene	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	TetraChloro-ethane[1,1,1,2-]	5	µg/l	none

Table I-4.0-11 (continued)
Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	TetraChloro-ethane[1,1,2,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	TetraChloro-ethene	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Toluene	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	TriChloro--1,2,2-trifluoroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	TriChloroethane[1,1,1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	TriChloroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	TriChloro-ethene	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	TriChloro-fluoromethane	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	TriChloro propane[1,2,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Trimethylbenzene[1,2,4-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Trimethylbenzene[1,3,5-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Vinyl Chloride	10	µg/l	none
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Xylene (Total)	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Acetone	20	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Benzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Bromobenzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	BromoChloro-methane	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Bromod.Chloro-methane	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Bromoform	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Bromomethane	10	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Butanone[2-]	20	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Butyl-benzene[n-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Butyl-benzene[sec-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Butyl-benzene[tert-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Carbon Disulfide	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Carbon Tetrachloride	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Chloro-benzene	5	µg/l	none

Table I-4.0-11 (continued)

Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Chloro-Dibromo-methane	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Chloro-ethane	10	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Chloro-form	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Chloro-methane	10	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Chloro-toluene[2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Chloro toluene[4-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Dibromo--3-Chloro-propane[1,2-]	10	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Dibromo ethane[1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Dibromo-methane	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Di-Chloro-benzene[1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Di-Chloro-benzene[1,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Di-Chloro benzene[1,4-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Di-Chloro-difluoro--methane	10	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Di-Chloro-ethane[1,1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Di-Chloro-ethane[1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Di-Chloro ethene[1,1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Di-Chloro-ethene[cis-1,2-]	10	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Di-Chloro-ethene[trans-1,2-]	10	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Di-Chloro-propane[1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Di-Chloro propane[1,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Di-Chloro propane[2,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Di-Chloro propene[1,1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Di-Chloro-propene[cis-1,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Di-Chloro propene[trans-1,3-]	5	µg/l	none

Table I-4.0-11 (completed)
Volatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Ethylbenzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Hexanone[2-]	20	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Iodomethane	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Isopropylbenzene	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Isopropyltoluene[4-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Methyl--2-pentanone[4-]	20	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Methylene Chloride	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Propylbenzene[1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Styrene	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	TetraChloro-ethane[1,1,1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	TetraChloro-ethane[1,1,2,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	TetraChloro-ethene	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Toluene	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	TriChloro--1,2,2-trifluoroethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	TriChloro-ethane[1,1,1-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	TriChloro-ethane[1,1,2-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	TriChloro-ethene	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	TriChloro-fluoromethane	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	TriChloro-propane[1,2,3-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Trimethylbenzene[1,2,4-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Trimethylbenzene[1,3,5-]	5	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Vinyl Chloride	10	µg/l	none
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Xylene (Total)	5	µg/l	none

Table I-4.0-12

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Acenaphthene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Acenaphthylene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Aniline	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Anthracene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Azobenzene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Benzo(a)-anthracene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Benzo(a)-pyrene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Benzo(b)-fluoranthene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Benzo(g,h,i)-perylene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Benzo(k)fluoranthene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Benzoic Acid	50	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Benzyl Alcohol	20	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Bis(2-Chloro-ethoxy)methane	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Bis(2-Chloro-ethyl)ether	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Bis(2-ethylhexyl)phthalate	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Bromophenyl-phenylether[4-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Butyl benzylphthalate	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Carbazole	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Chloro--3-methylphenol[4-]	20	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Chloro-aniline[4-]	20	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Chloro-naphthalene[2-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Chloro phenol[2-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Chloro phenyl phenyl[4-] Ether	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Chrysene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Dibenz(a,h)anthracene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Dibenzofuran	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-benzene[1,2-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-benzene[1,3-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-benzene[1,4-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-benzidine[3,3'-]	20	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	DiChloro-phenol[2,4-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Diethylphthalate	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Dimethyl Phthalate	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Dimethylphenol[2,4-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Di-n-Butyl-phthalate	1	µg/l	J
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Dinitro--2-methylphenol[4,6-]	50	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Dinitro-phenol[2,4-]	50	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Dinitro-toluene[2,4-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Dinitro-toluene[2,6-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Di-n-octylphthalate	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Fluoranthene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Fluorene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	HexaChloro-benzene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	HexaChloro-butadiene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	HexaChloro-cyclopentadiene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	HexaChloro-ethane	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Indeno(1,2,3-cd)pyrene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Isophorone	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Methyl-naphthalene[2-]	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Methyl-phenol[2-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Methyl-phenol[4-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Naphthalene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Nitroaniline[2-]	50	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Nitroaniline[3-]	50	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Nitroaniline[4-]	20	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Nitrobenzene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Nitrophenol[2-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Nitrophenol[4-]	50	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Nitrosodimethylamine[N-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Nitroso-di-n-propylamine[N-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Nitrosodiphenylamine[N-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	PentaChloro-phenol	50	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Phenanthrene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Phenol	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	Pyrene	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	TriChloro-benzene [1,2,4-]	10	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	TriChloro-phenol[2,4,5-]	50	µg/l	U
NA	16-2652	0316-96-3000	20-Dec-96	Unfiltered	WGS	TriChloro-phenol[2,4,6-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Acenaphthene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Acenaphthylene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Aniline	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Anthracene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Azobenzene	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Benzo(a)-anthracene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Benzo(a)-pyrene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Benzo(b) fluoranthene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Benzo(g h,i)-perylene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Benzo(k)fluoranthene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Benzoic Acid	50	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Benzyl Alcohol	20	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Bis(2-Chloro-ethoxy)methane	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Bis(2-Chloro-ethyl)ether	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Bis(2-ethylhexyl)phthalate	3	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Bromophenyl-phenylether[4-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Butyl-benzylphthalate	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Carbazole	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Chloro--3-methylphenol[4-]	20	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Chloro-aniline[4-]	20	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Chloro-naphthalene[2-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Chloro-phenol[2-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Chloro-phenyl-phenyl[4-] Ether	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Chrysene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Dibenz(a,h)anthracene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Dibenzofuran	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Di,Chloro-benzene[1,2-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Di,Chloro-benzene[1,3-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Di,Chloro benzene[1,4-]	10	µg/l	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	D,Chloro-benzidine[3,3'-]	20	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	D/Chloro-phenol[2,4-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Diethylphthalate	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Dimethyl Phthalate	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Dimethylphenol[2,4-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Di-n Butyl-phthalate	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Dinitro--2-methylphenol[4,6-]	50	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Dinitro-phenol[2,4-]	50	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Dinitro-toluene[2,4-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Dinitro-toluene[2,6-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Di n-octylphthalate	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Fluoranthene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Fluorene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	HexaChloro-benzene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	HexaChloro-butadiene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	HexaChloro-cyclopentadiene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	HexaChloro-ethane	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Indeno(1,2,3-cd)pyrene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Isophorone	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Methyl naphthalene[2-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Methyl phenol[2-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Methyl-phenol[4-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Naphthalene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Nitroaniline[2-]	50	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Nitroaniline[3-]	50	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Nitroaniline[4-]	20	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Nitrobenzene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Nitrophenol[2-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Nitrophenol[4-]	50	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Nitrosodimethylamine[N-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Nitroso di-n-propylamine[N-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Nitrosodiphenylamine[N-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	PentaChloro-phenol	50	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Phenanthrene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Phenol	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	Pyrene	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	TriChloro-benzene [1,2,4-]	10	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	TriChloro-phenol[2,4,5-]	50	µg/l	U
NA	16-2651	0316-96-3001	20-Dec-96	Unfiltered	WGS	TriChloro-phenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Acenaphthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Aniline	20	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Azobenzene	20	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Benzo(a)-pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Benzo(b)-fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Benzo(g,h,i) perylene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Benzo(k)fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Benzoic Acid	50	µg/l	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Benzyl Alcohol	20	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Bis(2-Chloro-ethyl)ether	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Bis(2-ethylhexyl)phthalate	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Bromophenyl-phenylether[4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Butyl-benzylphthalate	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Chloro--3-methylphenol[4-]	20	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Chloro-aniline[4-]	20	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Chloro-naphthalene[2-]	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Chloro-phenol[2-]	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Chloro-phenyl-phenyl[4-] Ether	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Chrysene	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Dibenz(a,h)anthracene	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Dibenzofuran	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	DiChloro-benzene[1,2-]	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	DiChloro-benzene[1,3-]	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	DiChloro-benzene[1,4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	DiChloro-benzidine[3,3'-]	20	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	DiChloro-phenol[2,4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Diethylphthalate	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Dimethyl Phthalate	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Dimethylphenol[2,4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Di-n-Butyl-phthalate	10	µg1	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Dinitro-phenol[2,4-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Di-n-octylphthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	HexaChloro-butadiene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Methyl-phenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Methyl-phenol[4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Nitroaniline[4-]	20	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	N,trosodphenylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	TriChloro-phenol[2,4,5-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3000	31-Mar-97	Filtered	WGI	TriChloro-phenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Acenaphthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Aniline	20	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Azobenzene	20	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Benzo(a)-pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Benzo(b) fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Benzo(g,h,i)-perylene	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Benzo(k)fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Benzoic Acid	50	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Benzyl Alcohol	20	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Bis(2-Chloro-ethyl)ether	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Bromophenyl-phenylether[4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Butyl-benzylphthalate	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Chloro--3-methylphenol[4-]	20	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Chloro-aniline[4-]	20	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Chloro-naphthalene[2-]	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Chloro phenol[2-]	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Chloro-phenyl-phenyl[4-] Ether	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Chrysene	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Dibenz(a,h)anthracene	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Dibenzofuran	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro-benzene[1,2-]	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro-benzene[1,4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro-benzidine[3,3'-]	20	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	DiChloro-phenol[2,4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Diethylphthalate	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Dimethyl Phthalate	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Dimethylphenol[2,4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Di-n-Butyl phthalate	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Dinitro-phenol[2,4-]	50	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Di-n-octylphthalate	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Fluoranthene	10	µg1	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	HexaChloro-butadiene	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Isophorene	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Methyl phenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Methyl phenol[4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Nitroaniline[4-]	20	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	Pyrene	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	TriChloro-benzene [1,2,4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	TriChloro-phenol[2,4,5-]	50	µg1	U
16-021(c)	16-2650	0316-97-3001	31-Mar-97	Unfiltered	WGI	TriChloro-phenol[2,4,6-]	10	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Acenaphthene	10	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Acenaphthylene	10	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Aniline	20	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Anthracene	10	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Azobenzene	20	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Benzo(a)-anthracene	10	µg1	U
16 021(c)	16-2651	0316-97-3003	31 Mar-97	Filtered	WGI	Benzo(a)-pyrene	10	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Benzo(b)-fluoranthene	10	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Benzo(g h,i)-perylene	10	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Benzo(k)fluoranthene	10	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Benzoic Acid	50	µg1	U
16-021(c)	16-2651	0316-97-3003	31 Mar-97	Filtered	WGI	Benzyl Alcohol	20	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Bis(2-Chloro-ethyl)ether	10	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Bis(2-ethylhexyl)phthalate	10	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Bromophenyl-phenylether[4-]	10	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Butyl-benzylphthalate	10	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Chloro--3-methylphenol[4-]	20	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Chloro-aniline[4-]	20	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Chloro-naphthalene[2-]	10	µg1	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Chloro-phenol[2-]	10	µg1	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Chloro-phenyl phenyl[4-] Ether	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Chrysene	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Dibenz(a,h)anthracene	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Dibenzofuran	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	DiChloro-benzene[1,2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	DiChloro-benzene[1,3-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	DiChloro-benzene[1,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	DiChloro-benzidine[3,3'-]	20	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	DiChloro-phenol[2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Diethylphthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Dimethyl Phthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Dimethylphenol[2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Di-n-Butyl-phthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Dinitro-2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Dinitro-phenol[2,4-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Di-n-octylphthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	HexaChloro benzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	HexaChloro butadiene	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U

Table 1-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Methyl-phenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Methyl-phenol[4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Nitroaniline[4-]	20	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	TriChloro-phenol[2,4,5-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3003	31-Mar-97	Filtered	WGI	TriChloro-phenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Acenaphthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Aniline	20	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Anthracene	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Azobenzene	20	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Benzo(a)-anthracene	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Benzo(a)-pyrene	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Benzo(b)-fluoranthene	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Benzo(g,h,i)-perylene	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Benzo(k)fluoranthene	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Benzoic Acid	50	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Benzyl Alcohol	20	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Bis(2-Chloro-ethyl)ether	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Bis(2-ethylhexyl)phthalate	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Bromophenyl-phenylether[4-]	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Butyl-benzylphthalate	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Chloro--3-methylphenol[4-]	20	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Chloro-aniline[4-]	20	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Chloro-naphthalene[2-]	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Chloro-phenol[2-]	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Chloro-phenyl-phenyl[4-] Ether	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Chrysene	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Dibenz(a,h)anthracene	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Dibenzofuran	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro benzene[1,2-]	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	10	µg1	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro-benzene[1,4-]	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro-benzidine[3,3'-]	20	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	DiChloro-phenol[2,4-]	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Diethylphthalate	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Dimethyl Phthalate	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Dimethylphenol[2,4-]	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Di-n-Butyl-phthalate	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Dinitro-phenol[2,4-]	50	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Di-n-octylphthalate	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Fluoranthene	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Fluorene	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	HexaChloro-benzene	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	HexaChloro-butadiene	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	HexaChloro-cyclopentadiene	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	HexaChloro-ethane	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Indeno(1,2,3-cd)pyrene	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Isophorone	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Methyl-naphthalene[2-]	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Methyl-phenol[2-]	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Methyl-phenol[4-]	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Naphthalene	10	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Nitroaniline[2-]	50	µg1	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Nitroaniline[3-]	50	µg1	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Nitroaniline[4-]	20	µg/l	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	TriChloro phenol[2,4,5-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3004	31-Mar-97	Unfiltered	WGI	TriChloro phenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Acenaphthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Aniline	20	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Azobenzene	20	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Benzo(a)-pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Benzo(b) fluoranthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Benzo(g h,i)-perylene	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Benzo(k)fluoranthene	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Benzoic Acid	50	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Benzyl Alcohol	20	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Bis(2-Chloro-ethyl)ether	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Bromophenyl-phenylether[4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Butyl-benzylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Chloro--3-methylphenol[4-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Chloro-aniline[4-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Chloro-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Chloro-phenol[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Chloro-phenyl-phenyl[4-] Ether	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Chrysene	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Dibenz(a,h)anthracene	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Dibenzofuran	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	DiChloro-benzene[1,2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	DiChloro-benzene[1,3-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	DiChloro-benzene[1,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	DiChloro-benzidine[3,3'-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	DiChloro-phenol[2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Diethylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Dimethyl Phthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Dimethylphenol[2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Di-n-Butyl-phthalate	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Dinitro-phenol[2,4-]	50	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Dinitro-toluene[2,4-]	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Dinitro-toluene[2,6-]	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Di-n-octylphthalate	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Fluoranthene	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Fluorene	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	HexaChloro benzene	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	HexaChloro-butadiene	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	HexaChloro-cyclopentadiene	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	HexaChloro-ethane	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Indeno(1,2,3-cd)pyrene	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Isophorone	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Methyl naphthalene[2-]	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Methyl-phenol[2-]	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Methyl-phenol[4-]	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Naphthalene	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Nitroaniline[2-]	50	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Nitroaniline[3-]	50	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Nitroaniline[4-]	20	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Nitrobenzene	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Nitrophenol[2-]	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Nitrophenol[4-]	50	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Nitrosodimethylamine[N-]	10	µg1	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Nitroso-di n-propylamine[N-]	10	µg1	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	TriChloro-phenol[2,4,5-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3006	31-Mar-97	Filtered	WGI	TriChloro-phenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Acenaphthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Aniline	20	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Azobenzene	20	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Benzo(a)-pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Benzo(b)-fluoranthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Benzo(g,h,i)-perylene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Benzo(k)fluoranthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Benzoic Acid	50	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Benzyl Alcohol	20	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Bis(2-Chloro-ethyl)ether	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Bromophenyl-phenylether[4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Butyl benzylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Chloro--3-methylphenol[4-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Chloro-aniline[4-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Chloro-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Chloro-phenol[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Chloro-phenyl phenyl[4-] Ether	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Chrysene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Dibenz(a,h)anthracene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Dibenzofuran	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro-benzene[1,2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro benzene[1,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro-benzidine[3,3'-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	DiChloro phenol[2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Diethylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Dimethyl Phthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Dimethylphenol[2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Di-n-Butyl-phthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Dinitro phenol[2,4-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Di-n-octylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Fluoranthene	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	HexaChloro-butadiene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Methyl-phenol[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Methyl-phenol[4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Nitroaniline[4-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	Pyrene	10	µg/l	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	TriChloro benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	TriChloro-phenol[2,4,5-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3007	31-Mar-97	Unfiltered	WGI	TriChloro-phenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Acenaphthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Aniline	25	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Azobenzene	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Benzidine	50	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Benzo(a)-pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Benzo(b) fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Benzo(g,h,i)-perylene	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Benzoic Acid	50	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Benzyl Alcohol	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Bis(2-Chloro-ethyl)ether	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Bromophenyl-phenylether[4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Butyl benzylphthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Carbazole	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Chloro--3-methylphenol[4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Chloro-aniline[4-]	25	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Chloro-naphthalene[2-]	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Chloro-phenol[2-]	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Chloro-phenyl-phenyl[4-] Ether	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Chrysene	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Dibenz(a,h)anthracene	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Dibenzofuran	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	DiChloro-benzene[1,2-]	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	DiChloro benzene[1,3-]	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	DiChloro-benzene[1,4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	DiChloro-benzidine[3,3'-]	50	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	DiChloro-phenol[2,4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Diethylphthalate	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Dimethyl Phthalate	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Dimethylphenol[2,4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Di-n-Butyl phthalate	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Dinitro-phenol[2,4-]	50	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Dinitro-toluene[2,4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Dinitro-toluene[2,6-]	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Di-n-octylphthalate	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Fluoranthene	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Fluorene	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	HexaChloro-benzene	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	HexaChloro-butadiene	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	HexaChloro-cyclopentadiene	10	µg1	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	HexaChloro ethane	10	µg1	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Methyl-phenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Methyl-phenol[4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Nitroaniline[4-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Nitroso di-n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	Pyridine	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	TriChloro-phenol[2,4,5-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3012	27-Jun-97	Filtered	WGI	TriChloro-phenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Acenaphthene	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Aniline	25	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Azobenzene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Benzidine	50	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Benzo(a)-pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Benzo(b)-fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Benzo(g,h,i)-perylene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Benzoic Acid	50	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Benzyl Alcohol	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Bis(2-Chloro-ethyl)ether	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Bromo-phenyl-phenylether[4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Butyl-benzylphthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Carbazole	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Chloro-3-methylphenol[4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Chloro-aniline[4-]	25	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Chloro-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Chloro-phenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Chloro-phenyl phenyl[4-] Ether	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Chrysene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Dibenz(a,h)anthracene	10	µg/l	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Dibenzofuran	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	DiChloro-benzene[1,2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	DiChloro-benzene[1,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	DiChloro-benzidine[3,3'-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	DiChloro-phenol[2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Diethyl-phthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Dimethyl Phthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Dimethylphenol[2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Di-n-Butyl-phthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Dinitro-phenol[2,4-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Di-n-octyl-phthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	HexaChloro-butadiene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Methyl-phenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Methyl-phenol[4-]	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Nitroaniline[4-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Nitroso-di n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	Pyridine	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	TriChloro-phenol[2,4,5-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3013	27-Jun-97	Unfiltered	WGI	TriChloro-phenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Acenaphthene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Acenaphthylene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Aniline	25	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Anthracene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Azobenzene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Benzidine	50	µg/l	R

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Benzo(a)-anthracene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Benzo(a)-pyrene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Benzo(b)-fluoranthene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Benzo(g,h,i)-perylene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Benzoic Acid	50	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Benzyl Alcohol	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Bis(2-Chloro-ethyl)ether	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Bromophenyl-phenylether[4-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Butyl-benzylphthalate	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Carbazole	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Chloro-3-methylphenol[4-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Chloro-aniline[4-]	25	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Chloro-naphthalene[2-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Chloro-phenol[2-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Chloro phenyl-phenyl[4-] Ether	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Chrysene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Dibenz(a,h)anthracene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Dibenzofuran	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Di-Chloro benzene[1,2-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Di-Chloro benzene[1,3-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Di-Chloro benzene[1,4-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Di-Chloro-benzidine[3,3'-]	50	µg/l	R

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	DiChloro-phenol[2,4-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Diethylphthalate	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Dimethyl Phthalate	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Dimethylphenol[2,4-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Di-n-Butyl-phthalate	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Dinitro phenol[2,4-]	50	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Dinitro-toluene[2,4-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Dinitro-toluene[2,6-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Di-n-octylphthalate	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Fluoranthene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Fluorene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	HexaChloro-benzene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	HexaChloro-butadiene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	HexaChloro-cyclopentadiene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	HexaChloro-ethane	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Isophorone	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Methyl-naphthalene[2-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Methyl-phenol[2-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Methyl phenol[4-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Naphthalene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Nitroaniline[2-]	50	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Nitroaniline[3-]	50	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Nitroaniline[4-]	50	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Nitrobenzene	10	µg/l	R

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Nitrophenol[2-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Nitrophenol[4-]	50	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Nitrosodimethylamine[N-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	PentaChloro-phenol	50	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Phenanthrene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Phenol	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Pyrene	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	Pyridine	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	TriChloro-phenol[2,4,5-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3016	27-Jun-97	Filtered	WGI	TriChloro-phenol[2,4,6-]	10	µg/l	R
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Acenaphthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Aniline	25	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Azobenzene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Benzidine	50	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Benzo(a)-pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Benzo(b)-fluoranthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Benzo(g,h,i)-perylene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Benzoic Acid	50	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Benzyl Alcohol	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Bis(2-Chloro-ethyl)ether	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Bis(2-ethylhexyl)phthalate	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Bromophenyl-phenylether[4-]	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Butyl-benzylphthalate	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Carbazole	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Chloro--3-methylphenol[4-]	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Chloro-aniline[4-]	25	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Chloro-naphthalene[2-]	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Chloro-phenol[2-]	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Chloro-phenyl-phenyl[4-] Ether	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Chrysene	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Dibenz(a,h)anthracene	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Dibenzofuran	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	DiChloro-benzene[1,2-]	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	DiChloro-benzene[1,4-]	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	DiChloro-benzidine[3,3'-]	50	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	DiChloro-phenol[2,4-]	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Diethylphthalate	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Dimethyl Phthalate	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Dimethylphenol[2,4-]	10	µg1	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Di-n-Butyl-phthalate	10	µg1	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Dinitro phenol[2,4-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Di-n-octylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	HexaChloro-butadiene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Methyl phenol[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Methyl-phenol[4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Nitroaniline[4-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Nitroso-dimethylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	Pyridine	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	TriChloro-phenol[2,4,5-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3017	27-Jun-97	Unfiltered	WGI	TriChloro-phenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Acenaphthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Aniline	25	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Azobenzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Benzidine	50	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Benzo(a)-pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Benzo(b)-fluoranthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Benzo(g,h,i)-perylene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Benzoic Acid	50	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Benzyl Alcohol	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Bis(2-Chloro-ethyl)ether	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Bromophenyl-phenylether[4-]	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Butyl-benzylphthalate	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Carbazole	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Chloro--3-methylphenol[4-]	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Chloro-aniline[4-]	25	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Chloro-naphthalene[2-]	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Chloro-phenol[2-]	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Chloro-phenyl phenyl[4-] Ether	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Chrysene	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Dibenz(a,h)anthracene	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Dibenzofuran	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	DiChloro-benzene[1,2-]	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	DiChloro-benzene[1,3-]	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	DiChloro-benzene[1,4-]	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	DiChloro-benzidine[3,3'-]	50	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	DiChloro-phenol[2,4-]	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Diethylphthalate	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Dimethyl Phthalate	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Dimethylphenol[2,4-]	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Di-n-Butyl-phthalate	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Dinitro-phenol[2,4-]	50	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Dinitro-toluene[2,4-]	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Dinitro-toluene[2,6-]	10	µg1	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Di-n-octylphthalate	10	µg1	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	HexaChloro-butadiene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Methyl-phenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Methyl-phenol[4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Nitroaniline[4-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Phenol	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	Pyridine	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	TriChloro-phenol[2,4,5-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3020	27-Jun-97	Filtered	WGI	TriChloro phenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Acenaphthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Aniline	25	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Azobenzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Benzidine	50	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Benzo(a)-pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Benzo(b)-fluoranthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Benzo(g h,i) perylene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Benzoic Acid	50	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Benzyl Alcohol	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Bis(2-Chloro-ethyl)ether	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Bromophenyl-phenylether[4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Butyl benzylphthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Carbazole	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Chloro-3-methylphenol[4-]	10	µg/l	U

Table 1-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Chloro-aniline[4-]	25	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Chloro-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Chloro-phenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Chloro phenyl phenyl[4-] Ether	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Chrysene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Dibenz(a,h)anthracene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Dibenzofuran	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-benzene[1,2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-benzene[1,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-benzidine[3,3'-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	DiChloro-phenol[2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Diethylphthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Dimethyl Phthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Dimethylphenol[2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Di n-Butyl-phthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Dinitro-phenol[2,4-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Di-n-octylphthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	HexaChloro-butadiene	10	µg/l	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Methyl-phenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Methyl-phenol[4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Nitroaniline[4-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	Pyridine	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	TriChlorophenol[2,4,5-]	10	µg/l	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3021	27-Jun-97	Unfiltered	WGI	TriChlorophenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Acenaphthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Aniline	20	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Azobenzene	20	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Benzo(a) pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Benzo(b)-fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Benzo(g h,i)-perylene	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Benzo(k)fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Benzoic Acid	50	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Benzyl Alcohol	20	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Bis(2-Chloro-ethyl)ether	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Bromophenyl-phenylether[4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Butyl-benzylphthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Chloro--3-methylphenol[4-]	20	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Chloro-aniline[4-]	20	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Chloro-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Chloro-phenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Chloro-phenyl-phenyl[4-] Ether	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Chrysene	10	µg/l	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Dibenz(a,h)anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Dibenzofuran	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	DiChloro benzene[1,2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	DiChloro-benzene[1,3-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	DiChloro-benzene[1,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	DiChloro-benzidine[3,3'-]	20	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	DiChloro-phenol[2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Diethylphthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Dimethyl Phthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Dimethylphenol[2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Di-n-Butyl-phthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Dinitro-phenol[2,4-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Di-n-octylphthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	HexaChloro butadiene	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Methyl phenol[2-]	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Methyl-phenol[4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Naphthalene	10	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Nitroaniline[2-]	50	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Nitroaniline[3-]	50	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Nitroaniline[4-]	20	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Nitrobenzene	10	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Nitrophenol[2-]	10	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Nitrophenol[4-]	50	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Nitrosodimethylamine[N-]	10	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Nitroso-di n-propylamine[N-]	10	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Nitrosodiphenylamine[N-]	10	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	PentaChloro-phenol	50	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Phenanthrene	10	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Phenol	10	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	Pyrene	10	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	TriChloro-benzene [1,2,4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	TriChlorophenol[2,4,5-]	50	µg1	U
16-021(c)	16-2650	0316-97-3101	19-Sep-97	Filtered	WGI	TriChlorophenol[2,4,6-]	10	µg1	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Acenaphthene	10	µg1	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Acenaphthylene	10	µg1	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Aniline	20	µg1	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Anthracene	10	µg1	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Azobenzene	20	µg1	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Benzo(a)-anthracene	10	µg1	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Benzo(a)-pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Benzo(b)-fluoranthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Benzo(g,h,i)-perylene	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Benzo(k)fluoranthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Benzoic Acid	50	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Benzyl Alcohol	20	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Bis(2-Chloro-ethyl)ether	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Bromophenyl-phenylether[4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Butyl-benzylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Chloro-3-methylphenol[4-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Chloro-aniline[4-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Chloro-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Chloro-phenol[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Chloro phenyl phenyl[4-] Ether	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Chrysene	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Dibenz(a,h)anthracene	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Dibenzofuran	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Di-Chloro-benzene[1,2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Di-Chloro-benzene[1,3-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Di-Chloro-benzene[1,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Di-Chloro-benzidine[3,3'-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Di-Chloro-phenol[2,4-]	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Diethylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Dimethyl Phthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Dimethylphenol[2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Di-n-Butyl phthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Dinitro-2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Dinitro-phenol[2,4-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Di-n-octylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	HexaChloro-butadiene	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Methyl-phenol[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Methyl-phenol[4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Nitroaniline[4-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Nitrophenol[2-]	10	µg/l	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	TriChlorophenol[2,4,5-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3104	19-Sep-97	Unfiltered	WGI	TriChlorophenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Acenaphthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Aniline	20	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Azobenzene	20	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Benzo(a)-pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Benzo(b)-fluoranthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Benzo(g,h,i) perylene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Benzo(k)fluoranthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Benzoic Acid	50	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Benzyl Alcohol	20	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Bis(2-Chloro-ethyl)ether	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Bromophenyl-phenylether[4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Butyl-benzylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Chloro--3-methylphenol[4-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Chloro-aniline[4-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Chloro-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Chloro-phenol[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Chloro-phenyl-phenyl[4-] Ether	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Chrysene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Dibenz(a,h)anthracene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Dibenzofuran	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	DiChloro-benzene[1,2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	DiChloro-benzene[1,3-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	DiChloro-benzene[1,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	DiChloro-benzidine[3,3'-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	DiChloro-phenol[2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Diethylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Dimethyl Phthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Dimethylphenol[2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Di-n-Butyl-phthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Dinitro-phenol[2,4-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Di-n-octylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	HexaChloro-butadiene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Methyl naphthalene[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Methyl phenol[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Methyl phenol[4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Nitroaniline[4-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	PentaChloro phenol	50	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	TriChlorophenol[2,4,5-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3105	19-Sep-97	Filtered	WGI	TriChlorophenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Acenaphthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Aniline	20	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Azobenzene	20	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Benzo(a)-pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Benzo(b)-fluoranthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Benzo(g,h,i)-perylene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Benzo(k)fluoranthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Benzoic Acid	50	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Benzyl Alcohol	20	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Bis(2-Chloro-ethyl)ether	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Bromophenyl-phenylether[4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Butyl-benzylphthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Chloro--3-methylphenol[4-]	20	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Chloro-aniline[4-]	20	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Chloro-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Chloro-phenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Chloro phenyl-phenyl[4-] Ether	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Chrysene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Dibenz(a,h)anthracene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Dibenzofuran	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-benzene[1,2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-benzene[1,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-benzidine[3,3'-]	20	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	DiChloro-phenol[2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Diethylphthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Dimethyl Phthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Dimethylphenol[2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Di-n Butyl-phthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Dinitro-phenol[2,4-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Di n-octylphthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	HexaChloro-butadiene	10	µg/l	U

Table 1-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Methyl-phenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Methyl-phenol[4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Nitroaniline[4-]	20	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	TriChloro-phenol[2,4,5-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3108	22-Sep-97	Unfiltered	WGI	TriChloro-phenol[2,4,6-]	10	µg/l	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Acenaphthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Aniline	20	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Azobenzene	20	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Benzo(a)-pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Benzo(b)-fluoranthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Benzo(g,h,i)-perylene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Benzo(k)fluoranthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Benzoic Acid	50	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Benzyl Alcohol	20	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Bis(2-Chloro-ethyl)ether	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Bromophenyl-phenylether[4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Butyl-benzylphthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Chloro-3-methylphenol[4-]	20	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Chloro-aniline[4-]	20	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Chloro-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Chloro-phenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Chloro-phenyl phenyl[4-] Ether	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Chrysene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Dibenz(a,h)anthracene	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Dibenzofuran	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	DiChloro-benzene[1,2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	DiChloro-benzene[1,3-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	DiChloro-benzene[1,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	DiChloro-benzidine[3,3'-]	20	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	DiChloro-phenol[2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Diethylphthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Dimethyl Phthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Dimethylphenol[2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Di n-Butyl-phthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Dinitro-phenol[2,4-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Di-n-octylphthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	HexaChloro-butadiene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Methyl-phenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Methyl-phenol[4-]	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Nitroaniline[4-]	20	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	TriChloro-phenol[2,4,5-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3109	22-Sep-97	Filtered	WGI	TriChloro-phenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Acenaphthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Aniline	20	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Azobenzene	20	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Benzo(a)-pyrene	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Benzo(b)-fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Benzo(g,h,i)-perylene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Benzo(k)fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Benzoic Acid	50	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Benzyl Alcohol	20	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Bis(2-Chloro ethyl)ether	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Bromophenyl-phenylether[4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Butyl Benzylphthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Chloro--3-methylphenol[4-]	20	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Chloro-aniline[4-]	20	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Chloro-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Chloro-phenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Chloro-phenyl-phenyl[4-] Ether	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Chrysene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Dibenz(a,h)anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Dibenzofuran	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-benzene[1,2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-benzene[1,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-benzidine[3,3'-]	20	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	DiChloro-phenol[2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Diethylphthalate	10	µg/l	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Dimethyl Phthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Dimethylphenol[2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Di-n-Butyl-phthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Dinitro phenol[2,4-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Di-n-octylphthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	HexaChloro-butadiene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Methyl naphthalene[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Methyl-phenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Methyl-phenol[4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Nitroaniline[4-]	20	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Nitrophenol[4-]	50	µg/l	U

Table 1-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	TriChloro-phenol[2,4,5-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3111	19-Sep-97	Unfiltered	WGI	TriChloro-phenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Acenaphthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Aniline	20	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Azobenzene	20	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Benzo(a)-pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Benzo(b)-fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Benzo(g,h,i)-perylene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Benzo(k)fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Benzoic Acid	50	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Benzyl Alcohol	20	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Bis(2-Chloro ethyl)ether	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Bromophenyl-phenylether[4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Butyl-benzylphthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Chloro--3-methylphenol[4-]	20	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Chloro-aniline[4-]	20	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Chloro-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Chloro-phenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Chloro-phenyl-phenyl[4-] Ether	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Chrysene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Dibenz(a,h)anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Dibenzofuran	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-benzene[1,2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-benzene[1,3-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-benzene[1,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-benzidine[3,3'-]	20	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	DiChloro-phenol[2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Diethylphthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Dimethyl Phthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Dimethylphenol[2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Di-n-Butyl-phthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Dinitro-phenol[2,4-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Di-n-octylphthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	HexaChloro-butadiene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Methyl-phenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Methyl-phenol[4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Nitroaniline[4-]	20	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Phenanthrene	10	µg/l	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Phenol	10	µg1	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	Pyrene	10	µg1	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	TriChloro-benzene [1,2,4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	TriChloro-phenol[2,4,5-]	50	µg1	U
16-021(c)	16-2650	0316-97-3185	19-Dec-97	Filtered	WGI	TriChloro-phenol[2,4,6-]	10	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Acenaphthene	10	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Acenaphthylene	10	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Aniline	20	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Anthracene	10	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Azobenzene	20	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Benzo(a)-anthracene	10	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Benzo(a)-pyrene	10	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Benzo(b)-fluoranthene	10	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Benzo(g,h,i)-perylene	10	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Benzo(k)fluoranthene	10	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Benzoic Acid	50	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Benzyl Alcohol	20	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Bis(2-Chloro ethyl)ether	10	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Bis(2-ethylhexyl)phthalate	10	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Bromophenyl-phenylether[4-]	10	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Butyl benzylphthalate	10	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Chloro--3-methylphenol[4-]	20	µg1	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Chloro-aniline[4-]	20	µg1	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Chloro-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Chloro-phenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Chloro-phenyl phenyl[4-] Ether	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Chrysene	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Dibenz(a,h)anthracene	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Dibenzofuran	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-benzene[1,2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-benzene[1,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-benzidine[3,3'-]	20	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	DiChloro-phenol[2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Diethylphthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Dimethyl Phthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Dimethylphenol[2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Di-n-Butyl-phthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Dinitro-phenol[2,4-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Di-n-octylphthalate	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	HexaChloro-butadiene	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Methyl-phenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Methyl-phenol[4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Nitroaniline[4-]	20	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	TriChloro-phenol[2,4,5-]	50	µg/l	U
16-021(c)	16-2650	0316-97-3186	19-Dec-97	Unfiltered	WGI	TriChloro-phenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Acenaphthene	10	µg/l	U

Table 1-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Aniline	20	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Azobenzene	20	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Benzo(a)-pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Benzo(b)-fluoranthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Benzo(g,h,i)-perylene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Benzo(k)fluoranthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Benzoic Acid	50	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Benzyl Alcohol	20	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg/l	U
16-021(c)	16-2651	0316-97-3167	19-Dec-97	Filtered	WGI	Bis(2-Chloro-ethyl)ether	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Bromophenyl-phenylether[4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Butyl-benzylphthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Chloro--3-methylphenol[4-]	20	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Chloro-aniline[4-]	20	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Chloro-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Chloro-phenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Chloro-phenyl-phenyl[4-] Ether	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Chrysene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Dibenz(a,h)anthracene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Dibenzofuran	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	DiChloro-benzene[1,2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	DiChloro-benzene[1,3-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	DiChloro-benzene[1,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	DiChloro-benzidine[3,3'-]	20	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	DiChloro-phenol[2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Diethylphthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Dimethyl Phthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Dimethylphenol[2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Di-n-Butyl-phthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Dinitro-phenol[2,4-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Di-n-octylphthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	HexaChloro-butadiene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Methyl phenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Methyl phenol[4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Naphthalene	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Nitroaniline[4-]	20	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	TriChloro-phenol[2,4,5-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3187	19-Dec-97	Filtered	WGI	TriChloro-phenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Acenaphthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Aniline	20	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Azobenzene	20	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Benzo(a)-pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Benzo(b)-fluoranthene	10	µg/l	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Benzo(g,h,i)-perylene	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Benzo(k)fluoranthene	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Benzoic Acid	50	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Benzyl Alcohol	20	µg1	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Bis(2-Chloro-ethyl)ether	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Bis(2-ethylhexyl)phthalate	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Bromophenyl-phenylether[4-]	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Butyl-benzylphthalate	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Chloro--3-methyl[phenol[4-]	20	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Chloro-aniline[4-]	20	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Chloro-naphthalene[2-]	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Chloro-phenol[2-]	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Chloro-phenyl-phenyl[4-] Ether	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Chrysene	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Dibenz(a,h)anthracene	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Dibenzofuran	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	DiChloro-benzene[1,2-]	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	DiChloro-benzene[1,4-]	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	DiChloro-benzidine[3,3'-]	20	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	DiChloro-phenol[2,4-]	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Diethylphthalate	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Dimethyl Phthalate	10	µg1	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Dimethylphenol[2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Di-n-Butyl-phthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Dinitro-phenol[2,4-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Di-n-octylphthalate	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	HexaChloro-butadiene	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Methyl phenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Methyl-phenol[4-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Nitroaniline[4-]	20	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Nitroso-di n-propylamine[N-]	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Nitrosodiphenylamine[N-]	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	PentaChloro-phenol	50	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Phenanthrene	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	Phenol	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	Pyrene	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	TriChloro benzene [1,2,4-]	10	µg1	U
16-021(c)	16-2651	0316-97-3188	19-Dec-97	Unfiltered	WGI	TriChlorophenol[2,4,5-]	50	µg1	U
16-021(c)	16-2651	0316-97-3188	19 Dec-97	Unfiltered	WGI	TriChlorophenol[2,4,6-]	10	µg1	U
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Acenaphthene	10	µg1	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Acenaphthylene	10	µg1	U
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Aniline	20	µg1	U
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Anthracene	10	µg1	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Azobenzene	20	µg1	U
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Benzo(a)-anthracene	10	µg1	U
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Benzo(a)-pyrene	10	µg1	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Benzo(b)-fluoranthene	10	µg1	U
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Benzo(g,h,i) perylene	10	µg1	U
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Benzo(k)fluoranthene	10	µg1	U
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Benzoic Acid	50	µg1	U
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Benzyl Alcohol	20	µg1	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg1	U
16-021(c)	16-2652	0316-97-3189	19 Dec-97	Filtered	WGI	Bis(2-Chloro ethyl)ether	10	µg1	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Bromophenyl-phenylether[4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Butyl-benzylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Chloro-3-methylphenol[4-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Chloro-aniline[4-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Chloro-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Chloro-phenol[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Chloro-phenyl-phenyl[4-] Ether	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Chrysene	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Dibenz(a,h)anthracene	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Dibenzofuran	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	DiChloro-benzene[1,2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	DiChloro-benzene[1,3-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	DiChloro-benzene[1,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	DiChloro-benzidine[3,3'-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	DiChloro-phenol[2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Diethylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Dimethyl Phthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Dimethylphenol[2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Di-n-Butyl-phthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Dinitro-2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Dinitro-phenol[2,4-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Di-n-octylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	HexaChloro-butadiene	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Methyl-phenol[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Methyl-phenol[4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Nitroaniline[4-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Nitroso-di-n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	PentaChloro phenol	50	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Phenanthrene	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Phenol	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	TriChlorophenol[2,4,5-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3189	19-Dec-97	Filtered	WGI	TriChlorophenol[2,4,6-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Acenaphthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Acenaphthylene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Aniline	20	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Anthracene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Azobenzene	20	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Benzo(a)-anthracene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Benzo(a)-pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Benzo(b)-fluoranthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Benzo(g,h,i)-perylene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Benzo(k)fluoranthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Benzoic Acid	50	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Benzyl Alcohol	20	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Bis(2-Chloro-ethoxy)methane	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Bis(2-Chloro-ethyl)ether	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Bis(2-ethylhexyl)phthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Bromophenyl-phenylether[4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Butyl-benzylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Chloro-3-methylphenol[4-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Chloro-aniline[4-]	20	µg/l	U

Table I-4.0-12 (continued)

Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Chloro-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Chloro-phenol[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Chloro-phenyl phenyl[4-] Ether	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Chrysene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Dibenz(a,h)anthracene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Dibenzofuran	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	DiChloro-benzene[1,2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	DiChloro-benzene[1,3-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	DiChloro-benzene[1,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	DiChloro-benzidine[3,3'-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	DiChloro-phenol[2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Diethylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Dimethyl Phthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Dimethylphenol[2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Di n-Butyl phthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Dinitro--2-methylphenol[4,6-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Dinitro-phenol[2,4-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Dinitro-toluene[2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Dinitro-toluene[2,6-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Di-n-octylphthalate	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Fluoranthene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Fluorene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	HexaChloro-benzene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	HexaChloro-butadiene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	HexaChloro-cyclopentadiene	10	µg/l	U

Table I-4.0-12 (continued)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	HexaChloro-ethane	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Indeno(1,2,3-cd)pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Isophorone	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Methyl-naphthalene[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Methyl-phenol[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Methyl-phenol[4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Naphthalene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Nitroaniline[2-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Nitroaniline[3-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Nitroaniline[4-]	20	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Nitrobenzene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Nitrophenol[2-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Nitrophenol[4-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Nitrosodimethylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Nitroso di-n-propylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Nitrosodiphenylamine[N-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Oxybis(1-Chloro-propane)[2,2'-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	PentaChloro-phenol	50	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Phenanthrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Phenol	10	µg/l	U

Table I-4.0-12 (completed)
Semivolatile Chemicals in Springs Samples

PRS Number	Location ID	Sample ID	Collection Date	Field Prep	Sample Medium	Analyte Name	Sample Results	Reporting Units	Focus Validation Qualifier
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	Pyrene	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	TriChloro-benzene [1,2,4-]	10	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	TriChloro-phenol[2,4,5-]	50	µg/l	U
16-021(c)	16-2652	0316-97-3190	19-Dec-97	Unfiltered	WGI	TriChloro-phenol[2,4,6-]	10	µg/l	U

Table I-4.0-13
Inorganic Chemicals in Historical Samples

Springs/Seeps
Major

Sample Id	Description	Date	Boron (ppm)	Bromine (ppm)	Calcium (ppm)	Chlorine (ppm)	Fluorine (ppm)	Hydrogen carbonate (ppm)	Lithium (ppm)	Magnesium (ppm)	Potassium (ppm)	Sodium (ppm)	Silicate calc (ppm)	Sulfate (ppm)	Strontium (ppm)	Total dissolved solvents (ppm)	Cation sum	Anion Sum
PP94-50	Burning Ground Spring	4/15/94	0.01	0.08	18.7	21.8	0.2	87.4	<0.01	4.66	3.3	21.4	49.66	8.31	0.14	220.5	2.461	2.279
NMED	Burning Ground Spring	8/12/94	<0.1	NA[a]	20	15	0.2	92	NA	4.9	5	19	NC[b]	10	0.1	NC	NC	NC
NMED	Burning Ground Spring	3/17/95	<0.01	<0.4	14	19	<0.5	85	<0.01	4.5	3	25	NC	30	<0.01	160	NC	NC
SSite96-5	Burning Ground Spring	3/01/96	0.021	0.09	17.5	16.6	0.16	104	<0.01	5.03	3.33	25.4	47.72	9.84	0.11	206.8	0.121	4.851
SSite96-17	Burning Ground Spring	4/10/96	0.021	0.07	16.4	14.3	0.14	100	<0.01	4.71	3.26	24	46.44	9.02	0.11	223.8	2.396	2.313
NMED	Martin Spring	5/12/95	1.4	<0.5	24	19	<0.5	104	<0.01	6	3	22	NC	20	0.12	200	NC	NC
PP95-132	Martin Spring	7/21/95	1.58	0.13	24.6	20.2	0.61	122	0.01	5.71	3.31	30.9	47.08	17.9	0.13	290.2	3.164	3.298
SSite96-4	Martin Spring	3/1/96	1.81	0.16	28.1	20.6	0.7	130	0.01	6.45	2.89	34.1	51.36	20.7	0.14	275.3	0.552	6.047
SSite96-15	Martin Spring	4/10/96	1.81	0.16	28.1	20.3	0.67	137	0.01	6.47	2.85	36.4	52	21	0.16	325.9	3.618	3.675
PP94-74	SWSC Spring	8/12/94	0.026	0.09	18.4	17.3	0.18	92.9	<0.01	4.97	3.04	20.2	45.37	10.2	0.13	219	2.318	2.322
NMED	SWSC Spring	8/12/94	<0.1	NA	18	15	0.2	90	NA	5.4	5	19	NC	10	0.1	NC	NC	NC
NMED	SWSC Spring	3/17/95	<0.01	<0.4	16	19	<0.5	80	<0.01	4.8	3	24	NC	31	<0.01	174	NC	NC
SSite96-18	SWSC Spring	4/10/96	0.029	0.09	16.3	14.3	0.13	100	<0.01	4.83	3.26	24.8	46.44	9.18	0.11	225.2	2.419	2.324
SSite96-6	SWSC Spring	3/1/96	0.033	0.1	18.2	16.8	0.16	104	<0.01	5.19	3.38	25.4	44.94	10.1	0.12	206.6	0.132	4.851

Table I-4.0-13
Inorganic Chemicals in Historical Samples

Springs/Seeps

Minor

Sample id	Description	Date	Silver (ppm)	Aluminum (ppm)	Arsenic (ppm)	Barium (ppm)	Cadmium (ppm)	Cobalt (ppm)	Chromium (ppm)
PP94-50	Burning Ground Spring	4/15/94	<0.0005	0.75	0.0006	0.29	0.0003	<0.002	<0.002
NMED	Burning Ground Spring	8/12/94	<0.1	0.4	0.0005	0.3	<0.001	<0.001	0.002
NMED	Burning Ground Spring	3/17/95	<0.01	0.4	<0.005	0.3	<0.005	<0.01	<0.01
SSite96-5	Burning Ground Spring	3/01/96	0.0004	0.55	0.0035	0.23	<0.001	<0.002	<0.002
SSite96-17	Burning Ground Spring	4/10/96	<0.0002	0.41	0.0009	0.21	<0.0002	<0.002	<0.002
NMED	Martin Spring	5/12/95	<0.01	<0.2	<0.01	0.2	<0.005	<0.01	<0.01
PP95-132	Martin Spring	7/21/95	<0.0005	0.16	0.0013	0.17	<0.0002	<0.002	<0.002
SSite96-4	Martin Spring	3/01/96	<0.0002	0.08	0.0019	0.19	<0.001	<0.002	<0.002
SSite96-15	Martin Spring	4/10/96	<0.0002	0.16	0.0018	0.19	<0.0002	<0.002	0.002
PP94-74	SWSC Spring	8/12/94	<0.0005	0.09	<0.0005	0.32	0.0006	<0.002	<0.002
NMED	SWSC Spring	8/12/94	<0.1	0.3	0.001	0.3	<0.001	<0.05	<0.001
NMED	SWSC Spring	3/17/95	<0.01	0.9	<0.005	0.3	<0.005	<0.01	<0.01
			(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
SSite96-18	SWSC Spring	4/10/96	<0.0002	0.29	0.0016	0.27	<0.0002	<0.002	<0.002
SSite96-6	SWSC Spring	3/01/96	0.0003	0.52	0.0016	0.28	<0.001	<0.002	<0.002

Table I-4.0-13
Inorganic Chemicals in Historical Samples

Springs/Seeps

Minor

Sample Id	Description	Date	Cesium (ppm)	Copper (ppm)	Iron (ppm)	Mercury (ppm)	Iodine (ppm)	Manganese (ppm)	Molybdenum (ppm)	Ammonium (ppm)
PP94-50	Burning Ground Spring	4/15/94	<0.002	0.004	0.31	0.0002	<0.01	<0.01	<0.002	0.1
NMED	Burning Ground Spring	8/12/94	NAa	<0.01	0.3	<0.0005	NA	<0.05	<0.001	NA
NMED	Burning Ground Spring	3/17/95	NA	<0.01	0.1	<0.0002	NA	<0.01	<0.01	NA
SSite96-5	Burning Ground Spring	3.01/96	<0.002	0.004	0.22	0.0002	<0.01	<0.01	0.002	0.05
SSite96-17	Burning Ground Spring	4/10.96	0.003	<0.002	0.16	<0.0002	<0.01	<0.01	0.003	0.05
NMED	Martin Spring	5/12/95	NA	<0.01	<0.1	<0.003	NA	<0.01	<0.01	NA
PP95-132	Martin Spring	7/21/95	<0.002	<0.002	0.06	<0.0002	<0.01	<0.01	0.007	0.19
SSite96-4	Martin Spring	3.01/96	<0.002	0.005	0.04	0.0006	0.04	<0.01	0.009	0.1
SSite96-15	Martin Spring	4/10.96	0.002	<0.002	0.01	<0.0002	0.03	<0.01	0.01	0.03
PP94-74	SWSC Spring	8/12/94	<0.002	0.018	0.07	<0.0002	<0.01	0.06	<0.002	0.15
NMED	SWSC Spring	8/12/94	NA	<0.01	0.2	<0.0005	NA	<0.001	<0.1	NA
NMED	SWSC Spring	3/17/95	NA	<0.01	0.4	<0.0002	NA	<0.01	<0.01	NA
SSite96-18	SWSC Spring	4/10.96	0.002	<0.002	0.1	<0.0002	<0.01	<0.01	0.003	0.04
SSite96-6	SWSC Spring	3.01/96	<0.002	0.003	0.22	<0.0002	<0.01	<0.01	0.002	0.07

Table –4.0-13

Inorganic Chemicals in Historical Samples

Springs/Seeps

Minor

Sample id	Description	Date	Nickel (ppm)	Nitrite (ppm)	Nitrate (ppm)	Lead (ppm)	Phosphate (ppm)	Rubidium (ppm)	Antimony (ppm)	Selenium (ppm)
PP94-50	Burning Ground Spring	4/15/94	0.005	<0.02	2.91	0.003	<0.05	0.005	<0.0002	<0.0002
NMED	Burning Ground Spring	8/12/94	<0.1	NA	1.1	<0.001	NA	NA	NA	<0.005
NMED	Burning Ground Spring	3/17/95	<0.02	NA	NA	<0.003	NA	NA	<0.06	<0.005
SSite96-5	Burning Ground Spring	3/01/96	<0.002	<0.02	3.91	<0.002	0.44	0.005	<0.0002	<0.0002
SSite96-17	Burning Ground Spring	4/10/96	0.002	<0.01	4.08	<0.002	0.42	0.006	<0.0001	<0.0001
NMED	Martin Spring	5/12/95	<0.02	NA	NA	<0.003	NA	NA	<0.02	<0.005
PP95-132	Martin Spring	7/21/95	<0.002	0.04	15.2	<0.002	0.21	0.003	<0.0002	<0.0002
SSite96-4	Martin Spring	3/01/96	0.003	<0.02	18.3	<0.002	0.28	0.002	<0.0002	<0.0002
SSite96-15	Martin Spring	4/10/96	<0.002	<0.01	18.3	<0.002	0.21	0.004	0.0001	<0.0001
PP94-74	SW/SC Spring	8/12/94	0.003	<0.01	5.32	<0.002	0.09	0.002	<0.0002	<0.0002
NMED	SW/SC Spring	8/12/94	<0.1	NA	1	<0.001	NA	NA	NA	<0.005
NMED	SW/SC Spring	3/17/95	<0.02	NA	NA	<0.003	NA	NA	<0.06	<0.005
SSite96-18	SW/SC Spring	4/10/96	<0.002	<0.01	4.6	<0.002	0.41	0.005	<0.0001	<0.0001
SSite96-6	SW/SC Spring	3/01/96	0.004	0.07	4.31	<0.002	0.33	0.006	<0.0002	<0.0002

Table I-4.0-13
Inorganic Chemicals in Historical Samples

Springs/Seeps

Minor

Sample id	Description	Date	Thiosulfate (ppm)	Zinc (ppm)
PP94-50	Burning Ground Spring	4/15/94	<0.01	0.01
NMED	Burning Ground Spring	8/12/94	NA	<0.1
NMED	Burning Ground Spring	3/17/95	NA	<0.02
SSite96-5	Burning Ground Spring	3/01/96	<0.01	0.01
SSite96-17	Burning Ground Spring	4/10/96	<0.01	<0.01
NMED	Martin Spring	5/12/95	NA	<0.02
PP95-132	Martin Spring	7/21/95	<0.01	0.01
SSite96-4	Martin Spring	3/01/96	<0.01	0.01
SSite96-15	Martin Spring	4/10/96	<0.01	<0.01
PP94-74	SWSC Spring	8/12/94	<0.01	0.1
NMED	SWSC Spring	8/12/94	NA	0.02
NMED	SWSC Spring	3/17/95	NA	0.04
SSite96-18	SWSC Spring	4/10/96	<0.01	<0.01
SSite96-6	SWSC Spring	3/01/96	<0.01	0.01

Table I-4.0-14
High Explosive Chemicals in Historical Samples

Sample Id	Description	Date	A-DNT(ppm)	HMX(ppm)	PETN(ppm)	RDX(ppm)	TNT(ppm)
Springs/Seeps							
SAL[a]	N/A[b]	N/A	NC[c]	1.8	0.7	0.00061	0.0022
PP94-50	Burning Ground Spring	4/15/94	NA[d]	<0.02	<0.05	<0.02	<0.02
NMED	Burning Ground Spring	8/12/94	NA	NA	NA	NA	NA
NMED	Burning Ground Spring	3/17/95	NA	NA	NA	NA	NA
SSite96-5	Burning Ground Spring	3/1/96	NA	0.04	<0.05	0.01	<0.01
SSite96-17	Burning Ground Spring	4/10/96	NA	<0.02	<0.05	<0.01	<0.01
NMED	Martin Spring	5/12/95	0.0033	0.011	NA	0.1	ND[e]
PP95-132	Martin Spring	7/21/95	NA	0.05	<0.05	0.11	<0.02
SSite96-4	Martin Spring	3/1/96	NA	0.03	<0.05	0.11	<0.01
SSite96-15	Martin Spring	4/10/96	NA	0.02	<0.05	0.12	<0.01
PP94-74	SWSC Spring	8/12/94	NA	<0.02	<0.05	<0.02	<0.02
NMED	SWSC Spring	8/12/94	NA	NA	NA	NA	NA
NMED	SWSC Spring	5/12/95	0.0023	0.0055	NA	0.083	ND
SSite96-18	SWSC Spring	4/10/96	NA	<0.02	<0.05	<0.01	<0.01
SSite96-6	SWSC Spring	3/1/96	NA	0.03	<0.05	0.02	<0.01

[a] Screening action level.

[b] N/A= Not applicable.

[c] NC=Not calculated

[d] NA=Not analyzed.

[e] ND=Not detected.

Table I-4.0-15
Volatile Chemicals and Historical Samples

Sample Id	Description	Date	Cis-1,2-diChloro-propene (ppm)	TetraChloro-ethene (ppm)	TriChloro-ethene (ppm)
Springs/Seeps					
NMED	Burning Ground Spring	3/17/95	ND*	0.0028	0.0026
NMED	Burning Ground Spring	5/12/95	ND	0.0032	0.0034
NMED	Martin Spring	5/12/95	ND	ND	0.0009
NMED	SWSC Spring	3/17/95	ND	0.0023	0.0022
NMED	SWSC Spring	5/12/95	ND	0.0022	0.0024
NMED	Fish ladder Seep	6/2/95	ND	ND	0.0003
NMED	Peter Seep	6/2/95	0.021 D(5)	0.015	0.0031

* Not detected.

Table I-4.0-16

Tritium and Stable Isotopes in Historical Samples

Sample ID	Description	Date	δD (‰)	δ18O (‰)	Tritium Units
Springs/Seeps					
SSite96-5	Burning Ground Spring	3/01/96	NAa	NA	33.5
SSite96-17	Burning Ground Spring	4/10/96	79	11.8	NA
SSite96-27	Burning Ground Spring	7/12/96	71	11.1	NA
PP95-132	Martin Spring	7/21/95	73	11.2	32.9
SSite96-4	Martin Spring	3/01/96	NA	NA	0.2
SSite96-15	Martin Spring	4/10/96	73	11.2	NA
SSite96-23	Martin Spring	7/12/96	66	9.9	NA
SSite96-6	SWSC Spring	3/01/96	NA	NA	35.7
SSite96-18	SWSC Spring	4/10/96	76	11.7	NA
SSite96-26	SWSC Spring	7/12/96	64	11.1	NA

Table 1-4.0-17
Spring Water Background Set

Major Elements

Data Source	Rock Type	Name	Description	Sample Number	Date	Temp °C	Si	Sio2	Ca
Dale	Tschicoma	Apache Spring	Apache Spg	SSite96-13	04/03/96	NA	NA	56.1	10.9
Dale	Tschicoma	Apache Spring	Apache Spring	VA-443	07/18/94	8.7	NA	54.8	11.3
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA-57	07/80	9	NA	58	10.8
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/20/91	8.3	NA	28	11.0
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10666	6/11/74	10	NA	NA	14.294
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-434	06/17/94	10.5	NA	51.1	13.4
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/24/91	12.6	NA	25	10.7
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	3.3*	NA	NA	11
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	12.1*	NA	53	14
NMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	4.8*	NA	NA	21
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	10.3	NA	98	11
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	10.2	NA	51	10
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10841	06/21/74	12	NA	NA	11.457
Mecker	Bandelier Tuff	Seven Springs	Seven Springs	VC2B-28	6/28/84	13.4	NA	31.0	15.1
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	NA	NA	31	12.5
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	NA	NA	30	12.0
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	12	NA	30	11.0
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	10	NA	41	12.3
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/10/91	11.5	NA	31	12.9
NMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5.0	7/17/92	8.1	NA	49	10
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	FP93-27	05/20/93	11.3	NA	39.8	6.94
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/18/92	15.3	NA	43.7	7.20
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	NA	NA	44.3	6.18
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	08/78	11	NA	43	7.0

Table I-4.0-17
Spring Water Background Set
(Continued)

Major Elements

Data Source	Rock Type	Name	Description	Sample Number	Date	Mg	Sr	Na	K	Li
Dale	Tschicoma	Apache Spring	Apache Spg	SSite96-13	04/03/96	4.66	0.1	9.77	4.75	<0.01
Dale	Tschicoma	Apache Spring	Apache Spring	VA-443	07/18/94	4.03	0.1	8.78	4.48	<0.01
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA-57	07/80	4.6	0.064	6.7	3.5	0.006
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/20/91	4.70	0.09	9.2	4.4	<0.01
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10666	6/11/74	0.664	NA	NA	NA	NA
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-431	06/17/94	4.16	0.11	6.82	2.99	<0.01
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/24/91	3.55	0.08	6.4	3.6	<0.01
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	3.3	NA	6.9	4	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	4	0.1	7	4	<0.01
NMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	4.8	0.11	14	9	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	3.6	0.09	5.1	3	0.01
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	3	0.07	6	3	<0.01
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10841	06/21/74	1.617	NA	NA	NA	NA
Meeker	Bandelier Tuff	Seven Springs	Seven Springs	VC2B-28	6/28/84	1.81	0.05	6.80	2.20	<0.02
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	1.63	0.06	7.26	2.13	<0.01
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	1.5	0.060	8.0	3.00	0.030
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	1.4	0.05	8.0	4.0	0.050
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	1.54	0.071	7.23	2.10	0.018
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/10/91	1.71	0.06	6.3	2.4	<0.01
NMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5.0	7/17/92	4	0.09	5	3	<0.01
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	PP93-27	05/20/93	2.79	0.07	4.90	1.79	0.01
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/18/92	3.05	0.07	6.30	1.72	<0.01
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	3.15	0.05	5.99	1.75	0.02
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	08/78	3.3	0.050	5.8	1.40	0.020

Table I-4.0-17
Spring Water Background Set
(Continued)

Major Elements

Data Source	Rock Type	Name	Description	Sample Number	Date	HCO3	SO4	Cl	F	Br
Dale	Tschicoma	Apache Spring	Apache Spg	SSite96-13	04/03/96	69	5.93	7.72	0.04	0.01
Dale	Tschicoma	Apache Spring	Apache Spring	VA-443	07/18/94	66.9	7.55	7.12	0.07	0.03
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA-57	07/80	57.0	8.30	8.0	0.27	<0.2
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/20/91	69.5	5.47	6.02	0.07	0.03
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10666	6/11/74	NA	NA	NA	NA	NA
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-434	06/17/94	65.6	10	1.71	0.1	<0.02
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/24/91	61.0	7.70	1.47	0.08	<0.02
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	41	<25	<2	<0.2	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	61	11	2	<0.2	NA
NMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	77	<50	4	0.3	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	NA	66	<5	<0.5	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	48	<10	2	<0.2	NA
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10841	06/21/74	NA	NA	NA	NA	NA
Meeker	Bandelier Tuff	Seven Springs	Seven Springs	VC2B-28	6/26/84	79.3	3.50	1.30	0.20	<0.1
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	59.5	4.03	1.85	0.12	<0.01
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	53.7	5.50	1.90	0.25	0.06
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	53.7	5.90	1.90	0.25	0.27
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	49.0	8.70	3.60	0.21	NA
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/10/91	61.0	3.85	1.22	0.16	0.02
NMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5.0	7/17/92	44.8	4.0	1.4	<0.5	NA
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	PP93-27	05/20/93	44.6	2.85	0.69	0.06	0.01
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/18/92	52.8	1.05	0.64	0.05	<0.02
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	48.9	1.2	0.77	0.03	<0.01
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	08/78	52.0	<5	<1	0.12	NA

Table I-4.0-17
Spring Water Background Set
(Continued)

Major Elements

Data Source	Rock type	Name	Description	Sample Number	Date	B	CO3	TDS
Dale	Tschicoma	Apache Spring	Apache Spg	SSite96-13	04/03/96	0.005	0	171.1
Dale	Tschicoma	Apache Spring	Apache Spring	VA-443	07/18/94	0.008	0	166.4
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA-57	07/80	<0.01	NA	158
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/20/91	<0.01	0.0	140.9
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10666	6/11/74	NA	NA	NA
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-434	06/17/94	0.01	0	158
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/24/91	<0.01	0.0	126.0
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	NA	<1	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	<0.1	<1	170
NMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	0.02	<1	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	0.02	NA	151
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	<0.1	<1	130
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10841	06/21/74	NA	NA	NA
Meeker	Bandelier Tuff	Seven Springs	Seven Springs	VC2B-28	6/28/84	<0.05	0.0	142.3
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	0.013	0	121.5
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	0.73	NA	117
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	NA	NA	117
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	< 003	NA	126
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/10/91	<0.02	0.0	121.7
NMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5.0	7/17/92	<0.1	NA	130
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	PP93-27	05/20/93	<0.01	0.0	105.9
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/18/92	<0.05	0.0	117.1
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	0.001	0	113.6
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	08/78	<0.05	NA	119

Table I-4.0-17
Spring Water Background Set
(Continued)

Major Elements

Data Source	Rock Type	Name	Description	Sample Number	Date	Cation Sum	Anion Sum
Dale	Tschicoma	Apache Spring	Apache Spg	SSite96-13	04/03/96	1.532	1.498
Dale	Tschicoma	Apache Spring	Apache Spring	VA-443	07/18/91	1.5	1.459
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA-57	07/80	1.30	1.35
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/20/91	1.488	1.455
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10666	6/11/74	NA	NA
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-434	06/17/91	1.528	1.34
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/24/91	1.594	1.208
NAMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	NA	NA
NAMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	NA	NA
NAMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	NA	NA
NAMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	NA	NA
NAMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	NA	NA
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10841	06/21/74	NA	NA
Meeker	Bandelier Tuff	Seven Springs	Seven Springs	VC2B-28	6/28/84	1.259	1.435
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	1.148	1.137
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	1.15	1.06
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	1.12	1.07
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	1.11	1.10
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/10/91	1.152	1.132
NAMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5.0	7/17/92	NA	NA
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	PP93-27	05/20/93	0.865	0.832
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/18/92	0.931	0.916
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	0.9	0.865
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	08/78	0.91	0.99

Table I-4.0-17
Spring Water Background Set
(Continued)

Major Elements

Data Source	Rock Type	Name	Description	Sample Number	Date	Balance
Dale	Tschicoma	Apache Spring	Apache Spg.	SSite96-13	04/03/96	0.0227
Dale	Tschicoma	Apache Spring	Apache Spring	VA-443	07/18/94	0.0275
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA-57	07/80	NA
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/20/91	0.0224
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10006	6/11/74	NA
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-434	06/17/94	0.1309
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/24/91	0.2757
NAMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	NA
NAMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	NA
NAMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	NA
NAMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	NA
NAMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	NA
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10841	06/21/74	NA
Mecker	Bandelier Tuff	Seven Springs	Seven Springs	VC2B-28	6/28/84	NA
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	0.0091
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	NA
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/10/91	0.0179
NAMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5.0	7/17/92	NA
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	PP93-27	05/20/93	0.0389
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/18/92	0.0158
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	0.039
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	08/78	NA

Table I-4.0-17
Spring Water Background Set
(Continued)

Dales Misc. Environmental Samples reported as ppm
Major cation/anion analyses from Meeker data reported as mg/kg
Major cation/anion analyses from W. Blake data reported as mg/kg
Major element analyses from Shevenell data reported as mg/l
NMED data reported as mg/L (NA in not analyzed or not applicable)
Nure samples reported as ppb; converted to ppm
- for temp (NMED) taken during low-flow conditions

Table I-4.0-17
Spring Water Background Set
(Continued)

Trace Elements

Data Source	Rock Type	Name	Description	Sample Number	Date	Temp °C	Ag	Al	As
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/19/87	8.3	<0.001	0.2	<0.05
Dale	Tschicoma	Apache Spring	Apache Spring	SSite96-13	04/03/96	NA	<0.0002	0.28	<0.0002
Dale	Tschicoma	Apache Spring	Apache Spring	VA-443	07/18/94	8.7	<0.0005	0.73	<0.0005
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA-57	07/80	9	<0.03	NA	NA
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10666	6/11/74	10.000	NA	NA	NA
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/23/87	12.6	<0.003	1.4	<0.05
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	3.3*	NA	NA	NA
NMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	4.8*	<0.01	1.1	<0.005
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	10.3	<0.01	1.0	<0.005
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	12.1*	<0.01	<0.2	<0.01
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	10.2	<0.01	<0.2	<0.01
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-434	06/17/94	10.5	<0.001	0.82	0.0003
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10841	6/21/74	12.000	NA	NA	NA
Mecker	Bandelier Tuff	Seven Springs	Seven Springs	VC2B-28	6/28/84	13.4	<0.001	<0.1	<0.05
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/09/87	11.5	<0.001	<0.1	<0.05
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	NA	<0.0002	0.12	0.0004
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	NA	NA	0.20	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	12	NA	0.2	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	10	<0.03	NA	NA
NMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5.0	7/17/92	8.1	<0.01	0.5	<0.01
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/17/88	15.3	<0.001	<0.1	<0.05
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	PP93-27	05/19/89	11.3	<0.001	0.2	<0.05
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	NA	<0.0002	0.15	0.0004
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	08/78	11	<0.03	NA	NA

Table I-4.0-17
Spring Water Background Set
(Continued)

Trace Elements

Data Source	Rock type	Name	Description	Sample Number	Date	Ba	Be	Cd	CLO3
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/19/87	0.06	NA	<0.001	<0.05
Dale	Tschicoma	Apache Spring	Apache Spring	SSite96-13	04/03/96	0.07	<0.002	<0.0002	NA
Dale	Tschicoma	Apache Spring	Apache Spring	VA-443	07/18/94	0.07	NA	<0.0005	<0.02
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA-57	07/80	0.066	NA	<0.001	NA
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10666	6/11/74	NA	NA	NA	NA
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/23/87	0.05	NA	<0.001	<0.05
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	NA	NA	NA	NA
NMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	0.1	<0.01	<0.005	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	0.1	<0.001	<0.005	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	<0.1	<0.005	<0.005	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	<0.1	<0.005	<0.005	NA
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-434	06/17/94	0.06	NA	<0.001	<0.02
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10841	6/21/74	NA	NA	NA	NA
Mecker	Bandelier Tuff	Seven Springs	Seven Springs	VC2B-28	6/28/84	0.01	NA	<0.002	NA
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/09/87	0.01	NA	<0.001	<0.05
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	0.02	<0.002	<0.0002	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	0.02	NA	0.0030	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	0.02	NA	0.003	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	0.036	NA	<0.03	NA
NMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5.0	7/17/92	<0.1	<0.005	<0.005	NA
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/17/88	0.01	NA	<0.001	NA
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	FP93-27	05/19/89	0.02	NA	0.001	<0.05
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	0.01	<0.002	<0.0002	<0.02
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	08/78	<0.12	NA	<0.03	NA

Table I-4.0-17
Spring Water Background Set
(Continued)

Trace Elements

Data Source	Rock Type	Name	Description	Sample Number	Date	Co	Cr	Cs	Cu
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/19/87	<0.002	<0.002	<0.005	0.003
Dale	Tschicoma	Apache Spring	Apache Spring	SSite96-13	04/03/96	<0.002	<0.002	<0.002	<0.002
Dale	Tschicoma	Apache Spring	Apache Spring	VA-443	07/18/94	<0.002	<0.002	0.005	0.003
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA-57	07/80	<0.001	0.00	NA	<0.001
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10666	6/11/74	.059	-.025	NA	-.004
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/23/87	<0.002	0.004	0.006	0.004
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	NA	NA	NA	NA
NMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	<0.01	<0.01	NA	0.03
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	<0.01	<0.01	NA	<0.01
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	<0.01	<0.01	NA	<0.01
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	<0.01	<0.01	NA	<0.01
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-434	06/17/94	<0.002	<0.002	<0.002	0.004
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10841	6/21/74	-.055	-.025	NA	-.004
Meeker	Bandelier Tuff	Seven Springs	Seven Springs	VC2B-28	6/28/84	<0.002	<0.002	<0.005	<0.002
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/09/87	<0.002	0.011	<0.005	<0.002
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	<0.002	<0.002	<0.002	0.002
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	NA	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	NA	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	<0.06	0.001	NA	<0.04
NMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5.0	7/17/92	<0.01	<0.01	NA	<0.01
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/17/88	<0.002	0.003	<0.002	<0.002
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	PP93-27	05/19/89	<0.002	<0.002	<0.002	0.002
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	<0.002	<0.002	<0.002	<0.002
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	08/78	<0.06	<0.03	NA	<0.04

Table I-4.0-17
Spring Water Background Set
(Continued)

Trace Elements

Data Source	Rock Type	Name	Description	Sample Number	Date	Fe	Hg	I	Mn
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/19/87	0.16	<0.1	<0.01	<0.02
Dale	Tschicoma	Apache Spring	Apache Spring	SSite96-13	04/03/96	0.1	<0.0002	<0.01	<0.01
Dale	Tschicoma	Apache Spring	Apache Spring	VA-443	07/18/94	0.26	<0.0002	<0.01	<0.01
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA-57	07/80	0.42	NA	NA	0.003
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10666	6/11/74	.664	NA	NA	-.003
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/23/87	4.17	<0.1	<0.01	<0.02
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	NA	NA	NA	NA
NMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	0.5	<0.0002	NA	0.07
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	0.5	<0.0002	NA	<0.01
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	<0.1	<0.0002	NA	<0.01
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	<0.1	<0.0002	NA	<0.01
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-434	06/17/94	0.49	<0.0002	<0.02	<0.01
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10841	6/21/74	.080	NA	NA	-.003
Meeker	Bandelier Tuff	Seven Springs	Seven Springs	VC2B-28	6/28/84	0.06	NA	NA	<0.01
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/09/87	0.52	<0.1	<0.01	<0.02
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	0.02	<0.0002	<0.01	<0.01
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	0.20	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	0.20	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	0.036	NA	NA	0.001
NMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5.0	7/17/92	<0.1	<0.0002	NA	<0.01
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/17/88	<0.01	NA	<0.02	<0.01
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	PP93-27	05/19/89	0.05	NA	<0.01	<0.01
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	0.05	<0.0002	<0.01	<0.01
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	08/78	<0.04	NA	NA	<0.02

Table I-4.0-17
Spring Water Background Set
(Continued)

Trace Elements

Data Source	Rock Type	Name	Description	Sample Number	Date	Mo	NH3	NH4	Ni
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/19/87	<0.002	NA	0.09	<0.002
Dale	Tschicoma	Apache Spring	Apache Spring	SSite96-13	04/03/96	<0.002	NA	0.04	<0.002
Dale	Tschicoma	Apache Spring	Apache Spring	VA-443	07/18/94	<0.002	NA	0.17	<0.002
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA-57	07/80	<0.002	NA	NA	<0.002
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10606	6/11/74	-.025	NA	-.025	NA
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/23/87	<0.002	0.24	<0.002	<0.02
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	NA	NA	NA	NA
NMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	<0.01	NA	<0.02	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	<0.01	NA	<0.02	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	<0.01	NA	<0.02	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	<0.01	NA	<0.02	NA
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-434	06/17/94	<0.002	0.42	<0.002	<0.02
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10841	6/21/74	-.025	NA	-.025	NA
Mecker	Bandelier Tuff	Seven Springs	Seven Springs	VC28-28	6/28/84	<0.002	<0.05	0.012	NA
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/03/87	<0.002	0.04	<0.002	<0.02
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	<0.002	0.06	<0.002	<0.01
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	NA	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	NA	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	0.001	NA	<0.05	NA
NMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5.0	7/17/92	<0.01	NA	<0.02	NA
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/17/88	0.009	<0.05	<0.002	<0.02
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	PP93-27	05/19/89	<0.002	<0.02	<0.002	<0.01
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	<0.002	0.06	<0.002	0.02
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	08/78	<0.10	NA	<0.05	NA

Table I-4.0-17
Spring Water Background Set
(Continued)

Trace Elements

Data Source	Rock type	Name	Description	Sample Number	Date	NO2	NO3	Pb	PO4
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/19/87	<0.02	1.55	<0.002	0.10
Dale	Tschicoma	Apache Spring	Apache Spring	SSite96-13	04/03/96	0.02	1.33	<0.002	0.07
Dale	Tschicoma	Apache Spring	Apache Spring	VA-443	07/18/94	<0.01	0.01	<0.002	<0.02
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA-57	07/80	NA	1.4	<0.004	<0.2
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10666	6/11/74	NA	-.200	NA	NA
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/23/87	0.04	0.003	<0.05	0.007
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	NA	NA	0.46	NA
NMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	NA	<0.003	NA	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	NA	<0.003	0.46	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	NA	<0.003	0.46	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	NA	<0.003	0.28	NA
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-434	06/17/94	0.12	<0.002	0.07	0.005
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10841	6/21/74	NA	-.200	NA	NA
Meeker	Bandelier Tuff	Seven Springs	Seven Springs	VC2B-28	6/28/84	0.90	<0.002	<0.2	0.010
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/09/87	0.47	<0.002	<0.05	0.020
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	1.16	<0.002	<0.05	0.019
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	0.09	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	NA	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	NA	<0.14	NA	NA
NMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5.0	7/17/92	NA	<0.003	0.15	NA
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/17/88	0.48	0.004	<0.05	0.004
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	PP93-27	05/19/89	0.98	0.005	0.07	0.006
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	0.91	<0.002	<0.05	0.006
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	08/78	NA	<0.14	NA	NA

Table I-4.0-17
Spring Water Background Set
(Continued)

Trace Elements

Data Source	Rock Type	Name	Description	Sample Number	Date	Rb	Sb	Se	S2O3
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/19/87	0.007	<0.05	<0.1	<0.01
Dale	Tschicoma	Apache Spring	Apache Spring	SSite96-13	04/03/96	0.01	<0.0001	<0.0001	<0.01
Dale	Tschicoma	Apache Spring	Apache Spring	VA-443	07/18/94	0.008	<0.0002	<0.0002	<0.01
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA-57	07/80	NA	NA	NA	NA
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10666	6/11/74	NA	NA	NA	NA
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/23/87	<0.05	<0.1	<0.01	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	NA	NA	NA	NA
NMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	<0.06	<0.005	NA	<0.02
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	<0.06	<0.005	NA	0.03
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	<0.02	<0.005	NA	<0.01
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	<0.02	<0.005	NA	<0.01
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-434	06/17/94	<0.0002	<0.0002	<0.01	NA
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10641	6/21/74	NA	NA	NA	NA
Meeker	Bandelier Tuff	Seven Springs	Seven Springs	VC2B-28	6/28/84	<0.05	NA	NA	NA
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/09/87	<0.1	<0.1	NA	NA
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	<0.0001	0.0003	<0.01	<0.002
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	NA	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	NA	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	NA	NA	NA	NA
NMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5 0	7/17/92	<0.02	<0.006	NA	<0.02
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/17/88	<0.1	NA	<0.02	NA
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	PP93-27	05/19/89	<0.1	NA	NA	NA
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	<0.0001	<0.0001	<0.01	<0.002
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	08/78	NA	NA	NA	NA

Table I-4.0-17
Spring Water Background Set
(Continued)

Trace Elements

Data Source	Rock Type	Name	Description	Sample Number	Date	Sn	Ti	Tl
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/19 87	NA	NA	NA
Dale	Tschicoma	Apache Spring	Apache Spring	SSite96-13	04/03/96	<0.002	0 014	<0.002
Dale	Tschicoma	Apache Spring	Apache Spring	VA-443	07/18/91	NA	NA	NA
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA-57	07/80	NA	NA	NA
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10666	6/11/74	.011	NA	below det
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/23/87	NA	NA	<0.1
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	NA	NA	NA
NMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	NA	<0 005	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	NA	<0 005	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	NA	<0 01	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	NA	<0 01	NA
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-434	06/17/91	NA	NA	NA
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10841	6/21/74	-.004	NA	.001
Meeker	Bandelier Tuff	Seven Springs	Seven Springs	VC2B-28	6/28 84	NA	NA	NA
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/09/87	NA	NA	<0 1
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	<0 002	<0.002	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	NA	NA	NA
NMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5 0	7/17/92	NA	<0 01	NA
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/17/88	NA	NA	NA
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	PP93-27	05/19 89	NA	NA	NA
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	0.005	<0.002	NA
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	08/78	NA	NA	NA

Table I-4.0-17
Spring Water Background Set
(Continued)

Trace Elements

Data Source	Rock Type	Name	Description	Sample Number	Date	Sn	Ti	Tl
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	NA	NA	NA
NMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5 0	7/17/92	NA	<0.01	NA
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/17/88	NA	NA	NA
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	PP93-27	05/19/89	NA	NA	NA
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	0 005	<0 002	NA
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	08/78	NA	NA	NA
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/19/87	NA	NA	NA
Dale	Tschicoma	Apache Spring	Apache Spring	SSite96-13	04/03/96	<0.002	0 014	<0 002
Dale	Tschicoma	Apache Spring	Apache Spring	VA-413	07/18/94	NA	NA	NA
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA 57	07/80	NA	NA	NA
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10666	6/11/74	.011	NA	below det
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/23/87	NA	NA	<0.1
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	NA	NA	NA
NMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	NA	<0 005	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	NA	<0 005	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	NA	<0.01	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	NA	<0 01	NA
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-434	06/17/91	NA	NA	NA
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10841	6/21/74	-.004	NA	001
Meeker	Bandelier Tuff	Seven Springs	Seven Springs	VC2B-28	6/28/84	NA	NA	NA
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/09/87	NA	NA	<0.1
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	<0 002	<0 002	NA

Table I-4.0-17
Spring Water Background Set
(Continued)

Trace Elements

Data Source	Rock Type	Name	Description	Sample Number	Date	U	V	Zn	Ammonia as N
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/19/87	<0.1	NA	0.03	NA
Dale	Tschicoma	Apache Spring	Apache Spring	SSite96-13	04/03/96	NA	0.004	<0.01	NA
Dale	Tschicoma	Apache Spring	Apache Spring	VA-443	07/18/94	NA	NA	<0.01	NA
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA-57	07/80	NA	NA	0.02	NA
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10666	6/11/74	NA	-.050	NA	NA
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/23/87	NA	0.07	NA	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	NA	NA	<0.05	0.2
NMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	<0.01	<0.02	NA	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	<0.01	<0.02	<0.05	0.2
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	<0.01	<0.02	<0.5	<0.1
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	<0.01	<0.02	<0.05	0.1
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-434	06/17/94	NA	<0.01	NA	NA
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10841	6/21/74	NA	.058	NA	NA
Meeker	Bandelier Tuff	Seven Springs	Seven Springs	VC2B-28	6/28/84	NA	<0.02	NA	NA
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/09/87	NA	0.01	NA	NA
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	<0.002	0.01	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	NA	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	NA	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	NA	<0.01	NA	NA
NMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5.0	7/17/92	<0.01	<0.02	0.13	0.32
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/17/88	NA	0.02	NA	NA
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	PP93-27	05/19/89	NA	0.05	NA	NA
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	0.005	<0.01	NA	NA
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	06/78	NA	<0.01	NA	NA
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/19/87	<0.1	NA	0.03	NA

Table I-4.0-17
Spring Water Background Set
(Continued)

Trace Elements

Data Source	Rock Type	Name	Description	Sample Number	Date	U	V	Zn	Ammonia as N
Dale	Tschicoma	Apache Spring	Apache Spring	SSite96-13	04/03/96	NA	0.004	<0.01	NA
Dale	Tschicoma	Apache Spring	Apache Spring	VA-443	07/18/94	NA	NA	<0.01	NA
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA-57	07/80	NA	NA	0.02	NA
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10066	6/11/74	NA	-.050	NA	NA
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/23/87	NA	0.07	NA	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	NA	NA	<0.05	0.2
NMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	<0.01	<0.02	NA	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	<0.01	<0.02	<0.05	0.2
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	<0.01	<0.02	<0.5	<0.1
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	<0.01	<0.02	<0.05	0.1
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-434	06/17/94	NA	<0.01	NA	NA
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10841	6/21/74	NA	.058	NA	NA
Meeker	Bandelier Tuff	Seven Springs	Seven Springs	VC2B 28	6/28/84	NA	<0.02	NA	NA
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/03/87	NA	0.01	NA	NA
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	<0.002	0.01	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	NA	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	NA	NA	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	NA	<0.01	NA	NA
NMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5.0	7/17/92	<0.01	<0.02	0.13	0.32
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/17/88	NA	0.02	NA	NA
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	PP93-27	05/19/89	NA	0.05	NA	NA
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	0.005	<0.01	NA	NA
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	08/78	NA	<0.01	NA	NA

Table 1-4.0-17
Spring Water Background Set
(Continued)

Trace Elements

Data Source	Rock Type	Name	Description	Sample Number	Date	NO2+NO3 as N	Map Number
Blake	Tschicoma	Apache Spring	Apache Spring	VA-350	05/19/87	NA	60
Dale	Tschicoma	Apache Spring	Apache Spring	SSite96-13	04/03/96	NA	NA
Dale	Tschicoma	Apache Spring	Apache Spring	VA-443	07/18/94	NA	NA
Shevenell	Tschicoma	Apache Spring	Apache Spring	VA-57	07/80	NA	51
nure	Bandelier Tuff	Pine Spring	Pine Spring	N10666	6/11/74	NA	NA
Blake	Bandelier Tuff	Pine Spring	Pine Spring	VA-356	05/23/87	66	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	12/26/90	NA	NA
NMED	Bandelier Tuff	Pine Spring	Pine spring (tributary)	NA	12/26/90	NA	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	3/25/91	NA	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (lower @ cabin)	NA	10/15/91	NA	NA
NMED	Bandelier Tuff	Pine Spring	pine spring (upper)	NA	10/15/91	NA	NA
Dale	Bandelier Tuff	Pine Spring	Pine Spring	VA-434	06/17/94	NA	NA
nure	Bandelier Tuff	Seven Springs	Seven Springs	N10841	6/21/74	NA	NA
Meeker	Bandelier Tuff	Seven Springs	Seven Springs	VC2B-28	6/28/84	NA	NA
Blake	Bandelier Tuff	Seven Springs	Seven Springs	VA-333	05/09/87	76	NA
Dale	Bandelier Tuff	Seven Springs	Seven Springs	SSite96-12	04/03/96	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-134	05/83	NA	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-138	05/83	44	NA
Shevenell	Bandelier Tuff	Seven Springs	Seven Springs	VA-47	10/79	44	NA
NMED	Tschicoma	Upper Canyon de Valle	Upper Canyon de Valle	CDV-5.0	7/17/92	NA	NA
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	WCG	08/17/88	25	NA
Blake	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	PP93-27	05/19/89	25	NA
Dale	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	SSite96-14	04/03/96	NA	NA
Shevenell	Bandelier Tuff	Water Canyon Gallery	Water Canyon Gallery	LA-1	08/78	1	NA

Table I-4.0-17
Spring Water Background Set
(Continued)

Trace Elements

W. Blake trace element analyses values reported as mg/kg
Dale Misc. Environmental Samples Values reported as ppm
Meeker trace element analyses values reported as mg/kg
NMED trace element analyses values reported as mg/kg
Nure samples reported as ppb; converted to ppm
Shevenell trace element analyses values reported as mg/l
* for temp data recorded during low-flow conditions (NMED)

APPENDIX J

APPENDIX J. RELEVANT DOCUMENTS

J-1.0 DOCUMENTATION OF REGULATORY HISTORY

J-1.1 Corrective Action History

The history of regulatory interaction concerning the TA-16-260 outfall site is extensive and has involved a close working relationship with EPA and NMED. This working relationship has included numerous site tours and briefings on the progress of investigations. A summary of the key corrective action interactions with the regulators is provided in Table J-1.1-1.

Table J-1.1-1

Corrective Action History Summary TA-16 260 Outfall, PRS 16-021(c)

Date	Description of Corrective Action Activity
July 1993	RFI Work Plan for OU 1082 submitted to EPA
7/18/94	DOE received letter from EPA describing NODs on the Work Plan (letter dated 7/13/94)
8/11/94	LANL sent letter to DOE responding to NODs received on the Work Plan, Part 1 – 30 day
8/17/94	DOE sent letter to EPA responding to NODs received on the Work Plan, Part 1
11/21/94	LANL sent letter to DOE responding to NODs received on the Work Plan, Part 2
11/30/94	DOE sent letter to EPA responding to NODs received on the Work Plan, Part 2
12/22/94	DOE received letter from EPA approving the Work Plan, Part 1
1/9/95	LANL received letter from DOE on approval of the Work Plan, Part 1
1/12/95	DOE received letter from EPA approving the Work Plan, Part 2
1/18/95	LANL received letter from DOE on approval of the Work Plan, Part 2
2/12/96	Interim Action Report for SWMU 16-021(c) submitted to NMED
2/16/96	IA Report re-submitted to NMED
9/17/96	DOE received letter from NMED recommending CMS for this site and requesting a CMS Plan submittal by October 1, 1996 (letter dated 4/3/96)
9/23/96	RFI Report for PRSs in TA-16, 16-003(k) and 16-021(c), submitted to NMED
9/26/96	LANL/DOE sent letter to NMED requesting permission to submit the CMS Plan following completion of the Phase II RFI Report for the site.
12/5/96	LANL/DOE received letter from NMED describing comments on RFI Report for Potential Release Sites in TA-16
1/9/97	LANL/DOE sent letter to NMED acknowledging 12/5/96 letter above
2/26/97	LANL/DOE sent letter responding to NMED comments on RFI Report for Potential Release Sites in TA-16
8/6/97	LANL/DOE received letter from NMED requesting supplemental information (RSI) on RFI Report for Potential Release Sites in TA-16 (letter dated 8/4/97)
8/26/97	LANL/DOE sent letter requesting extension for submittal of response to RSI on RFI Report for Potential Release Sites in TA-16
9/15/97	LANL/DOE received letter from NMED approving request for extension for submittal of response to RSI on RFI Report for Potential Release Sites in TA-16 (letter dated 9/11/97)
11/14/97	Response to RSI on RFI Report for Potential Release Sites in TA-16 submitted to NMED

Table J-1.1-1 (concluded)

Date	Description of Corrective Action Activity
1/26/98	LANL/DOE received letter from NMED approving RFI Report for Potential Release Sites in TA-16 upon modification (letter dated 1/20/98)
2/26/98	Response to Approval upon Modification RFI Report for Potential Release Sites in TA-16 submitted to NMED
3/31/98	LANL/DOE received letter from NMED approving RFI Report for Potential Release Sites in TA-16 (letter dated 3/26/98)

J-1.2 Other Regulatory Documents

None.

J-2.0 Referenced Documents

All referenced documents specific to this RFI report may be found in this section of the report. All other documents referenced in this report can be found in the ER Project Reference Library.

ER ID 57082.1

GROUP M-1 ANALYTICAL LABORATORY REPORT

Requester M. Barr

Sample HE contaminated soil from 260 pond

Analysis Req'd RDX, HMX, TNT Content

Operator W. King

Lab. No. 21423

P.O./P.C. TIGR

Date Rec'd 7/2/91

Reported 10/23/91

SAMPLE	% HMX	% RDX	% TNT
1 ft Left CL	2.64	0.80	0.07
20 ft CL	0.40	1.40	1.00
40 ft CL	0.10	0.01	< 0.01
45 ft Top of Pool	2.94	< 0.01	< 0.01
50 ft Center Pool	4.38	0.50	< 0.01
60 ft Center Pool	4.00	2.40	< 0.01
70 ft CL	3.90	5.18	0.60
80 ft CL	9.70	12.60	3.00
90 ft CL	13.25	13.47	2.00
110 ft CL	6.20	1.40	0.30
60 ft Left Edge	0.50	0.04	< 0.01
70 ft Left Edge	9.00	10.00	2.00
90 ft Left Edge	23.00	34.00	7.10

~~[illegible]~~

EZ-ISO 57082-1

GROUP M-1 ANALYTICAL LABORATORY REPORT

Requester M. BARR, WX-3

Sample SOIL BEHIND BLDG. 260

Analysis Req'd HMX, RDX, TNT, BARIUM

Operator W. King

Lab. No. 21453

P.O./P.C. TIGR

Date Rec'd 11/15/91

Reported 2/7/92

SAMPLE	%HMX	%RDX	%TNT	%Ba
1 210° [illegible] A	3.73	0.63	0.01	0.65
2 135° [illegible] 2nd	2.09	0.19	0.03	0.35
3 91' [illegible] SP. D	2.91	0.07 700	0.03	0.43
4 Burning Ground Upper C	0.11	0.11	<0.01	0.14
5 91' 13" deep [illegible] 5"	9.24	15.52	9.34	0.33
6 91' [illegible] 5" deep [illegible]	5.41	0.71	0.22	0.51
7 Burning Ground Lower G	0.08	0.05	0.01	0.14
8 91' [illegible] Top ② J	6.68	0.96	<0.01	0.53
9 91' [illegible] 13" deep ② K	9.60	3.89	0.42	0.46
10 90' 1' from Stake H	5.63	1.97	0.03	0.85
11 91'-13 I	10.63	17.18	0.97	0.67

FORM GR-45-501
Revised 1/21/63
Quality and Process Control Section
Analytical Laboratory Unit

~~40A00038~~ RID 58703

LABORATORY REPORT

REQUESTER: Jerry Buchholz, H-7
LAB. NO.: 8563
SAMPLE: Building TA-16-260, Effluent
PO NO.: ID 900026
ANALYSIS REQ'D: Ecology
DATE REC'D: 8/4/72
OPERATOR: Herman E. Roybal
REPORTED: 8/16/72

Sample	HMX-RDX (ppm)	TNT (ppm)	$Ba(NO_3)_2$ (ppm)		
6/30/72	0.0	13	1,587		
7/7/72	3.2	10	167		
7/14/72	3.0	10	196		
7/21/72	2.6	18	520		
7/28/72	2.1	13	228		
July Average	2.7	13	278		
8/4/72	2.5	8	371		
8/11/72	2.0	7	70		

REMARKS:

Ba LD = 800 mg

TABLE I

Analytical Results on TNT Wastes

Sample	Alpha TNT ppm	RDX ppm	Barium ppm	Dichromate Oxygen Cons. ppm	pH	ppm Nitrogen		
						NH_3	NO_2	NO_3
Raw 2/6/53 (grab sample)	38	-	681	59	7.3	0.6	0.04	140
Raw 2/10/53 (grab sample)	90	-	677	140	7.2	0.3	0.2	128
Raw Composite 3/4/53 (Machining operation)	57	-	273	40	7.5	5.0	1.2	68
Raw Composite 3/4/53 (Molding and casting operation)	96	-	149	148	7.0	0.3	4.8	29
Raw 6/4/53 (Molding and casting operation - grab sample)	83	26	116	111	8.0	8.0	0.1	40
Raw 2/18/54 (Molding and casting operation - grab sample)	19	4	60	13	8.3	0.0	0.0	16
Raw 2/18/54 (Machining operation - grab sample)	110	36	1,380	95	7.8	0.2	0.05	220

FORM GMX-3-307
Revised 1/21/63
Quality and Process Control Section
Analytical Laboratory Unit

LABORATORY REPORT

REQUESTER	JERRY BUCHHOLZ H-7	LAB. NO.	8705
SAMPLE	TA-16 BLDG.340 EFFLUENT 9/29/72	PO NO.	ED-900026
ANALYSIS REQ'D	ECOLOGY	DATE REC'D	9/29/72
OPERATOR	HERMAN E ROYBAL	REPORTED	10/11/72

	TA-16 BLDG.340			
HMX-RDX CONTENT	NOT DETECTED, LESS THAN 1 PPM			
$Ba(NO_3)_2$ CONTENT	NOT DETECTED, LESS THAN 1 PPM			
T N T CONTENT	NOT DETECTED, LESS THAN 1.5 PPM			

REMARKS:

RESULTS OF EFFLUENT SAMPLING FROM

BLDG. 260 S-SITE JUNE - AUG 197[illegible]

VOLUMES

WEEK DAYS 5100 gal/day - 11,700 gal/day - AVG ~ 6000 gal

WEEK ENDS ~ 600 gal/day

AVERAGE WEEKLY FLOW 32,000 gal

ANALYSIS (GMX-3)

DATE	Ba (ppm)	CALCULATED Ba (#/day)	TNT (ppm)	CALCULATED TNT (#/day)	RDX HMX (ppm)	CALC. HMX-RDX (#/day)
1 - 6/8	221	57	15	3.8	2	0.5
8 - 6/15	131	34	2	0.5	1.3	0.3
15 - 6/30	831	214	13	3.3	0	0
30 - 7/7	88	23	10	2.6	3	0.8
7 - 7/14	103	26	10	2.6	3	0.[illegible]

FORM CMA-3-307
Revised 1/21/63
Quality and Process Control Section
Analytical Laboratory Unit

LABORATORY REPORT

REQUESTER	JERRY BUCHHOLZ H-7	LAB. NO.	8698
SAMPLE	TA-16 BLDG 340 EFFLUENT 9/7/72	PO NO.	ID-900026
ANALYSIS REQ'D	~~[illegible]~~ ECOLOGY	DATE REC'D	9/8/72
OPERATOR	HERMAN E.HOYBAL	REPORTED	10/11/72

	TA-16 BLDG. 340			
HMX-RDX CONTENT	NOT DETECTED	LESS THAN 1 PPM		
$Ba(NO_3)_2$ CONTENT	NOT DETECTED	LESS THAN 1 PPM		
T N T CONTENT	NOT DETECTED	LESS THAN 1.5 PPM		

REMARKS:

Revised 1/21/63

Quality and Process Control Section
Analytical Laboratory Unit

LABORATORY REPORT

REQUESTER	JERRY BUCHHOLZ H-7	LAB. NO.	8700
SAMPLE	TA-16 BLDG. 340 EFFLUENT 9/22/72	PO NO.	TD-900026
ANALYSIS REQ'D	ECOLOGY	DATE REC'D	9/25/72
OPERATOR	HERMAN E ROYBAL	REPORTED	10/11/72

	TA-16 BLDG. 340				
HMX-RDX CONTENT	NOT DETECTED.	LESS THAN	1 PPM		
$Ba(NO_3)_2$ CONTENT	NOT DETECTED.	LESS THAN	1 PPM		
T N T CONTENT	NOT DETECTED.	LESS THAN	1.5 PPM		

REMARKS:

EASL-EDA-OFFICIAL

EC-W 28848

Los Alamos
NATIONAL LABORATORY
memorandum

Chemical Science and Technology
Responsible Chemistry for America
Environmental Restoration Project/CST-18
Los Alamos, New Mexico 87545

To/MS: Distribution
Thru: Roy Michelotti, CST-18, MS E525
From/MS: Don Hickmott, EES-1, MS E525
Phone/FAX: 7-8753/5-4632
Symbol: ER-DH-96-17
Date: November 18, 1996

Modifications to DQOs for PRS 16-021(c) SAP

The recent discovery of 5 ppm RDX at a depth of 70' in the core hole to the south of the pond at PRS 16-021(c) in the geophysical anomaly suggests that the original SAP DQOs should be modified. Based on our discussions of last week, we recommend:

- that all core holes be drilled to the depth of the base of the thick surge beds (70 ft or less). This level is currently assumed to be the unit 3-unit 4 contact. The rationale for this change is to define the level of contamination in this geologic unit, which appears to be a pathway for RDX contamination. The laboratory sample proposed for the bottom of each hole should be from this unit (with the exception noted below).

- that the hole in the center of the pond be drilled 10 ft deeper than the base of the surge bed, and that both the surge bed interval and the deepest interval be submitted for laboratory analysis. Each interval should also be analyzed by D-Tech RDX analysis per the SAP. These samples are designed to determine whether the unit beneath the thick surge beds is contaminated with HE, or whether is was impermeable to downward migration of COCs. Note that these samples should not be drilled if any significant concern remains about drilling-induced contamination of the unit beneath the surge bed.

- Locate the additional hole on the pond bounding traverse at a distance of 20 ft from the hole in which the contamination at 70 ft was found. This bounding hole should also be located in the geophysical anomaly that was used to site the first hole. Plan on completing this core hole as a potential monitoring well (screen the surge bed region). Note that if no contamination is found within the surge bed in this hole, then this decision to complete the hole as a well will be reconsidered. Unless drilling within the outfall channel goes extremely well this fall, this hole will be the first hole drilled when the drilling campaign resumes again in spring 1997.

If you have any questions please contact Don Hickmott (7-8753) or Roy Michelotti (5-7444)

Distribution:
Lynn Kidman, ICF Kiaser, MS M892
Peter Gram, ICF Kaiser, MS M892

ER-IO 58849

DRAFT

To: Peter Gram
From Donald Hickmott

SUBJECT ADDITIONS & MODIFICATIONS TO SAP FOR TA-16-260 HYDROGEOLOGIC HOLES

Based on the discussions at the readiness review for the TA-16-260 hydrogeologic drilling, I believe that we should take the following additional samples:

- An additional D-Tech RDX screening sample in each 5 ft core interval in the 200 ft hydrogeologic holes. These should be biased to any obvious potential transport pathways such as fractured areas, surge beds, etc.
- Additional lab samples in the 200 ft hydrogeologic holes. Any positive D-Tech intervals should be sampled. As a default take a maximum of 3 per borehole - if more than 3 positives occur we should probably consult the decision team. If no positive intervals are found, we should take lab samples in surge beds and fractured intervals (maximum of 3).
- An additional D-Tech RDX screening sample in each 2 ft interval in the alluvial holes. These should be biased to any obvious possible flow paths (e.g. units above aquitards etc.).
- Additional lab samples in the alluvial holes. Any positive D-Tech intervals should be sampled. As a default take a maximum of 3 per borehole - if more than 3 positives occur we should probably consult the decision team. . If no positive intervals or geologic features that would otherwise suggest a biased lab sample location are found, we should take lab samples (1) at the soil-tuff interface; and (2) at a depth of 5 ft. All lab samples will be for HE, TAL metals, SVOCs, and VOCs.

As was noted during the readiness review, the following deviations from the sampling and analysis plan will probably be required, based on known logistical difficulties with drilling at TA-16.

- Deep boreholes (200 ft) will probably have to be cased as they are drilled. Experience drilling in the TA-16-260 outfall areas suggests the boreholes will collapse in surge beds and poorly-welded tuff units if boreholes are drilled uncased, as specified in the SAP. Because, the boreholes will be cased, teleview logs cannot be completed. In lieu of teleview logs, full core recovery will be completed (as recovery allows) on all boreholes, and geologic logs will be completed of the cores.

cc.
FU 3 QA files
Lynn Kidman
Steve Yanicak

Post-it® Fax Note 7671	Date	# of pages ▶ 1
To Peter Gram	From Don Hickmott	
Co./Dept. ICF	Co. LANL	
Phone #	Phone #	
Fax #	Fax #	

9/8/97

ER-ID 58850

TELECONFERENCE NOTES

TO: Teri Davis
ORGANIZATION: HRMB
PHONE: 827-1561

FROM: P.Shanley
ORGANIZATION: ESH-19
PHONE: 667-0819/667-0663

DATE: 11/27/96
Time: 11:50 am

OTHER PARTIES: Dave McInroy

DISCUSSIONS: Teri Davis was contacted to provide a "heads up" on the postive HE spot test results from the drilling currently being conducted at TA-16. The surge bed encountered during drilling was found to be moist and the HE field test responded strongly. D. McInroy indicated that receipt of fixed Lab analytical is anticipated next week. If analytical data indicate a groundwater standard or SAL has been exceeded, LANL will notify per Module VIII requirements. T. Davis asked several highly speific questions which we could not answer. D. Mcinroy requested that T. Davis contact Don Hickmott for site specific questions.

ACTION ITEMS: Check analytical data when available to determine if SALs or groundwater standards exceeded

DISTRIBUTION:
T. Taylor, LAAO, MS A316
B. Koch, LAAO, MS A316
D. McInroy, EM/ER, MS M992
T. Glatzmaier, DDEES/ER, MS M992
D. Hickmott, EES-1, MS D462
R. Michelotti, CST-18, MS E525
M. Alexander, ESH-18, MS K497

ERID 58851

ER PROJECT
TELECONFERENCE NOTES

TO:	Kim Hill	FROM:	Donald Hickmott	DATE:	4/28/98
ORG:	DOE-LAAO MS E517	ORG.:	EM-ER	TIME:	4:00

OTHER PARTIES: None

Discussion:

Don called to inform HRMB that water had been found at borehole 16-2712, located at the TA-16-260 outfall at a distance of ~ 360 ft down gradient from the outfall. Don noted that the borehole had been producing water at a slow rate for week. The water is being sampled for laboratory analysis as the borehole fills. Kim suggested that LANL provide the water data when it is received from the laboratory.

Actions Items:

LANL will provide the lab data when it is received from the laboratory and QA is complete.

Distribution:
J. Mose, DOE-LAAO, MS A316
L. Kidman/P. Gram, ICF Kaiser, MS M892
D. McInroy, EM-ER, MS M992
T. George, EM-ER, MS M992
R. Michelotti, EM-ER, MS E525
D. Hickmott, EM-ER, MS E525
QA File

Don:
I suggest you add AJP and possibly ESA to the distribution for these telecons.
Roy

ERID 58852

ER PROJECT
TELECONFERENCE NOTES

TO:	John Kieling	FROM:	Don Hickmott	DATE:	March 17, 1998
ORG.:	NMED/HRMB	ORG.:	EES-1	TIME:	8:00 a.m.

OTHER PARTIES: None

DISCUSSION:

Don called to follow-up on Dave McInroy's call of the previous week in which LANL had informed HRMB that water had been found in the hydrogeologic borehole near the 90s Line Pond at TA-16.

Don noted that the borehole contained a small amount of water at a depth of approximately 140 ft. He suggested that the drilling team would advance the borehole another 10 to 15 ft (hoping to approach the Unit 3/4 contact) then complete a screened well. John Kieling agreed that this was a reasonable approach.

Don also inquired whether John and other HRMB participants would be attending the ITRD meeting later in the week.

ACTION ITEMS:

None.

DH:jgr

Distribution:

B. Koch, LAAO, MS A316
D. McInroy, EM/ER, MS M992
J. Mose, LAAO, MS A316
V. George, EM/ER, MS M992
R. Michelotti, EM/ER, MS E525
L. Kidman, ICF Kaiser, MS M892
P. Gram, ICF Kaiser, MS M892
D. Hickmott, EES-1, MS E525
QA File

Sent 12/8/97
ER ID 58853

FAX SHEET

Field Units One and Three
Environmental Restoration & Project Management
Los Alamos National Laboratory
P.O. Box 1663 MS E525
Los Alamos, NM 87545
(505)667-6080 FAX (505)665-4632

To: John Kieling

Company: NME / ITRMB

FAX Number: 827-1544

From: Don Hickmott

Number of page to follow: 1

Comments: For your records.

If there are any problems with this transmission, please call Carmella at (505)667-6080

ER PROJECT
TELECONFERENCE NOTES
RECORD OF COMMUNICATION

TO:	John Kieling	FROM:	Donald Hickmott	DATE: 12/1/97
ORGANIZATON:	HRMB	ORGANIZATION:	EES-1/FU 3	TIME:10:30 & 3:30

OTHER PARTIES None

DISCUSSION:*

Don called to discuss siting the next 200 ft. hydrogeologic borehole for the TA-16-260 investigations.

Don noted that the borehole at the Martin Spring area had gone dry. He also indicated that the field team would probably have to move their drill rig within the next few days. Don indicated that the FU 3 team wanted to locate the next borehole within the same geophysical anomaly as the Martin Spring hole, preferably within the SWSC cut, if that location was logistically possible. John requested a map showing the proposed location. Don faxed this to John.

In a follow-up call later the same day, John indicated that the new location was acceptable and requested a record of communication documenting this phone interaction.

ACTION ITEMS:

LANL will fax a map to HRMB of the proposed location.

FU 3 will provide a Record of Communication documenting this telecon

DISTRIBUTION:
T. George, EM/ER, MS M992
T. Glatzmaier , DDEES/ER, MS M992
P. Gram, ICF KAISER, MS 892
D. Hickmott, EES-1/FU 3 MS D462
L. Kidman, ICF KAISER, MS 892
J. Kieling, NMED-AIP
B. Koch, LAAO, MS A316
D. McInroy, EM/ER, MS M992
R. Michelotti, CST-7, MS E525
J. Mose, LAAO, MS A316
P. Shanley, ESH-19, MS K498
QA FILE

12/1/

FAX SHEET

Field Units One and Three
Environmental Restoration & Project Management
Los Alamos National Laboratory
P.O. Box 1663 MS E525
Los Alamos, NM 87545
(505)667-6080 FAX (505)665-4632

To: John Kieling

Company: HRMB

FAX Number: 827-1558

From: Don Hickmott

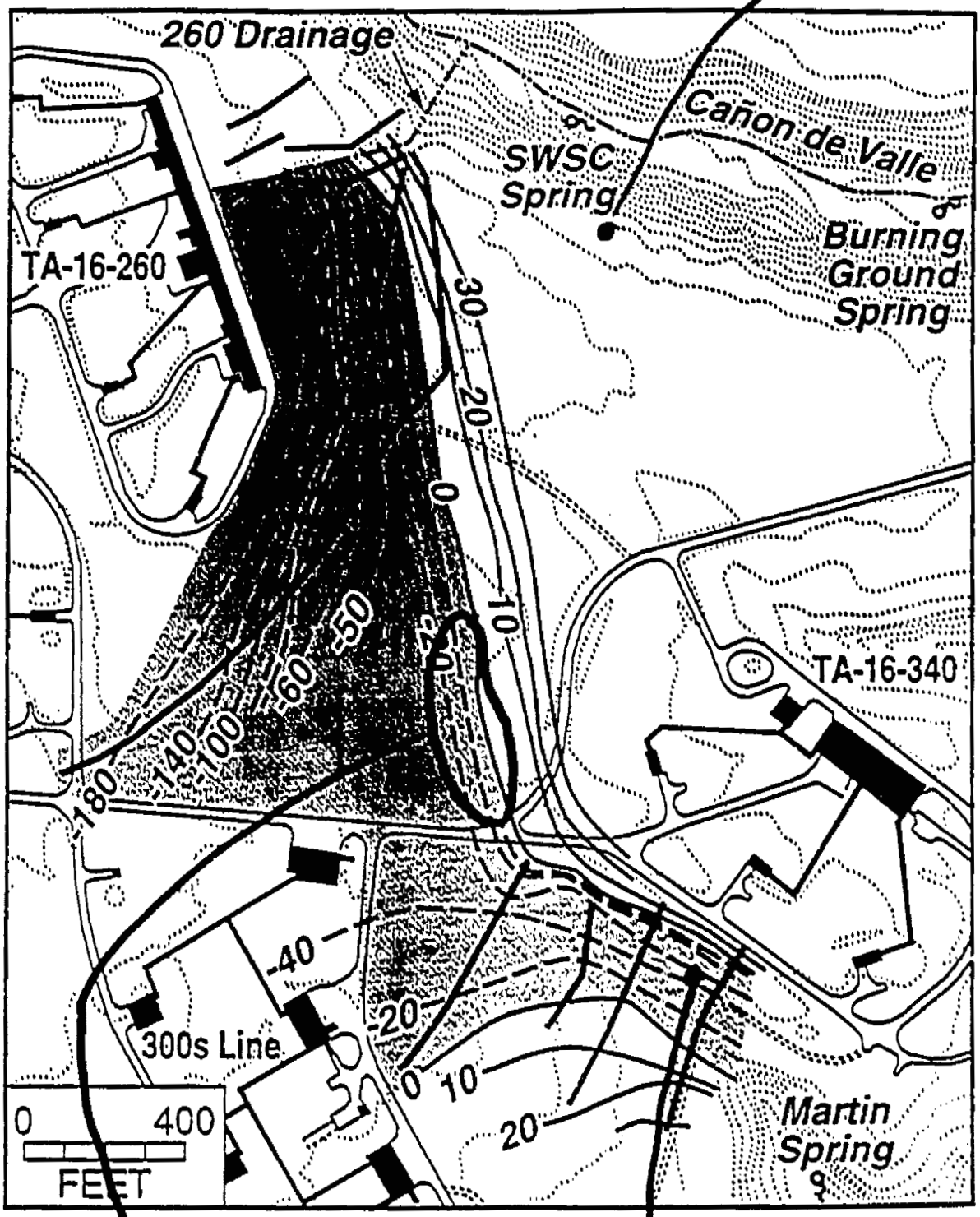
Number of page to follow: 1

Comments: (665-1116 #)

If there are any problems with this transmission, please call Carmella at (505)667-6080

approx. loc. of SWSC borehole

TA-16-260 Geophysics—Self Potential



Self-potential (milli-volts)

Traverse line

Anamolous zone

Possible location for next borehole

Approx. loc. of "wet" borehole

ER ID 58854
~~HS080658~~

FAX SHEET

Field Units One and Three
Environmental Restoration & Project Management
Los Alamos National Laboratory
P.O. Box 1663 MS E525
Los Alamos, NM 87545
(505)667-6080 FAX (505)665-4632

To: John Kieling / Kim Hill / John Young

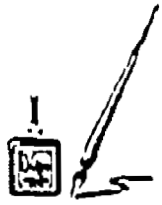
Company: HRMB

FAX Number: 827-1544

From: Don Hickmott

Number of page to follow: 4 total

Comments: John, Could you guys look over these telecon notes. Please fax back any changes.
Thanks Don



If there are any problems with this transmission, please call Carmelia at (505)667-6080

DRAFT

ER PROJECT
TELECONFERENCE NOTES

TO:	Kim Hill	FROM:	Donald Hickmott	DATE:	10/17/97
ORGANIZATON:	EPA	ORGANIZATION:	EES-1/FU3	TIME:	10:30

OTHER PARTIES _____

DISCUSSION:

Kim called to discuss the DRAFT memorandum (Subject: Geologic core logs for boreholes located at PRS 16-021(c) & revised borehole locations) that had been faxed to John Kieling on 10/16/97. This fax had been promised to HRMB during an FU 3 presentation to HRMB on 10/9/97.

The principal discussion topic was the location of the boreholes. Kim noted that the proposed locations were slightly different from those presented in the handout of 10/9/97. Don agreed. The FU 3 team had discussed those locations and proposed moving them further out from the highly contaminated region. The rationale for placing these boreholes remained the same - tracing pathways of contamination in a subsurface downgradient direction - but it was hypothesized that more information would come from more widely-spaced boreholes than from those that had been originally proposed.

Kim agreed with the new proposed locations.

ACTION ITEMS:

FU 3 will locate the final 3 boreholes at the TA-16-260 outfall at the locations provided in the fax of 10/16/97. This map is provided as an attachment to this telecon.

DISTRIBUTION:

T Glatzmaier, EESDO/ER, MS M992
P. Gram, ICF Kaiser, MS M892
D Hickmott, EES-1, MS E525
L. Kidman, ICF Kaiser, MS M892
D. McInroy, EM/ER, MS M992
R. Michelotti , CST-7, MS E525
Joe Mose, LAAO, MS A316
P Shanley, ESH-19, MS 498
QA File

ER ID 58855

ER PROJECT
TELECONFERENCE NOTES

TO:	John Kieling	FROM:	Donald Hickmott	DATE:	10/25/97
ORGANIZATON:	EPA	ORGANIZATION:	EES-1/FU3	TIME:	10:30

OTHER PARTIES Lynn Kidman, Peter Gram, Donna Sharp, John Young, Kim Hill

DISCUSSION:

LANL representatives discussed the recent (week of 10/20) discovery of water at borehole located upgradient from Martin spring.

Peter gram described the lithology and hydrology of the borehole:

The hole contains a surge bed from ~68 to ~70 ft. depth. A fracture zone is present from ~70-72 ft. Fractures are wet in this interval with apparent saturation at the bottom of the interval. A less fractured zone extends to the bottom of the hole.

Water was found to a depth of 113.2 ft. on 10/22/97. By 10/23/97, the depth to water was 118.9 ft. to water.

These data are somewhat confusing. It is not clear within which unit the water is being produced and to what degree water is draining from the bottom of the hole.

The technical issue to be determined was where the screened interval should be in the borehole.

FU 3 suggested that the current borehole should be screened from the bottom of the borehole to a depth ~74 ft. A second borehole should be drilled adjacent to the first, and be screened from a depth of ~72 ft. to ~68 ft. to overlap the surge bed interval. NMED representatives were in general agreement with this approach although further discussion will occur during a site tour on 10/24/97.

ACTION ITEMS:

FU will provide a site tour and a tour of the drill site to HRMB on 10/24/97. Drill core will be available for viewing at that time.

FU 3 will begin drilling a second borehole adjacent to the first borehole. Much of this drilling should be completed by the time of the site tour.

The screening interval depth in the first borehole will be finalized on the site tour

Distribution:
T Glatzmaier, EESDO/ER, MS M992
P. Gram, ICF Kaiser, MS M892
D Hickmott, EES-1, MS E525
L. Kidman, ICF Kaiser, MS M892

ERID 5885

Kim, Here are:

1) a copy of the SAP additions/modifications memo that I promised you (Let me know if you need this as a formal transmittal).

2) a DRAFT of the notes for our telecon.

3) the last 2 sets of our minutes (Let me know if you want older ones as well(.

Please review the telecon notes, and provide any comments/feedback. I'll plan on sending these out 'officially' early next week. If you have any questions, please give me a call. Thanks in advance. Don

Post-it® Fax Note 7671	Date 9/11	# of pages ▶ 13
To Kim Hill	From D. Hickmott	
Co./Dept. HRMB/EPA	Co. LANL	
Phone #	Phone # 665-1116	
Fax # 827-1544	Fax # 665-4632	

DRAFT

ER PROJECT
TELECONFERENCE NOTES

TO:	Kim Hill	FROM:	Donald Hickmott	DATE:	9/9/97
ORGANIZATON:	EPA	ORGANIZATION:	EES-1/FU3	TIME:	11:00

OTHER PARTIES NONE

DISCUSSION:
1) Kim provided her fax number.

2) Don requested that the bioremediation presentation on September 25 be scheduled for 45 minutes. It was agreed that the time for the presentation would be 2:30 P.M.

3) Don reported that bromide tracer had been observed in SWSC Line spring during early August. He noted that several days worth of samples of that spring had been missed following the bromide breakthrough due to an autosampler malfunction.

4) Don noted that the hydrogeologic drilling outlined in the PRS 16-021(c) phase II SAP was going to start within the next 2 weeks. Both alluvial boreholes and deep hydrogeologic boreholes are scheduled. He noted that additional samples would be taken beyond what is outlined in the SAP, and that drilling would have to be completed cased, rather than uncased. Kim requested that this information be provided as a faxed memo.

5) Specific comments in the PRS 16-021(c) RFI Report SI request were discussed:

- Don inquired about RPMP's request for updates and addendums of PRS 16-021(c) results. Kim indicated that the current interaction (presentations and meeting minutes) was a good start. Don agreed that this would continue and that additional hard-copy information would also be provided.

(Continued on page 2)

ACTION ITEMS:

1. Don will fax the last 2 months worth of FU 3 minutes and the memo describing additions and modifications to the TA-16-260 field campaign to Kim.

2. LANL will respond to the questions that were discussed in a manner consistent with the discussions.

DISTRIBUTION:
T. Glaztmaier, DDEES/ER, MS M992
D Hickmott
B. Koch, LAAO, MS A316
R. Michelotti
J. Mose, LAAO, MS A316
D. McInroy, EM/ER, MS M992
P. Shanley, ESH-19, MS K498
QA File

Discussion (continued)

DRAFT

- Comment 5.b was discussed. Kim indicated that HRMB wanted analytical methods, detection limits, etc. for all analytes, not just TATB. LANL will provide this in the response.
- Comment 10(a) was discussed. Don noted how LANL archives QA/QC data in FIMAD (based on Kathy Campbell's notes). Kim indicated that an acceptable response would: 1) reiterate what LANL does; 2) describe why we do it this way (cite SOPs and procedures if possible) and 3) indicate where this process is going (i.e. to DEEMS).
- Comment 10(b) was discussed. Don noted the rate at which FU 3 had collected field duplicates during the sampling at PRS 16-021(c). There was a discussion of the LANL philosophy for collecting field duplicates. Don noted that FU 3 typically collects field duplicates at a rate significantly less than 10%. It was noted that this was a programmatic issue. Kim indicated that an acceptable response to this comment would 1) describe what we did for field duplicates; and 2) indicate why we collected the number of field duplicates that we did.
- Comment 12 was discussed. Don suggested that the information requested was extractable from existing figures (e.g. Figure 5.2.4.1). Kim indicated that a new figure did not have to be generated. Kim requested that section 5.0 cite Appendix A as the location of all of the analytical data. LANL will do this in the response.
- Comment 18 was discussed. Don inquired about the request for an errata sheet. Kim indicated that the normal NOD response format would be adequate.
- Comment 21.a. was discussed. Don noted that the request (include all constituents with normalized concentration greater than 0.1 in a risk assessment) was contrary to project-wide guidance on MCEs. This was identified as a programmatic issue. Don agreed that the response would: 1) note that this method of performing MCEs was contrary to programmatic guidance; but 2) FU 3 would do this for the purposes of this response. It was noted that this discussion applied to several comments in this SI request.
- Comment 28 was discussed. Don noted that this request was inconsistent with the current RFI report guidance. He provided a rationale for why the table is set up the way it is — in many cases individual request numbers will include PRSs which are not included in the report. Kim indicated that HRMB would like to receive the table. LANL will provide it in the response.
- Comment 29 was discussed. Kim noted that this comment requested a cation sum/anion sum comparison. Don noted that this information was available in Table C-8. Kim agreed that the response should cite that table.
- Comment 31.a. was discussed. Kim noted that the comment should address paragraph 4 on page C-6. Don noted that the response would be couched in terms of drinking water standards rather than SALs, and that note of this would be made in the introduction to the response.

It was noted that several of the discussed SI request comments (and some that had not been discussed) had project-wide implications. Don stated that FU 3 would identify in the SI request response those comments that FU 3 felt had project-wide implications, in order to help focus upcoming discussion between LANL and HRMB.

ER-ID 58857

University of California
Environmental Restoration Project, MS M992
Los Alamos, New Mexico 87545
505-667-0808/FAX 505-665-4747

U. S. Department of Energy
Los Alamos Area Office, MS A316
Environmental Restoration Program
Los Alamos, New Mexico 87544
505-667-7203/FAX 505-665-4504

Date: July 3, 1997
Refer to: EM/ER:97-176

Mr. Benito Garcia
NMED-HRMB
P.O. Box 26110
Santa Fe, NM 87502

SUBJECT: MINUTES FOR MONTHLY MEETING WITH HRMB

Dear Mr. Garcia:

Enclosed please find a copy of the minutes pertaining to the Environmental Restoration (ER) portion of the meeting held in Santa Fe on April 15, 1997, with members of your staff and personnel from Los Alamos National Laboratory's ER Project. The minutes have been reviewed by your staff.

Should you have any questions, please call Dave at (505) 667-0819 or Joe at (505) 667-5808.

Sincerely,

David McInroy, Compliance Manager
LANL/ER Project

Sincerely,

Joe Mose, Compliance Manager
DOE/LAAO

DM/JM/ss

Enclosure: April 15, 1997, Monthly Meeting Minutes with HRMB

Cy (w/ enc.):
W. Cox, SNL
M. Ebinger, EES-15, MS J495
J. Ellvinger, ESH-19, MS K490
R. Ferenbaugh, EES-15, MS J495
T. Glatzmaier, DDEES/ER, MS M992
D. Griswold, AL-ERD, MS A906
D. Hickmott, EES-1, MS D462
J. Jansen, EM/ER, MS M992
J. Plum, LAAO, MS A316
P. Shanley, ESH-19, MS K498
T. Taylor, LAAO, MS A316
T. Todd, LAAO, MS A316
EM/ER File, MS M992
RPF, MS M707

T. Davis, NMED-HRMB
S. Dinwiddie, NMED-HRMB
K. Hill, NMED-HRMB
J. Kieling, NMED-OB
J. Parker, NMED-OB
B. Toth, NMED-HRMB
J. Young, NMED-HRMB
D. Wilburn, NMED-HRMB

Cy (w/o enc.):
T. Baca, EM, MS J591
G. Rael, DOE-AL, MS A906
J. Vozella, LAAO, MS A316
EM/ER File, MS M992

New Mexico Environment Department (NMED) and Los Alamos National Laboratory (LANL) Environmental Restoration (ER) Project
Meeting Minutes
April 15, 1997

Attendees:
NMED: Teri Davis, John Kieling, Stu Dinwiddie*, John Young, Kim Hill (EPA); Barbara Toth*, Diane Wilburn*
LANL: Joe Mose (DOE), David McInroy (UC), Pat Shanley (UC/ATK), Don Hickmott (UC)*
* Present only during some meeting segments

Agenda Item 1: Presentation From Field Unit 3

Don Hickmott provided a handout for his presentation describing the current status and future work planned at PRS 16-021c (TA-16, Building 260 Outfall). D. Hickmott indicated that the additional work that is being conducted at this investigation area is an enhancement of the existing SAP. He stated that the next three boreholes would be based on recent data from geophysical investigations as well as existing information. NMED indicated that they might be inclined to wait until all geophysical data is available prior to finalizing the selection of the borehole sites.

The need to address the changes to the current sampling and analysis plan were discussed. LANL expressed an interest in providing frequent oral updates to NMED on sampling decisions and how the field unit team was determining the next investigation step. NMED indicated that LANL may need to formally submit something to them to document the changes occurring to the investigation approach.

D. Hickmott indicated that a Notice of Intent for discharge of water at the outfall to support bioremediation will be submitted soon to the Surface Water Quality Bureau by ESH-18. In situ bioremediation was not proceeding at the pace FU 3 had anticipated due to the inability of the LANL principal investigator to commit time to the project.

D. Hickmott distributed EPA papers on HE field analytical methods and HE sampling.

Action Item: HRMB indicated that they will contact FU 3 Project Leader, Roy Michelotti, if they determine a SAP or SAP addendum is required.

Later in the meeting, this item was revisited and NMED indicated they believed a new SAP was necessary according to the new accelerated cleanup process. Dave McInroy will review the language in the Accelerated Corrective Action Process and contact D. Hickmott to determine if a new SAP or modifications are necessary.

Agenda Item 2: FY98 Priority Activities

LANL provided a draft list of the ER 1998 priority activities. The information is provided to NMED to facilitate their determination for NMED 1998 work priorities. LANL emphasized that the identified activities are draft and LANL is in the early stage of baseline development.

LANL explained that the 1998 Baseline must be submitted to DOE by July 1, 1997. The disconnect between LANL's submittals to NMED and NMED's 1997 grant commitments with EPA was briefly addressed. The problem remains that LANL puts a baseline of activities for the next year's budget together after the date NMED needs to select grant commitments. LANL reiterated that the baseline is often not finalized for many months after it is submitted, which may result in work scope changes.

NMED expressed appreciation for receiving the proposed work information. LANL indicated that they will strive to provide information on the proposed 1998 Accelerated Actions to facilitate selection of NMED's 1998 priority work. NMED and LANL will strive to ensure that grant commitments are not selected for low priority work that could be delayed in the FY98 baseline.

Agenda Item 6: Clarification of Recently Used Terminology

This agenda item was moved up in the meeting sequence to allow for S. Dinwiddie's participation.

LANL requested clarification on several terms used in letters received from HRMB in the recent past. The first issue was the use of the omnibus provision. P. Shanley indicated that LANL believed that a permit condition needs to be written to incorporate any new requirements. HRMB indicated that the requirement to follow other regulations is present in the permit. The second issue addressed was the use of the term "RCRA-regulated" in relation to a SWMU. HRMB and LANL agreed that the term is specific to land-based units that generally require ground water monitoring and that not all SWMUs are RCRA-regulated units. The final issue discussed was the requirement in a recent NOD that RFI Reports be stand-alone documents. K. Hill clarified that it is not appropriate for reports to reference a reviewer to another document for information like site history or environmental setting. The RFI Report should, at a minimum, present the information in an abbreviated manner and then reference the reader to another document.

P. Shanley provided the text of the HRMB correspondence and some applicable Federal Register pages.

Agenda Item 3: Definitions of Stabilization Activities

LANL provided a one page flow diagram of their interpretation of stabilization activities which had stabilization broken into two main divisions: best management practices and interim measures. Discussion on this topic led to the identification that LANL and HRMB disagree as to the requirements identified in Section J, Interim Measures of Module VIII. LANL indicated that NMED's view that LANL must notify of routine construction work in a SWMU was contrary to the way past work had been conducted under EPA oversight and that LANL's understanding had of the requirements for routine construction in a SWMU had been submitted to HRMB.

Action Item: P. Shanley will fax LANL letter on routine construction in SWMUs to HRMB.

Dave McInroy distributed a Draft Stabilization Process document which consists of text on when to implement a BMP or interim measure along with a flow diagram. NMED indicated that they believed actions such as debris pickup should not be a BMP but would be an interim measure. Discussion on the differences between BMPs and IMs continued.

Action Item: HRMB will review the draft stabilization document and provide comments to LANL by next month's meeting.

Agenda Item 4: FY97 Accelerated Cleanups

D. McInroy provided copies of one table identifying all planned VCAs and VCMs for this year and the fact sheets for all the VCA/VCMs. HRMB stated their appreciation for the information. NMED will review the fact sheets to determine which VCAs they need presentations on. NMED expressed an interest to see the same type of information for 1998 to help determine grant commitments. D. McInroy indicated that LANL will put as much information on this together as they can by next months meeting. Caution on the possibility that the FY98 VCAs may change was provided by J. Mose. Change is likely because the baseline for 1998 is not yet set and may not be approved for many months.

Action Item: NMED will review 1997 VCA Fact Sheets. NMED will notify LANL one week prior to the next meeting of any VCA presentations needed for that meeting.

Action Item: D. McInroy will provide a list of "reasonably certain" VCAs for 1998 by next month's meeting.

Agenda Item 5: EPA Visit

LANL requested NMED input on the agenda for the upcoming EPA visit. NMED indicated that they would be having an NMED/EPA only meeting on April 21 p.m. and April 22 a.m. NMED indicated that they understood that the agenda had already been set between EPA and LANL. LANL indicated this had not been accomplished. NMED indicated the following area of interest: MDAs at TA-21 (A, B, U, and V) and TA-16 (R, and T), TA-50 MDA C; and the TA-73 Airport Landfill. NMED and LANL will determine a schedule over the next week which will determine whether sites will be visited prior to or after an NOD discussion.

Action Item: NMED will contact EPA and let LANL know the agenda items as soon as possible.

Other Items:

The need for a meeting prior to responding to the NOD for TA-18/27 was identified. Kim Hill indicated that she was available to meet with LANL during the morning of April 21.

Action Item: D. McInroy and J. Mose will coordinate with LANL staff to arrange the meeting.

The meeting minutes were revisited and the following action items were assigned.

Action Item: D. McInroy will revisit the criteria for revising or writing a new SAP with FU 3 on the TA-16 260 outfall work. A new SAP may be needed.

Action Item: D. Hickmott will inform T. Davis on the material that was used to plug borehole 2707.

The next meeting is scheduled for May 13 at 8:30.

ER ID 58858

FAX SHEET

Field Units One and Three
Environmental Restoration & Project Management
Los Alamos National Laboratory
P.O. Box 1663 MS E525
Los Alamos, NM 87545
(505)667-6080 FAX (505)665-4632

To: John Kieling

Company: NMED/HRMB

FAX Number: 827-1544

From: Don Hickmott

Number of page to follow: 9

Comments:

If there are any problems with this transmission please call Carmella at (505)667-6080

DRAFT

INFORMAL MEMORANDUM

TO: John Kieling (NMED/HRMB)
FROM: Roy Michelotti (LANL/FU 3)

SUBJECT: GEOLOGIC CORE LOGS FOR BOREHOLES LOCATED AT PRS 16-021(C) & REVISED BOREHOLE LOCATIONS

As you requested in our meeting of 10/9/97, attached are a map showing borehole locations at the TA-16-260 outfall and preliminary geologic logs for three borehole locations, 16-2701, 16-2735/2705 and 16-2736/2708. All three of these boreholes are located in the easternmost geophysical anomaly observed in the outfall area. Note that 16-2736 and 16-2708 are co-located. Drill rod was 'hung up' in 16-2708, so 16-2736 had to be drilled adjacent to that hole. Boreholes 16-2705 and 16-2735 are also co-located, with 16-2705 started last fall and extended to a depth of 15 ft and 16-2736 continued at the same location this summer. These boreholes are relevant to re-siting the final borehole locations that will be completed at PRS 16-021(c). Please note that these logs are preliminary logs of these boreholes based on field observations. Notes on these boreholes are provided below:

- These logs are provisional. All core from these boreholes will be examined and assessed using more precise methods by a geologist who is an expert on extrusive volcanic rocks. The borehole logs will then be revised. The current borehole that the field team is working on, 16-2701, has not yet been logged into draft form. Data shown on the logs is based on quantitative field screening (D-Tech). Interpretations will change as laboratory data is received and incorporated.

- There appears to be a contaminated surge unit that extends to a depth of ~ 7475 ft MSL in all three boreholes, although poor recovery on borehole 16-2735 makes interpretation difficult in this borehole. It is FU 3's current hypothesis that the geophysical anomaly noted in this area may be related to this surge unit and that this surge unit represent a 'fast pathway' for contaminant migration. Note that borehole 2706 (log not provided) does not contain this surge bed interval.

- Contamination appears to be higher in the central (16-2735) and southern (16-2736) boreholes on this traverse. During our presentation last week, we had suggested that the northern borehole (16-2701) was uncontaminated. Further drilling and D-Tech analyses last weekend revealed low-ppm-level HE at depths of 28.5-29.5, 58.0-59.0, and 69.25-69.75 ft. This observation supports a conceptual model in which the downgradient subsurface direction is to the southeast.

- Although there appears to be a correlation between mapped 'fast pathways' such as surge beds and fractures with HE contamination in many cases, low level contamination is also seen in welded tuff in zones where no obvious structural controls are observed.

As discussed in the meeting of 10/9/97, FU 3 would like to place 2 upcoming boreholes: 1) in the eastern geophysical anomaly downgradient from the highly contaminated area (location 1 on the map); 2) outside that geophysical anomaly downgradient from the highly contaminated area (location 2 on the map). These holes will help confirm that the geophysical anomalies are correlated with surge units and will provide information on the

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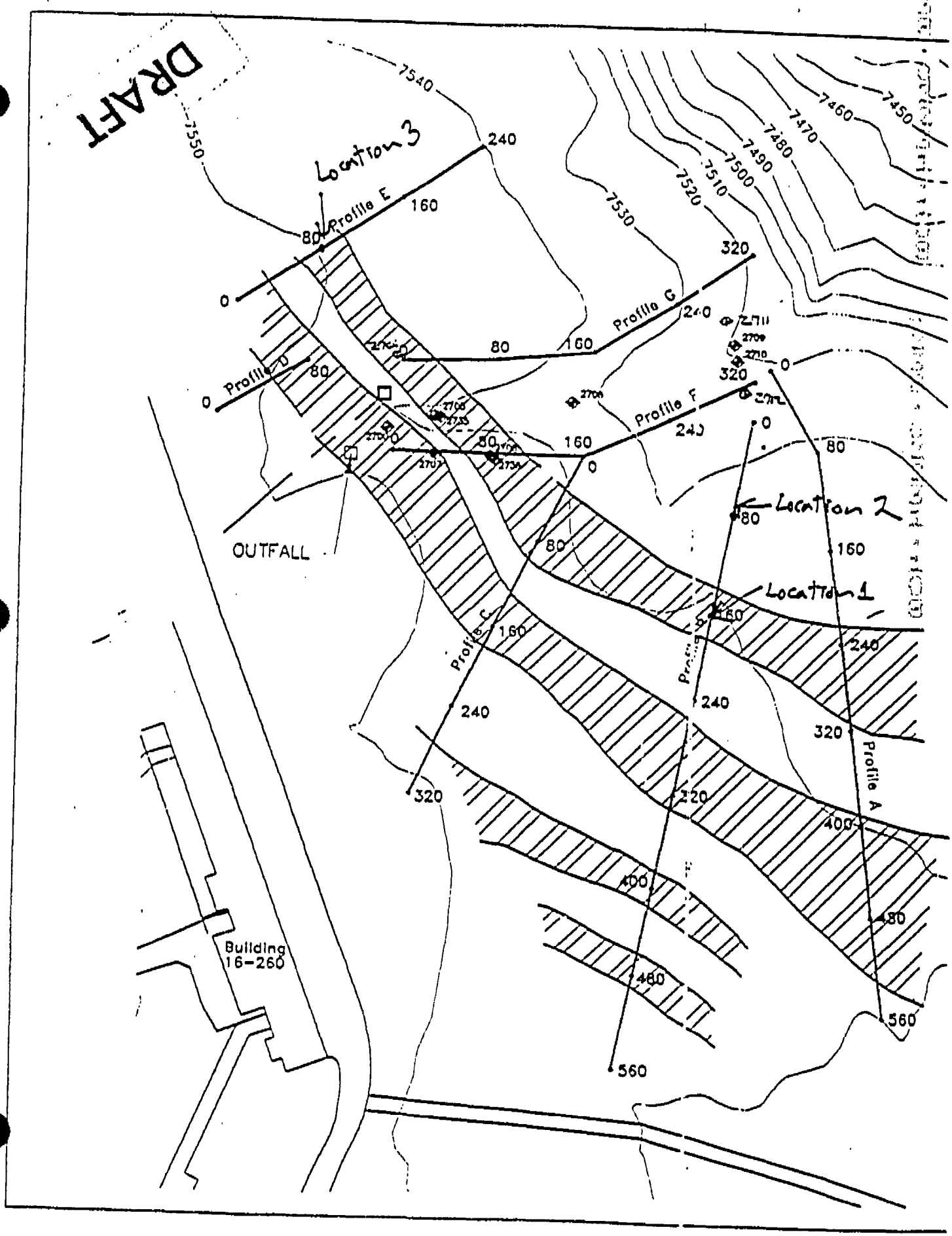
extent of contamination in the surge unit. Our current thinking is that if the borehole at location 2 supports the hypothesis of a continuous surge sequence and is clean, then fracture flow would be the dominant contaminant pathway to the springs. We would then site another borehole in the anomaly closer to the highly contaminated region to better bound contamination in the surge bed.

In the meeting of 10/9/97, FU 3 indicated that a contingent bounding borehole on the north side would not be drilled, because at that time borehole 16-2701 appeared to be clean. Because we have found low levels of HE in that borehole, we now propose to drill an additional borehole in the eastern geophysical anomaly on the north side of the highly contaminated region (location 3 on the map).

Please examine these logs and determine whether you agree that these are reasonable locations for upcoming boreholes. We will be moving the drill rig to location 1 this weekend. These locations are placed along geophysical measurement traverses to avoid dependence upon estimates of anomalous areas between the traverses. We would be glad to discuss this information with you either by phone (Roy Michelotti at 665-7444 or Donald Hickmott at 667-8753) or in association with the bioremediation presentation that is scheduled for tomorrow.

cc. Dave McInroy
FU 3 QA file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Location 3
Location 2
Location 1
Profile E
Profile G
Profile D
Profile F
Profile C
Profile A
OUTFALL
Building 16-260
7540
7550
7530
7520
7510
7500
7490
7480
7470
7460
7450
2711
2709
2710
2708
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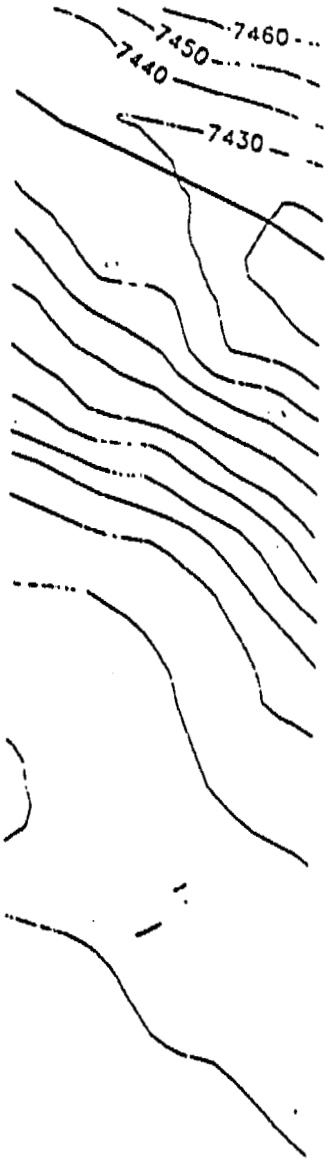
2704
2703
2702



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SCALE: 1" = 100'

LEGEND

- Resistivity Profile
- 80 — Distance (feet) Along Profile
- Grid Marker (Wooden Stake)
- Low Resistivity Zone
- Drainage
- Utilities - Sewer
- Roads
- Approximate Location of Outfall Pipe PRS 16-021(c)
- BORE HOLE

ORIGINAL DWG. "b260tbrd" FROM MARTIN MIELE

TA-16
BLDG 260
BORE HOLE AND OUTFALL LOCATIONS
02/28/97

REVISED 09/05/97 TO SHOW ADDITIONAL BOREHOLES

Eastern Geophysical anomaly - South

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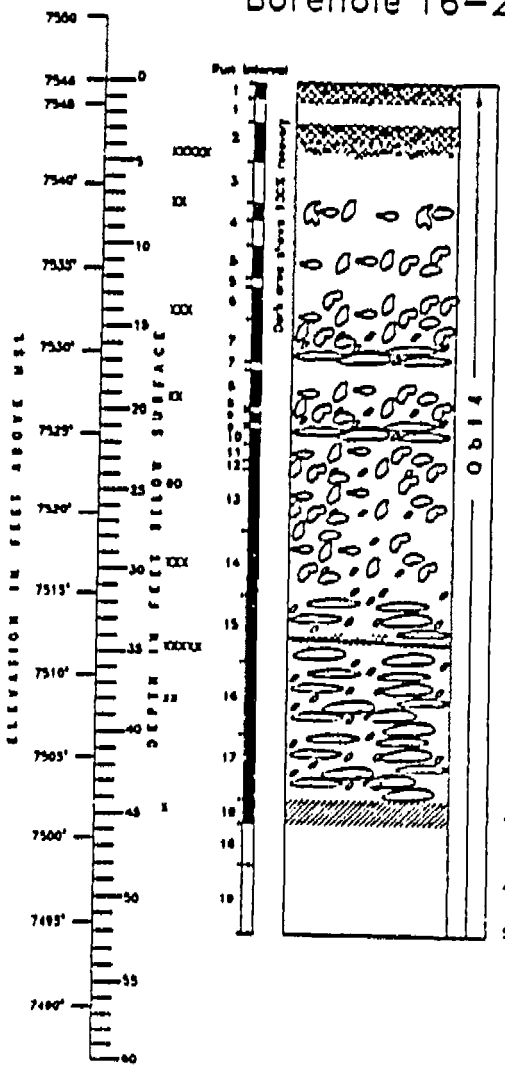
Borehole 16-2708



0–1' Saturated w/ drill water, predominantly clay, minor organics, sandal double granule, 10YR 4/3(m)

1'–2.5' No recovery

2.5'–4 Predominantly clay, minor organics, sandal double granule, 7.5YR 6/4 light brown

4'–7.5' No recovery

7.5'–8.5' Heavily weathered some lithics, phenocrysts, slightly moist 7.5YR 7/8 reddish brown

8.5'–10' No recovery

10–12' Heavily weathered some lithics, phenocrysts, slightly moist 7.5YR 7/6 reddish brown

12–12.5' No recovery

17'–17.5' No recovery

12.5–31.5' Weathered, mod. welded, <5% lithics, 20% phenocrysts, 20% pumice <2cm w/ decreasing pumice at 17.5', 5YR 7/2 pinkish gray

31.5'–44.5' Welded, w/ 5% lithics, 10–15% phenocrysts, 10–15% devitrified pumices, 2.5YR 7/2 pinkish gray, fracture at 34.5' w/ mineral development.

44.5'–45.5' Surge bed material, sandy texture, 20% silts & clay, fine pumices, delineated bedding layers

45.5'–52' No recovery

52' TD

BD = below detection
1X = 0–1 ppm
2X = 1–2 ppm

POX 0–1ach results
3x = 2–3 ppm
4x = 3–4 ppm
5x = 4–5 ppm

1+ = 5–6 ppm
2+ = .6 ppm

PRS 16-021'(c)
FU # 3
ICF Kaiser

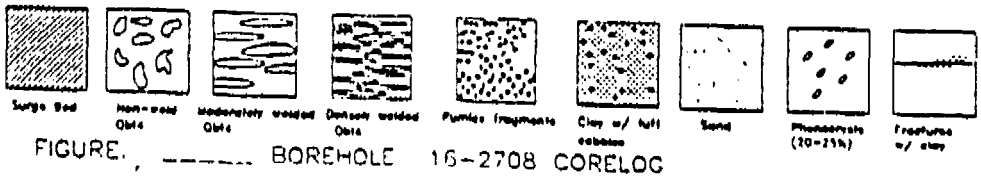


FIGURE. _____ BOREHOLE 16-2708 CORELOG

Eastern Geophysical Anomaly - South

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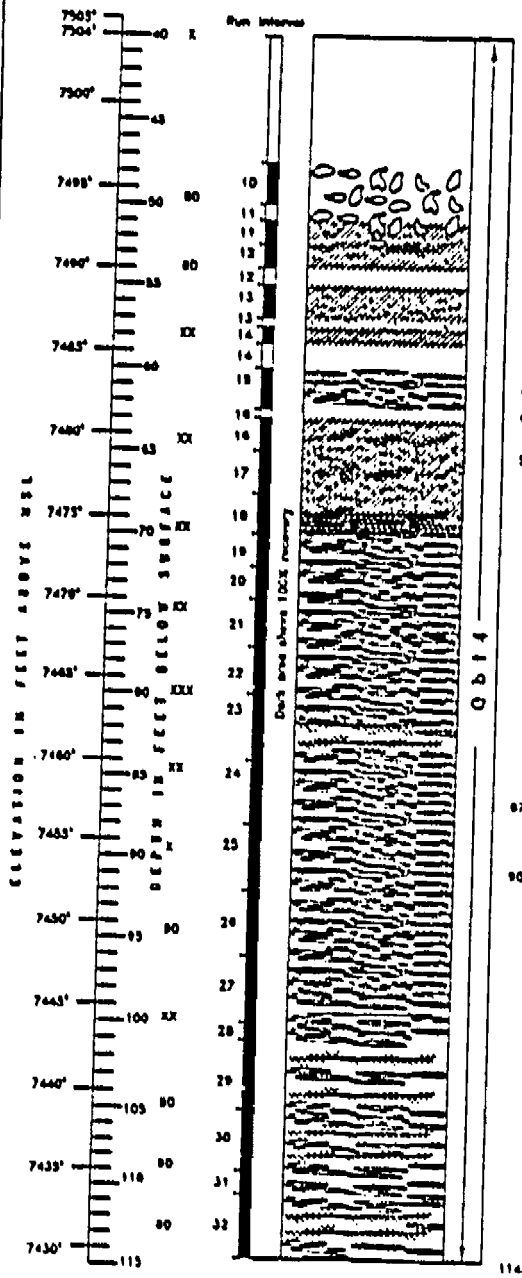
Borehole 16-2736



47.5–50' Sand welded, 5–10% pumice, 5% phenocrysts, < 5% lithics, some alteration, slightly moist, 10YR 7/1 light grey

50–51' No recovery

51–54' Surge bed material, dr sandy, distinct bedding clay development, 10YR 6/3 light brown color change at 54.5–54' 10YR 7/2 light grey

54–55' No recovery

55–60' Surge bed material dr sandy, distinct bedding clay development, 10YR 7/2light brown

57–57.5' No recovery

58.5–60' No recovery

60–62.5' Densely welded, 15% phenocrysts, no pumice, no lithics, 5YR 5/1 grey

62.5–63' No recovery

55–60' Surge bed material, abundant clay bedding, dominant weathering, 10YR 6/3 pale brown

67.5–114.5' Med. to densely welded, 15% phenocrysts, < 5% devitrified pumice, <5% lithics, condition to present starting at 72.75'(2.5YR 4/2), color change at 75.1' (7.5YR 4/1 dark grey) fractures w/ clay development occurring at 82', 83.10', 87', 99.6', 102',103',104',105',106', 108',109', 112' & 113'.

90'–92' Color change to 7.5YR 5/1 grey

ND = below detection
1X = 0–1ppm
2X = 1–2ppm
3X = 2–3ppm
4X = 3–4ppm
5X = 4–5ppm
1+ = 5–6ppm
2+ = >6ppm

PRS 16-021(c)
FU # 3
ICF Kaiser

FIGURE. ------ BOREHOLE 16-2736 CORELOG

Eastern Geophysical Anomaly - Drainage

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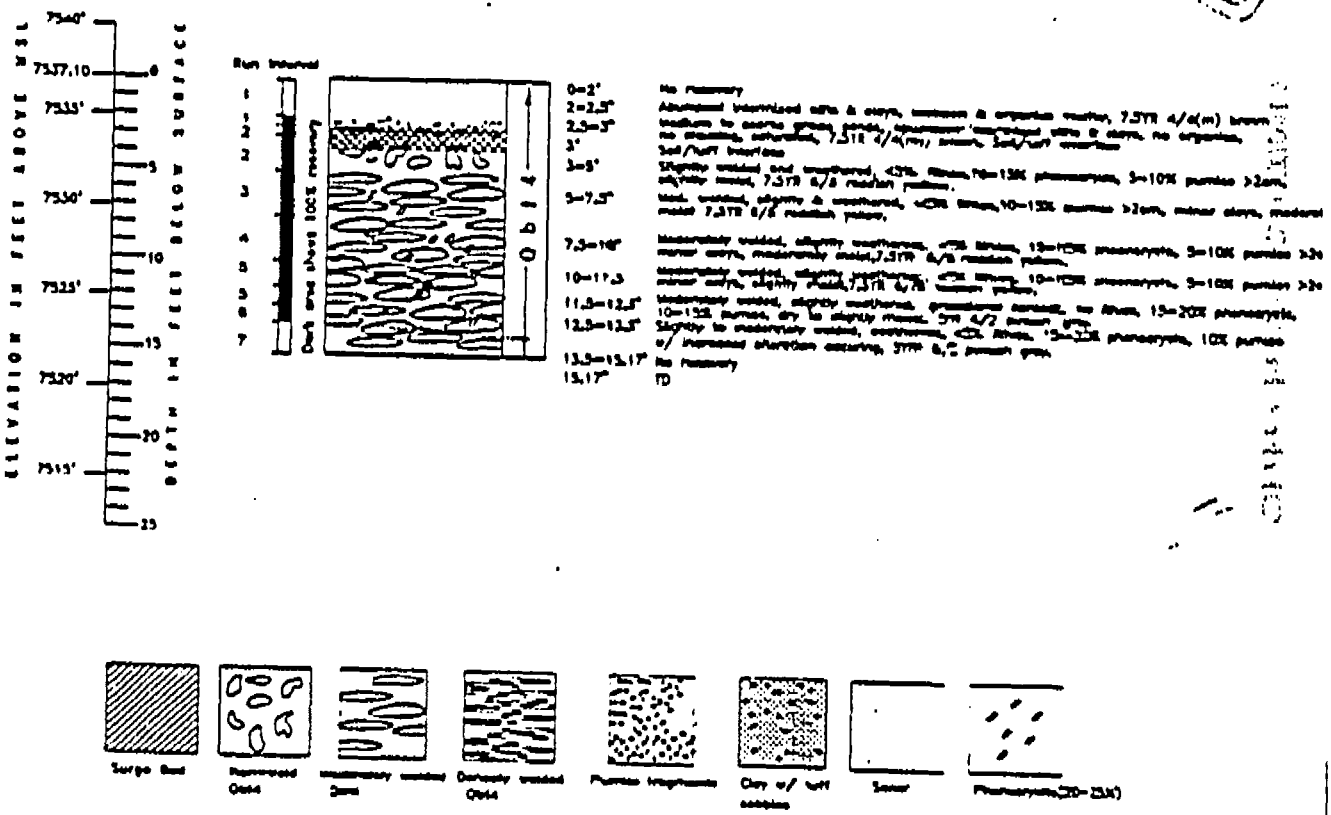
Borehole 16-2705



PRS 16-021(c)
FU # 3
ICF Kaiser

FIGURE. 4.3.1 BOREHOLE 16-2705 CORELOG

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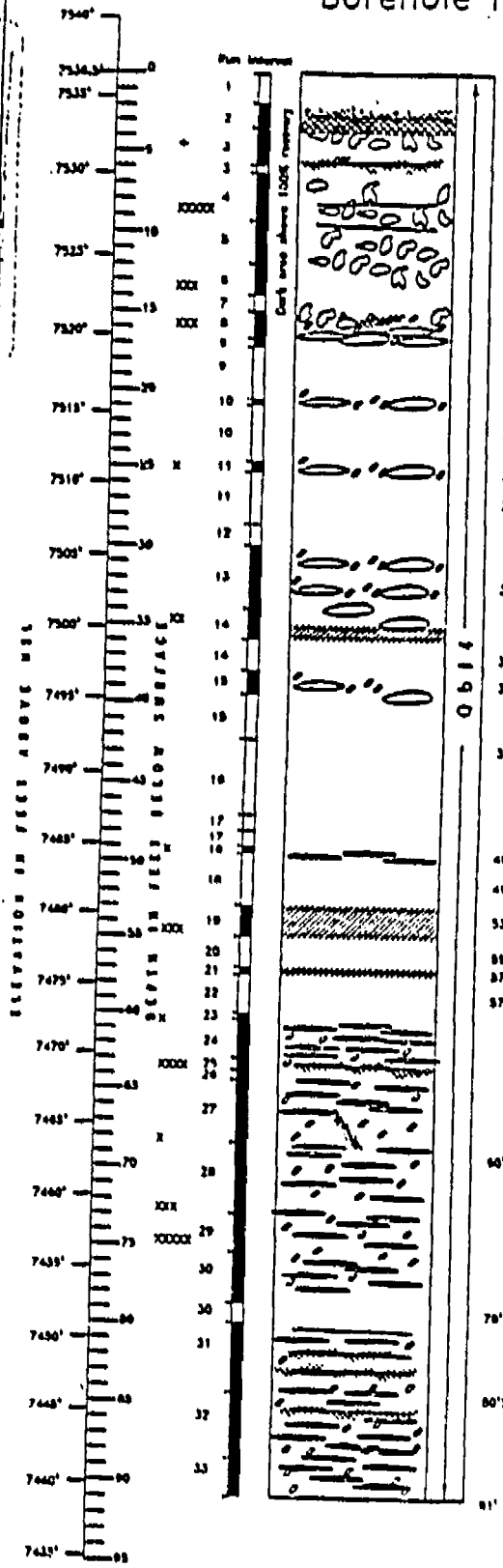
Borehole 16-2735

Eastern Geophysical anomaly - Drainage



0'-1'9" No recovery

1'9"-6' Soil w/half cobbles(basalts) saturated w/water from drilling also predominant, no organics 7.5YR 5/6 strong brown, soil/half interbeds 4-5.5' predominantly clay,some basalts grown,7.5YR 4/1 dark gray

6'-6'6" No recovery

6'-14' Slightly welded, w/ fractures 6'6"-8'4", 10% pumice fragments, <5% White, 10 % phenocrysts, 2.5 YR 4/3 reddish brown, wet from drilling.

14'-14'6" No recovery

14'6"-17'2" Weathered, slightly to moderately welded,increase in phenocrysts,20-30%, 5% White, 5% pumice, 2.5 YR 4/3 reddish brown, wet from drilling.

17'2"-20'6" No recovery

20'6"-21' Minor to no weathering, welded, 20-25% phenocrysts, 5% White, 5% pumice, 2.5YR 5/1 reddish gray

21'-24'9" No recovery

24'9"-25'4" Minor to no weathering, welded, 20-25% phenocrysts, 5% White, 5% pumice, 2.5YR 5/1 reddish gray

25'4"-29'6" No recovery

30'-36' Mod. welded, 20-25% phenocrysts,<5% White, 5% pumice, 2.5YR 5/1 reddish gray
Surge bed 35'-36' sandy, minor clays.

36'-38' No recovery

38'-39'6" Slight to mod. welded, 15-20% phenocrysts,<5% White, 5% pumice, 10YR 5/2 grayish brown.

39'6"-49' No recovery

49'-49'6" Densely welded, 10-15% phenocrysts,<5% White, 5% pumice, 10YR 5/2 dark brn.

49'6"-53' No recovery

53'-55' Slough 53-53'6". Surge bed 53'6". sandy texture, alteration, pressecrete.
53'-6"-53'6" 10YR 5/4 yellowish brn, 53'6"-54'2" 2.5YR 6/1 reddish gray,
54'2"-55' 10YR 5/4 yellowish brown

55'-57' No recovery

57'-57'6" Surge bed, sandy 10YR 5/4 yellowish brown,

57'6"-60' No recovery

60'-78'10" Welded, 20-25% phenocrysts, <5% pumice, <5% White, smectite weathering on 5% olive pyroxene, high angle fracture from 67'-68'4" w/ some clay development, moist from drilling.
60'-63'10YR 5/1 reddish gray, 63'-63'10" 10YR 5/2 weak red, 63'10" -78'10",
10YR 4/1 dark reddish gray.

78'10"-80'3" No recovery

80'3"-91' Densely welded, 20-25% phenocrysts, <5% pumice, <5% White, smectite development on olive pyroxene, fractures 80'11"-81'1", 82'3"-82'6",87'6"-88'
10YR 4/1 dark gray, color change @ 89'6" to 2.5YR 4/1 dark reddish gray.

91' TD

RQK Dwisch results
NO = below detection 3X = 2-3ppm 1+ = 5-8ppm
1X = 0-1ppm 4X = 3-4ppm 2+ = >8ppm
2X = 1-2ppm 5X = 4-5ppm

PRS 16-021(c)
FU # 3
ICF Kaiser

FIGURE. _____ BOREHOLE 16-2735 CORELOG

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Borehole 16-2701 Eastern Geophysical anomaly - north

0.0'

0.0'-2.0'- no recovery

2.0'-2.33'-dacite cobble, silts and clays
2.33'-3.5'-no recovery
3.5'-4.75'-intermixed silts and clays, dacite and tuff gravels
4.75'-5.5'-no recovery
5.5'-8.5'-intermixed silts and clays, dacite and tuff gravels
8.5'-9.5'-no recovery
9.5'-10.5'-heavly weathered Qbt, phenocrysts present, no pumice 7.56 YR 6/6(m)

10.0'

10.5'-11.5'-no recovery
11.5'-12.75'-heavly weathered Qbt, 15-20% pheno, <5% lithics,10-15% devitrified pumice
12.75'-13.5-no recovery
13.5'-15.5'-heavly weathered Qbt, 15-20% pheno, <5% lithics,10-15% devitrified pumice
15.5'-19.5'-heavly weathered,slightly welded Qbt, 15-20% pheno, <5% lithics,10-15% devitrified pumice, 7.5YR 6/6(

20.0'

19.5'-21.0'-slightly welded Qbt, <5% lithics, 25-30% pheno, <5% pumice 5YR 6/4(d)
21.0'-21.5'- no recovery
21.5'-23.5'-slightly welded Qbt, 5% lithics, 25-30% pheno, <5% pumice 5YR 6/4(d)
23.5'-25.0'-slightly welded Qbt, 5% lithics, 25-30% pheno, 5-10% pumice 5YR 6/4(d)
25.0'-25.5'- no recovery

28.5'-29.5':
3.6ppm RDX

25.5'-31.0 -slightly welded Qbt, <5% lithics, 20-25% pheno, <5% pumice 5YR 6/2(d)

30.0'

31.0'-31.5'-no recovery
31.5'-33.5'-slightly welded Qbt, <5% lithics, 20-25% pheno, <5% pumice 5YR 6/2(d)

33.5'-35.0'-slightly welded Qbt, <5% lithics, 25-30% pheno, <5% pumice 5YR 6/2(d)
35.0'-35.5'-no recovery
35.5'-43.0'-slightly to mod. welded Qbt, <5% lithics, 25-30% pheno, <5% pumice 5YR 6/2(d)

40.0'

43.0'-43.5'-no recovery
43.5'-45.0'-slightly to mod. welded Qbt, <5% lithics, 25-30% pheno, <5% pumice 5YR 6/1(d)
45.0'-45.5'-no recovery
45.5'-46.5'-slightly to mod. welded Qbt, <5% lithics,25-30% pheno, <5% pumice 10YR 6/2(d)
46.5'-46.75'-clay present, slightly moist, 10YR 6/2(m)

50.0'

46.75'-47.5'-slightly to mod. welded Qbt,<5% lithics,25-30% pheno,<5% pumice 10YR 6/2(d)
47.5'-62.0'-surge bed with clay bedding, slightly moist, 10YR 6/2(m)

51.0'-51.25'-darker, grainy band, 10YR 5/4(m)

58.0'-59.0':
2.8ppm RDX

56.5-57.5'-grainy texture, 7.5YR 7/1(m)

60.0'

60.0'-62.0'-7.5YR 7/1(d)
62.0'-62.5'-no recovery

69.25'-69.75':
2.4ppm RDX

62.5'-65.0'-soft Qbt,possible semectite alteration (5YR 8/4(d)),64.2'-clay layer
65.0'-66.5'-slightly to moderately welded Qbt,no lithics,25-30% pheno w/ semetite alteration on clino.,<5% pumice, dry,7.5YR 6/1(d)
66.5'-67.0'-moderately welded Qbt,no lithics,25-30% pheno w/ semetite alteration on clino., sanidine present,no pumic dry,5YR 4/1(d)

70.0'

67.0'-69.25'-no recovery
69.25'-69.5'-moderately welded Qbt,no lithics,25-30% pheno w/ semetite alteration on clino.,no pumice,dry,5YR 5/1(d

69.5-69.75'-no recovery
96.75'-72.0'-densly welded Qbt,no lithics,20-25% pheno. w/ semectite alteration on clino.,no pumice,sanadine present, 5YR 4/1(m)
72.0'-81.0'-densly welded Qbt,no lithics,30-35% pheno. in clusters w/ semectite alteration on clino.,no pumice,sanadin present,5YR 4/1(m)

80.0'

58909.1

Los Alamos

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Removed from Baytos & Marked to 16-000026

memorandum

TO: L. Strett, D. Loughran, M-1, J. Baytos M-1 DATE: 10 October 1984

FROM: M. J. Urizar MAIL STOP/TELEPHONE: C920/7-4325

SYMBOL: M-1

SUBJECT: IMPACT SENSITIVITY

SAMPLE	SENSITIVITY 50% Height log units	SENSITIVITY 50% Height cm	SENSITIVITY σ log units	STABILITY ml/g/48 h at 120°C
Type 12				
Std. TNT	2.1634	146.0	0.034	
Dirt + 25% HE	2.1468	140.0	0.074	
LAS-I-141 95% DINGU 5% Exon 461	2.0218	105.0	0.068	
Type 12B				
Std. TNT	NO GO AT 320 CM.			
Dirt + 25% HE	2.2009	159.0	0.076	
LAS-I-141	1.9438	87.9	0.077	

M. L. Clancy

M. L. Clancy

M-1-F-43

#59175

MEETING NOTES

Meeting with HRMB and LANL ER Project Personnel
TA-16-260 RFI Report/CMS Plan

Date: Wednesday, March 25, 1998
Location and Time: NMED HRMB Offices, 0800 hrs

Attendees:
Barbara Toth, HRMB
John Young, HRMB
John McCann, 260 RFI Rpt Team
Mark Tardiff, 260 RFI Rpt Team

BACKGROUND

The LANL ER Project is in the process of preparing an RFI Report documenting the Phase II investigation work at the TA-16 260 Outfall (PRS 16-021(c)). The purpose of this meeting was to discuss the risk assessment approach for the RFI Report due in the summer of 1998. At this point in time LANL had proposed to include in the RFI Report a baseline risk assessment for human health and an eco-risk screening assessment.

DISCUSSION

LANL provided a background presentation on the 260 Outfall including location and physical site conceptual model, a summary of the investigations conducted to date, and planned activities for the CMS. The requirements for a baseline risk assessment, and risk-based decision making under a RCRA Corrective Action context for this site were discussed in detail. Many risk assessment and CMS process decisions were made at this meeting and are documented as follows:

1. Phase II RFI Report (due Summer 1998)

   Because the 260 RFI Report Team is recommending a Phase III sampling campaign during the CMS, it was concluded that a baseline risk assessment is <u>not</u> appropriate for inclusion in the Phase II RFI Report. Additional data collection is required to complete the conceptual model and confirm source and hydrogeological connections. The baseline risk assessment for the site should be delayed until this information is collected. The Phase II RFI Report will include data assessment, conceptual model development, and both human health and ecological screening assessments.

   The human health risk approach will <u>not</u> include an evaluation of a residential exposure scenarios assuming that LANL: 1) can document that an industrial land use is planned for this area, and 2) should conditions change beyond the LANL planning window, appropriate property control and transfer procedures will occur to assure conditions are re-evaluated prior to the new land use. The human health screening assessment for the Phase II RFI Report, and subsequent risk assessment to follow, will evaluate the following industrial exposure scenarios:

   - environmental worker,
   - worker trail user, and
   - construction worker

2. CMS Plan (due by the end of FY 98)

The CMS Plan will include the following components:

- A recommendation for a source removal Interim Measure (IM) targeted for completion in 1999. Removal of the highly contaminated source material at this outfall will alleviate additional transport of contaminants into the subsurface and alluvial systems in Cañon de Valle. Source removal early in the process will also provide credibility to the approach for evaluating contaminants remaining in the environment during the CMS process to follow.

- The areal extent for the CMS consists of the basin delineation of Cañon de Valle to the confluence of Water Canyon, plus the subcanyon for Martin Spring. A point of compliance for Cañon de Valle is not obvious at this time because the confluence of Cañon de Valle and Water Canyon is dry. Current thinking is that the point of compliance may default to the point where Cañon de Valle looses flow to the subsurface.

- Phase III Investigation Sampling and Analysis Plan.

- Approach to Human Health and Ecological risk assessments assuming the source removal discussed above. The human health risk assessment will concentrate on contaminants remaining in the subsurface following the IM discussed above, potential contaminant fate and transport of these contaminants, and impacts to the alluvial and deeper groundwater systems at the site. The human health risk assessment will evaluate the industrial land use exposure scenarios discussed in Item 1 above.

- Documentation of the technology screening efforts conducted with ITRD and treatability study proposals.

3. IM Plan

A plan detailing the source removal effort will be prepared to accomplish the IM in 1999. This plan will consider both risk-based cleanup levels and practical engineering approaches. The plan will include a SAP to characterize the extent of contamination remaining in the environment following source removal. This information will be included in the risk assessment and CMS efforts to follow.

4. Phase III RFI Report (Ttile Optional)

A report documenting the results of the Phase III data collection, conceptual model refinement, and IM efforts will be prepared. This report will include both human health and ecological risk assessments to be used during the final CMS process to follow.

5. CMS Report

A CMS Report will be prepared that focuses on the contaminants remaining in the unsaturated subsurface, the alluvial system in Cañon de Valle, and groundwater. Remedial alternatives and long term monitoring will be addressed.

ACTION ITEMS

1. HRMB to determine if CMS process outlined above is acceptable for decision making and deliverable outline development.

2. LANL to prepare a Technical Memorandum documenting assumptions and parameters for the industrial land use exposure scenarios for the environmental worker, worker trail user, and future construction worker.

5.3 HE Sumps and Active Outfall at TA-16-260, SWMUs 16-003(k), 16-021(c)

5.3.1 Background

This aggregate consists of 13 high explosive sumps, their drain lines, the outfall, and the well-defined drainage channel associated with TA-16-260 (Fig. 5-6; Tables 5-4, 5-5). The sumps have been designated SWMU 16-003(k) and the outfall as SWMU 16-021(c). The outfall is permitted as EPA 05A056. A general background discussion of sumps and their operating principles is given in Subsection 5.2.1.

The outfall receives effluent from the sumps, as shown on Laboratory drawing 13Y-1920756 (Palmer and Abercrombie 1991, 15-16-366). Each sump flows into a trunk line that discharges to the outfall. Sump S14, serving Bay 25 on the southeast end of TA-16-260, has been removed. The outlet of Sump S15 is plugged and the sump is no longer active.

TA-16-260 is a HE machining facility that processes large quantities of explosives. Machine turnings are routed to the sumps as waste. The drainage channel from the outfall is contaminated with explosive waste, including barium nitrate, the primary ingredient in the explosive baratol.

In 1966, the 10-ft wide loading dock on the rear (northeast) of TA-16-260 was removed. New sumps with water-tight aluminum liners were installed adjacent to the northeast wall of TA-16-260. HE-contaminated dirt under the old sumps was removed and replaced with clean, compacted earth. PCOCs are listed in Table 5-21.

5.3.1.1 SWMU Description and History

SWMU 16-003(k). SWMU 16-003(k) is 13 HE sumps and drain lines associated with TA-16-260. Sump dimensions are 90 in. by 36 in. by 31 in. (1 each) and 176 in. by 36 in. by 31 in. (12 each). The waste consists primarily of HE. In 1970, Wilder classed the use of HE as very high and the probability of contamination in the outfall as very high. As shown in Table 5-18, dimethyl sulfoxide was the only solvent found by Panowski and Salgado (1971, 15-16-038; LANL 1989, 15-16-361). Currently, solvents are drummed to prevent their reaching the sump.

TABLE 5-21

POTENTIAL RELEASE SITES AND POTENTIAL CONTAMINANTS OF CONCERN CONTAINED IN OU 1082, TA-16-260 AGGREGATE

PRS NO.	DESCRIPTION	PRIMARY ACTIVITY LEADING TO POTENTIAL PROBLEMS	ACTIVE	HE		RAD	METALS		ORGANICS		
				UNDETONATED HE	HE DEGRADATION PRODUCTS	URANIUM	METALS SUITE	BARIUM	VOLATILES	SEMIVOLATILES	CYANIDE
16-003(k)	HE sump	HE machining	Y	x	x	x	x	x	x	x	x
16-021(c)	TA-16-260 outfall	HE machining	Y	x	x	x	x	x	x	x	x

The two sumps serving machining Bays 22 and 23, and 24 and 25 receive barium precipitation treatment. After pH adjustment, barium is precipitated as insoluble barium sulfate by adding sodium sulfate to the sump solution. Barium residues are removed to the TA-16 burning ground when the sumps are serviced.

HE charges to which uranium has been fastened (e.g., glued) have been machined at TA-16-260. Generally, only the HE was machined. Uranium was left intact. Special precautions are taken to prevent uranium from entering the waste water system (LANL 1989, 15-16-361).

In 1955, H-Division reported concerns that airborne particulate levels for TNT exceeded permissible limits at TA-16-260 (H-Division 1955, 15-16-227; and H-Division 1955, 0482).

SWMU 16-021(c). SWMU 16-021(c) is the outfall associated with the 13 HE sumps on the northeast side of TA-16-260 (Fig. 5-6). Although listed as inactive in the SWMU Report, the outfall is active (LANL 1990, 0145).

The drainage channel from the outfall flows about 600 ft to the bottom of Cañon de Valle, a drop in elevation of 80 ft. The drainage channel from the outfall is well defined, with apparent high-water marks. The water flows over a 15-ft high cliff approximately 500 ft from the outfall. A small pond approximately 55 ft long is formed by a rock dam located 93 ft from the outfall. HE-contaminated water from the outfall enters the pond about 40 ft from the outfall. The longitudinal axis of the pond is oriented east-west with flow in the easterly direction. The dam is about 9 ft thick, but only the first 2 ft of rock are closely packed. At present, the water in the pond is less than 2 in. deep and covers only a small area, although the soil and sediment are wet throughout the pond. Rain water from the roadway on the northeast side of TA-16-260 also flows into the pond. Bioremediation and other experiments are presently being conducted in the pond.

5.3.1.2 Conceptual Exposure Model for HE Sumps and Active Outfalls

The conceptual model for TA-16-260 is identical for that of the inactive HE sumps described in Subsection 5.2.1.2 (see Fig. 4-9).

5.3.1.2.1 Nature and Extent of Contamination

Existing data for the TA-16-260 outfall are extensive and show widespread HE contamination extending from the discharge point to Cañon de Valle (Tables 5-22 through 5-25) (Baytos 1970, 15-16-278, etc.; Turner and Schwartz 1971, 15-16-284; King 1991, 15-16-381; and King 1992, 15-16-380). Values range up to three orders of magnitude greater than SALs.

Baytos analyzed sediment samples taken from the channel during the period 1970 through 1985 (Table 5-22). His study extended several hundred feet from the outfall. The highest concentrations of HMX-RDX and TNT were found in the pond. Concentrations of total HE in the pond have remained uniformly high, from a low of 10.8 wt % in 1971 to 27.0 wt % in 1976 (Baytos 1971, 15-16-277; and Baytos 1976, 15-16-271). Baytos cited an unpublished report from 1960 in which the total HE concentration was 9.8 wt % (Baytos 1972, 15-16-275). In 1991, Barr and King found concentrations as high as 34.1 wt % in the pond (King 1991, 15-16-381; King 1992, 15-16-380). Barr and King also found that HE concentrations were high (4.4 wt %) for a distance of over 200 ft down the drainage. In dry soil, such high concentrations could be considered explosive mixtures under certain conditions (Urizar 1984, 15-16-353). Turner and Schwartz found that waste material from TA-16-260 travels only a short distance down Cañon de Valle.

Baytos' distances from the outfall are approximate (i.e., within 10 ft). Distances the samples were taken from the center line of the pond were not recorded. Therefore, there may be some inconsistencies in the data. For example, two samples taken on March 11, 1960, from the center of the pond have significantly different HE concentrations. However, one sample was taken on the approximate center line of the pond while the other was taken near the edge of the pond.

In 1972, contaminants in TA-16-260 sump water ranged from 0 to 3.2 ppm HMX-RDX, 10 to 18 ppm TNT, and 70 to 1 587 barium nitrate (Roybal 1972, 15-16-439). As part of NPDES permit application, sump waters from TA-16-260 were analyzed for TNT, yielding values ranging from <0.4 to 78 ppm (LASL 1977, 15-16-426). In 1988, Baytos analyzed water samples taken from the outfall. His data are tabulated in Table 5-25.

TABLE 5-22

HIGH EXPLOSIVES IN THE TA-16-260 DRAINAGE CHANNEL

DATE	SAMPLE LOCATION	HMX/RDX	TNT	TOTAL HE
03/11/60	Pond center	8.5	1.3	9.8
03/11/60	Pond center	3.5	1.3	4.8
03/11/60	20 ft below dam	4.3	1.7	6.0
03/11/60	30 ft below dam	3.3	0.7	4.0
03/11/60	100 ft below dam	2.7	0.04	2.7
03/11/60	150 ft below dam	0.5	0.02	0.5
04/29/70	Outfall	7.0	0.0	7.0
04/29/70	Pond center	20.5	3.7	24.2
04/29/70	1 ft below dam	4.8	0.07	4.9
04/29/70	Between dam and cliff	12.9	0.12	13.0
04/29/70	Cliff	3.9	0.10	4.0
11/18/70	10 ft from outfall	3.2	0.0	3.2
11/18/70	Inlet to pond	14.1	0.1	14.5
11/18/70	10 ft above dam	22.1	0.5	22.6
11/18/70	5 ft below dam	14.5	0.2	14.7
11/05/71	10 ft from outfall	2.9	0.0	2.9
11/05/71	Pond inlet	10.8	0.0	10.8
11/05/71	10 ft above dam	25.7	0.0	25.7
11/05/71	10 ft below dam	22.5	0.0	22.5
08/22/73	10 ft from outfall	1.3	0.0	1.3
11/14/74	Outfall	1.7	0.0	1.7
11/14/74	1 ft above dam	17.1	0.1	17.8
11/14/74	50 ft below dam	13.7	0.2	13.9
12/05/75	10 ft from outfall	0.2	0.0	0.2
12/05/75	1 ft above dam	9.2	0.0	9.2
11/19/76	10 ft from outfall	0.2	0.0	0.2
11/19/76	50 ft from outfall	3.0	0.1	3.1
11/19/76	65 ft from outfall	26.7	0.3	27.0
11/19/76	250 ft from outfall	17.3	0.3	17.6
07/18/84	3 ft from outfall	0.3	0.0	0.3
07/18/84	30 ft from outfall	10.4	0.9	11.3
07/18/84	50 ft from outfall	16.7	2.3	19.0
09/12/85	30 ft from outfall	2.0	0.1	2.1
09/12/85	110 ft from outfall	26.6	4.8	31.4
09/12/85	230 ft from outfall	1.7	0.1	1.8

Quantities of explosives are given in weight percent (wt %). Surface samples were taken from the sediment. Most samples were taken along the center line of the drainage channel. Distances are approximate. The sampling technique and analytical method are described in Baytos 1972, 15-16-275. Data from Baytos (1970-1985, 15-16-278 to 15-16-268). Soil SALs: TNT = 40 ppm (0.004 wt %), HMX = 4 000 ppm (0.4 wt %), RDX = 64 ppm (0.0064 wt %), and barium = 5 600 ppm.

TABLE 5-23

HIGH EXPLOSIVES AND BARIUM IN SOILS AND WATER AT TA-16-260

SAMPLE	MEDIA	HMX/RDX	TNT	BARIUM
3	Sump water	0.3	33	4
19	Water	1.5	3	30
20	Soil	0.6	1	9

Data from Turner and Schwartz (1971, 15-16-284). All values in ppm. Soil samples represent 4-hour Soxhelt extractions. Soil SALs same as Table 5-22. Water SALs: HMX = 1.8 ppm, RDX = 0.00032 ppm, TNT = 0.0175 ppm, and barium = 1 ppm.

TABLE 5-24

HIGH EXPLOSIVES IN THE TA-16-260 DRAINAGE CHANNEL, BARR-KING DATA OF 1991*

SEDIMENT SAMPLE LOCATION	HMX/ RDX	TNT	TOTAL HE	BARIUM
1 ft from outfall	3.4	0.1	3.5	
20 ft from outfall	1.8	1.0	2.8	
40 ft from outfall	0.1	<0.1	0.1	
45 ft from outfall	2.9	<0.1	2.9	
50 ft from outfall, pond center line	4.9	<0.1	4.9	
60 ft from outfall, pond center line	6.4	0.1	6.4	
60 ft from outfall, north edge of pond	0.5	<0.1	0.5	
70 ft from outfall, pond center line	9.1	0.6	9.7	
70 ft from outfall, north edge of pond	19.0	2.0	21.0	
80 ft from outfall, pond center line	22.3	3.0	25.3	
90 ft from outfall, pond center line	26.7	2.0	28.7	
90 ft from outfall, 12 in. from north edge	7.6	<0.1	7.6	0.85
91 ft from outfall, pond center line	3.0	<0.1	3.0	0.43
91 ft from outfall, pond center line, 2 in. deep	7.6	<0.1	7.6	0.53
91 ft from outfall, pond center line, 8 in. deep	6.1	0.2	6.3	0.51
91 ft from outfall, pond center line, 13 in. deep	13.5	0.4	13.9	0.46
91 ft from outfall, 8 in. from edge, 13 in. deep	24.8	9.3	34.1	0.33
91 ft from outfall, 12 in. from edge, 13 in. deep	27.8	1.0	28.8	0.67
110 ft from outfall	7.6	0.3	7.9	
135 ft from outfall	2.3	<0.1	2.3	0.35
210 ft from outfall	4.4	<0.1	4.4	0.65

Quantities of explosives and barium are given in weight percent (wt %). Surface samples were taken from the sediment along the center line of the drainage channel, unless otherwise specified. Soil SALs same as Table 5-22.

* (King 1991, 15-16-381; and King 1992, 15-16-380).

TABLE 5-25

DAILY WATER TESTING FOR CONTAMINANTS IN HIGH EXPLOSIVES SUMPS, TA-16-260 OUTFALL*

DAY:	1	2	3	4	5	6	7	8	9	10	MEAN	STANDARD DEVIATION	SALs WATER (ppm)
pH	7.91	7.80	7.80	7.90	7.98	7.80	7.95	8.10	9.20	7.85	8.03	0.422	
Suspended solids	2.6	4.6	3.1	2.6	6.2	0.0	2.0	0.8	1.3	0.9	2.4	1.88	
TNT	0.06	0.0	0.0	0.02	0.0	0.04	0.0	0.0	0.01	0.19	0.03	0.059	0.0175
RDX	2.25	0.0	0.03	0.02	0.0	0.34	0.0	0.04	0.03	1.19	0.39	0.751	0.00032
HMX	1.29	2.06	1.96	1.92	1.53	2.70	1.47	1.53	1.61	2.47	1.85	0.458	1.6
Acetone	nd	nd	nd	nd	nd	0.3	nd	0.1	0.2	0.1	-	-	3.5
MEK	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	-	1.7
Bu-Ac	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	-	
Toluene	nd	nd	nd	nd	nd	nd	7.7	0.1	nd	nd	-	-	0.75

* Baytos 1988, 15-16-266
Quantities are given in parts per million (ppm). Samples were taken on ten consecutive working days.
Mean and standard deviation computed by others.
nd: Not detected
MEK: Methyl ethyl ketone
Bu-Ac: n-Butyl acetate

5.3.2 Remediation Decisions and Investigation Objectives

Problem Statement (DQO Step 1)

The 13 sumps with a common outfall at TA-16-260 are all associated with HE processing activities. Archival data indicates extensive HE contamination is present, at levels as high as 30 wt% in soil. Other COCs include barium and other metals, uranium, semivolatiles, and volatiles. The primary goal of Phase I for these sumps will be to bound the region of contamination. A secondary goal is to detect PCOCs other than HE in those regions of this SWMU where HE contamination is minimal. All of these sumps are currently in active use. Their outfall has not been plugged, so the associated drain lines and their common outfall are also active. Current WX Division plans call for this drain line to be plugged by 1995 or at the latest by 1996. Field activities will be deferred until the drain line is plugged.

Sampling will be necessary to determine a boundary for the HE-contaminated zone. The extant information will be used to provide information for Phase II

sampling plans, to proceed directly to a VCA followed by additional sampling, or possibly to proceed to a corrective measures study (CMS).

Since the sumps and their upstream feeder troughs are still in active use and the drain lines, in most cases, lie under paved areas, sampling will be confined to the outfall and drainage. Action on the sumps themselves and their associated drain lines will be deferred until decommissioning and decontamination.

Decision Process (DQO Step 2)

Based on the existing date, the highly contaminated central portion of the TA-16-260 drainage will undergo a VCA or CMS. A Phase I study will be conducted to determine which of the following should be recommended for the remainder of the TA-16-260 outfall: 1) Phase II study (if additional information is needed to bound HE-contaminated region); 2) VCA (if Phase I study provides enough data to select a viable and cost-effective remediation option); or, 3) CMS (if Phase I study provides enough data to determine nature and extent of contamination, but additional information on costs and treatment methods are needed before proceeding with remediation). A baseline risk assessment for this site is not deemed to be necessary, because existing data suggest a potential detonation hazard. Current operating procedures restrict worker access to this SWMU.

Possible remediation alternatives include: 1) removal of HE-contaminated soil to a permitted landfill after removal of sufficient HE at the TA-16 burning ground to eliminate any safety risk in transporting the soil off-site; 2) *in-situ* degradation of HE by composting; or, 3) thermal, chemical, or biological treatment of HE-contaminated waste followed by replacement of clean soil. Following remediation the area will be resampled to verify cleanup.

Fig. 5-25 illustrates the decision process.

5.3.3 Data Needs and Data Quality Objectives

Decision Inputs and Investigation Boundary (DQO Steps 3 and 4)

In Phase I, the decision process will be applied to the surface soils of the TA-16-260 outfall and the associated drainage located below the TA-16-260 outfall. In Phase I, the following questions will be addressed.

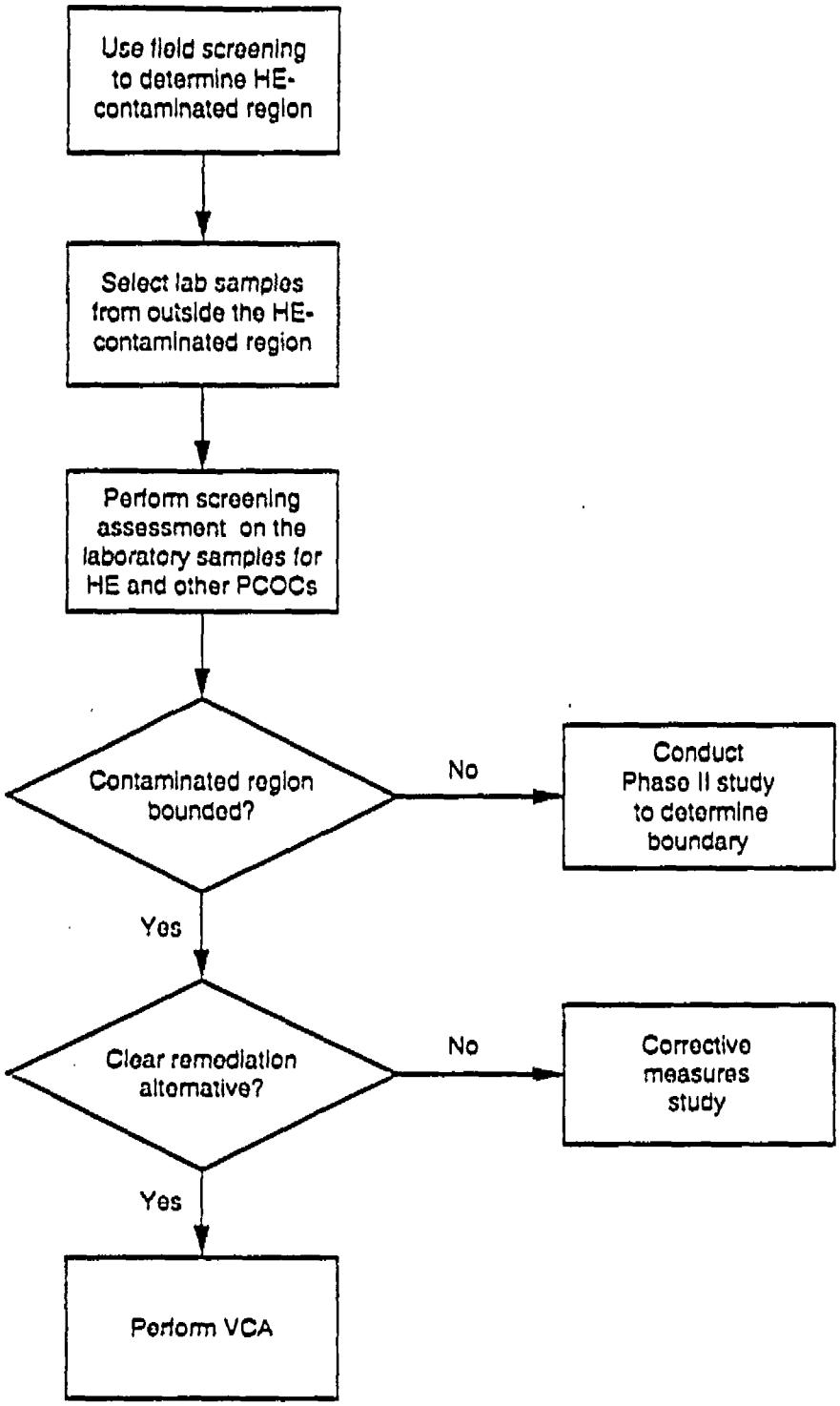

Fig. 5-25. Decision flow for TA-16-260 sumps.

1. How does the HE contamination vary in the TA-16-260 drainage and how far does it extend laterally and down the drainage?

2. Do the levels of semivolatiles, uranium, barium, or other metals differ from background, and if so, do they exceed SALs in the surface soils of the drainages associated with the TA-16-260 outfall in the area outside the HE-contaminated region, which will be remediated?

Additional questions regarding possible vertical transport of HE into the subsurface soils or into bedrock, and potential subsurface contamination from volatiles, semivolatiles, uranium, and other metals will be deferred until after VCA, due to the hazards of subsurface drilling in an area highly contaminated with HE.

The data needed to answer the first question are the concentrations of HE in the surface soils bounding the TA-16-260 drainage. The data needed to answer the second question are the concentrations of the other potential contaminants in the surface soils bounding the drainages. Surface contaminants will be assumed to be concentrated in the natural sediment traps of the drainage. The sampling will proceed downslope to Cañon de Valle, which will be sampled as described in Subsection 5.9.

The drainage channel for TA-16-260 is well defined, so lateral sampling is proposed at 5 ft from the drainage. The OU 1082 team considers it unlikely that contamination has reached a distance of 5 ft from the edge of HE-contaminated central drainage, but due to the magnitude of contamination in the site, the assumption will be verified.

Decision Logic (DQO Step 5)

The perimeter sample plan uses field screening to provide a bound on the HE-contaminated region, so laboratory samples directly outside the TA-16-260 drainage will be intended to confirm the absence of contamination outside the field-screened-clean region. The perimeter of the HE-contaminated region will be determined using a grid of HE field screening points, supplemented by additional field-screening points where needed to achieve negative HE spot tests. Laboratory samples will be taken outside the known HE-contaminated region. Based on the results of Phase I study,

proceed as follows: 1) If the laboratory samples contain HE, barium, uranium, or other COCs at levels different from background and the sample maxima are above SALs, then initiate a Phase II study to further delineate the boundary of the HE-contaminated region; 2) if the HE-contaminated region has been bounded, perform VCA followed by cleanup verification monitoring within the remediated zone; and, 3) if sufficient information on the nature and extent of contamination is available, but additional data are needed prior to implementing remediation, perform a CMS. This study would involve feasibility studies focused on determining the most efficient, cost-effective, and safe method of remediating such a highly HE-contaminated area.

Design Criteria (DQO Step 6)

A 20 ft downslope spacing was selected for radiation and HE field screening, because such an interval roughly corresponds to a scoop distance for a small backhoe, which may be used during VCA. A 5 ft lateral spacing would detect contaminants transported from the well-defined central drainage during over-bank flooding events. The entire length of the drainage, from the outfall to Cañon de Valle, will be investigated, because existing data suggests that HE and barium discharged from TA-16-260 have reached Cañon de Valle.

Radiation screening: Radiation screening will be conducted to check for the presence of uranium. Based on the likely limited transport of uranium in the drainage (Becker et al. 1985, 0029) and the unlikely possibility of uranium discharge from TA-16-260, radiation field screening will be limited to the first 100 ft of the drainage during Phase I.

Surface samples: A perimeter sampling approach will be applied that combines measurements from HE field screening and analytical samples. Field screening will be applied as described in Subsection 5.3.4 to determine the edge of HE-contaminated area. Based on the results of HE field screening on a grid, 14 analytical samples will be taken outside the HE-contaminated region, as delineated by field-screening. A 100-ft interval for these laboratory samples should provide adequate coverage of the soils bounding the central drainage. These laboratory samples will be used to check for barium and for HE occurring at levels above SALs but below the

limit of detection of the HE spot test. Additional samples will be taken where radiation field screening results yielded above background levels in order to examine the possible presence of uranium.

5.3.4 Sampling and Analysis Plans

The outfall from the sumps associated with machining building TA-16-260 are by far the most contaminated of any at S-Site (see Subsection 5.3.1.2.1).

The HE sumps described in this subsection are all active. In addition, the drain line for these sumps is in use, although WX-3 will soon plug the outfall (Barr 1992, 15-16-329). Thus, no sampling in the sumps or under and around the active drain line is proposed at this time.

SOPs that control field activities in this sampling plan are listed in Table 5-26. Sample numbers and necessary analyses are shown in Table 5-27. Field screening methods are described in Subsection 4.7. SOPs for field screening are currently in preparation.

TABLE 5-26

STANDARD OPERATING PROCEDURES FOR FIELD ACTIVITIES

LANL-ER-SOP	TITLE	NOTES
01.02, R0	Sample Containers and Preservation	Applied to all laboratory samples
01.04, R1	Sample Control and Field Documentation	Applied to all laboratory samples
06.11, R0	Stainless Steel Surface Soil Sampler	All 0 to 6 in. surface samples

5.3.4.1 Engineering Surveys

A detailed engineering survey is needed to delineate the boundaries of the drainage from the HE outfall accurately in the field, as well as to lay out sampling points for radiation screening, HE screening, and surface sampling along the channel boundaries.

All sample locations will be registered on a base map, scale 1:7 200. If, during the course of sampling, any sample points must be relocated, the new position will be resurveyed and the revised locations will be indicated

TABLE 5-27

SUMMARY OF SITE SURVEYS, SAMPLING, AND ANALYSIS FOR TA-16-260

PRS	PRS TYPE	Laboratory Samples: Sampled Media	Structure	Structure: Field dup	Surface	Surface: Field dup	Subsurface	Subsurface: Field dup	Field Screening: Gross Alpha	Gross Gamma/Beta	Organic Vapor	HE Spot Test	Geophysics Surface	Barium - LIBS	A Geological Characterization	Field Lab.: Gross Alpha	Gross Gamma/Beta	Tritium	Volatile Organics	B XRF	Soil Moisture	Laboratory Analyses: Alpha spectroscopy	Gamma spectroscopy	C Beta spectroscopy	Total Uranium	Isotopic Plutonium	Isotopic Uranium	D VOA (SW 8240)	E Semivolatiles (SW 8270)	F Metals (SW 6010)	G PCBs (SW 8080)	H High Explosives (SW 8330)	Cyanide
16-003(k)	HE sump	Sediments			14	1				30#		155#													14#				14#	14#		14#	14#
16-021(c)	HE sump outfall (a)	Sediments																															

(a) Both SWMUs are covered by the same sampling plan

A, B, C, G = not applicable; D, E, H = full suite; F = 1082 suite.

The actual number of points will depend on the results of the field screening as it defines the lateral boundaries of the contaminated area.

on the map. The engineering survey will be performed by a licensed professional under the supervision of the field team leader.

The field-screening points will be centered perpendicularly from the main drainage from the outfall behind TA-16-260 (Fig. 5-26). Points for field screening will be surveyed at 20 ft downstream intervals and 5 ft lateral intervals, for those areas where the drainage is wider than 5 ft, within the main channel downstream from the outfall egress point to Cañon de Valle. In addition, two points, spaced at 5 ft intervals, will be surveyed to the northeast and southwest of the edge of the main drainage channel and pond. The surveyed points will thus provide an approximately 31 x 5 ft grid for HE screening extending roughly 600 ft from the outfall to Cañon de Valle. Low-energy gamma radiation measurements for the detection of uranium and other radionuclides will be reported at the point surveyed above for a distance of 100 ft from the outfall at the grid intervals. Measurements will be examined for high values that would be used to guide the sampling described in the following sections. Field screening for HE (Baytos 1991, 15-16-339) will be performed at the points surveyed as described above. If positive HE or above-background radiation field-screening measurements are found in the points located at 10 ft from the drainage channel and pond, additional field-screened points, spaced at 5 ft intervals, will be surveyed and screened until the soils field screen as uncontaminated with HE or uranium. No field-screening for either HE or radiation will be done within the pond itself, because of the potential explosive risk to workers operating in this region. The goal of this HE field screening is to provide constraints on the downslope and lateral extent of the HE-contaminated region extending away from the central drainage channel and outfall to facilitate a VCA.

Thus, we will define a perimeter that bounds the highly HE-contaminated region using inexpensive field-screening techniques.

5.3.4.2 Sampling

Surface samples for laboratory analysis will be taken to investigate PCOC concentrations in areas abutting the channel, which is slated for VCA. Thus, if the environmental transport mechanisms for HE and other PCOCs such as barium are significantly different, there should be evidence of any other PCOCs that were transported from the channels. These laboratory samples

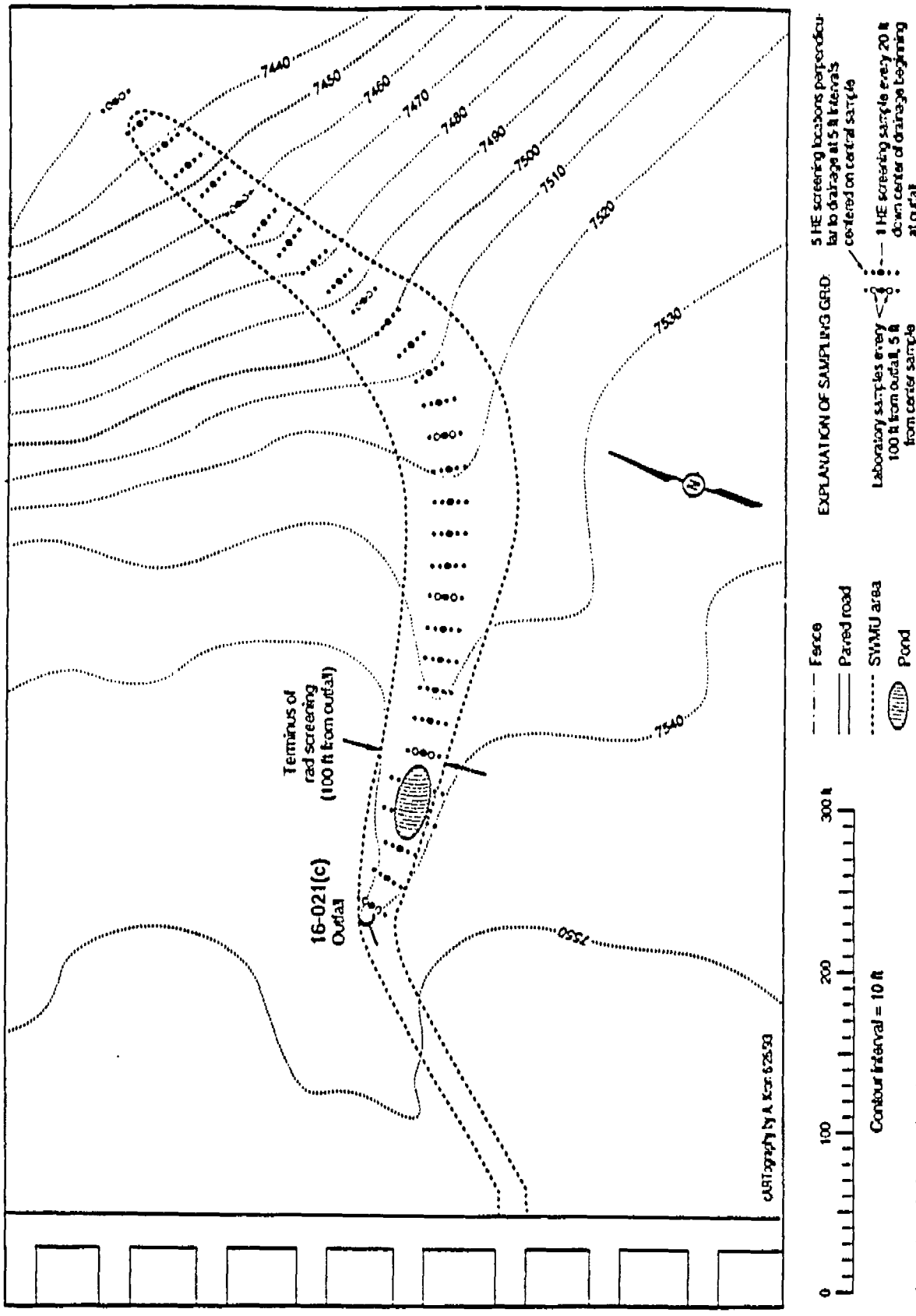

Fig. 5-26. Schematic TA-16-260 sampling grid.

will also provide quantitative information on any low-level HE contamination outside the drainage channels and information on any HE by-products outside the drainage channel. The laboratory surface samples will investigate HE levels in soils near the TA-16-260 outfall that may be present at a level between background and the detection limit for the HE screening.

After determination of the HE-contaminated region using the HE field spot test, laboratory samples will be taken at field-screening points at a distance of 5 ft from the edge of the main drainage on both the northwest and southeast of the drainage channel. These laboratory samples will be taken every 100 ft from the outfall point to Cañon de Valle, for a total of 14 samples. In addition, any points that yield positive results for radiation during the field surveys will be sampled for laboratory analysis. At all of these surface sampling locations, 0 to 6 in. of soil will be collected. The sampling strategy is delineated schematically in Fig. 5-26.

No subsurface sampling is proposed until after VCA, due to the hazards associated with drilling in regions highly contaminated with HE.

5.3.4.3 Laboratory Analysis

Full laboratory analyses of samples will be at Level III using the following methods: uranium (LANL or DOE method), VOCs (SW-846 Method 8240), SVOCs (SW-846 Method 8270), metals (SW-846 Method 6010), and HE and its by-products (SW-846 Method 8330). SOPs used in this sampling plan are listed in Table 5-26. The metal of particular concern for this sampling plan is barium; HE of principal concern are HMX, RDX, TATB, and TNT; HE by-products of concern are HE degradation products and HE impurities such as DNT, DNB, and TNB (See Appendix D).

5.3.4.4 Sample Quality Assurance

Field quality assurance samples will be collected according to the guidance provided in the latest revision of the IWP. Sampling parameters are summarized in Table 5-27, including a listing of appropriate QA/QC field duplicates planned to be collected during the course of the field investigations.

1.4.2.6.1.7.1.2 M. Burgess NOD-RFI Work Plan for OU 1082 (1993)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
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JUL 1 3 1994

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CERTIFIED LETTER: RETURN RECEIPT REQUESTED

Mr. Joseph C. Vozella, Chief
Environment, Safety and Health Branch
Department of Energy
Los Alamos Field Office
Los Alamos, NM 87544

Re: Notice of Deficiency, RFI Work Plan OU 1082
Los Alamos National Laboratory
NM0890010515

Dear Mr. Vozella:

The Environmental Protection Agency (EPA) has reviewed the RCRA Facility Investigation (RFI) Work Plan for Operable Unit 1082 (OU 1082) dated July 16, 1993 and found it to be deficient. Enclosed is a list of deficiencies which need to be addressed within thirty (30) days of receipt of this letter with the exception of the sampling plans noted in deficiency #18 which are due within sixty (60) days of receipt of this letter.

Should you have any questions, please contact Barbara Driscoll at (214) 655-7441. After August 1, 1994 Barbara's number will be changed to (214) 665-7441.

Sincerely yours,

William K. Honker, P.E.,
Chief, RCRA Permits Branch

Enclosure (1)

cc: Mr. Benito Garcia, Bureau Chief
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department

Mr. Jorg Jansen, Program Manager
Environmental Restoration Program
Los Alamos National Laboratory, M992

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Notice of Deficiency
Los Alamos National Laboratory
Operable Unit 1082

General Comments:

1. The baseline risk assessment should use a residential scenario with a 10^{-4} risk until agreement is reached with stakeholders as to future land use scenarios.

2. LANL should note that identification of potential contaminants of concern below screening action levels does not automatically lead to a determination of no further action. The extent of any release must be identified, and if this does not occur in Phase I sampling then it should in Phase II.

3. The format used for the HE sumps is very poor. The sampling plans or figures should be included with the description of each sump. In addition, text skips back and forth between different figures and sump numbers which adds confusion in reading the text. For example, all the SWMUs associated with Figure 5-4 should be discussed together rather than split up.

4. More emphasis should be placed on the actual sampling plans rather than on the data quality objectives. The sampling plans are the most important part of the work plan, and yet there is little detail in the work plan related to this. All work plans should be third party executable.

5. Engineering surveys for locating sampling points should have been conducted prior to writing the work plan. Actual sampling points should be included in the work plan.

6. Approval of any portion of this work plan by EPA does not constitute approval of a voluntary corrective action at any SWMU. LANL shall provide a work plan for each proposed VCA.

7. LANL should provide dates (as available) for when MDA's, lagoons, pits, outfall, etc. become abandoned or inactive. LANL shall indicate whether units are permitted (RCRA, NPDES etc.) or are interim status.

8. Discrete rather than composite samples should be collected in the following sections of the work plan: Section 5.4.4.3 (p.5-110), Section 5.14.4.2 (p.5-258), and Section 5.16.4.2 (p.5-278).

9. All figures of SWMUs with sampling locations or which denote the locations of SWMUs should have contour lines.

Specific Comments:

1. Executive Summary, p. ES-6 Milestone Chart - Does the five years for completion of the RFI field work include completion of field work for the additional work plans being submitted in July 1994 and 1995? In addition, the HSWA permit requires submittal of the final CMS report within 10 years of issuance of the permit which is the year 2000. LANL's schedule shows a final CMS report in May 2002 twelve years after the effective date of the permit. In a letter dated June 27, 1994, EPA requested updated and revised schedules for all OUs, LANL may include their response to this question in the August 5, 1994 response.

2. 1.3 Description of OU 1082, p. 1-10 (last paragraph) - EPA's approval of this work plan does not demonstrate concurrence with the Laboratory units that are proposed for no further action (NFA). EPA will indicate which units do not need to be added to the permit for an RCRA Facility Investigation (RFI) and which may be requested for removal from the permit following a Class III permit modification.

3. Figure 3-1, p. 3-3 - It is unclear where the inset map (MDA P) belongs in this figure. LANL should indicate on the map where the inset is located.

4. 3.4[redacted].2 Soil, p. 3-10 - The soil-tuff interface on the Pajarito Plateau has not been sufficiently characterized for LANL to state that an impermeable clay zone often forms there.

5. Table 4-1, p. 4-8 - Are the background concentrations listed specific to this OU, or are they general for the laboratory?

6. 4.2.3 Voluntary Corrective Actions, p. 4-7 - EPA will approve VCA's on a site-by-site basis. All VCA's which are final remedies will require a Class III permit modification.

7. 4.2.4 Active Sites, p. 4-13 - EPA will evaluate corrective actions at active sites on a case-by-case basis. Inactive sites under active sites will be required to be characterized as is appropriate and may not automatically be deferred to decommissioning.

8. 4.3.1 Potential Contaminants of Concern, p. 4-15 - What is the significance of an high explosive compound being used at TA-16 in quantities greater than 10,000 lbs? Were compounds not considered which were used in volumes lower than 10,000 lbs?

9. 4.3.3.1 Conceptual Site Model, p. 4-18 - The upper two feet are considered the surface soils for purposes of the RFI investigation and not the upper 6 inches as stated in this text. LANL shall revise text accordingly.

10. 4.4.1 Criteria for Recommending NFA, p. 33 - No further action (NFA) requests should follow the baseline risk assessment scenarios agreed to by the Technical Assumptions Task Force of 10^{-6} for carcinogens.

11. Table 4-9, Sample Sizes for Reconnaissance Sampling, p. 4-41 Until LANL can provide the standard operating procedure (SOP) for use of this table, and an explanation of how consistency in usage will be maintained, EPA cannot approve this sampling method. A review of the work plan shows that there is no consistency in use of the table; rather it appears that LANL chooses a number of samples they want to analyze and then goes to the table to determine the probability and fraction of site affected.

12. 4.7.3 Analytical Laboratory Methods, p. 4-48 - LANL shall provide rationale for using a subset of metals from the SW-846 6010 analysis for metals. LANL shall provide an explanation for all the analysis tables which indicate that for "E Semivolatiles (SW 8270), a full suite is PAH". LANL must request a reduction in analysis from 40 CFR Part 261 Appendix IX and provide the basis for that request prior to the initiation of field work.

5.1.1.1 Description and History, p 5-11

13. SWMU 16-001(c), p. 5-4 - LANL shall provide the dimensions of this tank.

14. SWMU 16-001(d), p. 5-5 -

a. LANL shall provide information related to when this dry well was abandoned and when the floor grooves of building TA-16-208 were plugged if available.

b. Were pesticides ever stored in TA-16-208? If pesticides were stored in this building then they need to be added to the analytical suite.

15. Figure 5-4, p. 5-22 - SWMU 16-003(b) (6 inch VC pipe) is not shown on this figure. LANL shall provide a figure with the approximate location of this unit.

16. 5.1.4 Sampling and Analysis Plans, p. 5-11 - Text indicates that SOPs for some field screening methods are in preparation. All SOPs should be finalized prior to initiation of field work.

17. 5.1.4.3 Sampling, p. 5-13 - LANL shall choose a minimum of three surface samples for laboratory analysis.

18. 5.2 HE Sumps and Outfalls, SWMUs 16-003(a-j, l-o), 16-026(b-e, v, h2,j2), 16-029(a-g), 16-001(e), p. 5-16 - LANL shall sample all sumps and outfalls especially active sumps

which may continue to discharge hazardous constituents to the environment. LANL may not wait until those units become inactive. LANL shall submit sampling plans for the active outfalls and all sumps within 60 days of receipt of this NOD, and sampling shall occur in FY95.

19. 5.2.1.1 SWMU Descriptions and Histories, SWMU 16-029(g), p. 5-39 - When LANL is using archival information such as an interview from a former lab employee, a location of their work place and dates worked there should be indicated. Text states "Richard Daly, a longtime employee at S-site and past group leader of WX-3 states that no plating operations were ever conducted in the building". The building in question (TA-16-450), was constructed in the early 1950's. Was Mr. Daly employed at S-Site during the early 1950's and later?

20. 5.2.2 Remediation Decisions and Investigation Objectives, Problem Statement (DQO 1), p. 5-57 - Sampling at NPDES outfalls is conducted in order to determine if surface water quality is being impacted. If an outfall was being used prior to being permitted then there were no limits on discharges at that time. Sampling at the outfall does not take into consideration the accumulation of material in the soil at or below an outfall. This material is not sampled under the NPDES permit, and there is no corrective action authority for cleaning up contamination under the NPDES permit. How does the outfall for TA-16-340 relate to the sampling done in Water Canyon?

21. Decision Logic (DQO Step 5), p. 5-61 - LANL has shown no correlation between the deposition of high explosives (HE) and other hazardous constituents. If LANL removes portions of the drainage based only on the HE content then additional contamination may be missed. LANL shall define the extent of the contamination.

22. 5.2.4 Sampling and Analysis Plans, p, 5-62 -

a. How will samples be collected (spade and scope)? This should be indicated in the text and the SOP should be cited.

b. On page 5-80, first paragraph the fourth sentence indicates that all sample locations will be analyzed for HE, metals, semivolatile organics and radionuclides. Does this mean all samples which are field screened, or does this mean the samples which are defined as clean through the HE screening? By comparing text with the analytical charts it is not clear where samples will be taken for laboratory analysis.

c. Will the three samples taken in the auger core be analyzed for HE, metals, semivolatile organics and radionuclides?

23. 5.2.4.2 Sampling, p. 5-79 - SWMU 16-029(g) samples are

listed for radiation screening in Table 5-20, p. 5-66, but not listed in the text. LANL shall clarify.

24. 5.3.2 Remediation Decisions and Investigations Objectives, p. 5-87 -

a. This area is highly contaminated and sampling should not be delayed until the line is plugged. LANL shall sample this area in FY95, and this includes the sampling of the sumps and especially the feeder troughs.

b. LANL shall sample and analyze the effluent from the NPDES outfall permitted as EPA05A056 for all the parameters as required under permit number NM0028355. LANL shall also analyze this sample and determine the concentrations present of TNT, RDX, HMX, acetone, methyl ethyl ketone, n-butyl acetate and toluene. LANL shall indicate which methods are being used for analysis and the detection limits of those methods. Sampling should occur within thirty-days of receipt of this NOD, and the results shall be sent to EPA upon receipt from the laboratory.

25. 5.3.4.2 Sampling, p. 5-94 - LANL shall revise their sampling plan to include full laboratory analysis for VOCs, SVOCs, metals and HE and its by-products for every 20 feet until 100 feet from the HE pond. Then a surface sample (0-6 inches) should be collected every 60 feet for full laboratory analysis.

Also, samples deeper than 6 inches should be taken in the drainage where sediment may have accumulated. LANL should also take three samples at the 6 inch to 2 foot depth within the first 100 feet from the pond, and analysis should include VOCs, SVOCs, metals and HE products and by-products.

26. 5.4.1 Background, SWMU 13-003 (a,b), p. 5-97 - Action will not be deferred until decommissioning and demolition (D&D). Should sampling in the drain field or outfall indicate contamination then the rest of the system will be required to be sampled prior to D&D.

27. 5.4.1.1 Description and History, p. 5-97 - Figure 5-52 does not show the drain lines from TA-11-4 and TA-11-1. Only the drain field is indicated in the figure. LANL shall revise the figure to indicate the location of the drain lines, and septic tanks to the drain field. In the future, it would also be helpful that if a figure was not located with text, the page number of the figure would be included in the text (e.g. Figure 5-52, p. 262).

28. Design Criteria (DQO Step 6) p. 5-104 through 5-107 - The explanation for the drain field for these units is incomplete. Are the lines in the drain field perforated so that material flows out along the line, or does it only flow out at the end of

the line? The size of each drain field is not included in this work plan; therefore, LANL shall submit a figure for each drain field indicating the locations samples will be collected. EPA cannot evaluate if the sampling proposed is adequate based on the information presented. LANL may propose a similar sampling approach for these systems, but enough information should be provided for EPA to determine that the sampling proposed is adequate.

29. 5.4.4.1 Engineering Surveys, p. 5-107 - All geomorphic mapping should have been completed prior to submittal of the work plan. Actual sampling locations should be in the work plan.

30. Outfalls, p. 5-110 - An additional sample should be collected at each outfall from the soil/tuff interface and analyzed for VOC, SVOCs, metals, HE and HE by-products.

31. 5.5.4.1 Engineering Surveys, p. 5-117 - Site mapping should have occurred prior to submittal of the work plan. A detailed figure should be included with sampling locations indicated.

32. 5.5.4.2 Sampling, p. 5-117 - One sample is not adequate for this site. An additional sample should be collected five feet from the first sample. The sample should be collected to the soil/tuff interface and analysis should be for metals, VOCs, SVOCs, and cyanide.

33. 5.6.1.2.1 Nature and Extent of Contamination, p. 5-122, second paragraph - Explain the meaning of this sentence, "Silver concentration in the soils followed a much more erratic pattern and was always lower in silver than the sediment". In addition, the data from this report (Kasunic et al., 1985) should be included in the workplan.

34. 5.6.4.2 Sampling, p. 5-130 - The proposed sampling plans do not adequately delineate the extent of the contamination. Data excerpted from Kasunic et al. (1985) indicates that at 33 ft down channel the concentration of silver at 3-ft depth was 182 ppm. Sampling should be conducted so that a clean zone beneath the contaminated zone is delineated. Additional corings are required and samples should be collected at the surface (0-6 in.), at 3 feet depth, and at 5 feet depth beginning at the outfall and continuing every 25 feet for the first 100 feet of channel.

35. 5.6.4.3 Laboratory Analysis, p. 5-130 - How does LANL know that silver and cyanide are the only constituents of concern? Were any solvents used in the photoprocessing? What type of acids were used? LANL shall provide an explanation.

36. 5.7.3 Data Needs and Data Quality Objectives, DQO Step 4, p. 5-141 - LANL should consider a slant boring approach underneath most of these structures in order to determine if the

soil has been impacted by past releases.

37. 5.7.4.1 Engineering Surveys, p. 5-145 - LANL shall provide figures with the field surveyed SWMUs and sampling locations. This should have been done prior to submittal of the work plan.

38. 5.7.4.2 Sampling, p. 5-145 -

a. LANL indicates that cored samples will be taken, and then indicates that these samples will be collected at 0-6 in. These statements are contradictory, LANL shall take an additional sample at the soil turf interface or at 2 feet depth which ever comes first.

b. Page 5-147, 1st paragraph - EPA does not understand the reasoning for drilling to three-quarters of the thickness of the Imhoff tank. If LANL is concerned that the tank has leaked then they should drill through the tank or slant drill under the tank. If LANL is concerned that the tank has absorbed hazardous material and is hazardous then, a chip from the first several inches of the bottom of the tank should be analyzed to see if the tank needs to be disposed as hazardous waste. What does LANL mean by the entire core sample will be sent to the laboratory for analysis? LANL shall provide an explanation.

c. Page 5-147, 2nd paragraph - LANL shall explain the rationale behind Table 5-43. Randomization of samples is not appropriate for this area. Any samples which are to be analyzed for VOCs should be field screened and collected in a manner so as to not drive off the VOCs.

39. 5.8.1.1 Description and History, Figure 5-34, p. 5-150 - LANL shall include the location of all the active units which are listed as SWMUs on this figure.

Fig. 5-34 changed - 7 actn units added.

40. 5.8.1.2 Conceptual Model, p. 5-156 -

a. Page 5-156, paragraph one 4th & of 5.8.1.2.1 - LANL shall clarify the portion of the text which refers to the barium concentrations in the drainage from SWMU 16-016(c) and in the southern drainage. If available, the sampling locations should be included on a figure and the results of all the samples indicated rather than a range.

4th & of 5.8.1.2 changed to reflect fig. not table show sample locations & table no. that show results.

b. Paragraph two 5th & of 5.8.1.2.1 - LANL shall provide the actual data from the single soil sample rather than indicating if SALs were exceeded (Raper and Brown et. al.).

Data provided

41. 5.8.2 Remediation Decisions and Investigation Objectives, p. 5-156- LANL indicates that the open burn/open detonation units are operating under a permit. Technically these units are interim status and are not permitted yet.

1st sentence of DQO step 1 is re-written

42. 5.8.3 Data Needs and Data Quality Objectives, p. 5-161 - EPA does not agree with assumption number 3 [that the secondary contaminants of concern (semivolatiles, metals other than barium) do not have a different deposition and transport mechanisms than HE, uranium, and barium so field screening for these three contaminants will allow LANL to locate probable high concentrations of other potential contaminants of concern]. This assumption is not valid and may not be used.

Assumption 3 changed. (LANL of 5.8.3)

43. 5.8.3 Sampling, SWMU 16-010(i), p. 5-~~164~~ 170 - LANL should also take a sample from below the buried pipe at the end of the pipe's length.

One sample added as indicated. p 5-170

44. 5.8.4.2 Sampling, p. 5-167 through 5-171 -

a. SWMU 16-010(a) -

i. LANL shall collect samples at the following depths at the locations with the three maximum barium values: 0-6 inches, two feet and five feet. These samples shall be analyzed for semivolatiles, metals, HE and cyanide. LANL shall provide information on the correlation between field screening for barium using the XRF and laboratory analysis.

Paragraph added after 3rd ¶ of DQO step 6 Also, sampling depths changed in 5.8.4.2 SWMU 16-010(a).

ii. Table 5-46 - LANL shall indicate what analysis shall occur for the ten additional samples which may be collected based on HE screening (only 3 samples are indicated in this table).

Table 5-46 entitled "Summary of Sitewide Sampling & Analysis for Burning Ground" table changed

b. SWMU 16-016 (c) -

i. LANL shall provide a figure indicating the location of MDA P in relation to the drainage and samples to be collected.

Fig. 5-36 revised to show location of MDA-P, contours, samples & additional

ii. Table 5-46 - LANL shall provide an explanation why the two out of four potential samples located in this unit are not be analyzed for semivolatiles and cyanide as are the samples in SWMU 16-016(a). In addition, the table shows 8 samples being analyzed. If field screening indicates barium may have been stored at this area, then LANL shall take core samples at 2 feet and 5 feet and analyze for semivolatiles, metals, HE and cyanide.

Table changed Text added to 5.8.4.2, SWMU 16-016(c) 3rd ¶

iii. LANL shall extend the area of sampling to the intersection with Cañon de Valle rather than stopping at 210 feet. A sample should be sent for full laboratory analysis every 30 feet until this intersection occurs. Field screening may be used to potentially determine the lateral extent of barium contamination in the drainage ditch; however full delineation of the extent of contamination, including depth, will be required. Therefore, for the three

Text added to 3rd ¶ of DQO step 6.

Paragraph added after 3rd paragraph 5.8.4.2 SWMU 16-016(c)

highest field screened areas for barium within the ditch, LANL shall collect samples at the two foot depth and conduct full laboratory analysis.

c. SWMU 16-010 (h), p. 5-169 - It is unclear from the diagrams and text here and in the rest of the chapter where the potential release of contaminants occurred. Text on page 5-152 indicates that the HE residues were emptied into a floor drain located on the south end of the building which went to the troughs. Is LANL sampling under the connections to the drainage troughs? LANL should provide a better explanation for their sampling rationale. In addition, several samples should be taken deeper than 0-6 inches.

Sampling key changed

d. SWMU 16-010(1), p. 5-170 - LANL shall conduct full laboratory analysis at a minimum of ten sites rather than a minimum of three sites. At the three samples with the highest field screening results an additional sample should be collected at two feet or the soil/tuff interface (3 samples at 2 feet) and undergo full laboratory analysis.

No key change made; response defends existing sampling plan.

e. South drainage, p. 5-171 - At the three locations where sediment traps are sampled, a deeper sample at the sediment to tuff interface should also be analyzed for SVOCs, metals, HE and cyanide.

Paragraph added to 5.9.4.2 South drainage.

<u>Cañon de Valle</u>

45. 5.9.3 Data Needs and Data Quality Objectives, p. 5-178 - LANL shall explain what is meant by "realistic exposure scenarios".

46. Design Criteria (DQO Step 6), p. 5-181 - Text in the first paragraph indicates that 30 samples are adequate for an initial baseline risk assessment while text in the second paragraph indicates that only 10 samples will be submitted for laboratory analysis. In addition, Table 5-52 indicates that 40 sediment samples will be sent for laboratory analysis. LANL shall clarify how many samples are actually being taken and submitted for laboratory analysis.

47. 5.9.4.2 Sampling Cañon de Valle, p. 5-184 - Text here and under Decision Logic (DQO Step 5) indicate that subsurface sampling is being performed. The sampling indicated is not considered subsurface by EPA. The top two feet are considered surface soils. LANL shall revise text in response to this comment.

It is unclear from the text how many samples will be selected from below the 0-6 inch depth. LANL shall provide clarification.

MDA R, SWMU 16-012

48. 5.10.1.1 Description and History, p. 5-186 - LANL shall provide a figure of the site based on the 1984 aerial photographs or indicate on Figure 5-41 the location of the original three burning areas.

49. 5.10.1.2.1 Nature and Extent of Contamination, p. 5-187 - Why are the potential contaminants of concern (PCOC) different than the contaminants of concern listed (e.g. semivolatiles, fuel oil). Table 5-53 should include these potential contaminants. LANL shall revise the table to include all contaminants of concern.

50. Design Criteria (DQO Step 6), p. 5-193 -

a. Paragraph two - The probabilities for the statistical analysis are low; EPA would like to see a probability of 90% if 10% of the site was contaminated for the surface. Therefore, LANL shall take 22 near surface samples.

b. Paragraph three - The probabilities for the statistical analysis seem low; therefore, EPA would like to see a probability of 90% if 15% of the site is contaminated or 15 samples from the drainage.

51. 5.10.4.2 Sampling, p. 5-197 -

a. Second paragraph, - EPA recommends that of the randomized samples six become biased samples which will be collected at obvious drainages near the canyon rim and the topographic depressions within MDA-R. In addition, if the bottom 6 inch interval is above background for radiation, barium or HE then it should be submitted for laboratory analysis.

b. Fourth paragraph, Eight drill cores - If LANL only takes one of the 1-6" samples for analysis then the actual vertical extent of contamination will be hard to define. Rather, if one of the segments other than the bottom 6 inch segment has a positive reading then LANL shall also submit the bottom segment for laboratory analysis. If the bottom segment of the core segment has a positive reading then LANL shall core deeper, and take an additional sample every two feet until no positive readings are made for HE, radiation or barium. LANL shall also sample and analyze the 15 randomized three-foot cores in the same manner, thereby defining the depth of any contamination.

52. 5.10.4.3 Laboratory Analysis, p. 5-199 - LANL shall submit a list of the semivolatile organics for which analysis is being conducted.

5.11 Surface Waste Disposal Areas, SWMUs 16-009 and 16-016(a,b)

53. 5.11.1.1 Description and History, p. 5-202 - SWMU 16-016(b) - What types of HE contamination were found in the CEARP field survey and at what amounts?

Source added other CEARP refers DOE 1987, 0264

54. 5.11.4.3 Sampling, SWMU 16-009, p. 5-210 -

a. Three samples over this area (approximately 180,000 sq. ft.) is not adequate. LANL shall analyze a minimum of twenty samples from this area. If a surface soil sample indicates radioactivity or barium levels above background then the bottom portion of the 3 foot interval should also be sent in for analysis. This extra sample should be in addition to the minimum of twenty samples required. In addition, LANL does not know that this area was not used for burning HE; therefore fifty percent of the samples should at least be field screened for HE. If field screening indicates positive results then laboratory analysis should occur for those samples.

Text added to DQO sampling, Table 5-5 sample added; 5.11.4.3 number of samples increased.

b. LANL shall provide a better explanation of how samples will be collected from this area. Are 6-inch sections from each three foot core being screened as in other parts of the work plan, and then will that 6 inch sample be sent for analysis if field screening indicates barium or radioactivity above background? How and over what interval will the samples be homogenized?

Paragraph added to 5.11.4.3 to explain

c. SWMU 16-016(b), p. 5-213 - Any surface samples with positive HE field screening results should be submitted for laboratory analysis.

Sentence added 5.11.4.3 SWMU 16-016(b) to send all positive samples to laboratory.

TA-16 Waste Water Ponds Aggregate, SWMU 16-007(a) and SWMU 16-008(a)

55. 5.12.4.2 Sampling, p. 5-222 - SWMU 16-007(a) -

a. LANL shall not homogenize over the 5 ft. core interval for one sample. LANL shall obtain samples from 6 inches or less of core. This will allow for less dilution of the sample and make it easier to determine the depth of any contamination.

b. The original description of these ponds indicates that material was probably deposited between 8 and 10 feet depth from the surface; therefore, cores to a depth of 10 feet may not adequately define the possible contamination. LANL shall core to a depth of 15 feet at each sampling location. Should field screening not indicate any potential contaminants of concern then LANL shall submit a sample from the 8-10 ft. depth for two out of the three cores drilled in each pond. This will make a total of 8 samples sent for laboratory analysis.

56. SWMU 16-008(a), p. 5-224 -

a. LANL shall not homogenize over the 5 ft. core interval as above, but should obtain samples from 6 inch intervals. Should the bottom 6 inches of core indicate potential contaminants of concern (PCOC) then the depth of contamination should be delineated and an additional 5 ft. core should be taken. This core should also be screened and an additional sample analyzed where any PCOC are indicated. If no PCOC are indicated then the sample 2 ft. below the last positively field screened interval for PCOC should be submitted for analysis.

b. A comparison of Figure 5-46 and text for sampling of this SWMU is confusing. LANL shall explain the total number of cores that will be taken and field screened for PCOC.

<u>TA-13 (P-Site), SWMUs 13-001, 13-002, 13-004, 16-035, 16-036</u>

57. 5.13.1.1 Description and History, p. 5-229 - LANL shall provide an explanation or better history description for SWMUs 16-035 and 16-036. Why does LANL suspect contamination beneath the bunkers?

58. Design Criteria (DQO Step 6), p. 5-234 - SWMUs 13-004, 16-035, and 16-036 - What percentage of these SWMUs is anticipated to be contaminated? LANL indicates two very different levels of contamination and probability of detecting that contamination. LANL shall provide an explanation for the sampling size. In addition, EPA would prefer to see a minimum of 90% probability of determining if contamination is present.

59. 5.13.4.3 Sampling, p. 5-239 -

a. Figure 5-48 does not show the location of the drainage or drainage samples. LANL shall provide a figure with this information.

b. In addition the survey grid (Figure 5-48) does not cover the entire SWMU 13-002. LANL shall provide an explanation for this.

c. It is unclear from text how the 38 samples for laboratory analysis will be selected from this firing site. Shallow surface sampling (0-18 inches) in prominent drainages and topographic lows could be used to supplement the grid samples.

d. SWMUs 13-004, 16-036, and 16-035, p. 5-240 - Based on the response to the questions on DQO Step 6 and Description and History above, EPA may determine that additional samples will be required.

5.14 TA-11 Firing Site Aggregate, PRSs 11-001 (a,b), 11-002, 11-003(b), 11-004(a-f), 11-006(a-d), C-11-001, p. 5-242 -

60. 5.14.1.1 Description and History -

a. SWMU 11-001(a), p. 5-245 - What type of HE was used in experiments in the firing pit? LANL shall provide a better description of the activities which occurred at this unit.

b. LANL shall provide a figure with more detail of the SWMUs, as Figure 5-49 is good for an overall picture, but does not have the detail required to examine SWMU size and locations.

c. SWMU 11-001(b), p. 5-245 - What type of HE was used at this site?

d. SWMU 11-004, p. 5-247 - What type of HE has been used at this SWMU?

e. SWMU 11-002, p. 5-248 - Has this unit been used since 1992? Does the unit have interim status and will it receive a permit?

61. 5.14.1.2.2 Potential Pathways and Exposure Routes, p. 5-250 - What is the schedule for use of this site? What is the date for decommissioning this site? LANL shall submit workplans for the subsurface potential release sites within 90 days of receipt of this NOD. Based on the response to the above questions work on subsurface units may or may not be deferred until the site is decommissioned.

62. 5.14.4.2 Sampling, p. 5-258 -

a. The drainage area from SWMU 11-006(c) should also be sampled and undergo analysis for the full suite of analytes.

b. North and South drainages - All the samples should be submitted for a full suite laboratory analysis not just the first and last.

5.15 TA-11 Outfalls Aggregate, SWMU 11-005(c), SWMUs 11-011(a-c)

63. 5.15.1.1 Description and History, p. 5-260 - LANL should provide the dates of operation for all these outfalls.

64. 5.15.4.2 Sampling, p. 5-262 -

a. Outfalls on moderate slopes - LANL shall collect an additional sample for laboratory analysis 4-6 feet away from the outfall discharge point.

b. Paragraph four - Text indicates that two samples with the highest filed screening readings will be selected for laboratory

analysis. This contradicts text in Design Criteria (DQO Step 6) on page 5-266 which indicates that "three samples per core will be submitted for full laboratory analysis". LANL should clarify what analysis will be conducted.

5.16 TA-11 Potential Surface Contamination Aggregate, SWMU 1-001(g), SWMU 11-012(a-d), C-11-002

65. **5.16.1.1 Description and History, C-11-002: TA-11-12, p. 5-274** - LANL shall provide additional information on this unit. Is it visible in any of the aerial photographs reviewed. Based on the information provided it should probably be included as a SWMU and be included in the permit.

66. **5.16.4.2 Sampling, p. 5-278** -

a. LANL shall clarify the sampling procedures to be used. Will the entire 18 inches of core be analyzed as one sample. Why are 300 ml of core required?

b. For SWMU 11-001(c) which is a former burn pit, sampling should occur to 3 feet in depth. LANL shall take at least two samples per core.

5.17 Decommissioned Waste Storage Area, SWMU 16-013

67. **5.17.1.2.1 Nature and Extent of Contamination, p. 5-286** - LANL shall describe what is meant by the area has been cleaned. What does this include?

68. **5.17.4.2 Sampling, p. 5-289** - Any areas of staining should be preferentially sampled. If no samples have a positive screening for PCOC's then LANL shall send 2 samples collected from obvious down gradient portions along the edge of the asphalt pad for laboratory analysis.

69. **5.17.4.3 Laboratory Analysis, p. 5-291** - Why is LANL conducting laboratory analysis for VOCs when samples are being taken from the top 6 inches?

Chapter 6

70. **Table 6-1, p. 6-1** - EPA does not necessarily agree with the criteria for no further action or deferred action. Each unit will be evaluated separately. Undergoing voluntary corrective action is not a reason for deferral.

71. **6.1.1.1.1 Background, p. 6-3** -

a. EPA does not approve deferral of any site which is beneath one of the open burn/detonation units (16-005(g)). These units must be sampled and a workplan submitted within 90 days detailing the

sampling of these units. Removal of the interim status units which will receive a permit will be approved with concurrence of NMED.

b. SWMU 16-010(d), p. 6-4 - Has this unit also been converted to a burn table and is it currently active?

72. 6.1.2.1.2 Rationale for Recommendation, Inactive Surface Impoundment. p. 6-7 - Has NMED approved the actual closure of this unit? With concurrence from NMED, LANL may request removal from the permit via a Class 3 permit modification.

73. 6.1.3.1.1 Background, SWMU 16-010(g) - LANL may request removal of this unit from the permit by a Class 3 permit modification. If this unit did not handle or manage solid waste then it should not be listed as a SWMU.

With approval from NMED, LANL may request removal of the following units by a Class 3 modification from the HSWA portion of the permit:

16-012 (d,i,j,l,m,n,t,u,x)
16-012(p)
16-012(a2)
11-011(c)
16-006(f)

74. MDA P - NMED has the lead for this unit and all activities should be covered under closure requirements. LANL may request removal of this unit from the HSWA portion of the RCRA permit by a Class 3 permit modification.

75. 6.1.5.1.3 Rationale for Recommendation, SWMU 11-007 p. 6-14 - The reason to recommend this unit for no further action should be that it does not meet the definition of a SWMU. LANL may request removal of this unit from the permit by a Class 3 permit modification.

76. 6.1.5.2 MDA S, SWMU 11-009, p. 6-14 - What procedures are in place to ensure there will be no release of materials from this SWMU. If the SWMU is defined by the area of the fence then investigation of this site may be deferred until completion of the experiment.

77. 6.1.5.3.1 SWMU 16-005(n), p. 6-16 - Archival information does not appear sufficient to no further action this SWMU. This unit should be investigated and a sampling plan should be submitted within 90 days.

78. 6.1.5.4.1 SWMU 16-005(o), p. 6-17 - Was there ever any other use for building TA-16-101 other than a guard house? If this unit only served a guard house then EPA concurs that no

further action is required.

79. 6.1.5.5.2 Recommendation SWMU 16-006(b), p. 6-18 - Why is this listed as an active septic system when the guard house it serves is inactive? LANL may request removal of this unit from the permit.

80. 6.1.5.7 Rest Houses SWMUs 16-012 (a-z) and 11-010(z), p. 6-19 - What is the function of the drains associated with the rest houses? Why do the drains lead to high-explosive sumps if there is no problem with the handling of HE at these sites. LANL needs to provide additional information prior to consideration of no further action by EPA. Figures should be provided.

81. The following units do not need to be added to the permit:

SWMU 16-007(b)	SWMU 37-001
SWMU 11-003(a)	C-11-003
SWMU 11-008	
SWMU 11-010(b)	

August 11, 1994
EM/ER:94-J330
M992
505-667-0808

Mr. Joseph Vozella, Chief
Environment, Safety, and Health Branch
US Department of Energy
Los Alamos Area Office, MS A316
Los Alamos, NM 87544

Dear Mr. Vozella:

SUBJECT: RESPONSE TO NOTICE OF DEFICIENCY (NOD) CONCERNING OPERABLE UNIT (OU) 1082 RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION (RFI) WORK PLAN WORK BREAKDOWN STRUCTURE NUMBER 1.4.2.6.1.7.1.2

Enclosed is the Los Alamos National Laboratory's response to the Environmental Protection Agency's Notice of Deficiency concerning the OU 1082 RFI Work Plan and a certification form signed by the appropriate Laboratory official. The NOD was received at the Los Alamos Area Office on July 18, 1994. A response within thirty days is required by the regulatory agency.

The enclosed response shows the comments from the NOD and proposed text changes. A documented quality review of the enclosed response has been performed in accordance with procedure LANL-ER-AP-01.3.

Please let me know if there are questions about this response to the NOD, or contact Brad Martin of my staff at 667-6080. I would appreciate having the response and the signed certification form set to the Environmental Protection Agency, Region 6, by August 17, 1994, to meet the required deadline.

Sincerely,

for Jorg Jansen, Project Manager
Environmental Restoration

JJ/rfr

Enclosure: Responses to NOD
Certification Form

Cy: T. Baca, EM, MS J591
J. Shipley, EM, MS J591
B. Martin, CST-6, MS E525
B. Koch, LAAO, MS A316
J. Levings, ERPO, MS A906
EM/ER File, MS M992
RPF, MS M707
CIC-10, MS A150, w/o enclosure

94 -

Los Alamos

Los Alamos National Laboratory
Los Alamos, New Mexico 87544

INTERNAL/EXTERNAL DOCUMENTAPPROVAL

NOTE: Please furnish CRMO with two copies of this form. An approved copy will be returned to the originating office.

Please contact Group Office immediately after signature for pick up at 5-4558.

Document Date: 8/11/94

CHECK ONE: ☐ CLASSIFIED ☒ UNCLASSIFIED

Document Identification: EM/ER:94-J330

	MAIL STOP	AUTHORIZING OFFICIAL	SIGNATURE	APPROVE YES	APPROVE NO	DATE SENT
2	M992	Jorg Jansen Project Manager		✓		8/12/94
1	M992	Brad Martin, FPL	Brad Martin	✓		8/12/94
	M992					
	M992					
		Associate Director(s)				
6	K491	ESH DO Dennis Erickson		✓		8/15/94
	F674	OS-6 (Classification)	pls [illegible] p.8 [illegible]			
		Budget Division	[illegible] ?			(2/15)
		MAT				
5	J591	EM Program Director Tom Baca		✓		8/12/94
		PA				
4	A183	Legal Counsel Cheryl Mack	Cheryl Mack	✓		8-15-94
3	K490	Other Pat Shanley		✓		8-11-94
		ESH-8 Group Leader	Arthur Group Leader			
	A150	CRMO (for dispatch)				
		Originator				

*Reason(s) for disapproval.

Recommendation: Please approve and sign letter.

NOD concerning OU 1082 RFI work plan work breakdown structure number 1.4.2.6.1.7.1.2

Form Number CRM-35 (6/85)
ST-2640

rir/ERM form

Los Alamos
NATIONAL LABORATORY
ENVIRONMENT, SAFETY, AND HEALTH

- [x] Signature
- [ ] Review
- [ ] Approval
- [ ] FYI

To: DENNIS ERICKSON
(Provide name of individual whose signature is requested.)

Please provide the information requested in the boxes below.

Author/Originator	Phone	Group	Check here if Urgent
DON HICKMOT	78753	ESS-1	✓
Subject: Response to OU 1082 RFI Work Plan NOD			Due Date
Type of Document (memo, letter, other? include any identifiers): Letter			

PRIOR APPROVALS

Be sure that all appropriate prior approvals are recorded before forwarding the document.

Originating Office (print name)	Signature	Date
BRAD MARTIN	Brad Martin	8/11/94
Reviewer #1 (print name): PAT STANLEY	Signature: P Stanley	Date: 8-11-94
Reviewer #2 (print name)	Signature	Date

Use this space to provide pertinent information (see instructions and suggestions on the back of this form).

Document responds to EPA's NOD comments for the OU 1082 RFI Work Plan. The Work Plan was submitted July 93. A total of 81 specific and 9 general comments are addressed. The NOD requires that w/in 60 days, and another in 90 days 2 additional sampling plans be submitted. These will be prepared by the ER OU 1082 team in the near future.

Return to: DON HICKMOT Mail Stop _____ Telephone number 78753

Forwarding Instructions _____

Attachment 2 (ESH-DO: 94-059)

ESH 94-009

CERTIFICATION

I certify under penalty of law that these documents and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violation.

Document Title:

Response to NOD for RFI Work Plan for OU 1082

Name: _____ Date: 8/15/94

Dennis Erickson
Division Director
Los Alamos National Laboratory

Name: _____ Date: _____

Joseph Vozella, Chief
Environment, Safety, and Health Branch
DOE-Los Alamos Area Office

OU 1082 NOD RESPONSE

BOLD text is the EPA NOD comments.

General comments:

1. **The baseline risk assessment should use a residential scenario with a 10^{-6} risk until agreement is reached with stakeholders as to future land use scenarios.**
LANL concurs. LANL realizes that it is required to have stakeholder input in order to apply land use scenarios other than the residential scenario with a 10^{-6} risk in the baseline risk assessment. The OU 1082 work plan will be revised to reflect this point.

2. **LANL should note that identification of potential contaminants of concern below screening action levels does not automatically lead to a determination of no further action. The extent of any release must be identified, and if this does not occur in Phase I sampling then it should in Phase II.**
Per our conversation of August 8, 1994, this comment is being addressed on a project-wide basis.

3. **The format used for the HE sumps is very poor. The sampling plans or figures should be included with the description of each sump. In addition, text skips back and forth between different figures and sump numbers which adds confusion in reading the text. For example, all the SWMUs associated with Figure 5-4 should be discussed together rather than split up.**
LANL will reorganize the HE sump subsection to improve the presentation of the sampling plans and figures. In particular, based on our conversation of August 8, 1994, LANL will provide additional copies of location or sampling figures to improve document readability.

4. **More emphasis should be placed on the actual sampling plans rather than on the data quality objectives. The sampling plans are the most important part of the work plan, and yet there is little detail in the work plan related to this. All work plans should be third party executable.**
LANL concurs. LANL is currently developing a field implementation plan for OU 1082 RFI Phase I sampling and analysis. This field implementation plan is scheduled to be complete before the readiness review for late spring field activities. As we discussed in the August 8, 1994 conference call, we will not submit this implementation plan. LANL will submit the revised work plan by December 1, 1994 per our discussion of August 8, 1994.

5. **Engineering surveys for locating sampling points should have been conducted prior to writing the work plan. Actual sampling points should be included in the work plan.**
Per our conversation of August 8, 1994, LANL did conduct extensive field surveys before writing the work plan. These field surveys were essential in developing sample numbers and locations for all sites. The work plan includes actual sampling points, with the exception of Chapter 5 subsection 4. The work plan will be revised to emphasize that detailed field surveys have been done.

6. **Approval of any portion of this work plan by EPA does not constitute approval of a voluntary corrective action at any SWMU. LANL shall provide a work plan for each proposed VCA.**
LANL concurs. LANL will submit a VCA work plan per the technical assumptions document and other negotiated agreements between LANL and EPA, and any indications to the contrary in the text will be corrected.

7. **LANL should provide dates (as available) for when MDA's, lagoons, pits, outfall, etc. become abandoned or inactive. LANL shall indicate whether units are permitted (RCRA, NPDES etc.) or are interim status.**
In cases where such information is not already included, LANL will provide dates when various SWMUs or AOCs became abandoned or inactive. In cases where exact dates are not available, LANL will explicitly state that archival reviews and interviews did not provide exact dates that sites became inactive. LANL will also indicate the status of permitted or interim status SWMUs.

8. **Discrete rather than composite samples should be collected in the following sections of the work plan: Section 5.4.4.3 (p.5-110), Section 5.14.4.2 (p.5-258), and Section 5.16.4.2 (p.5-278).**
See responses to specific sampling plans below:
LANL will take discrete samples for septic outfalls (Subsection 5.4.4.3)
LANL will submit discrete samples from the bottom core or soil-tuff interface in the absence of positive field indicators (Subsection 5.14.4.2).
See response to specific comment 66a (Subsection 5.16.4.2).

9. **All figures of SWMUs with sampling locations or which denote the locations of SWMUs should have contour lines.**
LANL concurs. LANL will produce revised septic sampling figures, which will have contour lines depicted. For some of the septic systems there are no engineering drawings that indicate the location of drain fields. In these cases, locations of soil cores in the drain field will be made after field trenching documents locates the drain lines. LANL will verify that all other sampling figures have contour lines.

Specific comments:

1. Executive Summary, p. ES-6 Milestone Chart - Does the five years for completion of the RFI field work include completion of field work for the additional work plans being submitted in July 1994 and 1995? In addition, the HSWA permit requires submittal of the final CMS report within 10 years of issuance of the permit which is the year 2000. LANL's schedule shows a final CMS report in May 2002 twelve years after the effective date of the permit. In a letter dated June 27, 1994, EPA requested updated and revised schedules for all OUs, LANL may include their response to this question in the August 5, 1994 response.
The plan to update the schedule matrix has been submitted by the Project Office on August 5, 1994, and will be further discussed during your August visit to LANL.

2. 1.3 Description of OU 1082, p. 1-10 (last paragraph) - EPA's approval of this work plan does not demonstrate concurrence with the Laboratory units that are proposed for no further action (NFA). EPA will indicate which units do not need to be added to the permit for an RCRA Facility Investigation (RFI) and which may be requested for removal from the permit following a Class III permit modification.
LANL concurs. LANL will modify text to "these SWMUs will be proposed for a permit modification and formal EPA approval will occur when the permit modification is accepted."

3. Figure 3-1, p. 3-3 - It is unclear where the inset map (MDA P) belongs in this figure. LANL should indicate on the map where the inset is located.
LANL concurs. The location of the inset map will be shown more clearly on Figure 3-1.

4. 3.4.3.2 Soil, p. 3-10 - The soil-tuff interface on the Pajarito Plateau has not been sufficiently characterized for LANL to state that an impermeable clay zone often forms there.
LANL concurs. The paragraph will be deleted.

5. Table 4-1, p. 4-8 - Are the background concentrations listed specific to this OU, or are they general for the laboratory?
Background concentration data are general for LANL; however, some background samples were collected at TA-16. Footnote (7) on p. 4-8 will be modified to clarify this point.

6. 4.2.3 Voluntary Corrective Actions, p. 4-7 - EPA will approve VCA's on a site-by-site basis. All VCA's which are final remedies will require a Class III permit modification.
LANL concurs. LANL will submit a Class III permit modification as the mechanism of EPA approval of the VCA as a final remedy, and any indications to the contrary in the text will be corrected.

7. 4.2.4 Active Sites, p. 4-13 - EPA will evaluate corrective actions at active sites on a case-by-case basis. Inactive sites under active sites will be required to be characterized as is appropriate and may not automatically be deferred to decommissioning.

LANL concurs. Per our conversation of August 8, 1994, this determination will be made on a case-by-case basis and any indications to the contrary in the text will be revised.

8. 4.3.1 Potential Contaminants of Concern, p. 4-15 - What is the significance of an high explosive compound being used at TA-16 in quantities greater than 10,000 lbs? Were compounds not considered which were used in volumes lower than 10,000 lbs?
All compounds will be identified (via GC scans), but the compounds that were more commonly used (e.g., >10,000 lbs) will be identified and quantified when possible. Many of the less commonly used compounds listed in Table 4-1 do not have toxicological data and cannot be quantified using SW-846 methods. The text will be modified to clarify this point.

9. 4.3.3.1 Conceptual Site Model, p. 4-18 - The upper two feet are considered the surface soils for purposes of the RFI investigation and not the upper 6 inches as stated in this text. LANL shall revise text accordingly.
LANL concurs. Text will be modified to indicate that surface soil is generally 24 in., but samples will be taken to represent the soil horizon that is most likely to contain contaminants. Note that LANL soils are generally thin (< 3 ft.) so in many cases 0-24 in. will extend to the soil-tuff interface.

10. 4.4.1 Criteria for Recommending NFA, p. 33 - No further action (NFA) requests should follow the baseline risk assessment scenarios agreed to by the Technical Assumptions Task Force of 10^{-6} for carcinogens.
LANL concurs. See response to general comment 1. The text will be modified.

11. Table 4-9, Sample Sizes for Reconnaissance Sampling, p. 4-41 Until LANL can provide the standard operating procedure (SOP) for use of this table, and an explanation of how consistency in usage will be maintained, EPA cannot approve this sampling method. A review of the work plan shows that there is no consistency in use of the table; rather it appears that LANL chooses a number of samples they want to analyze and then goes to the table to determine the probability and fraction of site affected.
Per our conversation of August 8, 1994, within 90 days, LANL will provide a guidance document on the development of sample sizes for reconnaissance sampling using the nomogram table. The information in this document will ultimately be incorporated into the IWP.

12. 4.7.3 Analytical Laboratory Methods, p. 4-48 - LANL shall provide rationale for using a subset of metals from the SW-846 6010 analysis for metals. LANL shall provide an explanation for all the analysis tables which indicate that for "E Semivolatiles (SW 8270), a full suite is PAH". LANL must request a reduction in analysis from 40 CFR Part 261 Appendix IX and provide the basis for that request prior to the initiation of field work.
Based on an extensive review of H-Division reports, X-Division reports, GMX-Division reports, and WX-Division reports, LANL has direct evidence for the use of the following metals in processes at TA-16: barium, beryllium, cadmium, chromium, copper, lead nickel, silver, thallium, zinc and mercury (mercury was added during our research for Addendum I). LANL had proposed a reduced metal suite to control QA/QC and data validation costs relative to the full suite of 6010 metals. The ICP data for the other

metals (i.e. arsenic, selenium, tin) will be collected, but these data will not be extensively validated. Unless you advise otherwise, LANL will formally provide such a request for a reduction in QA/validation on select metals to EPA prior to initiation of field work.

The "full suite is PAH" statement is misleading. LANL's intention was to emphasize that PAHs are included on the analyte list for SW-846 Method 8270. This text will be clarified and the footnote with PAHs as a parenthetical note will be revised. This deletion will affect the sampling-analysis tables for aggregates 5.8, 5.9, 5.10, and 5.11.

5.1.1.1 Description and History, p 5-1:

13. SWMU 16-001(c), p. 5-4 - LANL shall provide the dimensions of this tank.
LANL concurs. Engineering drawing ENG-C-28874 shows TA-16-541, a blow-down tank, as 7 ft. long and 4 ft. in diameter. The volume of this tank is approximately 650 gals. The text will be modified to incorporate this information.

14. SWMU 16-001(d), p. 5-5 -

a. LANL shall provide information related to when this dry well was abandoned and when the floor grooves of building TA-16-208 were plugged if available.
The date that dry well was abandoned is not known. The discharge from the floor grooves was plugged in May 1993, following the Tiger Team visit. This information will be added to the text.

b. Were pesticides ever stored in TA-16-208? If pesticides were stored in this building then they need to be added to the analytical suite.
Pesticides were not stored in this building based on our archival research. It was a solvent/petroleum products storage building. Specific pesticide storage buildings existed at TA-3; it is unlikely that the operating group would have had any occasion to use pesticides at TA-16 inasmuch as pesticide application was a lab-wide activity.

15. Figure 5-4, p. 5-22 - SWMU 16-003(b) (6 inch VC pipe) is not shown on this figure. LANL shall provide a figure with the approximate location of this unit.
SWMU 16-003(b) is shown on Figure 5-1 as cited, but as a part of response to general comment 3 an additional copy of Figure 5-1 will be provided in this subsection.

16. 5.1.4 Sampling and Analysis Plans, p. 5-11 - Text indicates that SOPs for some field screening methods are in preparation. All SOPs should be finalized prior to initiation of field work.
LANL concurs. SOPs will be finalized before initialization of field work. Note the LANL-ER-AP-1.06 "Approval Process for External Procedures Used in the Environmental Restoration Program" is a mechanism for facilitating approval of other organization's SOPs as ER SOPs. We plan to use this procedure to finalize SOPs for the HE spot test and the field-based XRF.

17. 5.1.4.3 Sampling, p. 5-13 - LANL shall choose a minimum of three surface samples for laboratory analysis.

LANL concurs. The number of surface samples will be increased to three samples, and the design criteria will be modified to reflect that each blowdown tank will have a minimum of one surface sample each. The sampling Figure 5-3 and the sampling Table 5-3 will be modified.

18. 5.2 HE Sumps and Outfalls, SWMUs 16-003(a-j, l-o), 16-026(b-e, v, h2,j2), 16-029(a-g), 16-001(e), p. 5-16 -
LANL shall sample all sumps and outfalls especially active sumps which may continue to discharge hazardous constituents to the environment. LANL may not wait until these units become inactive. LANL shall submit sampling plans for the active outfalls and all sumps within 60 days of receipt of this NOD, and sampling shall occur in FY95.
Per our conversation of August 8 1994, LANL will sample all outfalls (active and inactive). If contamination is detected in the outfall, then all sumps upstream of that outfall will be sampled. Sampling of sumps upgradient to contaminated outfalls will include a visual inspection of the interior of the sump and a single angle coring under the sump. LANL will submit revised sampling figures and plans for these SWMUs for EPA consideration by September 16, 1994.

19. 5.2.1.1 SWMU Descriptions and Histories, SWMU 16-029(g), p. 5-39 - When LANL is using archival information such as an interview from a former lab employee, a location of their work place and dates worked there should be indicated. Text states "Richard Daly, a longtime employee at S-site and past group leader of WX-3 states that no plating operations were ever conducted in the building". The building in question (TA-16-450), was constructed in the early 1950's. Was Mr. Daly employed at S-Site during the early 1950's and later?
Mr. Daly began working as a staff member with GMX-3 at S-Site in 1956. He was promoted to Deputy Group Leader in 1977 and Group Leader in 1980. He retired in 1983. The text will be modified to reflect this information.

20. 5.2.2 Remediation Decisions and Investigation Objectives, Problem Statement (DQO 1), p. 5-57 - Sampling at NPDES outfalls is conducted in order to determine if surface water quality is being impacted. If an outfall was being used prior to being permitted then there were no limits on discharges at that time. Sampling at the outfall does not take into consideration the accumulation of material in the soil at or below an outfall. This material is not sampled under the NPDES permit, and there is no corrective action authority for cleaning up contamination under the NPDES permit. How does the outfall for TA-16-340 relate to the sampling done in Water Canyon?
LANL concurs that NPDES effluent sampling is not adequate to characterize the soil located at locations which received discharge prior to NPDES permitting. The currently permitted discharge is adequately sample and monitored per LANL's NPDES permit. Please note that TA-16-340's monitoring adequately characterizes the discharge from the outfall. LANL will be sampling the historically potentially impacted sediments and soils at many NPDES outfalls (see response to specific comment 18 above). Sampling in Water Canyon was mentioned to show that there is no off-LANL migration of contaminants released from TA-16. The text will be clarified.

21. Decision Logic (DQO Step 5), p. 5-61 - LANL has shown no correlation between the deposition of high explosives (HE) and other hazardous constituents.

If LANL removes portions of the drainage based only on the HE content then additional contamination may be missed. LANL shall define the extent of the contamination.
The strategy behind the sampling and analysis plans for these drainages may not have been clear. First, the HE spot test will define the portion of the drainage that is HE contaminated. Existing data shows only HE contamination. Second, LANL will propose a mini-VCA for the HE-contaminated portion of the drainage. Third, sampling will occur in the portions of the drainage adjacent to the VCA (mostly downgradient) and below the remediated area. The laboratory sampling will be based on the complete list of PCOCs for each sump/drainage SWMU (see Table 5-20), enabling LANL to evaluate other hazardous constituents on the portion of each drainage that was not remediated during the VCA. LANL will add one (for a total of two) subsurface core in the contaminated zone to further define the concentrations of potential contaminants with migration properties different from HE. This strategy assumes that there will be no waste disposal or treatment issues relating to the HE-contaminated zone. The DQOs and sampling plans will be clarified to reflect this decision process. These five lab samples in the surface drainage and two cores in the subsurface should define the extent of all PCOCs in each drainage. (These sampling plans were designed in support of the potential VCAs).

22. 5.2.4 Sampling and Analysis Plans, p. 5-62 -

a. How will samples be collected (spade and scope)? This should be indicated in the text and the SOP should be cited.
LANL concurs. LANL will modify Table 5-19 to include spade and scoop (LANL ER-SOP 06.09), and references to the type of surface samples taken by each SOP will be clarified.

b. On page 5-80, first paragraph the fourth sentence indicates that all sample locations will be analyzed for HE, metals, semivolatile organics and radionuclides. Does this mean all samples which are field screened, or does this mean the samples which are defined as clean through the HE screening? By comparing text with the analytical charts it is not clear where samples will be taken for laboratory analysis.
LANL concurs. LANL will clarify the text. The intention is to analyze five surface samples downgradient of where there are no positive HE spot test readings in the laboratory (3 plus 2 as described in the text).

c. Will the three samples taken in the auger core be analyzed for HE, metals, semivolatile organics and radionuclides?
The auger samples will be analyzed for HE, metals, VOCS, SVOCs, and radionuclides (the latter in drainages from buildings handling uranium). LANL will modify text to be more consistent with Table 5-20 where organics refers to volatile and semivolatile organic compounds.

23. 5.2.4.2 Sampling, p. 5-79 - SWMU 16-029(g) samples are listed for radiation screening in Table 5-20, p. 5-66, but not listed in the text. LANL shall clarify.
LANL concurs. LANL will add SWMU 16-029(g) to the text on pg. 5-79 for radionuclide analyses.

24. 5.3.2 Remediation Decisions and Investigations Objectives, p. 5-87 -

a. This area is highly contaminated and sampling should not be delayed until the line is plugged. LANL shall sample this area in FY95, and this includes the sampling of the sumps and especially the feeder troughs.
Per our discussion of August 8 1994, in FY 1995 LANL will sample the portion of the TA-16-260 outfall where there is no water flowing. The major goal of this effort is to determine if characterization of contamination is adequate (we know HE and barium are present, but other constituents are poorly characterized). This sampling will also address waste disposal and remediation data needs. We will also propose five angle samples under TA-16-260 sumps and five under troughs in support of a baseline risk assessment for these units using a construction worker scenario. The locations will be based on visual inspection for cracks and flaws in the units.

b. LANL shall sample and analyze the effluent from the NPDES outfall permitted as EPA05A056 for all the parameters as required under permit number NM0028355. LANL shall also analyze this sample and determine the concentrations present of TNT, RDX, HMX, acetone, methyl ethyl ketone, n-butyl acetate and toluene. LANL shall indicate which methods are being used for analysis and the detection limits of those methods. Sampling should occur within thirty-days of receipt of this NOD, and the results shall be sent to EPA upon receipt from the laboratory.
LANL concurs. A sample was collected on August 3, 1994, and the request information is provided on Attachment A. N-butyl acetate is not a standard SW-846 analyte, and thus probably cannot be analyzed. We should see a peak for it on the gas chromatograph for volatiles if it is present. N-butyl acetate is not particularly toxic. According to LANL CST-9 (the environmental chemistry group), the detection limit for acetone by a gas chromatographic method (SW 846 8240) is 20 ppb, that for toluene is 5 ppb, and that for methyl ethyl ketone is 20 ppb. According to LANL DX-16 (the explosives development group), the detection limits for HE by HPLC (SW 846 8330 or equivalent) are: TNT = 0.068 µg/l (ppb) RDX = 0.27 µg/l (ppb) and HMX = 0.21 µg/l.

25. 5.3.4.2 Sampling, p. 5-94 - LANL shall revise their sampling plan to include full laboratory analysis for VOCs, SVOCs, metals and HE and its by-products for every 20 feet until 100 feet from the HE pond. Then a surface sample (0-6 inches) should be collected every 60 feet for full laboratory analysis.

Also, samples deeper than 6 inches should be taken in the drainage where sediment may have accumulated. LANL should also take three samples at the 6 inch to 2 foot depth within the first 100 feet from the pond, and analysis should include VOCs, SVOCs, metals and HE products and by-products.
Per our conversation of August 8 1994, LANL will collect samples every 20 ft. until 100 ft. beyond the pond and then collect surface samples every 60ft.. In addition we will take 3 samples at the 6 in. to 2 ft. depth within 100 ft. from the pond. Surface samples will be analyzed for SVOCs, metals, HE and HE by-products. Subsurface samples will be analyzed for VOCs, SVOCs, metals, HE, and HE by-products. The text will be modified to reflect those changes.

26. 5.4.1 Background, SWMU 13-003 (a,b), p. 5-97 - Action will not be deferred until decommissioning and demolition (D&D). Should sampling in the

drain field or outfall indicate contamination then the rest of the system will be required to be sampled prior to D&D.
The septic tank was removed in 1951 (see history on p. 5-98), and other statements that call the removal of the tank into question will be revised (problem statement on p. 5-103). The former location of the septic tank is partly beneath a walkway, a transformer station, and a parking lot, which should prevent migration of any potential releases from the tank. In addition, the historic removal of the tank eliminates the primary source of potential contamination for this portion of the septic system. Therefore action for the decommissioned system should be deferred until D&D. The drain field [SWMU 13-003(b)] is scheduled for sampling during RFI Phase I. Per our conversation of August 8 1994, LANL will provide a drawing that shows the SWMU and the surrounding buildings and transformer station. (see Attachment B).

27. 5.4.1.1 Description and History, p. 5-97 • Figure 5-52 does not show the drain lines from TA-11-4 and TA-11-1. Only the drain field is indicated in the figure. LANL shall revise the figure to indicate the location of the drain lines, and septic tanks to the drain field. In the future, it would also be helpful that if a figure was not located with text, the page number of the figure would be included in the text (e.g. Figure 5-52, p. 262).
LANL concurs. LANL will include drain lines and the tank on the figure if their locations can be determined. Figure 5-52 will be revised to show this drain line and sampling points. In the future if figures are not located in the same subsections as text, then the relevant page numbers will be cited.

28. Design Criteria (DQO Step 6) p. 5-104 through 5-107 - The explanation for the drain field for these units is incomplete. Are the lines in the drain field perforated so that material flows out along the line, or does it only flow out at the end of the line? The size of each drain field is not included in this work plan; therefore, LANL shall submit a figure for each drain field indicating the locations samples will be collected. EPA cannot evaluate if the sampling proposed is adequate based on the information presented. LANL may propose a similar sampling approach for these systems, but enough information should be provided for EPA to determine that the sampling proposed is adequate.
LANL concurs. LANL will add details on the construction of the septic systems where available. Sampling figures for each drain field will be provided.

29. 5.4.4.1 Engineering Surveys, p. 5-107 - All geomorphic mapping should have been completed prior to submittal of the work plan. Actual sampling locations should be in the work plan.
LANL concurs. Where possible, the proposed sampling locations will be added to sampling figures. See responses to general comment 5 and specific comment 28.

30. Outfalls, p. 5-110 - An additional sample should be collected at each outfall from the soil/tuff interface and analyzed for VOC, SVOCs, metals, HE and HE by-products.
LANL concurs. LANL will collect an additional sample at the soil-tuff interface where there is more than 6 inches of soil. LANL will modify the design criteria to indicate that some PCOCs (i.e. VOC) will not occur at the surface and historic releases may have degraded from the surface.

31. 5.5.4.1 Engineering Surveys, p. 5-117 - Site mapping should have occurred prior to submittal of the work plan. A detailed figure should be included with sampling locations indicated.
See response to general comment 5.

32. 5.5.4.2 Sampling, p. 5-117 - One sample is not adequate for this site. An additional sample should be collected five feet from the first sample. The sample should be collected to the soil/tuff interface and analysis should be for metals, VOCs, SVOCs, and cyanide.
LANL concurs. An additional soil core will be taken at a 5 ft. downgradient location. The purpose of this additional sample will be to collect a sample that is representative of the more mobile potential contaminates, and the design criteria will be revised to reflect this reasoning. If more than 6 in. of sediment are present, then two samples will be collected for laboratory analysis per core. The surface samples will be analyzed for metals, SVOC and cyanide. The second sample (>6 in. taken at the soil-tuff interface) will be analyzed for metals, VOCs, SVOCs, and cyanide.

33. 5.6.1.2.1 Nature and Extent of Contamination, p. 5-122, second paragraph - Explain the meaning of this sentence, "Silver concentration in the soils followed a much more erratic pattern and was always lower in silver than the sediment". In addition, the data from this report (Kasunic et al., 1985) should be included in the work plan.
LANL concurs. The sentence is not clearly written, and will be edited to state the following "Silver concentration in the soils followed a much more erratic pattern, but silver concentration was typically lower in the soil than the associated sediment." LANL will provide the Kasunic data in tabular form in the work plan. See Attachment C to this NOD response.

34. 5.6.4.2 Sampling, p. 5-130 - The proposed sampling plans do not adequately delineate the extent of the contamination. Data excerpted from Kasunic et al. (1985) indicates that at 33 ft down channel the concentration of silver at 3-ft depth was 182 ppm. Sampling should be conducted so that a clean zone beneath the contaminated zone is delineated. Additional corings are required and samples should be collected at the surface (0-6 in.), at 3 feet depth, and at 5 feet depth beginning at the outfall and continuing every 25 feet for the first 100 feet of channel.
LANL concurs. Samples will be collected at 0 ft., 25 ft., 50 ft., 75 ft., and 100 ft. from the outfall. Samples will be collected at the surface, 3 ft depth, and 5 ft depth.

35. 5.6.4.3 Laboratory Analysis, p. 5-130 - How does LANL know that silver and cyanide are the only constituents of concern? Were any solvents used in the photoprocessing? What type of acids were used? LANL shall provide an explanation.
LANL concurs. It is not known whether solvents were used. A 1955 encyclopedia lists commercial film developers as including organic reducing agents such as phenols and amines. VOCs and SVOCs will be added to the analyte list for this SWMU. Acids used in TA-16-222 included: acetic acid, boric acid, and sulfuric acid.

36. 5.7.3 Data Needs and Data Quality Objectives, DQO Step 4.

p. 5-141 - LANL should consider a slant boring approach underneath most of these structures in order to determine if the soil has been impacted by past releases.
The waste water treatment plant is now entirely decommissioned, so there is no longer any reason to hesitate to sample under the units in the most effective way possible. Slant borings are not required. LANL will coordinate the D&D activities with the characterization activities proposed in the work plan. If D&D has occurred prior to field work (and LANL will attempt to ensure that this happens), then LANL will take a 5 ft. core in the excavation produced by removal of each unit. Locations of these cores will be biased by field screening and/or visual indication of cracks/leaks. If D&D has not occurred, then LANL will drill a vertical borehole through each unit to a depth of 5 ft. beneath each unit. The core location would be biased to any zones of obvious cracking/staining based on visual inspection following pumping our water in the units. Following any boring through a unit, each borehole will be plugged with cement to prevent any mobilization of constituents. The text will be modified to reflect this approach.

37. 5.7.4.1 Engineering Surveys, p. 5-145 - LANL shall provide figures with the field surveyed SWMUs and sampling locations. This should have been done prior to submittal of the work plan.
See response to general comment 5.

38. 5.7.4.2 Sampling, p. 5-145 -

a. LANL indicates that cored samples will be taken, and then indicates that these samples will be collected at 0-6 in. These statements are contradictory. LANL shall take an additional sample at the soil turf interface or at 2 feet depth which ever comes first.
LANL concurs. Text will be clarified. We will add an additional analysis for the core segment at the soil-tuff interface or at 2 ft., if there are more than 6 in. of sediment.

b. Page 5-147, 1st paragraph - EPA does not understand the reasoning for drilling to three-quarters of the thickness of the Imhoff tank. If LANL is concerned that the tank has leaked then they should drill through the tank or slant drill under the tank. If LANL is concerned that the tank has absorbed hazardous material and is hazardous then, a chip from the first several inches of the bottom of the tank should be analyzed to see if the tank needs to be disposed as hazardous waste. What does LANL mean by the entire core sample will be sent to the laboratory for analysis? LANL shall provide an explanation.
LANL concurs. LANL proposed drilling 3/4 of the way through the tank to avoid providing a pathway for migration to the subsurface (This was a concern when the system was active). LANL was analyzing the tank to determine if it was hazardous waste. The 'entire core' sample was deemed to provide an adequate amount of material for all required lab analyses. LANL will use the D&D SOP (SOP # not known) for sampling concrete, and the revised work plan will cite this SOP.

c. Page 5-147, 2nd paragraph - LANL shall explain the rational behind Table 5-43. Randomization of samples is not appropriate for this area. Any samples which are to be analyzed for VOCs should be field screened and collected in a manner so as to not drive off the VOCs.

The samples submitted for laboratory analysis were identified through randomization where there are no positive field screening indicators. It is extremely unlikely that randomization will be used. LANL will clarify this point in the text. This procedure will not impact the collection of VOC samples (LANL-ER-SOP-01.02, R0), which are collected in such a manner as to not drive off the energetic VOCs.

39. 5.8.1.1 Description and History, Figure 5-34, p. 5-150 -LANL shall include the location of all the active units which are listed as SWMUs on this figure.
LANL concurs. LANL will include all active units that are listed as SWMUs on this figure.

40. 5.8.1.2 Conceptual Model, p. 5-156 -

a. Page 5-156, paragraph one - LANL shall clarify the portion of the text which refers to the barium concentrations in the drainage from SWMU 16-016(c) and in the southern drainage. If available the sampling locations should be included on a figure and the results of all the samples indicated rather than a range.
LANL concurs. LANL will include a table and figure with the actual data for SWMU 16-016(c) and the southern drainage in the revised work plan. See Attachment D to this NOD response for a list of the data.

b. Paragraph two - LANL shall provide the actual data from the single soil sample rather than indicating if SALs were exceeded (Raper and Brown et. al.).
LANL concurs. LANL will include the actual data.

41. 5.8.2 Remediation Decisions and Investigation Objectives,
p. 5-156- LANL indicates that the open burn/open detonation units are operating under a permit. Technically these units are interim status and are not permitted yet.
LANL concurs. The words "interim status" will be added to the text on p. 5-156.

42. 5.8.3 Data Needs and Data Quality Objectives, p. 5-161 - EPA does not agree with assumption number 3 [that the secondary contaminants of concern (semivolatiles, metals other than barium) do not have a different deposition and transport mechanisms than HE, uranium, and barium so field screening for these three contaminants will allow LANL to locate probable high concentrations of other potential contaminants of concern]. This assumption is not valid and may not be used.
LANL concurs. Assumption 3 is deleted and the following assumption is made in its place "HE and barium are the most likely constituents to present a health risk and screening for these constituents may help define the location of the highly contaminated zone."

43. 5.8.3 Sampling, SWMU 16-010(i), p. 5-164 - LANL should also take a sample from below the buried pipe at the end of the pipe's length.
LANL concurs. The text has been revised to indicate that a sample will be collected from below the buried pipe at the end of the pipe's length.

44. 5.8.4.2 Sampling, p. 5-167 through 5-171 -

a. SWMU 16-010(a) -

i. LANL shall collect samples at the following depths at the locations with the three maximum barium values: 0-6 inches, two feet and five feet. These samples shall be analyzed for semivolatiles, metals, HE and cyanide. LANL shall provide information on the correlation between field screening for barium using the XRF and laboratory analysis.
LANL concurs. LANL will modify the text, sampling table, and sampling figures to indicate that subsurface samples will be collected. Per our discussion of August 8 1994, the detection limit for the field XRF is 10 ppm (see Attachment E), the laboratory detection limit is 0.2 ppm (method 6010), and the SAL for barium is 5600 ppm.

ii. Table 5-46 - LANL shall indicate what analysis shall occur for the ten additional samples which may be collected based on HE screening (only 3 samples are indicated in this table).
LANL concurs. LANL will indicate in Table 5-46 that the same analyses will be conducted on all of these samples.

b. SWMU 16-016 (c) -

i. LANL shall provide a figure indicating the location of MDA P in relation to the drainage and samples to be collected.
LANL concurs, LANL will add the boundary of MDA-P to the sampling figure for SWMU 16-016(c).

ii. Table 5-46 - LANL shall provide an explanation why the two out of four potential samples located in this unit are not be analyzed for semivolatiles and cyanide as are the samples in SWMU 16-016(a). In addition, the table shows 8 samples being analyzed. If field screening indicates barium may have been stored at this area then LANL shall take core samples at 2 feet and 5 feet and analyze for semivolatiles, metals, HE and cyanide.
LANL concurs. LANL will add semivolatiles and cyanide as analytes to all eight samples for SWMU 16-016(c). The text will be clarified to remove the suggestion that only four samples will be taken. Per our discussion of August 8 1994, LANL will collect a deeper additional sample, where field screening indicates barium contamination. Thus, if barium contamination is detected at the surface, then an additional sample will be collected at 2 ft., and then an additional sample will be collected at 5 ft. if barium contamination is detected at 2 ft.

iii. LANL shall extend the area of sampling to the intersection with Cañon de Valle rather than stopping at 210 feet. A sample should be sent for full laboratory analysis every 30 feet until this intersection occurs. Field screening may be used to potentially determine the lateral extent of barium contamination in the drainage ditch; however full delineation of the extent of contamination, including depth, will be required. Therefore, for the three highest field screened areas for barium within the ditch, LANL shall collect samples at the two foot depth and conduct full laboratory analysis.

LANL concurs. LANL will collect these additional samples downgradient to the Canon. Also, LANL concurs with taking additional depth samples in the ditch. The text and figures will be modified to reflect this change.

c. SWMU 16-010 (h), p. 5-169 - It is unclear from the diagrams and text here and in the rest of the chapter where the potential release of contaminants occurred. Text on page 5-152 indicates that the HE residues were emptied into a floor drain located on the south end of the building which went to the troughs. Is LANL sampling under the connections to the drainage troughs? LANL should provide a better explanation for their sampling rationale. In addition, several samples should be taken deeper than 0-6 inches.
Possible release points are: 1) the one existing trough exit on the south side of the building, 2) the three filled trough exits on the south side of the building, and 3) the stained holes in the building wall on the south side of the building. This additional detail will be added to the work plan. LANL is sampling under the drainage trough connections. We will modify the description of sampling to indicate that in the absence of positive field screening results, the laboratory samples will include the sampling points beneath the troughs and beneath the holes in the building. The laboratory samples will be taken from the surface and a depth of 3 ft or the soil-tuff interface (if the soil-tuff interface is less than 3 ft deep). Two laboratory analyses will be submitted per sampling location.

d. SWMU 16-010(l), p. 5-170 - LANL shall conduct full laboratory analysis at a minimum of ten sites rather than a minimum of three sites. At the three samples with the highest field screening results an additional sample should be collected at two feet or the soil/tuff interface (3 samples at 2 feet) and undergo full laboratory analysis.
Per our discussion of August 8 1994, LANL will collect a minimum of three samples with additional samples submitted for laboratory analysis given positive HE field screening. No subsurface samples will be directly allocated to this trough. Rather, they will be distributed per the original plan among all the troughs based on field screening.

e. South drainage, p. 5-171 - At the three locations where sediment traps are sampled, a deeper sample at the sediment to tuff interface should also be analyzed for SVOCs, metals, HE and cyanide.
LANL concurs. LANL accepts additional samples at depth, and will also change sampling tables and figures.

<u>Cañon de Valle</u>

45. 5.9.3 Data Needs and Data Quality Objectives, p. 5-178 - LANL shall explain what is meant by "realistic exposure scenarios".
LANL concurs. The text will be rewritten to the following "but the risk to human health remains to be quantified."

46. Design Criteria (DQO Step 6), p. 5-181 - Text in the first paragraph indicates that 30 samples are adequate for an initial baseline risk assessment while text in the second paragraph indicates that only 10 samples will be submitted for laboratory analysis. In addition, Table 5-52 indicates that 40 sediment samples will be sent for laboratory analysis. LANL shall clarify how many samples are actually being taken and submitted for laboratory analysis.

LANL concurs. The design criteria paragraph 1 has been clarified to the following: "A total of 40 laboratory samples [30 0 to 6 in. and 10 deep-surface/subsurface samples (6-12 in. or 12-18 in. or soil-tuff interface)] from Cañon de Valle will be submitted for laboratory analysis. The purpose of surface sampling Cañon de Valle is to obtain information about contaminant migration and transport. The samples will be located to provide approximately uniform coverage of the region of interest. Geomorphologic mapping will provide information on the heterogeneity of sediments and rock outcrops in the canyon bottom. In Cañon de Valle, 30 sediment traps and associated water will be selected so that a sample for laboratory analysis is taken approximately every 200 ft. These samples of sediment traps will be selected to provide adequate coverage of the diversity of sediments in the canyon, based on the geomorphologic mapping. Professional judgment suggests that 30 samples will be adequate for a baseline risk assessment."

47. 5.9.4.2 Sampling Cañon de Valle, p. 5-184 - Text here and under Decision Logic (DQO Step 5) indicate that subsurface sampling is being performed. The sampling indicated is not considered subsurface by EPA. The top two feet are considered surface soils. LANL shall revise text in response to this comment. It is unclear from the text how many samples will be selected from below the 0-6 inch depth. LANL shall provide clarification.
LANL concurs. LANL agrees with EPAs definition of subsurface soil, and samples deeper than 6 in. will be considered deep-surface samples. This will be clarified in the text. LANL will rewrite the section describing selection of the samples from below 0-6". The hierarchy of biasing is: 1st) samples with positive HE field screening results; 2nd) the highest Ba samples by field screening to a total of 10 samples below 0-6".

MDA R, SWMU 16-019

48. 5.10.1.1 Description and History, p. 5-186 - LANL shall provide a figure of the site based on the 1984 aerial photographs or indicate on Figure 5-41 the location of the original three burning areas.
LANL concurs. LANL will indicate the approximate former location of the three burning pits in MDA R.

49. 5.10.1.2.1 Nature and Extent of Contamination, p. 5-187 -Why are the potential contaminants of concern (PCOC) different than the contaminants of concern listed (e.g. semivolatiles, fuel oil). Table 5-53 should include these potential contaminants. LANL shall revise the table to include all contaminants of concern.
LANL concurs. LANL will revise Table 5-53 to include semivolatile organics.

50. Design Criteria (DQO Step 6), p. 5-193 -

a. Paragraph two - The probabilities for the statistical analysis are low; EPA would like to see a probability of 90% if 10% of the site was contaminated for the surface. Therefore, LANL shall take 22 near surface samples.
LANL concurs. LANL will modify the text and the sampling figures and tables to indicate that 22 near-surface samples will be collected.

b. Paragraph three - The probabilities for the statistical analysis seem low; therefore, EPA would like to see a probability of 90% if 15% of the site is contaminated or 15 samples from the drainage.
Per our discussion of August 8 1994 on the likely homogeneity of the potential contamination in the drainages, LANL will not modify the original sampling plan for the drainages.

51. 5.10.4.2 Sampling, p. 5-197 -

a. Second paragraph. - EPA recommends that of the randomized samples six become biased samples which will be collected at obvious drainages near the canyon rim and the topographic depressions within MDA-R. In addition, if the bottom 6 inch interval is above background for radiation, barium or HE then it should be submitted for laboratory analysis.
LANL concurs. LANL will modify the text to indicate the approximate location of these biased samples. LANL will also indicate in the revised text that if the bottom interval is above background, then this interval will be submitted for lab analysis.

b. Fourth paragraph. Eight drill cores - If LANL only takes one of the 1-6" samples for analysis then the actual vertical extent of contamination will be hard to define. Rather, if one of the segments other than the bottom 6 inch segment has a positive reading then LANL shall also submit the bottom segment for laboratory analysis. If the bottom segment of the core segment has a positive reading then LANL shall core deeper, and take an additional sample every two feet until no positive readings are made for HE, radiation or barium. LANL shall also sample and analyze the 15 randomized three-foot cores in the same manner, thereby defining the depth of any contamination.
LANL concurs. LANL will submit an additional core segment for laboratory analysis where there is a positive field reading. We will core deeper if the bottom segment has a positive reading and take an additional sample every 2 ft. until no positive readings are found. This approach holds for both 3 ft. and deep cores. The appropriate text for this aggregate will be modified.

52. 5.10.4.3 Laboratory Analysis, p. 5-199 - LANL shall submit a list of the semivolatile organics for which analysis is being conducted.
LANL is proposing to analyze the full complement of SW-846 Method 8270 semivolatile organics. The reference to PAHs in Table 5-55 will be deleted.

5.11 Surface Waste Disposal Areas, SWMUs 16-009 and 16-016(a,b)

53. 5.11.1.1 Description and History, p. 5-202 - SWMU 16-016(b) - What types of HE contamination were found in the CEARP field survey and at what amounts?
The release site data base mentions HE as a COC and cites CEARP. LANL has no information on the specific types and amounts of HE used, but we hypothesize that the indication of HE was a positive HE spot test.

54. 5.11.4.3 Sampling, SWMU 16-009, p. 5-210 -

a. Three samples over this area (approximately 180,000 sq. ft.) is not adequate. LANL shall analyze a minimum of twenty samples from this area. If a surface soil sample indicates radioactivity or barium levels above background then the

bottom portion of the 3 foot interval should also be sent in for analysis. This extra sample should be in addition to the minimum of twenty samples required. In addition, LANL does not know that this area was not used for burning HE; therefore fifty percent of the samples should at least be field screened for HE. If field screening indicates positive results then laboratory analysis should occur for those samples.
Per our discussion of August 8 1994, LANL will apply a 25 ft grid over the location of highest expected contamination, the former 100 by 100 ft bermed area. From these 25 field screening locations five laboratory samples will be selected based on field screening results for barium and radiation. Per our discussion, we will not use the HE spot test on these samples. This revised sampling plan will also indicate that in the case of positive screening hits on the surface, the bottom portion of the 3 ft. cores will be sent for separate lab analysis.

b. LANL shall provide a better explanation of how samples will be collected from this area. Are 6-inch sections from each three foot core being screened as in other parts of the work plan, and then will that 6 inch sample be sent for analysis if field screening indicates barium or radioactivity above background? How and over what interval will the samples be homogenized?
LANL proposes to screen three 6-in. core segments (one per foot), and field screening results will be used to select one core segment for laboratory analysis. If there are no positive field screening indications, then LANL will submit the 12 to 18 in. core segment for laboratory analysis. The text will be clarified.

c. SWMU 16-016(b). p. 5-213 - Any surface samples with positive HE field screening results should be submitted for laboratory analysis.
LANL concurs. The text will be rewritten to indicate that all positive HE screening results will be submitted for laboratory analysis.

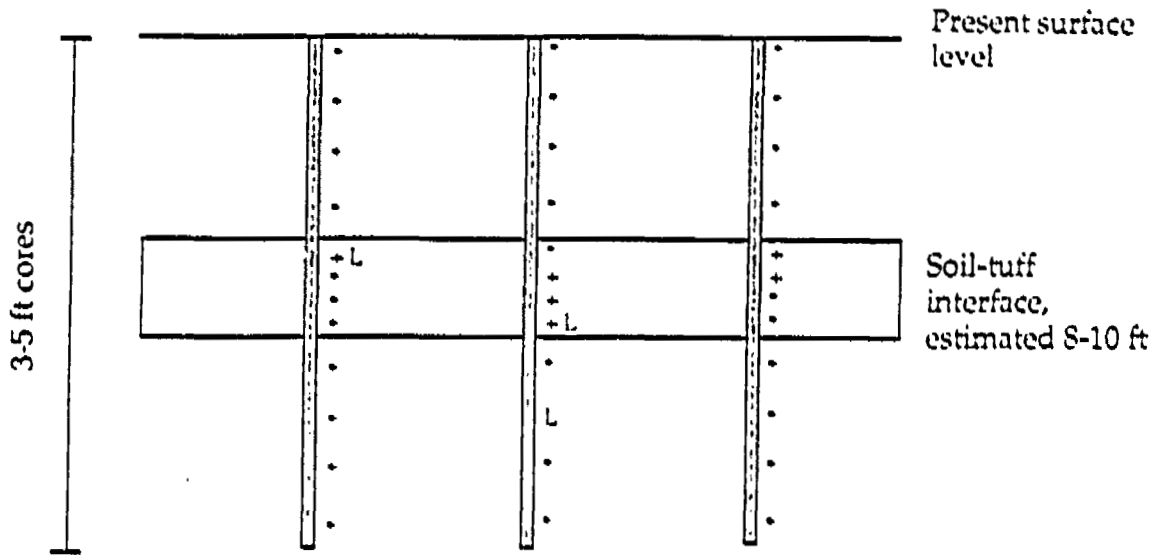
<u>TA-16 Waste Water Ponds Aggregate, SWMU 16-007(a) and SWMU 16-008(a)</u>

55. 5.12.4.2 Sampling, p. 5-222 - SWMU 16-007(a) -

a. LANL shall not homogenize over the 5 ft. core interval for one sample. LANL shall obtain samples from 6 inches or less of core. This will allow for less dilution of the sample and make it easier to determine the depth of any contamination.
LANL concurs. LANL will screen the 5-ft. cores at 6 in. intervals.

b. The original description of these ponds indicates that material was probably deposited between 8 and 10 feet depth from the surface; therefore, cores to a depth of 10 feet may not adequately define the possible contamination. LANL shall core to a depth of 15 feet at each sampling location. Should field screening not indicate any potential contaminants of concern then LANL shall submit a sample from the 8-10 ft. depth for two out of the three cores drilled in each pond. This will make a total of 8 samples sent for laboratory analysis.
LANL concurs. LANL will core to 15 ft and take 12 field screening samples per core and 3 laboratory analyses per pond (total of 108 field screening and 12 laboratory analyses for the SWMU). Details of this plan will be provided in the work plan revision.

Modified Sampling Plan with Example Biasing Results



• = field screening locations

+ = positive field screening locations

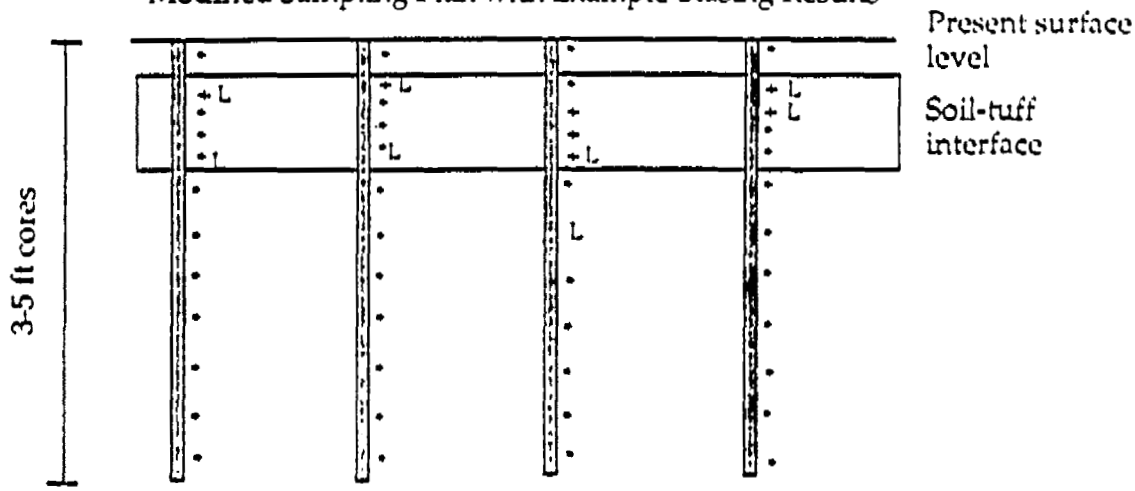
L = samples submitted for laboratory analysis, given this pattern of field screening hits

56. SWMU 16-008(a), p. 5-224 -

a. LANL shall not homogenize over the 5 ft. core interval as above, but should obtain samples from 6 inch intervals. Should the bottom 6 inches of core indicate potential contaminants of concern (PCOC) then the depth of contamination should be delineated and an additional 5 ft. core should be taken. This core should also be screened and an additional sample analyzed where any PCOC are indicated. If no PCOC are indicated then the sample 2 ft. below the last positively field screened interval for PCOC should be submitted for analysis.

LANL concurs. The general strategy for these cores will be similar to that described for SWMU 16-007(a). LANL will collect 6 in. core segments through field screening (12 per core for a total of 48 with emphasis on the pond bottom/soil-tuff interface) and submit two core segments for laboratory analysis per core based on screening (total of 8 laboratory analyses for the SWMU). In cases where the bottom 6 in. indicate contamination, the cores will be continued so that a 'clean' sample can be collected. Details of this plan will be provided in the revised work plan.

Modified Sampling Plan with Example Biasing Results



• = field screening locations

+ = positive field screening locations

L = samples submitted for laboratory analysis, given this pattern of field hits

b. A comparison of Figure 5-46 and text for sampling of this SWMU is confusing. LANL shall explain the total number of cores that will be taken and field screened for PCOC.
LANL concurs, and the text will be clarified. See response for 56a.

TA-13 (P-Site), SWMUS 13-001, 13-002, 13-004, 16-035, 16-036

57. 5.13.1.1 Description and History, p. 5-229 - LANL shall provide an explanation or better history description for SWMUs 16-035 and 16-036. Why does LANL suspect contamination beneath the bunkers?
LANL will expand the historical description of SWMUs 16-035 and 16-036. LANL suspects historic contamination because of several memos (written by Buckland in the late 1940s) that suggested polonium contamination in the bunkers. Since polonium has a short half-life (138 days), this contamination would have decayed in the intervening years. Other constituents are likely to be of minor importance. This information will be clarified in the work plan. In summary, LANL does not expect current contamination at these SWMUs.

58. Design Criteria (DQO Step 6), p. 5-234 - SWMUs 13-004, 16-035, and 16-036 - What percentage of these SWMUs is anticipated to be contaminated? LANL indicates two very different levels of contamination and probability of detecting that contamination. LANL shall provide an explanation for the sampling size. In addition, EPA would prefer to see a minimum of 90% probability of determining if contamination is present.
Given the historical information provided in response to specific comment 57, LANL does not expect any significant contamination within these SWMUs. As discussed on August 8, 1994 we view this as a 'not very serious' SWMU that doesn't warrant 90%

certainty. Therefore, the samples represent an extensive sampling of those units to test this assumption.

59. 5.13.4.3 Sampling, p. 5-239 -

a. Figure 5-48 does not show the location of the drainage or drainage samples. LANL shall provide a figure with this information.
Figure 5-48 does show the drainages in detail. The figure will be revised to show these features more clearly (as was done for drainages in Figure 5-41).

b. In addition the survey grid (Figure 5-48) does not cover the entire SWMU 13-002. LANL shall provide an explanation for this.
The boundary for SWMU 13-002 was drawn based on the cleared area in a 1948 aerial photograph. Visual inspection of the SWMU shows an area of high concentration of boulders about 200 ft from the firing point. We hypothesize that this is the limit of the bulldozed area. Sampling is not designed to continue beyond this point for SWMU 13-002 (the additional samples are for SWMU 13-001). This information will be added to the text.

c. It is unclear from text how the 38 samples for laboratory analysis will be selected from this firing site. Shallow surface sampling (0-18 inches) in prominent drainages and topographic lows could be used to supplement the grid samples.
LANL concurs. LANL will rewrite to clarify the text. Rather than collecting samples at randomized grid locations, samples will be biased to prominent drainages and topographic low points. The proposed samples in the north and south drainage channels will be collected to represent the 0 to 18 in. soil profile (in 6 in. increments) rather than the 0 to 6 in. layer.

d. SWMUs 13-004, 16-036, and 16-035, p. 5-240 - Based on the response to the questions on DQO Step 6 and Description and History above, EPA may determine that additional samples will be required.
SWMU 13-004 has not been located with any certainty. Since the potential contamination at SWMUs 16-035 and 16-036 was likely to be polonium (with a half-life of 138 days), LANL requests that the number of samples remain at four for these SWMUs. Note that these samples are being analyzed for metals, uranium, SVOCS, asbestos, and HE - so other constituents will be found if they are present.

5.14 TA-11 Firing Site Aggregate, PRSs 11-001 (a,b), 11-002, 11-003(b), 11-004(a-f), 11-006(a-d), C-11-001, p. 5-242 -

60. 5.14.1.1 Description and History -

a. SWMU 11-001(a), p. 5-245 - What type of HE was used in experiments in the firing pit? LANL shall provide a better description of the activities which occurred at this unit.
Since this was a WWII site, the primary HE used would have likely been Comp B (TNT and RDX) and Baratol (TNT and barium nitrate). This firing pit was built in early 1945 and abandoned by early 1950. Memo 11-00002 (no author 1944) states that blast pressures of 7 000 psi (476 atm) could be expected against the nose cones of TA-11-2 and TA-11-3. The firing pit was built almost immediately after those buildings were

built. Given that they were abandoned within five years, it is likely that testing nose cones occurred only for a few years until they determined the optimum nose cone structure for the buildings. This information will be added to the text.

b. LANL shall provide a figure with more detail of the SWMUs, as Figure 5-49 is good for an overall picture, but does not have the detail required to examine SWMU size and locations.
LANL concurs. LANL will provide a more detailed map of K-Site as a new figure.

c. SWMU 11-001(b), p. 5-245 - What type of HE was used at this site?
Since this was a WWII site, the primary HE used would have been Comp B (TNT and RDX) and Baratol (TNT and barium nitrate). This information will be added to the text.

d. SWMU 11-004, p. 5-247 - What type of HE has been used at this SWMU?
Because this drop tower was constructed in 1956, the primary HE used would have been plastic-bonded explosives (containing primarily HMX, TNT, RDX, TATB). This information will be added to the text.

e. SWMU 11-002, p. 5-248 - Has this unit been used since 1992? Does the unit have interim status and will it receive a permit?
According to the current ESA-1 Group Leader, Paul Smith, the burn pit is currently used. The building manager of TA-11-24 states that the pit has been used in the last year or two and will be used extensively during the next three years. The pit is not used for waste disposal, rather it is an experimental unit - individual experiments are permitted by the state. Attachment F is the cover page of a recent permit application for a series of experimental tests to simulate transportation accidents involving fuel, high explosives, depleted uranium, and polyurethane.

61. 5.14.1.2.2 Potential Pathways and Exposure Routes,
p. 5-250 - What is the schedule for use of this site? What is the date for decommissioning this site? LANL shall submit work plans for the subsurface potential release sites within 90 days of receipt of this NOD. Based on the response to the above questions work on subsurface units may or may not be deferred until the site is decommissioned.
Per our discussion of August 8 1994, this site is used for experimental drops at most 4 times a year. The burn pit currently is used more often (36 burns scheduled for the next three years). LANL will submit sampling plans for these subsurface sites within 90 days. Per our discussion of August 8 1994, a single coring under the asphalt will be collected for each site.

62. 5.14.4.2 Sampling, p. 5-258 -

a. The drainage area from SWMU 11-006(c) should also be sampled and undergo analysis for the full suite of analytes.
LANL concurs. The majority of the area within the SWMU boundary is a cement trough that originally discharged 10 ft from the south drainage. However, this trough is breached 50 ft from the drainage, and an erosion channel has developed. LANL will take two 0 to 6 in. surface samples, one at the sediment trap beneath the trough breach, and one at the sediment trap 10 ft from the south drainage. These samples will be analyzed for the full suite of analyses.

b. North and South drainages - All the samples should be submitted for a full suite laboratory analysis not just the first and last.
LANL concurs. The DQOs and sampling plans will be updated to reflect this change.

5.15 TA-11 Outfalls Aggregate, SWMU 11-005(c), SWMUs 11-011(a-c)

63. 5.15.1.1 Description and History, p. 5-260 - LANL should provide the dates of operation for all these outfalls.
As stated in the work plan, all of the outfalls except SWMU 11-005(c) are still active. SWMU 11-005(c) was installed in 1944 to serve TA-11-2. A field visit in February 1992 showed that the drain for SWMU 11-005(c) had been plugged at an unknown date. TA-11-30 [associated with SWMU 11-011(b)] was built in 1959, the addition of TA-11-30A [associated with SWMU 11-011(c)] was built in 1956 according to the structure list. The text will be revised to incorporate this information.

64. 5.15.4.2 Sampling, p. 5-268 -

a. Outfalls on moderate slopes - LANL shall collect an additional sample for laboratory analysis 4-6 feet away from the outfall discharge point.
LANL concurs. An additional soil core will be taken 5 ft downgradient from the outfall. If there are more than 6 in. of sediment, then deep samples will be also be collected in each outfall for laboratory analysis. The surface samples will be analyzed for metals, SVOCs, and cyanide. The second sample (>6 in. taken at the soil-tuff interface) will be analyzed for metals, VOCs, SVOCs, and cyanide.

b. Paragraph four - Text indicates that two samples with the highest filed screening readings will be selected for laboratory analysis. This contradicts text in Design Criteria (DQO Step 6) on page 5-266 which indicates that "three samples per core will be submitted for full laboratory analysis". LANL should clarify what analysis will be conducted.
LANL concurs. LANL will clarify the text on p. 5-266 to indicate that field screening will be used to select two of the three core segments that will be submitted for laboratory analysis.

5.16 TA-11 Potential Surface Contamination Aggregate, SWMU 1-001(c), SWMU 11-012(a-d), C-11-002

65. 5.16.1.1 Description and History, C-11-002: TA-11-12, p. 5-274 - LANL shall provide additional information on this unit. Is it visible in any of the aerial photographs reviewed. Based on the information provided it should probably be included as a SWMU and be included in the permit.
TA-11-12 is present on the July 15, 1954 version of Engineering drawing R-128 and is listed as a laboratory building. It is shown on utility map R-646 dated July 30, 1958, but no utility lines are shown servicing this building. According to the structure list, it was a wooden frame building (7 ft wide x 9 ft long x 8 ft high) built in December 1944. It is not noted in 1983 or later drawings. TA-11-12 is visible on an oblique photograph of the airgun target range and appears to be a construction shack. It was removed to salvage in March 1959. Photos from March 11, 1958, indicate that TA-11-12 was located on a poorly maintained dirt road.

TA-11-5 was the other laboratory building at this site. TA-11-5 was built in 1944 and removed in 1956. TA-11-5 was 6 ft wide x 32 ft long x 8 ft high.
The CEARP report notes a 1950 memo that reported a chemistry building with "active" samples Ogle (1950, 15-11-011). This memo cannot refer to TA-11-12, since the memo refers to unsatisfactory hoods and poorly lit entrances and exits. TA-11-12 is too small to have multiple hoods and an entrance and exit door. This additional information will be added to the work plan. LANL contends that TA-11-12 was not a major laboratory facility, and should not be upgraded to a SWMU.

66. 5.16.4.2 Sampling, p. 5-278 -

a. LANL shall clarify the sampling procedures to be used. Will the entire 18 inches of core be analyzed as one sample. Why are 300 ml of core required?
LANL will analyze the entire 18-in. core segment, which will be collected using LANL-ER-SOP-06.10, R0. The reason for collecting an 18-in. segment is that these structures have been decommissioned and bulldozed, which will have redistributed PCOCs from the surface to a shallow depth. 300 ml is estimated to be an adequate volume of material for all required analyses. The investigation boundary on p. 5-277 will be updated to reflect this information.

b. For SWMU 11-001(c) which is a former burn pit, sampling should occur to 3 feet in depth. LANL shall take at least two samples per core.
LANL concurs. LANL will collect a 3-ft core segment or to the soil-tuff interface if it is shallower. The investigation boundary and the sampling plan for this unit will be updated.

5.17 Decommissioned Waste Storage Area, SWMU 16-013

67. 5.17.1.2.1 Nature and Extent of Contamination, p. 5-286 -LANL shall describe what is meant by the area has been cleaned. What does this include?
LANL concurs. LANL will include a brief description of the cleanup which included removing the empty boxes and cans.

68. 5.17.4.2 Sampling, p. 5-289 - Any areas of staining should be preferentially sampled. If no samples have a positive screening for PCOC's then LANL shall send 2 samples collected from obvious down gradient portions along the edge of the asphalt pad for laboratory analysis.
Based on a field visit, there is no staining visible in the north drainage. This information will be added to the text. There are two obvious downgradient sampling locations along the north end of the storage area. These locations are at the eastern sampling points on Figure 5-57. Samples submitted for laboratory analysis will be preferentially chosen from these locations in the absence of positive field screening.

69. 5.17.4.3 Laboratory Analysis, p. 5-291 - Why is LANL conducting laboratory analysis for VOCs when samples are being taken from the top 6 inches?
LANL concurs. LANL will remove VOC sampling from Table 5-78.

Chapter 6

70. Table 6-1, p. 6-1 - EPA does not necessarily agree with the criteria for no further action or deferred action. Each unit will be evaluated separately. Undergoing voluntary corrective action is not a reason for deferral.
LANL understands that the regulators review each site that LANL proposes for NFA or DA on a case-by-case basis. These criteria are used by LANL to create consistency within the ER Project and to facilitate review of these sites by EPA. We understand that new criteria are proposed for EPA consideration in a draft letter, dated June 24,1994, written in response to NOD comment 9 for the OU 1157 RFI Work Plan. OU 1082 has used the criteria that were current when each work plan was written.

71. 6.1.1.1.1 Background, p. 6-3 -

a. EPA does not approve deferral of any site which is beneath one of the open burn/detonation units (16-005(g)). These units must be sampled and a work plan submitted within 90 days detailing the sampling of these units. Removal of the interim status units which will receive a permit will be approved with concurrence of NMED.
Per our discussion of August 8 1994, LANL will take one angled boring beneath the active open burn unit. A sampling plan for this unit will be provided within 90 days. The closure plan for the TA-16 open burn units that was requested in the August 8 conference call is presented in Attachment G.

b. SWMU 16-010(d), p. 6-4 - Has this unit also been converted to a burn table and is it currently active?
This burn slab has been converted to a burn table, and the text will be clarified to reflect this change.

72. 6.1.2.1.2 Rationale for Recommendation, Inactive Surface Impoundment, p. 6-7 - Has NMED approved the actual closure of this unit? With concurrence from NMED, LANL may request removal from the permit via a Class 3 permit modification.
NMED has recently approved the closure of this unit (SWMU 16-008(b) the hypalon pond), and a copy of this letter (dated June 7, 1994) has been attached to this response (Attachment H). The text will be modified to reflect this information.

73. 6.1.3.1.1 Background, SWMU 16-010(g) - LANL may request removal of this unit from the permit by a Class 3 permit modification. If this unit did not handle or manage solid waste then it should not be listed as a SWMU.

With approval from NMED, LANL may request removal of the following units by a Class 3 modification from the HSWA portion of the permit:

16-012 (d,i,j,l,m,n,t,u,x)
16-012(p)
16-012(a2)
11-011(c)
16-006(f)
LANL will include these units in the next Class 3 permit modification. Approval from NMED will also be requested.

74. MDA P - NMED has the lead for this unit and all activities should be covered under closure requirements. LANL may request removal of this unit from the HSWA portion of the RCRA permit by a Class 3 permit modification.
This unit is currently undergoing regulatory approval. LANL will include this unit in a future Class 3 permit modification with approval from NMED. LANL recently submitted a revised closure plan for this unit. NMED issued an NOD on the initial plan and LANL is currently responding.

75. 6.1.5.1.3 Rationale for Recommendation, SWMU 11-007
p. 6-14 - The reason to recommend this unit for no further action should be that it does not meet the definition of a SWMU. LANL may request removal of this unit from the permit by a Class 3 permit modification.
LANL concurs. The text will be modified to indicate that the unit does not meet the definition of a SWMU. LANL will include this unit in the next Class 3 permit modification.

76. 6.1.5.2 MDA S, SWMU 11-009, p. 6-14 - What procedures are in place to ensure there will be no release of materials from this SWMU. If the SWMU is defined by the area of the fence then investigation of this site may be deferred until completion of the experiment.
The buffer zone around the experimental pots ensures that no release from the unit, which is defined by the fence, will occur.

77. 6.1.5.3.1 SWMU 16-005(n), p. 6-16 - Archival information does not appear sufficient to no further action this SWMU. This unit should be investigated and a sampling plan should be submitted within 90 days.
Per our discussion of August 8 1994, LANL will submit a sampling plan to collect a sludge sample from this tank within 90 days.

78. 6.1.5.4.1 SWMU 16-005(o), p. 6-17 - Was there ever any other use for building TA-16-101 other than a guard house? If this unit only served a guard house then EPA concurs that no further action is required.
There was never any use for TA-16-101 other than a guard house, and the text will be rewritten to indicate this fact. LANL will include this unit in a future Class 3 permit modification. Approval from NMED will also be requested.

79. 6.1.5.5.2 Recommendation SWMU 16-006(b), p. 6-18 - Why is this listed as an active septic system when the guard house it serves is inactive? LANL may request removal of this unit from the permit.
The guard house is used periodically as an alternate access point for construction equipment. LANL will include this unit in a future Class 3 permit modification. Approval from NMED will also be requested.

80. 6.1.5.7 Rest Houses SWMUs 16-012 (a-z) and 11-010(a),
p. 6-19 - What is the function of the drains associated with the rest houses? Why do the drains lead to high-explosive sumps if there is no problem with the handling of HE at these sites. LANL needs to provide additional information prior to consideration of no further action by EPA. Figures should be provided.
Per our discussion of August 8 1994, LANL will provide a better description of these rest houses in support of the NFA proposal rather than provide figures. Of the SWMUs

listed, only SWMUs 16-012(k,r,s) have exterior drains, and the sumps associated with these SWMUs will be sampled as described in aggregate 5.2 of this work plan.

81. The following units do not need to be added to the permit:

SWMU 16-007(b)
SWMU 11-003(a)
SWMU 11-008
SWMU 11-010(b)
SWMU 37-001
C-11-003

LANL concurs.

Department of Energy
Field Office, Albuquerque
Los Alamos Area Office
Los Alamos, New Mexico 87544

AUG 17 1994

William K. Honker, Chief
RCRA Permits Branch
U. S. Environmental Protection Agency
Region 6
1445 Ross Ave., Suite 1200
Dallas, Texas 75202-2733

RE: Response to Notice of Deficiency (NOD) for OU 1082 RCRA Facility Investigation (RFI) Work Plan

Dear Mr. Honker:

Enclosed is the response to the NOD for the OU 1082 RFI Work Plan which was submitted to your office for review on July 16, 1993. Environmental Protection Agency (EPA) NOD comments were received at the Los Alamos Area Office on July 18, 1994.

A teleconference call to your staff was initiated on August 8, 1994. We have formulated many of our responses in accordance with the guidance we were given during this discussion, and we have referenced this dialogue, where applicable, within our responses. However, during this discussion, several items were identified as EPA concerns that would be more appropriately addressed at the programmatic level rather than specifically within this NOD response. These items have been identified in the enclosure and we are currently in the process of developing responses which will be delivered to EPA at a later date.

We are also required to deliver, within 60 days of the receipt of your NOD, sampling plans for the sumps sited in deficiency number 18. This material will be sent to you no later than September 16, 1994. You also requested that additional sampling plans and other material addressing deficiencies number 71 and 77 be provided within 90 days of receipt of the NOD. This material will be sent to you no later than October 16, 1994. Additionally, the sampling results for NPDES outfall number EPA05A056 will be sent to you as soon as they are received from the analytical laboratory. Pending your approval of all these deliverables, the revised work plan incorporating all changes outlined in our responses will be submitted to EPA by December 1, 1994.

Should you have any questions or concerns, please call me at (505) 665-7203, or Bonnie Koch, Scientech, at (505) 665-7202.

Sincerely,

for Theodore J. Taylor
Program Manager
Environmental Restoration
Program

LAAMEP:2TT-009

Enclosure

cc w/enclosure:
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K. Hargis, EM, LANL, MS-J591
B. Martin, CST-6, LANL, MS-E525

November 21, 1994
EM/ER:94-J450
M992
505-667-0808

Mr. Joseph Vozella, Chief
Environment, Safety, and Health Branch
US Department of Energy
Los Alamos Area Office, MS A316
Los Alamos, NM 87544

Dear Mr. Vozella:

SUBJECT: RESPONSE TO NOTICE OF DEFICIENCY (NOD) CONCERNING OPERABLE UNIT (OU) 1082 RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION (RFI) WORK PLAN WORK BREAKDOWN STRUCTURE NUMBER 1.4.2.6.1.7.1.2

Enclosed is the Los Alamos National Laboratory's revised work plan pages incorporating all changes required in the Environmental Protection Agency's (EPA's) Notice of Deficiency concerning the OU 1082 RFI Work Plan and a certification form signed by the appropriate Laboratory official. The NOD was received at the Los Alamos Area Office on July 18, 1994. LANL stated that those revised pages would be delivered by December 1, 1994 in the response to the EPA NOD that was transmitted August 17, 1994.

The enclosed revisions show the comments from the NOD indicated in the margins and the text cahanges highlighted. LANL has also provided a coversheet that indicates where responses to specific NOD comments are located. A documented quality review of the enclosed response has been performed in accordance with procedure LANL-ER-AP-01.3.

Please let me know if there are questions about this response to the NOD, or contact Brad Martin of my staff at 667-6080. I would appreciate having the response and the signed certification form sent to the EPA, Region 6, by December 1 to meet the required deadline.

Sincerely,

Jorg Jansen, Project Manager
Environmental Restoration

JJ/rfr

Enclosure: Responses to NOD
Certification Form

CERTIFICATION

I certify under penalty of law that these documents and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violation.

Document Title:

Response to NOD for RFI Work Plan for OU 1082

Name: _____ Date: 11/24/94
Dennis Erickson
Division Director
Los Alamos National Laboratory

Name: _____ Date: 11/30/94
Joseph Vozella, Chief
Environment, Safety, and Health Branch
DOE-Los Alamos Area Office

Cy: T. Baca, EM, MS J591
J. Shipley, EM, MS J591
B. Martin, CST-6, MS E525
B. Koch, LAAO, MS A316
J. Levings, ERPO, MS A906
EM/ER File, MS M992
RPF, MS M707
CIC-10, MS A150, w/o enclosure

5.3 HE Sumps and Active Outfall at TA-16-260, SWMUs 16-003(k), 16-021(c)

5.3.1 Background

This aggregate consists of 13 high explosive sumps, their drain lines, the outfall, and the well-defined drainage channel associated with TA-16-260 (Fig. 5-27; Tables 5-21, 5-22). The sumps have been designated SWMU 16-003(k) and the outfall as SWMU 16-021(c). The outfall is permitted as EPA 05A056. A general background discussion of sumps and their operating principles is given in Subsection 5.2.1.

The outfall receives effluent from the sumps, as shown on Laboratory drawing 13Y-1920756 (Palmer and Abercrombie 1991, 15-16-366). Each sump flows into a trunk line that discharges to the outfall. Sump S14, serving Bay 25 on the southeast end of TA-16-260, has been removed. The outlet of Sump S15 is plugged and the sump is no longer active.

TA-16-260 is an HE machining facility that processes large quantities of explosives. Machine turnings are routed to the sumps as waste. The drainage channel from the outfall is contaminated with explosive waste, including barium nitrate, the primary ingredient in the explosive baratol.

In 1966, the 10-ft wide loading dock on the rear (northeast) of TA-16-260 was removed. New sumps with water-tight aluminum liners were installed adjacent to the northeast wall of TA-16-260. HE-contaminated dirt under the old sumps was removed and replaced with clean, compacted earth. PCOCs are listed in Table 5-21.

5.3.1.1 SWMU Description and History

24a

SWMU 16-003(k). SWMU 16-003(k) is 13 HE sumps and drain lines associated with TA-16-260. Sump dimensions are 90 in. by 36 in. by 31 in. (1 each) and 176 in. by 36 in. by 31 in. (12 each). Unlike most active sumps located at TA-16, the majority of these sumps are located above ground level. Each sump is served by a primary cement trough (2 ft deep x 1.5 ft wide) that empties into a secondary cement trough (4 ft deep x 1.8 ft wide). This trough feeds into the main feeder trough (4 ft deep x 2 ft wide) that drains to the outfall. All of the cement troughs are capped by removable steel lids. The waste consists primarily of HE. In 1970, Wilder classed the

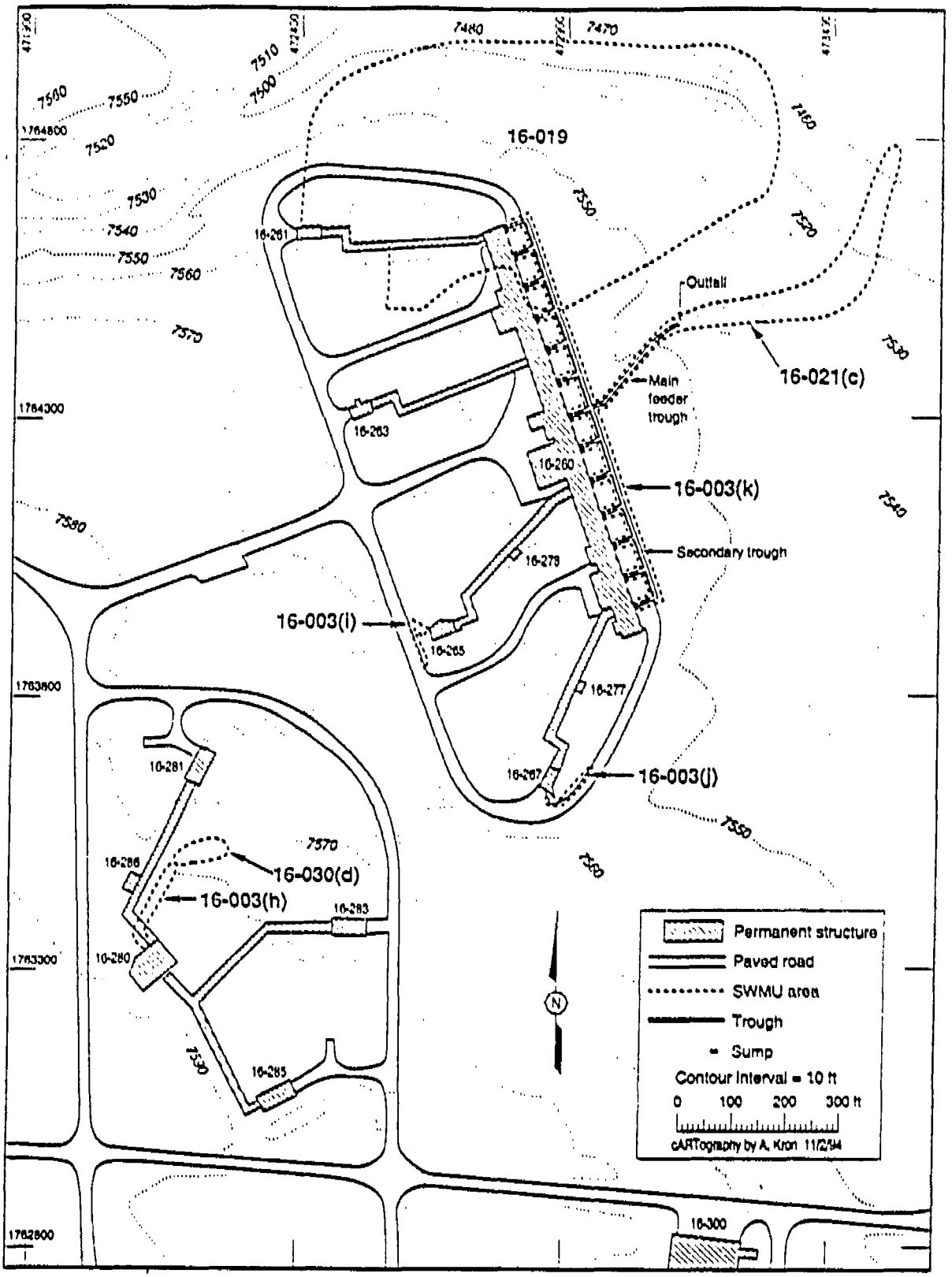

Fig. 5-27. TA-16-260 and TA-16-280 groups.

TABLE 5-21

POTENTIAL RELEASE SITES AND POTENTIAL CONTAMINANTS OF CONCERN CONTAINED IN OU 1082, TA-16-260 AGGREGATE

PRS NO.	DESCRIPTION	PRIMARY ACTIVITY LEADING TO POTENTIAL PROBLEMS	ACTIVE	HE		RAD	METALS		ORGANICS		
				UNDETONATED HE	HE DEGRADATION PRODUCTS	URANIUM	METALS SUITE	BARIUM	VOLATILES	SEMIVOLATILES	CYANIDE
16-003(k)	HE sump	HE machining	Y	x	x	x	x	x	x	x	x
16-021(c)	TA-16-260 outfall	HE machining	Y	x	x	x	x	x	x	x	x

TABLE 5-22

HIGH EXPLOSIVES IN THE TA-16-260 DRAINAGE CHANNEL

DATE	SAMPLE LOCATION	HMX/RDX	TNT	TOTAL HE
03/11/60	Pond center	8.5	1.3	9.8
03/11/60	Pond center	3.5	1.3	4.8
03/11/60	20 ft below dam	4.3	1.7	6.0
03/11/60	30 ft below dam	3.3	0.7	4.0
03/11/60	100 ft below dam	2.7	0.04	2.7
03/11/60	150 ft below dam	0.5	0.02	0.5
04/29/70	Outfall	7.0	0.0	7.0
04/29/70	Pond center	20.5	3.7	24.2
04/29/70	1 ft below dam	4.8	0.07	4.9
04/29/70	Between dam and cliff	12.9	0.12	13.0
04/29/70	Cliff	3.9	0.10	4.0
11/18/70	10 ft from outfall	3.2	0.0	3.2
11/18/70	Inlet to pond	14.1	0.1	14.5
11/18/70	10 ft above dam	22.1	0.5	22.6
11/18/70	5 ft below dam	14.5	0.2	14.7
11/05/71	10 ft from outfall	2.9	0.0	2.9
11/05/71	Pond inlet	10.8	0.0	10.8
11/05/71	10 ft above dam	25.7	0.0	25.7
11/05/71	10 ft below dam	22.5	0.0	22.5
08/22/73	10 ft from outfall	1.3	0.0	1.3
11/14/74	Outfall	1.7	0.0	1.7
11/14/74	1 ft above dam	17.1	0.1	17.8
11/14/74	50 ft below dam	13.7	0.2	13.9
12/05/75	10 ft from outfall	0.2	0.0	0.2
12/05/75	1 ft above dam	9.2	0.0	9.2
11/19/76	10 ft from outfall	0.2	0.0	0.2
11/19/76	50 ft from outfall	3.0	0.1	3.1
11/19/76	65 ft from outfall	26.7	0.3	27.0
11/19/76	250 ft from outfall	17.3	0.3	17.6
07/18/84	3 ft from outfall	0.3	0.0	0.3
07/18/84	30 ft from outfall	10.4	0.9	11.3
07/18/84	50 ft from outfall	16.7	2.3	19.0
09/12/85	30 ft from outfall	2.0	0.1	2.1
09/12/85	110 ft from outfall	26.6	4.8	31.4
09/12/85	230 ft from outfall	1.7	0.1	1.8

Quantities of explosives are given in weight percent (wt %). Surface samples were taken from the sediment. Most samples were taken along the center line of the drainage channel. Distances are approximate. The sampling technique and analytical method are described in Baytos 1972, 15-16-275. Data from Baytos (1970-1985, 15-16-278 to 15-16-268). Soil SALs: TNT = 40 ppm (0.004 wt %), HMX = 4 000 ppm (0.4 wt %), RDX = 64 ppm (0.0064 wt %), and barium = 5 600 ppm.

use of HE as very high and the probability of contamination in the outfall as very high. As shown in Table 5-18, dimethyl sulfoxide was the only solvent found by Panowski and Salgado (1971, 15-16-038; LANL 1989, 15-16-361). Currently, solvents are drummed to prevent their reaching the sump.

The two sumps serving machining Bays 22 and 23, and 24 and 25 receive barium precipitation treatment. After pH adjustment, barium is precipitated as insoluble barium sulfate by adding sodium sulfate to the sump solution. Barium residues are removed to the TA-16 burning ground when the sumps are serviced.

HE charges to which uranium has been fastened (e.g., glued) have been machined at TA-16-260. Generally, only the HE was machined. Uranium was left intact. Special precautions are taken to prevent uranium from entering the waste water system (LANL 1989, 15-16-361).

In 1955, H-Division reported concerns that airborne particulate levels for TNT exceeded permissible limits at TA-16-260 (H-Division 1955, 15-16-227; and H-Division 1955, 0482).

SWMU 16-021(c). SWMU 16-021(c) is the outfall associated with the 13 HE sumps on the northeast side of TA-16-260 (Fig. 5-27). Although listed as inactive in the SWMU Report, the outfall is active (LANL 1990, 0145).

The drainage channel from the outfall flows about 600 ft to the bottom of Cañon de Valle, a drop in elevation of 80 ft. The drainage channel from the outfall is well defined, with apparent high-water marks. The water flows over a 15-ft high cliff approximately 500 ft from the outfall. A small pond approximately 55 ft long is formed by a rock dam located 93 ft from the outfall. HE-contaminated water from the outfall enters the pond about 40 ft from the outfall. The longitudinal axis of the pond is oriented east-west with flow in the easterly direction. The dam is about 9-ft thick, but only the first 2 ft of rock are closely packed. At present, the water in the pond is less than 2-in. deep and covers only a small area, although the soil and sediment are wet throughout the pond. Rain water from the roadway on the northeast side of TA-16-260 also flows into the pond. Bioremediation and other experiments are presently being conducted in the pond.

5.3.1.2 Conceptual Exposure Model for HE Sumps and Active Outfalls

The conceptual model for TA-16-260 is identical to that of the inactive HE sumps described in Subsection 5.2.1.2 (see Fig. 4-9).

5.3.1.2.1 Nature and Extent of Contamination

Existing data for the TA-16-260 outfall are extensive and show widespread HE contamination extending from the discharge point to Cañon de Valle (Tables 5-22 through 5-25) (Baytos 1970, 15-16-278, etc.; Turner and Schwartz 1971, 15-16-284; King 1991, 15-16-381; and King 1992, 15-16-380). Values range up to three orders of magnitude greater than SALs.

Baytos analyzed sediment samples taken from the channel during the period 1970 through 1985 (Table 5-22). His study extended several hundred feet from the outfall. The highest concentrations of HMX-RDX and TNT were found in the pond. Concentrations of total HE in the pond have remained uniformly high, from a low of 10.8 wt % in 1971 to 27.0 wt % in 1976 (Baytos 1971, 15-16-277; and Baytos 1976, 15-16-271). Baytos cited an unpublished report from 1960 in which the total HE concentration was 9.8 wt % (Baytos 1972, 15-16-275). In 1991, Barr and King found concentrations as high as 34.1 wt % in the pond (King 1991, 15-16-381; King 1992, 15-16-380). Barr and King also found that HE concentrations were high (4.4 wt %) for a distance of over 200 ft down the drainage. In dry soil such high concentrations could be considered explosive mixtures under certain conditions (Urizar 1984, 15-16-353). Turner and Schwartz found that waste material from TA-16-260 travels only a short distance down Cañon de Valle.

Baytos' distances from the outfall are approximate (i.e., within 10 ft). Distances the samples were taken from the center line of the pond were not recorded. Therefore, there may be some inconsistencies in the data. For example, two samples taken on March 11, 1960, from the center of the pond have significantly different HE concentrations. However, one sample was taken on the approximate center line of the pond while the other was taken near the edge of the pond.

In 1972 contaminants in TA-16-260 sump water ranged from 0 to 3.2 ppm HMX-RDX, 10 to 18 ppm TNT, and 70 to 1 587 barium nitrate (Roybal 1972, 15-16-439). As part of NPDES permit application, sump waters from

TABLE 5-23

HIGH EXPLOSIVES AND BARIUM IN SOILS AND WATER AT TA-16-260

SAMPLE	MEDIA	HMX/RDX	TNT	BARIUM
3	Sump water	0.3	33	4
19	Water	1.5	3	30
20	Soil	0.6	1	9

Data from Turner and Schwartz (1971, 15-16-284). All values in ppm. Soil samples represent 4-hour Soxhelt extractions. Soil SALs same as Table 5-22. Water SALs: HMX = 1.8 ppm, RDX = 0.00032 ppm, TNT = 0.0175 ppm, and barium = 1 ppm.

TABLE 5-24

HIGH EXPLOSIVES IN THE TA-16-260 DRAINAGE CHANNEL,

BARR-KING DATA OF 1991*

SEDIMENT SAMPLE LOCATION	HMX/ RDX	TNT	TOTAL HE	BARIUM
1 ft from outfall	3.4	0.1	3.5	
20 ft from outfall	1.8	1.0	2.8	
40 ft from outfall	0.1	<0.1	0.1	
45 ft from outfall	2.9	<0.1	2.9	
50 ft from outfall, pond center line	4.9	<0.1	4.9	
60 ft from outfall, pond center line	6.4	0.1	6.4	
60 ft from outfall, north edge of pond	0.5	<0.1	0.5	
70 ft from outfall, pond center line	9.1	0.6	9.7	
70 ft from outfall, north edge of pond	19.0	2.0	21.0	
80 ft from outfall, pond center line	22.3	3.0	25.3	
90 ft from outfall, pond center line	26.7	2.0	28.7	
90 ft from outfall, 12 in. from north edge	7.6	<0.1	7.6	0.85
91 ft from outfall, pond center line	3.0	<0.1	3.0	0.43
91 ft from outfall, pond center line, 2 in. deep	7.6	<0.1	7.6	0.53
91 ft from outfall, pond center line, 8 in. deep	6.1	0.2	6.3	0.51
91 ft from outfall, pond center line, 13 in. deep	13.5	0.4	13.9	0.46
91 ft from outfall, 8 in. from edge, 13 in. deep	24.8	9.3	34.1	0.33
91 ft from outfall, 12 in. from edge, 13 in. deep	27.8	1.0	28.8	0.67
110 ft from outfall	7.6	0.3	7.9	
135 ft from outfall	2.3	<0.1	2.3	0.35
210 ft from outfall	4.4	<0.1	4.4	0.65

Quantities of explosives and barium are given in weight percent (wt %). Surface samples were taken from the sediment along the center line of the drainage channel, unless otherwise specified. Soil SALs same as Table 5-22.

* (King 1991, 15-16-381; and King 1992, 15-16-380).

TABLE 5-25

DAILY WATER TESTING FOR CONTAMINANTS IN HIGH EXPLOSIVES SUMPS, TA-16-260 OUTFALL*

DAY:	1	2	3	4	5	6	7	8	9	10	MEAN	STANDARD DEVIATION	SALs WATER (ppm)
pH	7.91	7.80	7.80	7.90	7.98	7.80	7.95	8.10	9.20	7.85	8.03	0.422	
Suspended solids	2.6	4.6	3.1	2.6	6.2	0.0	2.0	0.8	1.3	0.9	2.4	1.88	
TNT	0.06	0.0	0.0	0.02	0.0	0.04	0.0	0.0	0.01	0.19	0.03	0.059	0.0175
RDX	2.25	0.0	0.03	0.02	0.0	0.34	0.0	0.04	0.03	1.19	0.39	0.751	0.00032
HMX	1.29	2.06	1.96	1.92	1.53	2.70	1.47	1.53	1.61	2.47	1.85	0.458	1.6
Acetone	nd	nd	nd	nd	nd	0.3	nd	0.1	0.2	0.1	-	-	3.5
MEK	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	-	1.7
Bu-Ac	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	-	
Toluene	nd	nd	nd	nd	nd	nd	7.7	0.1	nd	nd	-	-	0.75

* Baytos 1988, 15-16-266
Quantities are given in parts per million (ppm). Samples were taken on ten consecutive working days.
Mean and standard deviation computed by others.
nd: Not detected
MEK: Methyl ethyl ketone
Bu-Ac: n-Butyl acetate

TA-16-260 were analyzed for TNT, yielding values ranging from <0.4 to 78 ppm (LASL 1977, 15-16-426). In 1988, Baytos analyzed water samples taken from the outfall. His data are tabulated in Table 5-25.

5.3.2 Remediation Decisions and Investigation Objectives

Problem Statement (DQO Step 1)

The 13 sumps with a common outfall at TA-16-260 are all associated with HE processing activities. Archival data indicate extensive HE contamination is present, at levels as high as 30 wt % in soil. Other COCs include barium and other metals, uranium, semivolatiles, and volatiles. The primary goal of Phase I for these sumps will be to bound the region of contamination. A secondary goal is to detect PCOCs other than HE in those regions of this SWMU where HE contamination is minimal. All of these sumps are currently in active use. Their outfall has not been plugged, so the associated drain lines and their common outfall are also active.

Sampling will be necessary to determine a boundary for the HE-contaminated zone. The extant information will be used to provide information for Phase II sampling plans, to proceed directly to a VCA followed by additional sampling, or possibly to proceed to a corrective measures study (CMS).

Decision Process (DQO Step 2)

Based on the existing data, the highly contaminated central portion of the TA-16-260 drainage will undergo a VCA or CMS. A Phase I study will be conducted to determine which of the following should be recommended for the remainder of the TA-16-260 outfall: 1) Phase II study (if additional information is needed to bound HE-contaminated region); 2) VCA (if Phase I study provides enough data to select a viable and cost-effective remediation option); or, 3) CMS (if Phase I study provides enough data to determine nature and extent of contamination, but additional information on costs and treatment methods are needed before proceeding with remediation). A baseline risk assessment for this site is not deemed to be necessary, because existing data suggest a potential detonation hazard. Current operating procedures restrict worker access to this SWMU.

Possible remediation alternatives include: 1) removal of HE-contaminated soil to a permitted landfill after removal of sufficient HE at the TA-16 burning ground to eliminate any safety risk in transporting the soil off-site; 2) *in-situ* degradation of HE by composting; or, 3) thermal, chemical, or biological treatment of HE-contaminated waste followed by replacement of clean soil. Following remediation the area will be resampled to verify cleanup.

Fig. 5-28 illustrates the decision process.

5.3.3 Data Needs and Data Quality Objectives

Decision Inputs and Investigation Boundary (DQO Steps 3 and 4)

In Phase I, the decision process will be applied to the surface and subsurface soils of the TA-16-260 outfall and the associated drainage located below the TA-16-260 outfall. In Phase I, the following questions will be addressed.

1. How does the HE contamination vary in the TA-16-260 drainage and how far does it extend laterally and down the drainage?

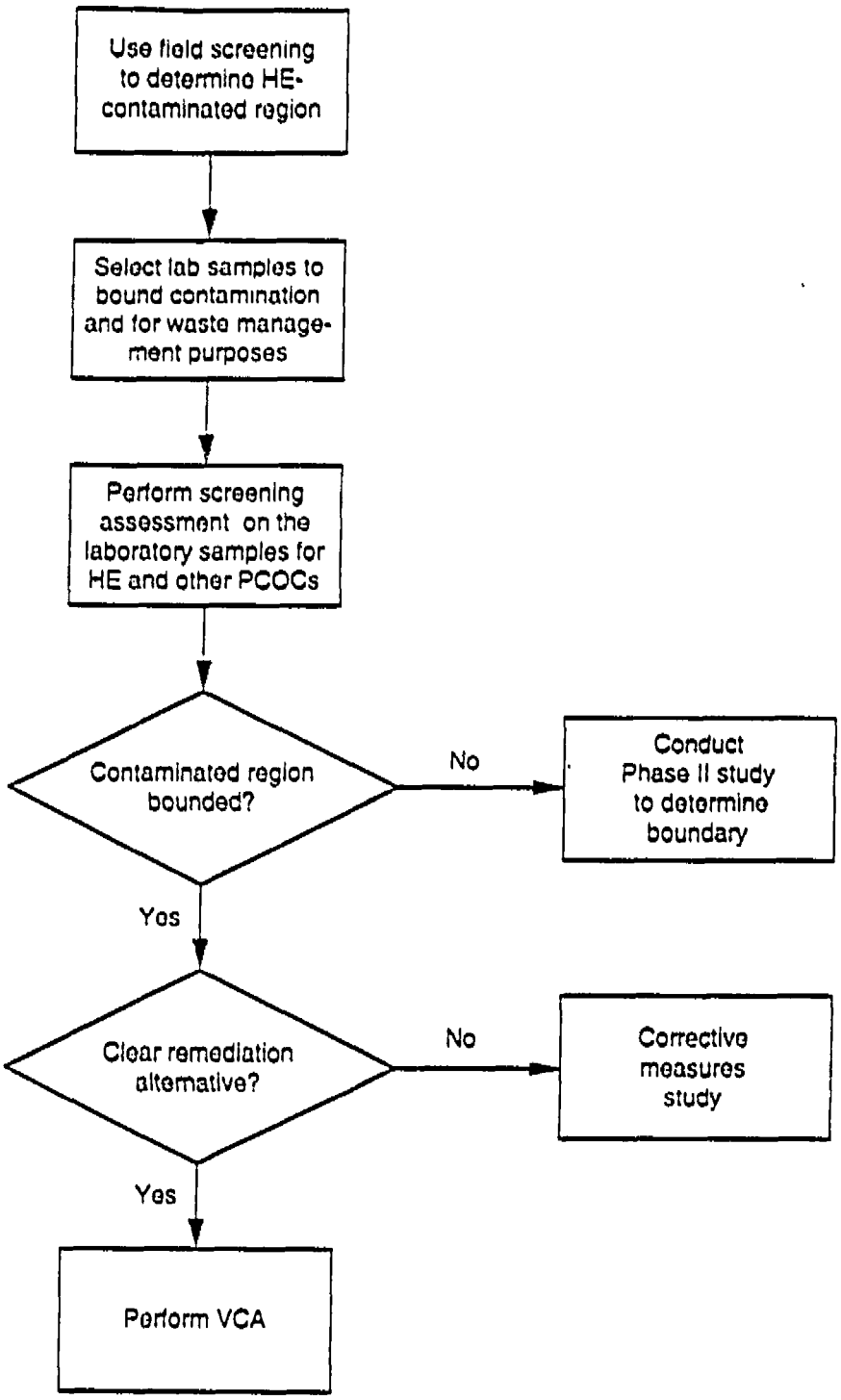

Fig. 5-28. Decision flow for TA-16-260 sumps.

2. Do the levels of semivolatiles, volatiles, uranium, barium, or other metals differ from background? If so, do they exceed SALs in the surface soils of the drainages associated with the TA-16-260 outfall in the area outside the HE-contaminated region that will be remediated?

3. What types of wastes are located in the contaminated outfall?

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4. Is there any HE contamination beneath the sumps and troughs?

Additional questions regarding possible vertical transport of HE into bedrock will be deferred until after VCA, due to the hazards of subsurface drilling in an area highly contaminated with HE.

The data needed to answer the first question are the concentrations of HE in the surface soils bounding the TA-16-260 drainage. The data needed to answer the second question are the concentrations of the other potential contaminants in the surface soils bounding the drainages. The third question requires both surface and subsurface samples in highly contaminated regions in the center of the drainage. The fourth question requires samples from angled boreholes beneath sumps and troughs. Surface contaminants will be assumed to be concentrated in the natural sediment traps of the drainage. The sampling will proceed downslope to Cañon de Valle, which will be sampled as described in Subsection 5.9.

The drainage channel for TA-16-260 is well defined, so lateral sampling is proposed at 5 ft from the drainage. The OU 1082 team considers it unlikely that contamination has reached a distance of 5 ft from the edge of HE-contaminated central drainage, but due to the magnitude of contamination in the site, the assumption will be verified.

Decision Logic (DQO Step 5)

The perimeter sampling plan uses field screening to provide a bound on the HE-contaminated region, so laboratory samples directly outside the TA-16-260 drainage will be intended to confirm the absence of contamination outside the field-screened clean region. The perimeter of the HE-contaminated region will be determined using a grid of HE field screening points, supplemented by additional field-screening points where needed to

achieve negative HE spot tests. Based on the results of Phase I study, proceed as follows: 1) If the laboratory samples contain HE, barium, uranium, or other COCs at levels different from background and the sample maxima are above SALs, then initiate a Phase II study to further delineate the boundary of the HE-contaminated region; 2) if the HE-contaminated region has been bounded, perform VCA followed by cleanup verification monitoring within the remediated zone; and, 3) if sufficient information on the nature and extent of contamination is available, but additional data are needed prior to implementing remediation, perform a CMS. This study would involve feasibility studies focused on determining the most efficient, cost-effective, and safe method of remediating such a highly HE-contaminated area.

Design Criteria (DQO Step 6)

A 20-ft downslope spacing was selected for radiation and HE field screening because such an interval roughly corresponds to a scoop distance for a small backhoe, which may be used during VCA. A 5-ft lateral spacing would detect contaminants transported from the well-defined central drainage during over-bank flooding events. The entire length of the drainage, from the outfall to Cañon de Valle, will be investigated because existing data suggest that HE and barium discharged from TA-16-260 have reached Cañon de Valle.

Radiation screening: Radiation screening will be conducted to check for the presence of uranium. Based on the likely limited transport of uranium in the drainage (Becker et al. 1985, 0029) and the unlikely possibility of uranium discharge from TA-16-260, radiation field screening will be limited to the first 100 ft of the drainage during Phase I.

Surface samples: Laboratory and field laboratory samples will be taken in the center of the drainage with a 20-ft interval from the outfall to a distance of 100 ft from the pond. Then the interval for laboratory samples will be increased to 60 ft until the drainage intersects Cañon de Valle. These samples are designed to support waste management activities as part of a VCA.

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In addition, a perimeter sampling approach will be applied that combines measurements from HE field screening and analytical samples. Field screening will be applied as described in Subsection 5.3.4 to determine the edge of HE-contaminated area. Based on the results of HE field screening on a grid, 14 analytical samples will be taken outside the HE-contaminated region, as delineated by field-screening. A 100-ft interval for these laboratory samples should provide adequate coverage of the soils bounding the central drainage. These laboratory samples will be used to check for barium and for HE occurring at levels above SALs but below the limit of detection of the HE spot test. Additional samples will be taken where radiation field screening results yielded above background levels in order to examine the possible presence of uranium.

24a
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Subsurface samples : Although augering in highly HE-contaminated zones is hazardous, a limited number of subsurface samples are needed for waste management characterization, particularly to determine the presence or absence of RCRA-listed solvents in the outfall. Three laboratory samples will be selected from subsurface cores in the highly contaminated region of the outfall. The locations of those samples will be based on field screening by PID.

In addition, subsurface samples beneath the sumps and their feeder troughs are required to determine the distribution of contamination. At least 10 laboratory samples will be taken from 5 angled cores beneath the sumps and from 5 angled cores beneath the drainage troughs.

5.3.4 Sampling and Analysis Plans

The outfall from the sumps associated with machining building TA-16-260 are by far the most contaminated of any at S-Site (see Subsection 5.3.1.2.1).

24a
text
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The HE sumps described in this subsection are all active. In addition, the drain line for these sumps is in use, although WX-3 will soon plug the outfall (Barr 1992, 15-16-329).

SOPs that control field activities in this sampling plan are listed in Table 5-26. Sample numbers and necessary analyses are shown in Table 5-27. Field screening methods are described in Subsection 4.7. SOPs for field screening are currently in preparation.

TABLE 5-26

STANDARD OPERATING PROCEDURES FOR FIELD ACTIVITIES

LANL-ER-SOP	TITLE	NOTES
01.02, R0	Sample Containers and Preservation	Applied to all laboratory samples
01.04, R1	Sample Control and Field Documentation	Applied to all laboratory samples
06.11, R0	Stainless Steel Surface Soil Sampler	All 0 to 6 in. surface samples
06.10, R0	Hand Auger and Thin-Wall Tube Sampler	Applied to all augered soil samples

5.3.4.1 Engineering Surveys

A detailed engineering survey is needed to delineate the boundaries of the drainage from the HE outfall accurately in the field, as well as to lay out sampling points for radiation screening, HE screening, and surface and subsurface sampling.

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All sample locations will be registered on a base map, scale 1:7 200. If during the course of sampling any sample points must be relocated, the new position will be resurveyed and the revised locations will be indicated on the map. The engineering survey will be performed by a licensed professional under the supervision of the field team leader.

The field-screening points will be centered perpendicularly from the main drainage from the outfall behind TA-16-260 (Fig. 5-29). Points for field screening will be surveyed at 20-ft downstream intervals and 5-ft lateral intervals; for those areas where the drainage is wider than 5 ft, within the main channel downstream from the outfall egress point to Cañon de Valle. In addition, two points, spaced at 5-ft intervals, will be surveyed to the northeast and southwest of the edge of the main drainage channel and pond. The surveyed points will thus provide an approximately 31 x 5 ft grid for HE screening extending roughly 600 ft from the outfall to Cañon de Valle. Low-energy gamma radiation measurements for the detection of uranium and other radionuclides will be reported at the point surveyed above for a distance of 100 ft from the outfall at the grid intervals. Measurements will be

TABLE 5-27

SUMMARY OF SITE SURVEYS, SAMPLING, AND ANALYSIS FOR TA-16-260

PRS	PRS TYPE	SAMPLED MEDIA	LABORATORY SAMPLES #						FIELD SCREENING #							FIELD						LABORATORY ANALYSES #									
			STRUCTURE		SURFACE		SUBSURFACE								A					B				C				D	E	F	G	H	
				FIELD DUP		FIELD DUP		FIELD DUP	GROSS ALPHA	GROSS GAMMA/BETA	ORGANIC VAPOR	HE SPOT TEST	GEOPHYSICS SURFACE	BARIUM - LIBS	GEOLOGICAL CHARACTERIZATION	GROSS ALPHA	GROSS GAMMA/BETA	HE	VOLATILE ORGANICS	XRF	SOIL MOISTURE	ALPHA SPECTROSCOPY	GAMMA SPECTROSCOPY	BETA SPECTROSCOPY	TOTAL URANIUM	ISOTOPIC PLUTONIUM	ISOTOPIC URANIUM	VOA (SW 8240)	SEMIVOLATILES (SW 8270)	METALS (SW 6010)	PCBs (SW 8080)	HIGH EXPLOSIVES (SW 8330)	CYANIDE
16-003(k)	HE sump & trough	Sediments					20					120													20			20	20	20		20	20
16-021(c)	Bounding samples	Sediments			14					30		155													14				14	14		14	14
16-021(c)	Drainage center	Sediments			17		3				33														20			3	20	20		20	20

A, B, C, G = not applicable; D, E, H = full suite; F = 1082 suite. Note that TCLP analyses will be done on the center-drainage samples within 100 ft of the pond

The actual number of points will depend on the results of the field screening as it defines the lateral boundaries of the contaminated area.

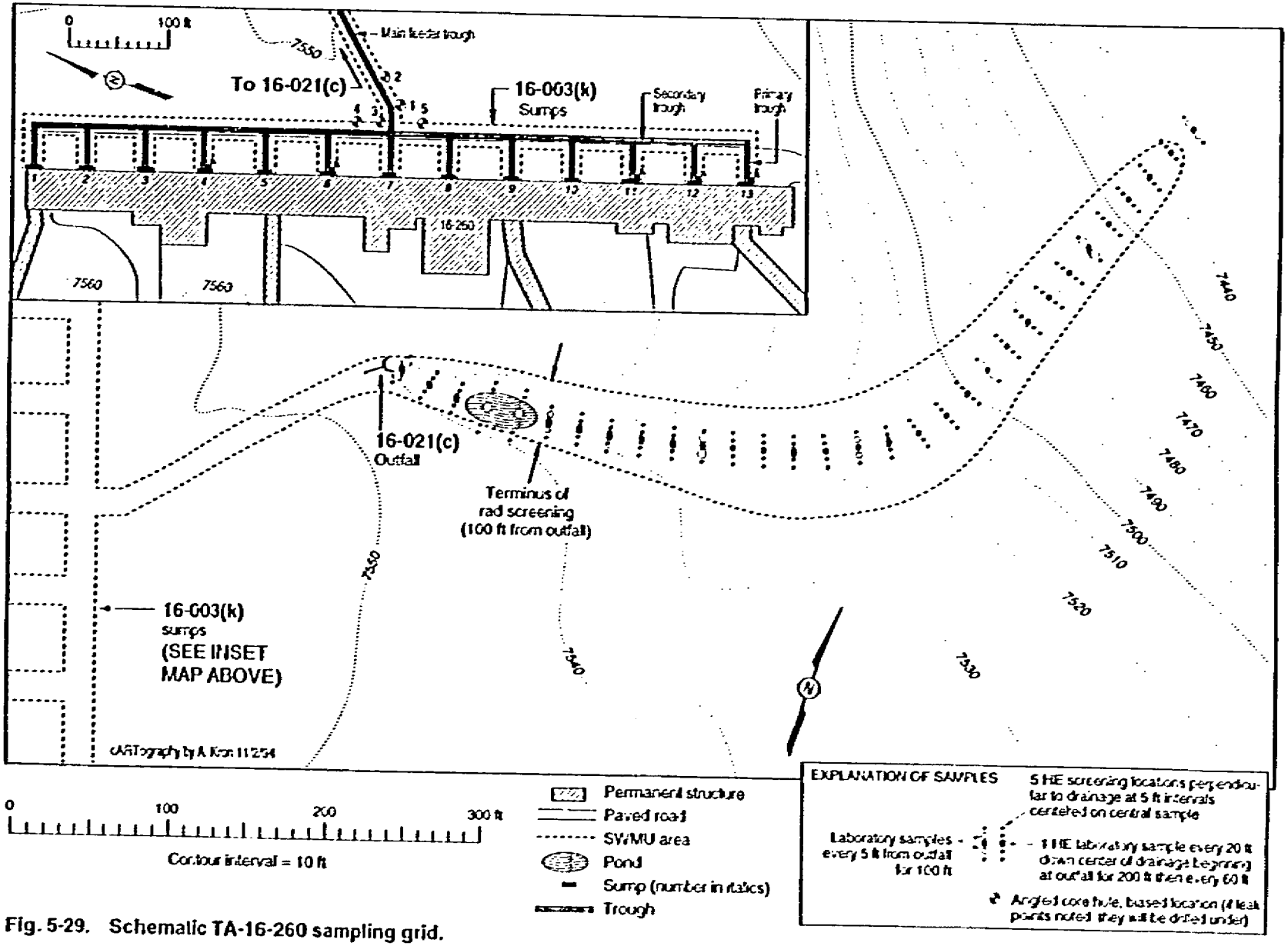

Fig. 5-29. Schematic TA-16-260 sampling grid.

examined for high values that would be used to guide the sampling described in the following sections. Field screening for HE (Baytos 1991, 15-16-339) will be performed at the points surveyed as described above. If positive HE or above-background radiation field-screening measurements are found in the points located at 10 ft from the drainage channel and pond, additional field-screened points, spaced at 5-ft intervals, will be surveyed and screened until the soils field screen as uncontaminated with HE or uranium. The goal of this HE field screening is to provide constraints on the downslope and lateral extent of the HE-contaminated region extending away from the central drainage channel and outfall to facilitate a VCA.

Thus, we will define a perimeter that bounds the highly HE-contaminated region using inexpensive field-screening techniques.

5.3.4.2 Sampling

Surface samples for laboratory analysis will be taken to investigate PCOC concentrations in areas abutting the channel, which is slated for VCA. Thus, if the environmental transport mechanisms for HE and other PCOCs such as barium are significantly different, there should be evidence of any other PCOCs that were transported from the channels. These laboratory samples will also provide quantitative information on any low-level HE contamination outside the drainage channels and information on any HE by-products outside the drainage channel. The laboratory surface samples will investigate HE levels in soils near the TA-16-260 outfall that may be present at a level between background and the detection limit for the HE screening.

After determination of the HE-contaminated region using the HE field spot test, laboratory samples will be taken at field-screening points at a distance of 5 ft from the edge of the main drainage on both the northwest and southeast of the drainage channel. These laboratory samples will be taken every 100 ft from the outfall point to Cañon de Valle, for a total of 14 samples. In addition, any points that yield positive results for radiation during the field surveys will be sampled for laboratory analysis. At all of these surface sampling locations, 0 to 6 in. of soil will be collected. The sampling strategy is delineated schematically in Fig. 5-29.

Samples will be taken in the center of the drainage every 20 ft starting at the outfall and continuing for a distance of 100 ft from the HE pond (Fig. 5-25). Each of these samples will be augered to a depth of 2 ft or bedrock. The 0- to 6-in. interval of each of these cores will be submitted for laboratory analysis (Table 5-27). The remainder of each of these cores will be screened on 6-in. intervals for volatile organics by PID. Three deep-surface laboratory samples will be selected from these screened intervals based on positive readings on the PID. The samples exhibiting the highest readings will be selected. In the absence of positive readings, the three deep-subsurface samples will be randomly selected. These deep surface samples will be analyzed for volatiles, as well as the other COCs for this aggregate. Starting at a distance of 100 ft from the pond additional (0 to 6 in.) laboratory samples will be collected from the surface at 60-ft intervals downstream to Cañon de Valle.

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Subsurface sampling is needed beneath the active sumps and drainage troughs.

24a

Sumps 4, 6, 11, 12, and 13 (from the north end of the building) have been used extensively (Hyde 1994, 15-16-584) and are representative of all 13 sumps (Fig. 5-30). A single 45-degree angled core hole to a total depth of 4 ft, with a wellhead at a distance of 2 ft east of each of these sumps would yield a core that passed roughly 2 ft beneath the center of each sump (Fig. 5-30). Wellheads will be located so the cores pass adjacent to the sump-trough joint, a possible leak point. These cores will be screened at 6-in. intervals for HE by spot test. The deepest and shallowest positive sample for each sump will be submitted for laboratory analysis. In the absence of a positive reading for any sump, submit only the deepest sample from a core. We will not continue coring farther than beneath the center of the sump because we do not want to core into the building's foundation.

The subsurface beneath the feeder troughs to the 260 outfall will also be sampled using angled cores. A preliminary examination of roughly 10 locations on the feeder troughs revealed no obvious leak points or cracks. A more detailed survey that will include washing the interior of the troughs with water will further search for leak points or patched areas. If these are found, they will be sampled preferentially. In the absence of the discovery of leak points, the 5 trough samples will be located: 1) at a

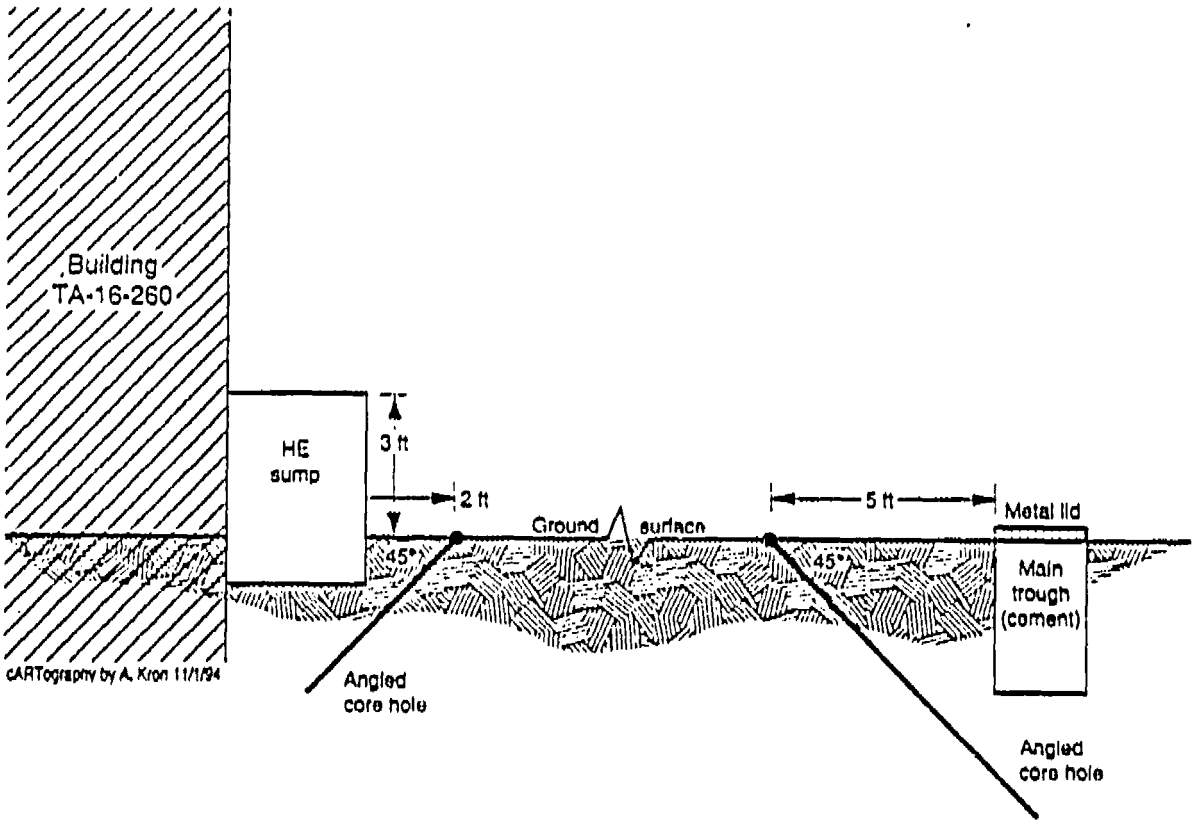

Fig. 5-30. Schematic cross section showing angled coring approach under sumps and troughs

distance of 20 ft down the main feeder trough; 2) at a distance of 40 ft down the main feeder trough; 3) at the joint between the main feeder trough and the 2 main secondary troughs; 4) at a distance 20 ft north of the main trough joint; and, 5) at a distance 20 ft south of that joint. Those locations are designated as 1 - 5 on Fig. 5-29.

Each of these 45-degree angled cores will have a wellhead roughly 5 ft from the trough and will pass roughly 1 to 2 ft beneath the center of the trough. The cores will be HE field screened on 6-in. intervals, and the shallowest and deepest positive intervals will be sent for laboratory analysis. In the absence of positive indicators only the deepest core interval will be submitted for laboratory analysis. If the deepest interval in any core yields a positive field screening reading, continue coring and laboratory sampling until no positive HE screening readings are found.

5.3.4.3 Laboratory Analysis

Full laboratory analyses of samples will be at Level III using the following methods: uranium (LANL or DOE method), VOCs (SW-846 Method 8240), SVOCs (SW-846 Method 8270), metals (SW-846 Method 6010), and HE and its by-products (SW-846 Method 8330). TCLP analysis for metals will be performed on a subset of samples. SOPs used in this sampling plan are listed in Table 5-26. The metal of particular concern for this sampling plan is barium; HE of principal concern are HMX, RDX, TATB, and TNT; HE by-products of concern are HE degradation products and HE impurities such as DNT, DNB, and TNB (See Appendix D).

5.3.4.4 Sample Quality Assurance

Field quality assurance samples will be collected according to the guidance provided in the latest revision of the IWP. Sampling parameters are summarized in Table 5-27, including a listing of appropriate QA/QC field duplicates planned to be collected during the course of the field investigations.

Department of Energy
Field Office, Albuquerque
Los Alamos Area Office
Los Alamos, New Mexico 87544

NOV 30 1994

Mr. William Honker, Chief
RCRA Permits Branch
Hazardous Waste Management Division
U.S. EPA, Region 6
1445 Ross Ave., Suite 1200
Dallas, Texas 75202-2733

Dear Mr. Honker:

Please find enclosed revised sections of the Operable Unit 1082 Resource Conservation and Recovery Act Facility Investigation Workplan which incorporates all changes listed in the Notice of Deficiency (NOD) submitted by the Environmental Protection Agency (EPA) on July 18, 1994. The revised sections reflect the response to the NOD that was transmitted to the EPA on August 17, 1994. Should you have any questions, please contact me at (505) 665-7203.

Sincerely,

Theodore J. Taylor
Program Manager
Environmental Restoration
Program

Enclosure

cc w/enclosure:
Ms. Kathleen Sisneros
New Mexico Environment Department
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, New Mexico 87502
B. Swanton, NMED-AIP, MS J993
T. Taylor, LAAMEP, MS A316
C. Fesmire, LAAMEP, MS A316

NOV 30 1994

cc wo/enclosure:
K. Schenck, Scientech/LAAO, ES&H, MS A316
J. Levings, AL-ERPO, MS A906
E. Merrill, EM-452, HQ
W. Spurgeon, EM-452, HQ
T. Baca, UC-LANL, EMP, MS J591
J. Jansen, UC-LANL, EM/ER, MS M992
K. Hargis, UC-LANL, ESH-8, K490
RPF, MS M707
File 1.4.2.6.1.7.1.2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

DEC 2 2 1994

Mr. Joseph C. Vozella, Chief
Environment, Safety and Health Branch
Los Alamos Area Office
Department of Energy
Los Alamos, NM 87544

Dear Mr. Vozella:

The Environmental Protection Agency (EPA) has reviewed and approves the first RCRA Facility Investigation (RFI) workplan for Operable Unit 1082 with the enclosed modifications. The approved workplan shall consist of the RFI workplan submitted on July 16, 1993, the Notice of Deficiency responses dated August 17, 1994, September 16, 1994, October 14, 1994, and November 30, 1994, as well as the enclosed modifications. Los Alamos National Laboratory shall immediately implement this workplan according to the proposed schedule.

If you should have any questions, please feel free to contact Barbara Driscoll of my staff at (214) 665-7441.

Sincerely yours,

for Allyn M. Davis, Director
Hazardous Waste Management Division

Enclosure

cc: Ms. Kathleen Sisneros
New Mexico Environment Department
Mr. Jorg Jansen
Los Alamos National Laboratory

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US DOE/LAAO

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Modifications
Operable Unit 1082

1. RFI report dates for each SWMU in this Operable Unit (OU) are listed below:

Report Due	SWMUs
9-30-96	11-001(a-c), 11-002, 11-004(a-e), 11-005(a-c), 11-006(a-d), 11-011(a,b,d), 13-003(a), 16-003(a-o), 16-004(a-f), 16-005(n), 16-006(a,c,d,e), 16-007(a), 16-009, 16-010(a,h,i,k,l,m,n), 16-013, 16-016(a-c), 16-020, 16-021(a,c), 16-026(b,c,d,e,h2,j2,v), 16-029(a-g),, 16-030(h)
9-30-97	13-001, 13-002, 13-004, 16-001(a-e), 16-005(g,j), 16-008(a), 16-019, 16-035, 16-036

2. Los Alamos National Laboratory (LANL) may request a Class 3 permit modification for removal of the following solid waste management units (SWMUs) from the HSWA portion of the RCRA permit:

16-012(a-z)

3. NOD Response dated September 16, 1994, p. 5-81, first and second paragraphs - LANL shall submit the deepest core sample with an above background reading for laboratory analysis, and shall also submit a sample from one foot below the deepest sample for laboratory analysis.

United States Government

memorandum

Department of Energy
Los Alamos Area Office
Albuquerque Operations Office
Los Alamos, New Mexico 87544

DATE: JAN 9 1995

REPLY TO ATTN OF: LESH:PJT:1082nodapp:1.4.2.8.1.7.1.2

SUBJECT: Approval of the OU 1082 RFI Workplan

TO: H. Jansen, UC-LANL, EM/ER, MS M992

The Region VI Environmental Protection Agency has approved the RCRA Facility Investigation (RFI) Workplan for Operable Unit 1082 pending the attached modifications. The approval was received by LAAO on December 22, 1994. Please modify the RFI Workplan as specified by Region VI and update working copies as appropriate. Should you have any questions, please contact Paul Treat, of my staff, at 7-5808.

Theodore J. Taylor
Program Manager
Environmental Restoration Program

Attachment

cc w/Attachment:
T. Taylor, LAAMEP, MS A316
P. Treat, LAAMEP, MS A316
K. Schenck, Scientech/LAAO, ES&H, MS A316
J. Levings , AL-ERPO, MS A906
E. Merrill, EM-452, HQ
W. Spurgeon, EM-452, HQ
T. Baca, UC-LANL, EMP, MS J591
J. White, UC-LANL, ESH-19, K498
RPF, MS M707

Received by ER-RPF
JAN 09 1995

Paul - Please draft a memo to send to Jorg.
Ted

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

JAN 12 1995

Mr. Joseph C. Vozella, Chief
Environment, Safety and Health Branch
Los Alamos Area Office
Department of Energy
Los Alamos, NM 87544

Dear Mr. Vozella:

The Environmental Protection Agency (EPA) has reviewed and approves Operable Unit 1082 RCRA Facility Investigation (RFI) Workplan Addendum I with the enclosed modification. The approved workplan shall consist of the RFI workplan submitted on May 25, 1994, and the Notice of Deficiency responses dated November 21, 1994, and December 22, 1994, along with the enclosed modification. Los Alamos National Laboratory shall immediately implement this workplan according to the proposed schedule.

Should you have any questions, please feel free to contact Ms. Barbara Driscoll of my staff at (214) 665-7441.

Sincerely yours,

Allyn M. Davis

Allyn M. Davis, Director
Hazardous Waste Management Division

Enclosure

cc: Ms. Kathleen Sisneros
New Mexico Environment Department
Mr. Jorg Jansen
Los Alamos National Laboratory

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US DOE/LAAO IN

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Modification
Operable Unit 1082 Addendum I

Los Alamos National Laboratory shall submit RFI reports for the following SWMUs as indicated below.

Report Submittal Date	SWMUs
9-30-97	16-005(c,d,j,m); 16-011; 16-023(b); 16-024(e); 16-025(a-b); 16-025(d-f); 16-025(g-o); 16-025(u,v); 16-026(m-q); 16-026(w); 16-029(f2,h2); 16-029(k-u); 16-029(x-z); 16-031(c-d); 16-032(a,c); 16-034(a-f); 16-034(l,p)
6-30-98	16-005(a,e,h,k,l); 16-006(g); 16-015(a,b); 16-017; 16-025(b2,c2); 16-025(t); 16-025(w-z); 16-026(s); 16-028(a); 16-029(a2-e2); 16-029(v,w); 16-034(m-o)

United States Government

memorandum

Department of Energy
Los Alamos Area Office
Albuquerque Operations Office
Los Alamos, New Mexico 87544

DATE: JAN 18 1995

REPLY TO ATTN OF: LESH:PJT:1082nodapp:1.4.2.6.1.7.1.2

SUBJECT: Approval of the OU 1082 RFI Workplan

TO: H. Jansen, UC-LANL, EM/ER, MS M992

The Region VI Environmental Protection Agency has approved the RCRA Facility Investigation (RFI) Workplan for Operable Unit 1082 Addendum 1 pending the attached modifications. The approval was received by LAAO on January 18, 1995. Please modify the RFI Workplan as specified by Region VI and update working copies as appropriate. Should you have any questions, please contact Paul Treat, of my staff, at 7-5808.

Theodore J. Taylor
Program Manager
Environmental Restoration Program

Attachment

cc w/Attachment:
T. Taylor, LAAMEP, MS A316
P. Treat, LAAMEP, MS A316
K. Schenck, Scientech/LAAO, ES&H, MS A316
J. Levings , AL-ERPO, MS A906
E. Merrill, EM-452, HQ
W. Spurgeon, EM-452, HQ
T. Baca, UC-LANL, EMP, MS J591
J. White, UC-LANL, ESH-19, K498
RPF, MS M707

Received by ER-RPF
JAN 20 1995

(12)

Los Alamos National Laboratory

ENVIRONMENTAL RESTORATION

University of California
Environmental Restoration, MS M992
Los Alamos, New Mexico 87545
505-667-0808/FAX 505-665-4747

U. S. Department of Energy
Los Alamos Area Office, MS A316
Los Alamos, New Mexico 87544
505-665-7200
FAX 505-665-4504

Date: February 12, 1996
Refer to: EM/ER:96-050

Mr. Steve Yanicak
New Mexico Environment Department
2044 Galisteo Street, Bldg. A
Santa Fe, NM 87502

SUBJECT: SUBMITTAL OF POTENTIAL RELEASE SITE (PRS) 16-021(c) INTERIM ACTION FINAL REPORT

Dear Mr. Yanicak:

In coordination with the Los Alamos National Laboratory's Water Quality group (ESH-18), the New Mexico Environment Department, and the Los Alamos Area Office, Field Unit 3 is formally submitting the final report for the interim action that took place at PRS 16-021(c). As specified in a letter to you dated October 11, 1995, all the suggested best management practices were implemented.

If you have any questions, please call Brad Martin at (505) 667-6080 or Joe Mose at (505) 667-5808.

Sincerely,

Jorg Jansen, Program Manager
Environmental Restoration

Sincerely,

Theodore J. Taylor, Program Manager
Los Alamos Area Office

JJ/TT/bp

Enclosures: PRS 16-021(c) Interim Action Final Report

Received by ER-RPF
FEB 20 1996

Cy (w/enc.):
M. Alexander, ESH-18, MS K497
B. Driscoll, EPA
B. Garcia, NMED-HRMB
D. Griswold, ERD, AL, MS A906
B. Hoditschek, NMED-HRMB
R. Kern, NMED-HRMB
D. Macdonnel, ESA-FM, MS C928
B. Martin, CST-18, MS E525
R. Michelotti, CST-18, MS E525
J. Mose, LAAO, MS A316
N. Naraine, EM-453, DOE-HQ
R. Taylor, ESA-WMM, MS C930
T. Taylor, LAAO, MS A316
N. Weber, Bureau Chief, NMED-AIP
J. White, ESH-19, MS K490
EM/ER File, MS M992
[redacted]

Please see Reference Library for attachment(s)

38

Cy (w/o enc.):
T. Baca, EM, MS J591
T. Glatzmaier, DDEES/ER, MS M992
D. McInroy, EM/ER, MS M992
G. Rael, ERD, AL, MS A906
W. Spurgeon, EM-453, DOE-HQ
J. Vozella, LAAO, MS A316

2

Los Alamos National Laboratory

UNIVERSITY OF CALIFORNIA

Environmental Restoration Project
MS M992
Los Alamos, New Mexico 87545
505-667-0808/FAX 505-665-4747

Date: February 16, 1996
Refer to: EM/ER:96-066

SUBJECT: RESUBMITTAL OF POTENTIAL RELEASE SITE (PRS) 16-021(C) INTERIM ACTION FINAL REPORT

To Distribution:

Enclosed please find a good copy of the final report for the interim action that took place at PRS 16-021(c), reference EM/ER:96-050, dated February 12, 1996. I apologize that the enclosure that was previously submitted was missing every other page.

Sincerely,

Gloria M. Norris

Gloria M. Norris

GMN/bp

Enclosure: Potential Release Site 16-021(c) Interim Action Final Report

Cy: M. Alexander, ESH-18, MS K497
B. Driscoll, EPA
B. Garcia, NMED-HRMB
D. Griswold, ERD, AL, MS A906
B. Hoditschek, NMED-HRMB
R. Kern, NMED-HRMB
D. Macdonnel, ESA-FM, MS C928
B. Martin, CST-18, MS E525
R. Michelotti, CST-18, MS E525
J. Mose, LAAO, MS A316
N. Naraine, EM-453, DOE-HQ
R. Taylor, ESA-WMM, MS C930
T. Taylor, LAAO, MS A316
N. Weber, Bureau Chief, NMED-AIP
J. White, ESH-19, MS K490
EM/ER File, MS M992
RPF, MS M707

FEB 27 1996

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Interim Action Report for

Solid Waste Management Unit 16-021(c)

Field Unit 3

Environmental Restoration Project

January 1996

A Department of Energy Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

LA-UR-96-410

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1.0 OBJECTIVE

Potential release site (PRS) 16-021(c) is the National Pollutant Discharge Elimination System (NPDES) permitted outfall [Environmental Protection Agency (EPA) 05A056] from TA-16-260, the high explosives (HE) machining facility at S-Site. This PRS has undergone an interim action to stabilize the soil and prevent further migration of contaminants into Cañon de Valle. This action is being conducted at the request of the New Mexico Environment Department (NMED) and the Department of Energy (DOE) Los Alamos Area Office (see Attachment 1). The associated fact sheet can be found in Attachment 2.

2.0 SITE TYPE AND DESCRIPTION

Large quantities of explosives are processed in TA-16-260. Machine turnings are routed to the sumps as waste. Each sump flows into a trunk line that discharges to the outfall. The drainage channel from the outfall is contaminated with explosives waste, including barium nitrate, the primary ingredient in the explosive baratol. The drainage channel from the outfall flows about 600 ft to the bottom of Cañon de Valle, a drop in elevation of 80 ft (Fig. 1). A small pond approximately 55 ft long is formed by a rock dam located 93 ft from the outfall. Stressed vegetation is present in the drainage channel. Rainwater from the roadway on the northeast side of TA-16-260 also flows into the pond.

3.0 CONTAMINANTS

Existing data for the TA-16-260 outfall are extensive and show widespread HE contamination extending from the discharge point to Cañon de Valle [Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Work Plan for OU 1082, Subsection 5.3.1.1] (LANL 1993, 1094). Sediment samples were taken from the channel from 1960 through 1991. These studies analyzed soil for a distance of several hundred feet from the outfall. The highest concentrations of the high explosives HMX-RDX and TNT were found in the pond. Concentrations of total HE in the pond have remained uniformly high with a maximum of 9.8 wt % in 1960 to 34.1 wt % in 1991 (Appendix A). In 1995 RFI sampling was conducted at the TA-16-260 outfall. Surface soil samples were collected and indicated barium levels greater than the SAL of 5 340 ppm. Eleven samples were collected with barium concentrations ranging from 7 500 ppm to 26 900 ppm. Data on water and sediment samples from Cañon de Valle suggest that both RDX and barium have been mobilized from PRS 16-021(c) to the canyon. Other constituents of concern include other metals, uranium, semivolatile organic compounds, and volatile organic compounds.

4.0 INTERIM ACTION

As requested by the NMED and DOE, Field Unit 3 initiated an interim action to stabilize the soil associated with PRS 16-021(c) and prevent further release of contaminants. In coordination with the Water Quality Group (ESH-18) at LANL, the interim action consisted of three measures.

- The volume of surface flow through the drainage channel was reduced by diverting storm water runoff. Johnson Controls workers placed sandbags along the eastern edge of the asphalt apron to divert storm water runoff from the area into adjacent drainages (Fig. 1).
- ICF Kaiser Engineers covered the existing settling pond with Poly-Jute™ matting to reduce the potential for sediments within the pond to be mobilized by rainfall.
- The capacity for sediment deposition within the drainage was enhanced by installing eight straw-bale dams. ICF Kaiser Engineers constructed these dams within the steeper sections of the channel between the existing rock dam and cliff face where the drainage drops into Cañon de Valle.

The dams consist of loose straw, straw bales, and Poly-Jute™ matting. The straw bales are partially wrapped in Poly-Jute™ to maintain the bale structure. A section of Poly-Jute™ mat the width of the drainage channel and 15 ft long was placed in the drainage at each dam location. Loose straw was laid down over the mat in the location of the dam to ensure a seal between the straw bales and the bottom of the drainage channel. The mat was placed so that the upgradient edge of the mat is at or above the specified dam location. Straw bales were placed end-to-end over the loose straw across the entire width of the drainage channel at the specified dam location. The downgradient portion of Poly-Jute™ mat was wrapped over the straw bales. Any excess Poly-Jute™ mat will lay in the bottom of the drainage channel upgradient of the dam, secured in place with rocks. The entire structure is supported with rocks and a log on the downgradient side of the dam. Wire anchors the log at both ends to nearby trees. These measures will reduce mobilization and subsequent transfer of contaminants into Cañon de Valle.

PRS 16-021(c) is listed in the Hazardous and Solid Waste Amendments Module of Los Alamos National Laboratory's Part B operating permit and has undergone a National Environmental Policy Act review for categorical exclusion (B1.3).

Figures 2, 3, and 4 are photographs taken before, during, and after the interim action.

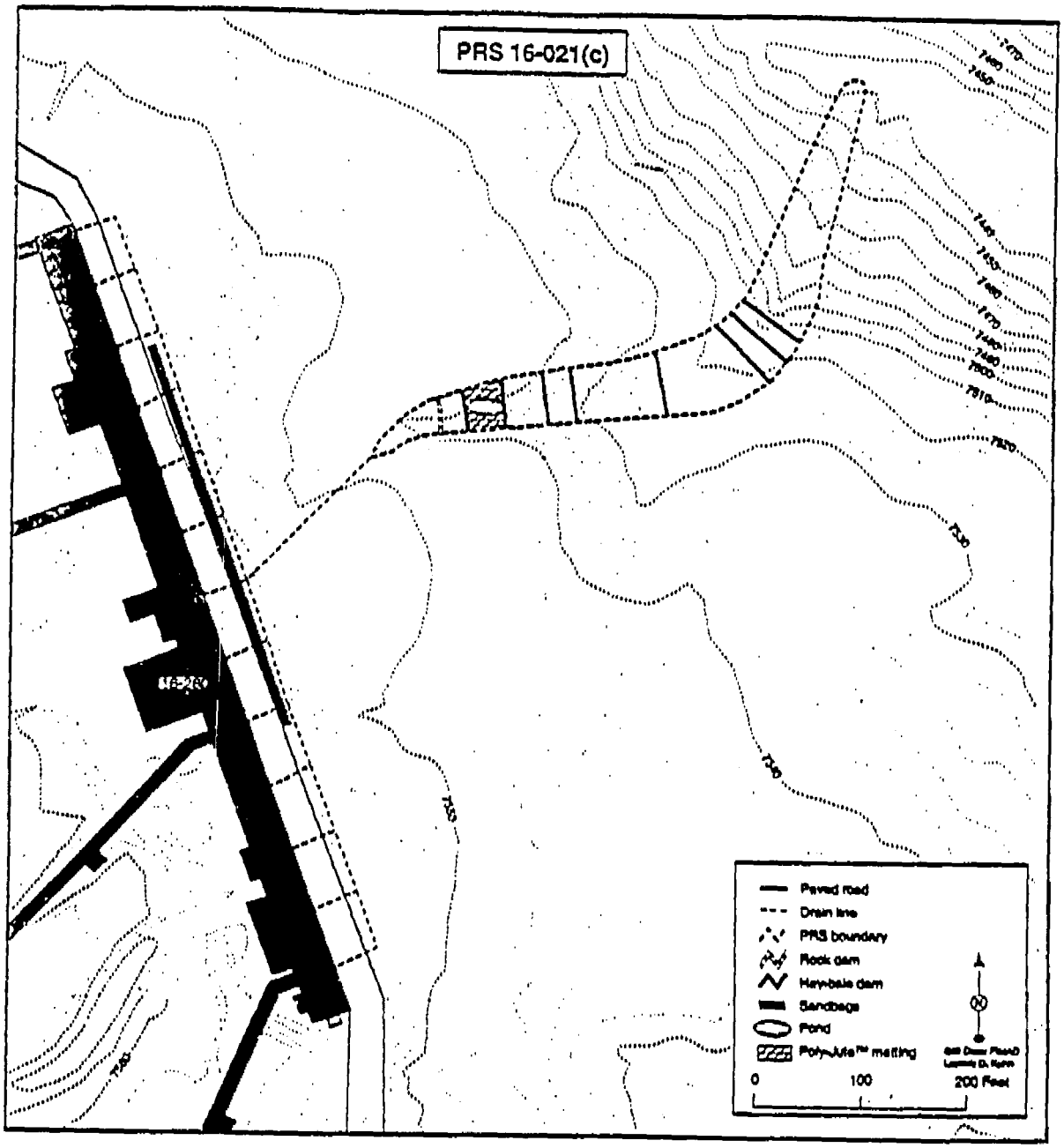

Fig. 1. PRS 16-021(c), outfall from TA-16-260.

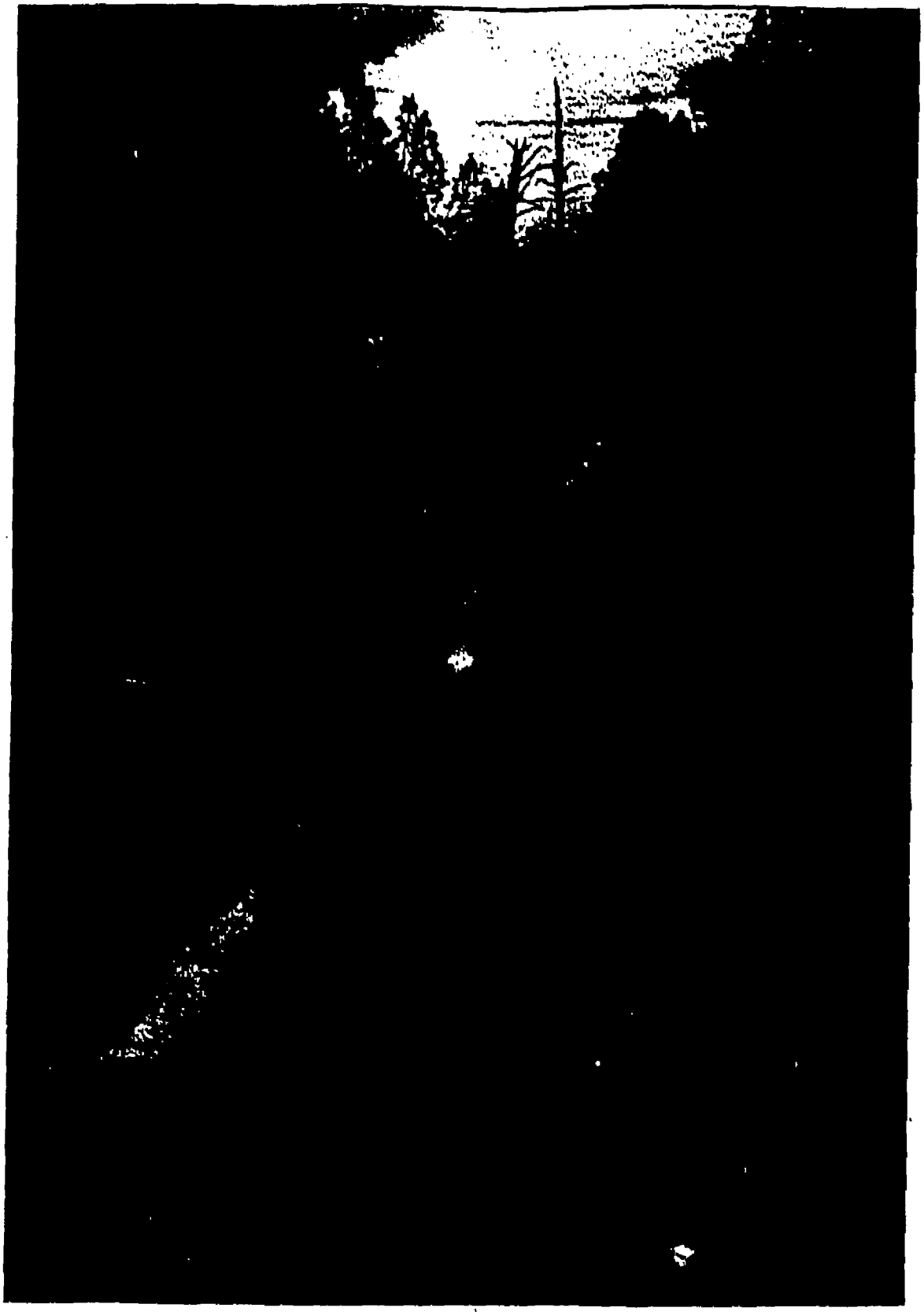

Fig. 2. TA-16-260 outfall, before interim action.

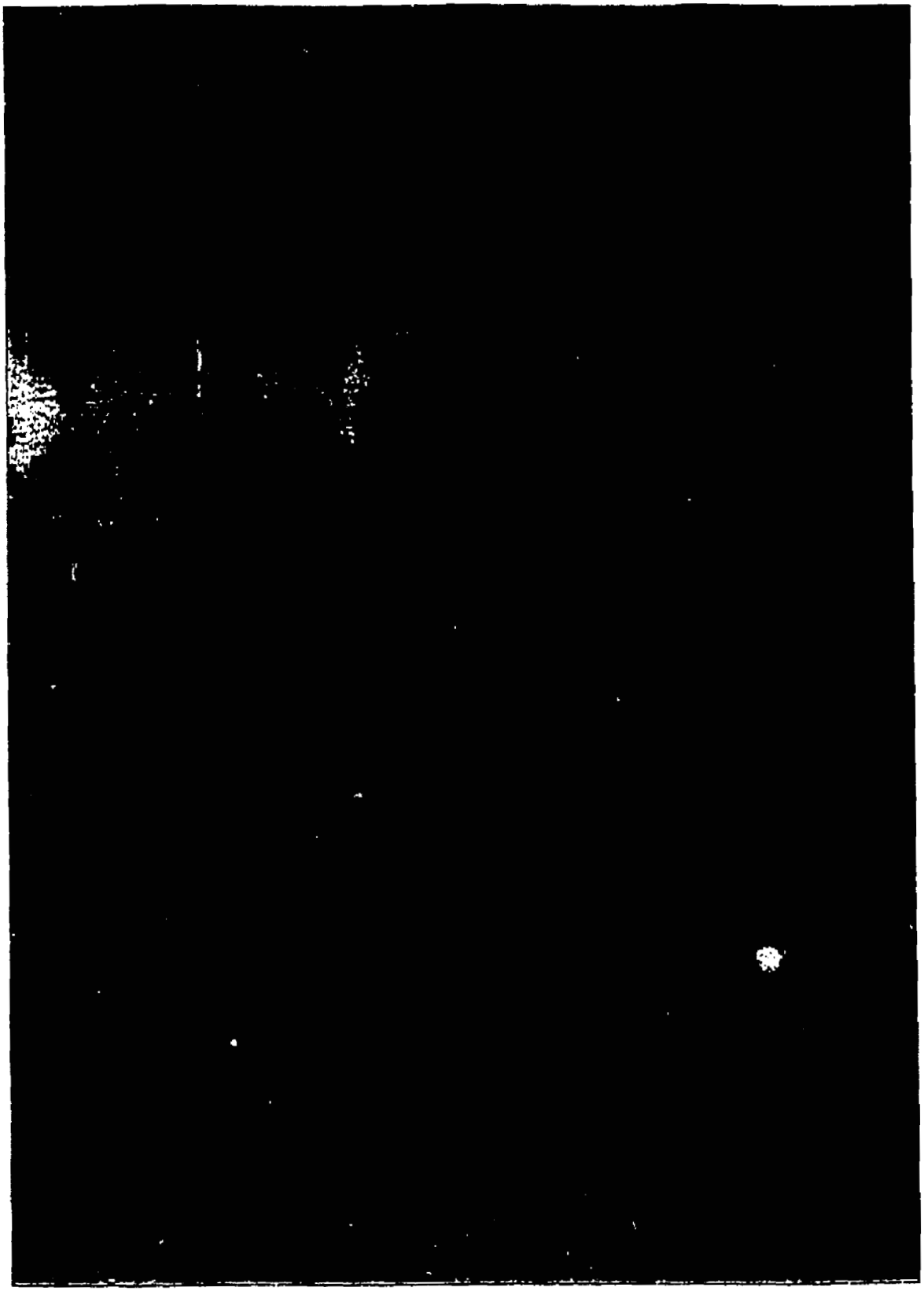

Fig. 3. TA-16-260 outfall, during interim action.

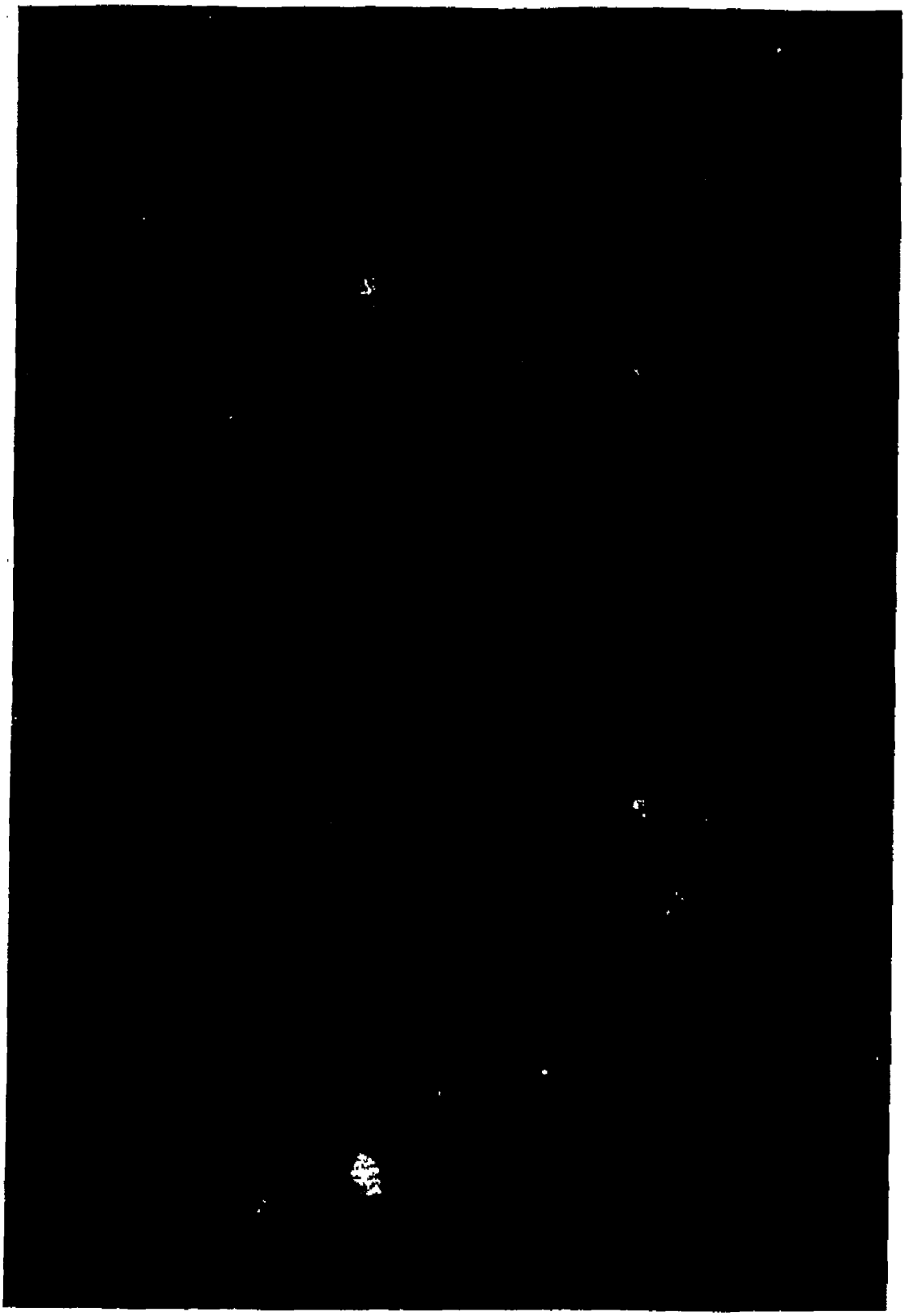

Fig. 4. TA-16-260 outfall, after interim action.

5.0 CONFIRMATORY ACTIVITIES

The objective of confirmatory activities is to demonstrate whether the best management practice implemented was effective at reducing or preventing the migration of contaminants into Cañon de Valle.

The objective of the sampling effort is to evaluate the effectiveness of the pond stabilization and down-drainage dams in reducing the off-site migration of contaminants. One sample will be collected from along the upstream side of each of the eight dams. A geomorphologic survey and professional judgment will be used to insure that only sediments deposited after completion of the interim action are collected and analyzed. The survey will also evaluate the volume of sediment deposited within the eight reaches of the drainage as defined by the dams. Samples will be collected immediately following spring snowmelt runoff; this should insure that an adequate volume of sediment for sampling has accumulated along the dams. If is determined during the survey that a sufficient volume of sediment has not been deposited, the site will be resurveyed and sampled following the summer rainwater runoff season. Samples will be analyzed for high explosives.

6.0 MAINTENANCE AND INSPECTION

An inspection of the Poly-Jute™ matting, straw bales, and sandbags will be conducted once every month and after storm water runoff events (Federal Register 1992, 15-16-619). If it becomes necessary to move or replace these materials ICF Kaiser engineers will take the required actions to restore the site. Inspection and maintenance reports will be placed in the project file.

7.0 WASTE MANAGEMENT

The waste generated from the interim action will be minimal. The Poly-Jute™ matting and the straw bales will eventually deteriorate. If it becomes necessary to replenish the materials, the older material will be taken to the burning ground for flash burning. The sandbags will be disposed of in the same manner.

8.0 ESTIMATED SCHEDULE AND COST TO COMPLETE

Sandbags were placed along the edge of the asphalt Friday, November 17, 1995.

The Poly-Jute™ matting was placed on the pond Friday, December 1, 1995.

Eight straw-bale dams were placed with the Poly-Jute™ matting on Friday, December 1, 1995.

TABLE 8-1

INTERIM ACTION COST

MATERIALS AND LABOR	COST
Poly-Jute™ matting	$ 600
Straw bales	$ 120
Labor for dams and pond cover	$ 6 000
Total	$ 8 720

9.0 REFERENCES

Baytos, J. F., August 7, 1985. "Analysis of Soil Samples for Residual Explosives from Drainage Ditches at Sump Effluent Outlets," Los Alamos National Laboratory Memorandum M-1 to A. P. Torres (WX-3) from J. F. Baytos (M-1), Los Alamos, New Mexico. (Baytos 1985, 15-16-268)

Baytos, J. F., June 2, 1970. "Analysis of Soil Samples for Residual Explosives from Drainage Ditches at the Sump Effluent Outlets at Group GMX-3 Operating Buildings," Los Alamos Scientific Laboratory Memorandum GMX-3 to E. Wilder from J. F. Baytos, Los Alamos, New Mexico. (Baytos 1970, 15-16-278)

Federal Register, September 9, 1992. "Final NPDES General Permits for Storm Water Discharges from Construction Sites, Section IV, Storm Water Pollution Prevention Plan, D, 2a," Federal Register, Vol. 57, No. 175. (Federal Register 1992, 15-16-619)

King, W., October 23, 1991. "Group M-1 Analytical Laboratory Report," Los Alamos National Laboratory Report, Los Alamos, New Mexico. (King 1991, 15-16-381)

King, W., February 7, 1992. "Group M-1 Analytical Laboratory Report," Los Alamos National Laboratory Report, Los Alamos, New Mexico. (King 1992, 15-16-380)

LANL (Los Alamos National Laboratory), July 1993. "RFI Work Plan for Operable Unit 1082," Los Alamos National Laboratory Report LA-UR-93-1196, Los Alamos, New Mexico. (LANL 1993, 1094)

Los Alamos Scientific Laboratory, August 1972. "Analysis of Soil Samples for Residual Explosives from Drainage Ditches at the Sump Effluent Outlets at Group GMX-3 Operating Buildings," Los Alamos Scientific Laboratory Report No. LA-4925 by J. F. Baytos, Los Alamos, New Mexico. (LASL 1972, 15-16-275)

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APPENDIX A SAMPLING DATA

TABLE A-1

HIGH EXPLOSIVES IN THE TA-16-260 DRAINAGE CHANNEL[a,b]

DATE	SAMPLE LOCATION	HMX/RDX [c]	TNT [d]	TOTAL HE [e]
03/11/60	Pond center	8.5	1.3	9.8
03/11/60	Pond center	3.5	1.3	4.8
03/11/60	20 ft below dam	4.3	1.7	6.0
03/11/60	30 ft below dam	3.3	0.7	4.0
03/11/60	100 ft below dam	2.7	0.04	2.7
03/11/60	150 ft below dam	0.5	0.02	0.5
04/29/70	Outfall	7.0	0.0	7.0
04/29/70	Pond center	20.5	3.7	24.2
04/29/70	1 ft below dam	4.8	0.07	4.9
04/29/70	Between dam and cliff	12.9	0.12	13.0
04/29/70	Cliff	3.9	0.10	4.0
11/18/70	10 ft from outfall	3.2	0.0	3.2
11/18/70	Inlet to pond	14.1	0.1	14.5
11/18/70	10 ft above dam	22.1	0.5	22.6
11/18/70	5 ft below dam	14.5	0.2	14.7
11/05/71	10 ft from outfall	2.9	0.0	2.9
11/05/71	Pond inlet	10.8	0.0	10.8
11/05/71	10 ft above dam	25.7	0.0	25.7
11/05/71	10 ft below dam	22.5	0.0	22.5
08/22/73	10 ft from outfall	1.3	0.0	1.3
11/14/74	Outfall	1.7	0.0	1.7
11/14/74	1 ft above dam	17.1	0.1	17.8
11/14/74	50 ft below dam	13.7	0.2	13.9
12/05/75	10 ft from outfall	0.2	0.0	0.2
12/05/75	1 ft above dam	9.2	0.0	9.2
11/19/76	10 ft from outfall	0.2	0.0	0.2
11/19/76	50 ft from outfall	3.0	0.1	3.1
11/19/76	65 ft from outfall	26.7	0.3	27.0
11/19/76	250 ft from outfall	17.3	0.3	17.6
07/18/84	3 ft from outfall	0.3	0.0	0.3
07/18/84	30 ft from outfall	10.4	0.9	11.3
07/18/84	50 ft from outfall	16.7	2.3	19.0
09/12/85	30 ft from outfall	2.0	0.1	2.1
09/12/85	110 ft from outfall	26.6	4.8	31.4
09/12/85	230 ft from outfall	1.7	0.1	1.8

[a] Quantities of explosives are given in weight percent (wt%). Surface samples were taken from the sediment. Most samples were taken along the centerline of the drainage channel. Distances are approximate. The sampling technique and analytical method are described in Baytos 1972, 15-16-275.
[b] Data from Baytos (1970-1985, 15-16-278 to 15-16-268.
[c] Soil SAL HMX = 3 259 ppm (0.32 wt%), RDX = 4 ppm (0.0004 wt%).
[d] Soil SAL TNT = 48.4 ppm (0.004 wt%).

TABLE A-2

HIGH EXPLOSIVES IN THE TA-16-260 DRAINAGE CHANNEL, BARR-KING DATA OF 1991[a,b]

SEDIMENT SAMPLE LOCATION [c]	HMX/ RDX	TNT	TOTAL HE	BARIUM
1 ft from outfall	3.4	0.1	3.5	ND [d]
20 ft from outfall	1.8	1.0	2.8	ND
40 ft from outfall	0.1	<0.1	0.1	ND
45 ft from outfall	2.9	<0.1	2.9	ND
50 ft from outfall, pond centerline	4.9	<0.1	4.9	ND
60 ft from outfall, pond centerline	6.4	0.1	6.4	ND
60 ft from outfall, north edge of pond	0.5	<0.1	0.5	ND
70 ft from outfall, pond centerline	9.1	0.6	9.7	ND
70 ft from outfall, north edge of pond	19.0	2.0	21.0	ND
80 ft from outfall, pond centerline	22.3	3.0	25.3	ND
90 ft from outfall, pond centerline	26.7	2.0	28.7	ND
90 ft from outfall, 12 in. from north edge	7.6	<0.1	7.6	0.85
91 ft from outfall, pond centerline	3.0	<0.1	3.0	0.43
91 ft from outfall, pond centerline, 2 in. deep	7.6	<0.1	7.6	0.53
91 ft from outfall, pond centerline, 8 in. deep	6.1	0.2	6.3	0.51
91 ft from outfall, pond centerline, 13 in. deep	13.5	0.4	13.9	0.46
91 ft from outfall, 8 in. from edge, 13 in. deep	24.8	9.3	34.1	0.33
91 ft from outfall, 12 in. from edge, 13 in. deep	27.8	1.0	28.8	0.67
110 ft from outfall	7.6	0.3	7.9	ND
135 ft from outfall	2.3	<0.1	2.3	0.35
210 ft from outfall	4.4	<0.1	4.4	0.65

[a] King 1991, 15-15-381; King 1992, 15-16-380.
[b] Quantities of explosives and barium are given in weight percent (wt%).
[c] Surface samples were taken from the sediment along the centerline of the drainage channel, unless otherwise specified.
[d] ND = Not detected..

APPENDIX B ANALYTICAL DATA

TABLE B-1

BARIUM CONCENTRATIONS ABOVE SCREENING ACTION LEVELS IN 1995 RFI SAMPLING DATA

SAMPLE NUMBER	CONCENTRATIONS (mg/kg)	SAL* (mg/kg)
0316-95-0030	12 700	5 340
0316-95-0031	14 600	
0316-95-0033	19 000	
0316-95-0034	11 100	
0316-95-0035	21 100	
0316-95-0036	26 100	
0316-95-0037	26 900	
0316-95-0017	7 500	
0316-95-0018	12 100	
0316-95-0019	7 750	
0316-95-0022	20 200	

* SAL = Screening action level

TABLE B-2

HIGH EXPLOSIVE CONCENTRATIONS IN
1995 RFI SAMPLING DATA

ANALYTE	HMX (mg/kg)	RDX (mg/kg)	TNT (mg/kg)	2,4-DNT (mg/kg)
SAL	3 259	4	48.4	0.65
SAMPLE ID				
0316-95-0026	378	74.8[a]	16.8	ND[c]
0316-95-0027	1 360	898[a]	22.8	0.122
0316-95-0028	4 860[a]	6 830[a]	1 760[a]	0.917[a]
0316-95-0029	4 300[a,b]	ND[c]	90[a,b]	ND[c]
0316-95-0030	7 900[a,b]	4 100[a,b]	100[a,b]	ND[c]
0316-95-0031	6 400[a,b]	4 300[a,b]	180[a,b]	ND[c]
0316-95-0032	32 900[a]	29 600[a]	4 570[a]	2.54[a]
0316-95-0033	8 100[a,b]	5 100[a,b]	240[a,b]	ND[c]
0316-95-0034	10 000[a,b]	5 700[a,b]	ND[c]	ND[c]
0316-95-0035	2 700[b]	2 700[a,b]	ND[c]	ND[c]
0316-95-0036	3 500[a,b]	1 800[a,b]	ND[c]	ND[c]
0316-95-0037	3 200[b]	1 200[a,b]	ND[c]	ND[c]
0316-95-0038	54 700[a]	3 500[a]	106[a]	1.45[a]
0316-95-0039	2 750	1 220[a]	19.8	0.308
0316-95-0040	23 000[a]	137[a]	95.2[a]	0.88[a]
0316-95-0041	5 200[a]	452[a]	19.9	1.13[a]
0316-95-0042	20 300[a]	611[a]	44.3	0.916[a]
0316-95-0043	12 500[a]	302[a]	14.3	0.877[a]
0316-95-2012	5 400[a,b]	4 200[a,b]	190[a,b]	ND[c]

[a] Values above SALs.
[b] DX-16 data.
[c] ND = Not detected.

ATTACHMENT 1 CORRESPONDENCE

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United States Government

Department of Energy

memorandum

Albuquerque Operations Office
Los Alamos Area Office
Los Alamos, New Mexico 87544

DATE:

REPLY TO ATTN OF: LAAO:EP:TJT:1.4.2.6.1.7.1

SUBJECT: Stabilization of Solid Waste Management Unit

TO: J. Jansen, EM/ER, UC-LANL, MS M992

Attached is a letter from Steve Yanicak, New Mexico Environment Department, dated September 8, 1995, in which Mr. Yanicak expresses a concern regarding the potential for release of contaminants from solid waste management unit (SWMU) 16-021(c). Please review the letter and ask your staff to initiate any mitigation measures you believe are appropriate. Everett Trollinger will be available by phone on Wednesday, September 20, 1995, to discuss this matter with your staff. He can be reached on his digital pager at 104-8636.

Please advise me of the actions, if any, that you plan to take.

If you have any questions, please call me at 665-7203.

T.J. Taylor

Theodore J. Taylor
Program Manager
Environmental Restoration Program

Attachment

cc w/attachment:
D. Griswold, ERD, AL, MS A906
T. Taylor, EP, LAAO
C. Fesmire, EP, LAAO
E. Trollinger, EP, LAAO
K. Zamora, EP, LAAO
E. Merrill, EM-452, HQ
RPF, UC-LANL, MS M707
J. White, ESH-19, MS K498

cc w/o attachment:
J. Vozella, AAMEP, LAAO
W. Spurgeon, EM-452, HQ
T. Baca, EM, UC-LANL, MS J591

Post-it™ brand fax transmittal memo 7671	# of pages ▸
To Don Hickmott	From Roy Michelotti
Co.	Co.
Dept.	Phone # 5-7444
Fax # 665-3285	Fax #

from Everett 9/22/95

file

Copy sent to Greg
Rec'd at LAAO
9/14/95 11:46 a.m.

State of New Mexico
ENVIRONMENT DEPARTMENT
DOE OVERSIGHT BUREAU
2044 A Galisteo Street
P.O. Box 26110
Santa Fe, New Mexico 87502

GARY E. JOHNSON
GOVERNOR

MARK E. WEIDLER
SECRETARY

EDGAR T. THORNTON, III
DEPUTY SECRETARY

Dan has seen this. He has dealt with it already -K

September 8, 1995

Joseph Vozella, Chief
Environment, Safety, and Health Bra
Department of Energy
Los Alamos Area Office
Los Alamos, NM 87544

Re: Storm water discharges into Cañon de Valle from SWMU 16-021(c)

Dear Mr. Vozella:

On August 29, 1995, 1.52 inches of rainfall in one hour (recorded at the S-site meteorological station) resulted in storm water runoff in most of the major canyon systems at Los Alamos National Laboratory (LANL). Storm water runoff samples were collected by DOE OB personnel from Mortandad, Canada del Buey, Potrillo, Ancho and Water Canyons along State Road 4. On August 30, 1995, New Mexico Environment Department (NMED), Department of Energy Oversight Bureau (DOE OB) personnel conducting field surveys observed that flash flooding had recently occurred in Cañon de Valle. There was evidence (debris piles) at the junction of SWMU 16-021(c) and Cañon de Valle that showed that this tributary may also have experienced high flows of storm water runoff.

SWMU 16-021(c) has been described as by far the most contaminated outfall at S-site with HE contamination ranging up to three orders of magnitude greater than SALs (RFI Work Plan for OU 1082, 1993). Other Constituents Of Concern (COCs) include barium and other metals, uranium, semi-volatile organics and volatile organics.

The RFI Work Plan notes that due to the continuing operation of Outfall 05A-056, field activities will be deferred until the outfall is plugged sometime in 1995 or 1996. The RFI Work Plan does not mention any Best Management Practices (BMPs) for this SWMU and to this date none have been put in place.

The proximity of this SWMU and it's subsequent direct discharge into Cañon de Valle is of immediate concern. The postponement of remediation, noted above, necessitates that BMPs should be put in place and maintained to mitigate the transport of contaminants from

SWMU 16-021 (c) into Cañon de Valle. The RFI work plan notes that rain water from the roadway on the northeast side of TA-16-260 also flows into this drainage. Consideration should be given to the diversion of this runoff away from SWMU 16-021 to reduce mobilization of contaminants and subsequent transfer into Cañon de Valle. Measures must be taken to assure that COCs remain in SWMU 16-021 (c) until remediation is completed.

These concerns are being forwarded to the NMED Surface Water Quality Bureau. If you have any questions please contact Ralph Ford-Schmid at 827-1536.

Sincerely,

Stephen Yanicak

Steve Yanicak,
Point of Contact/LANL,
NMED, DOE OB

cc: John Parker, Program Manager, NMED, DOE OB
Glen Saums, Program Manager, NMED, SWQB
Steve Rae, UC-LANL/ESH-18, MS K490
Ivan Trujillo, DOE/LAAO AIP POC, MS A316

Los Alamos National Laboratory

ENVIRONMENTAL RESTORATION

University of California
Environmental Restoration, MS M992
Los Alamos, New Mexico 87545
505-665-4557
FAX 505-665-4747

U. S. Department of Energy
Los Alamos Area Office, MS A316
Los Alamos, New Mexico 87544
505-665-7203
FAX 505-665-4504

Date: October 11, 1995
Refer to: EM/ER:95-562

Mr. Steve Yanicak
New Mexico Environment Department
DOE-Oversight Bureau
P.O. Box 1663, MS J993
Los Alamos, NM 87545

SUBJECT: STABILIZATION OF SOLID WASTE MANAGEMENT UNIT (SWMU) 16-021(c)

Dear Steve:

In a letter to the U.S. Department of Energy (DOE) Office dated September 8, 1995, you expressed concern that there was the potential for release of contaminants from SWMU 16-021(c). The Los Alamos National Laboratory's (Laboratory's) Environmental Restoration (ER) Project shares many of the New Mexico Environment Department's (NMED's) concerns.

The Laboratory staff visited SWMU 16-021(c) with NMED DOE Oversight Bureau personnel on September 29, 1995. NMED personnel approved of the existing best-management practices (BMP), which consist of a sandbag run-on diversion that was implemented in June 1995 by Field Unit 3 personnel. NMED DOE Oversight Bureau also suggested additional BMPs such as installation of hay-bale check dams, jute matting, and additional run-on control. Field Unit 3 personnel agree that the suggested BMPs suggested would further decrease potential impacts to human health and the environment from transport of contaminants from SWMU 16-021(c). Field Unit 3 personnel will immediately begin implementing the suggested BMPs as interim measures. The ER Project will coordinate these activities with the Laboratory's Water Quality and Hydrology Group. Field Unit 3 will continue to inform DOE and NMED of their progress.

Environmental Restoration

If you have any questions, please call Roy Michelotti at (505) 667-5444, or Everett Trollinger at (505) 667-5801.

Sincerely,

Jorg Jansen, Program Manager
Environmental Restoration

Sincerely,

Theodore J. Taylor, Program Manager
Los Alamos Area Office

JJ/TT/bp

Cy: T. Baca, EM, MS J591
B. Driscoll, EPA
B. Garcia, NMED-HRMB
T. Glatzmaier, DDEES/ER, MS M992
D. Griswold, ERD, AL, MS A906
R. Michelotti, CST-18, MS E525
D. McInroy, EM/ER, MS M992
E. Merrill, EM-453, DOE-HQ
S. Rae, ESH-18, MS K497
G. Rael, ERD, AL, MS A906
W. Spurgeon, EM-453, DOE-HQ
T. Taylor, LAAO, MS A316
E. Trollinger, LAAO, MS A316
J. Vozella, LAAO, MS A316
N. Weber, Bureau Chief, NMED, DOE-OB
J. White, ESH-19, MS K498
EM/ER File, MS M992
RPF, MS M707

State of New Mexico
ENVIRONMENT DEPARTMENT
DOE OVERSIGHT BUREAU
P.O. Box 1663, MS/J-993
Los Alamos, New Mexico 87545

GARY E. JOHNSON
GOVERNOR

MARK E. WEIDLER
SECRETARY

EDGAR T. THORNTON, III
DEPUTY SECRETARY

October 11, 1995

Ivan Trujillo
Department of Energy
Los Alamos Area Office
MS-A316
Los Alamos, NM 87545

Re: Storm Water Pollution Prevention Best Management Practices (BMPs) at the TA-16 05A056 H.E. outfall SWMU 16-021(c)

Dear Mr. Trujillo:

On Friday September, 29th NMED DOE OB staff visited the TA-16 021(c) High Explosives SWMU in conjunction with LANL ER staff in order to discuss Storm Water Pollution Prevention BMPs associated with this site. At present, the date of remediation for this site is expected to be sometime in 1997. Because of this delay in remediation it is the concern of the NMED DOE OB that contaminants from this site will be transported down the arroyo into Canon de Valle unless Storm Water BMPs are implemented. The following recommendations were expressed to ER staff at this site visit:

* Existing BMP measures currently in place (sand bags and diversions) used to reduce the flow of water over the most contaminated portion of the SWMU should be maintained.

* In addition to existing BMPs the following recommended BMPs should be considered:

  1) A series of check dams constructed of hay bales and silt fencing should be erected along intervals down canyon beginning at the earthen dam below the most highly contaminated area and continuing down the arroyo to near the junction with Canon de Valle. It is recommended that at least four such check dams be installed.

  2) In addition to the check dams it is recommended that a "Jute" matting also be installed over the exposed soil in the arroyo between each of the check dams. This matting would minimize mobilization of contaminated soil particles from the impact of rain drops and help trap sediment.

  3) Storm Water runoff from the upgradient parking lot should be diverted to prevent entry onto the SWMU site.

DOE OB staff feel that the implementation of these BMPs would significantly reduce contaminant migration due to Storm Water runoff into Canon de Valle.

If you have any further questions please do not hesitate to call Harvey Decker at 672-0459 to discuss this matter.

Sincerely,

Stephen Yanicak

Steve Yanicak
NMED/DOE/OB/POC

cc: Steve Rae, Group Leader, ES&H-18, MS-K497
Neil Weber, Chief, NMED, DOE OB
Steve Yanicak, NMED/AIP/POC, MS-J993
Jim Piatt, Chief, NMED, SWQB
Benito Garcia, Chief, NMED, HRMB
Brad Martin, LANL, ER/FPL/FU3, MS-E525
Everett Trollinger, DOE, FPC/FU3, MS-A316
Roy Michelotti, LANL, ER, MS-E525
Don Hickmott, LANL, ER, MS-D462
Harvey Decker, NMED, DOE OB, LANL

SY:bld

ATTACHMENT 2 FACT SHEET

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Los Alamos National Laboratory
Environmental Restoration Project
PRS Fact Sheet for Interim Action

Description:

PRS 16-021(c) is the NPDES permitted outfall (EPA 05A056) from the high explosives (HE) machining facility at S-Site, TA-16-260. Large quantities of explosives are processed in this building. Machine turnings are routed to the sumps as waste. Each sump flows into a trunk line that discharges to the outfall. The drainage channel from the outfall is contaminated with explosive waste, including barium nitrate, the primary ingredient in the explosive baratol. The drainage channel from the outfall flows about 600 ft to the bottom of Cañon de Valle, a drop in elevation of 80 ft. A small pond approximately 55 ft long is formed by a rock dam located 93 ft from the outfall. Stressed vegetation is present in the drainage channel. Rainwater from the roadway on the northeast side of TA-16-260 also flows into the pond.

Contaminants:

Existing data for the TA-16-260 outfall are extensive and show widespread HE contamination extending from the discharge point to Cañon de Valle (RFI Work Plan for OU 1082, subsection 5.3.1.1). Sediment samples were taken from the channel from 1960 through 1991. These studies analyzed soil for a distance of several hundred feet from the outfall. The highest concentrations of HMX-RDX and TNT were found in the pond. Concentrations of total HE in the pond have remained uniformly high with a maximum of 9.8 wt % in 1960 to 34.1 wt% in 1991 (RFI Work Plan for OU 1082, subsection 5.3.1.1). In 1995 RFI sampling was conducted at the TA-16-260 outfall. Surface soil samples were collected and indicated barium levels greater than the SAL of 5 340 ppm. Eleven samples were collected with barium concentrations ranging from 7 500 ppm to 26 900 ppm. Data on water and sediment samples from Cañon de Valle suggest that both RDX and barium have been mobilized from PRS 16-021(c) to the canyon. Other constituents of concern include other metals, uranium, semivolatile organics, and volatile organics.

Interim Action:

As requested by the State of New Mexico, Field Unit 3 is initiating an interim action to stabilize the soil associated with PRS 16-021(c) and prevent further release of contaminants. In coordination with the Water Quality Group at LANL, the interim action, also known as a best management practice to be implemented will consist of three actions.

- The volume of surface flow through the drainage channel will be reduced by diverting storm water runoff. Johnson Controls workers will place sandbags along the eastern edge of the asphalt apron to divert storm water runoff from the area into adjacent drainages (see attached figure).

- ICF Kaiser Engineers will cover the existing settling pond with Poly-Jute™ matting to reduce the potential for rainfall mobilized sediments within the pond.

- The capacity for sediment deposition within the drainage will be enhanced by installing eight straw-bale dams. ICF Kaiser Engineers will construct these dams within the steeper sections of the channel between the existing rock dam and cliff face where the drainage drops into Cañon de Valle.

The dams will consist of loose straw, straw bales, and Poly-Jute™ matting. The straw bales will be partially wrapped in Poly-Jute™ to maintain the bale structure. A section of Poly-Jute™ mat the width of the drainage channel and 15 ft long will be placed in the drainage at each dam location. Loose straw will be laid down over the mat in the location of the dam to ensure a seal between the straw bales and the bottom of the drainage channel. The mat will be placed so that the upgradient edge of the mat is at or above the specified dam location. Straw bales will then be placed end-to-end over the loose straw across the entire width of the drainage channel at the specified dam location. The downgradient portion of Poly-Jute™ mat will then be wrapped over the straw bales. Any excess Poly-Jute™ mat will lay in the bottom of the drainage channel upgradient of the dam.

secured in place with rocks. The entire structure will be supported with rocks and a log on the downgradient side of the dam. Wire will anchor the log at both ends to nearby trees.
The proposed best management practice will reduce mobilization and subsequent transfer of contaminants into Cañon de Valle.

PRS 16-021(c) is HSWA listed and has undergone a NEPA review for categorical exclusion (B1.3).

Estimated Cost:

Sandbags with labor	$2 000
Poly-Jute™ matting	$600
Straw bales	$120
Labor	$6 000
Total	$8 720

Schedule:

Sand bags were placed along the edge of the asphalt on Friday, November 17, 1995.

The Poly-Jute™ matting will be placed on the pond Friday, December 8, 1995.

Eight straw-bale dams will be placed with the Poly-Jute™ matting on Friday, December 8, 1995.

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous & Radioactive Materials Bureau
2044 Galisteo
P.O. Box 36110
Santa Fe, New Mexico 87502
(505) 827-1557
Fax (505) 827-1544

GARY E. JOHNSON
GOVERNOR

MARK E. WEIDLER
SECRETARY

EDGAR T. THORNTON, III
DEPUTY SECRETARY

1.4.2.6.1.7.2

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

4/3/96

Mr. Joseph C. Vozella, Chief
Environment, Safety, and Health Branch
Los Alamos Area Office
Department of Energy
Los Alamos, New Mexico 87544

RE:Corrective Measure Study for SWMU 16-021(c)
Los Alamos National Laboratory (NM0890010515)

Dear Mr. Vozella:

The New Mexico Environment Department (NMED)-Hazardous and Radioactive Materials Bureau (HRMB) and the U.S. Environmental Protection Agency (EPA), recently reviewed Los Alamos National Laboratory's (LANL) Interim Action Report dated February 12, 1996, for Solid Waste Management Unit (SWMU) 16-021(c). SWMU 16-021(c) is an area of significant high-explosive contamination that discharges into Cañon de Valle.

During a site visit by NMED-HRMB/EPA in October 1995, LANL staff indicated that SWMU 16-021(c) was the possible source of high explosives found in nearby springs. Based upon a review of the above- mentioned report and previous documentation of extensive contamination, NMED-HRMB/EPA recommends that a Corrective Measure Study (CMS) be conducted for this site and that a CMS Workplan for this site be submitted by LANL by October 1, 1996.

Should you have any questions concerning this letter, please contact either Mr. Robert Dinwiddie at 505/827-1561 or Ms. Teri Davis at 505/827-1558 concerning permitting or technical issues, respectively.

Sincerely,

Barbara Hoditschek

Barbara Hoditschek,
RCRA Permitting Program Manager

enclosures

cc: Benito Garcia, Bureau Chief, NMED-HRMB
Ronald Kern, Technical Compliance Program Manager, NMED-HRMB
David Nolcigh, Chief, US EPA Region 6

University of California
Environmental Restoration Project, MS
Los Alamos, New Mexico
505-667-0808/FAX 505-665-4747

U.S. Department of Energy
Los Alamos Area Office, MS
Environmental Restoration Program
Los Alamos, New Mexico
505-667-7265/FAX

Date September 23, 1996
Refer to EM/ER 96-502

Mr. Benito Garcia
NMED-HRMB
P.O. Box 26110
Santa Fe, NM 87502

SUBJECT: SUBMITTAL OF THE RFI REPORT FOR PRSs 16-003(k) AND 16-021(c) IN TA-16

Dear Mr. Garcia:

Enclosed are two copies of the Los Alamos National Laboratory's Resource Conservation and Recovery Act Facility Investigation (RFI) Report concerning Potential Release Sites 16-003(k) and 16-021(c) in Technical Area 16. One report is for your information and the second should go to your technical branch. The report documents the field work performed as detailed in the approved RFI Work Plan for Operable Unit 1082 and the results of the sampling.

Please ask your office to contact Roy Micheloto at (505) 665-7444 or Joe Mose at (505) 667-5808 if you have any questions.

Sincerely,

Jorge Jaramillo, Program Manager
LANL/ER Project

Sincerely,

Theodore J. Taylor, Program Manager
DOE/LAAO

JJ/TT/bp

Enclosures: 1) RFI Report for PRSs in TA-16
2) Certification

OCT 15 1996

An Equal Opportunity Employer Operated by the University of California

RFI Report for Potential Release Sites in TA-16

16-003(k)
16-021(c)

Field Unit 3

Environmental Restoration Project

September 1996

A Department of Energy
Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

LA-UR [illegible]

EXECUTIVE SUMMARY

This Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) report discusses Phase I investigations, results, and recommendations for two potential release sites (PRSs), 16-021(c) and 16-003(k), at Los Alamos National Laboratory (LANL) Technical Area (TA) 16. TA-16 has been the site of high explosives (HE) research and development programs since 1944. PRSs 16-021(c) and 16-003(k) are the HE sumps, drain lines, and outfall associated with TA-16-260, an HE-machining building that has been in operation since 1951. PRS 16-003(k) includes the HE sumps, the vitrified-clay pipe connected to the sumps, the concrete troughs that feed the single outfall, and contaminated soil surrounding those structures. PRS 16-021(c) includes all contaminated soils and tuff downstream from the outfall. These two PRSs are combined in this RFI report because they are both associated with TA-16-260, because they contain similar constituents, and because any cleanup of the two PRSs will be coordinated to save costs and time.

The RFI work plan for Operable Unit (OU) 1082 (LANL 1993, 1094) was approved by the Environmental Protection Agency (EPA) Region 6 in December 1994 (Taylor 1995, 1357). The approval letter required that RFI reports for these two PRSs be completed by September 30, 1996. Only a subset of the sampling prescribed for PRS 16-003(k) was completed due to funding constraints and hazards associated with drilling in HE-contaminated areas. This deviation from the approved work plan was documented in a letter to EPA dated May 24, 1995 (Jansen and Taylor 1995, 15-16-627).

Phase I sampling for PRSs 16-021(c) and 16-003(k) was completed during fiscal year (FY) 1995. Surface and near-surface samples were collected. Analyses were performed for HE, inorganics, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and uranium. Existing data suggested that PRS 16-021(c) was highly contaminated with HE and barium, so the objective of the Phase I sampling at that PRS was to determine the lateral extent of contamination in anticipation of a voluntary corrective action (VCA) cleanup. The objective of Phase I sampling at PRS 16-003(k) was to determine whether a release had occurred beneath the HE sumps and troughs that presented a risk to human health and the environment.

The following constituents were found above screening action levels (SALs) at PRS 16-021(c): cyclotrimethylenetrinitramine (RDX), cyclotetramethylene-tetranitamine (HMX), 2,4,6-trinitrotoluene (TNT), 2,4-dinitrotoluene (DNT), 1,3,5-trinitrobenzene (TNB), anthracene, bis(2-ethylhexyl)phthalate, and barium. Some constituents, such as RDX, were present at levels more than four orders of magnitude greater than SALs. Detection limits for HE and other

organic constituents were high due to the large amounts of HE in many samples and the resultant large numbers of dilutions required for chemical analyses. Non-RFI surface and groundwater sampling reveal that HE constituents and barium are present at levels greater than maximum contaminant levels (MCLs) in springs and surface waters potentially associated with PRS 16-021(c). Together, these data imply that a corrective measures study (CMS) and corrective measures implementation (CMI) are required for this unit.

The PRSs discussed in this RFI report are listed in Table ES-1. PRS 16-003(k) is recommended for voluntary corrective action (VCA) to be performed in conjunction with CMS/CMI at PRS 16-021(c). Phase I data indicated that minor releases of constituents to the environment have occurred at the sumps, but the identified releases are not at levels greater than SALs. Final soil characterization, drain line and trough removal, and, if necessary, soil cleanup of PRS 16-003(k) will occur in association with the CMI at PRS 16-021(c). Accelerated Phase II sampling is recommended for PRS 16-021(c) in preparation for a CMS. A CMS plan will be completed during fiscal year 1997.

Although radionuclides are regulated by the Department of Energy (DOE) and not under RCRA, it is more efficient and cost-effective to investigate all types of potential contaminants during a single site characterization. Therefore, it is LANL and DOE policy to address radiochemical concerns in this report.

TABLE ES-1

SUMMARY OF PROPOSED ACTIONS

PRS[a] NUMBER.	HSWA[b]	RADIONUCLIDE COMPONENT[c]	PROPOSED ACTION			SECTION NO.
			NFA[d] RITERION	FURTHER ACTION	RATIONALE	
16-003(k)	X		N/A[e]	VCA	Characterize soils, remove fixtures, and cleanup soil with CMI[f] at 16-021(c)	5.1.10
16-021(c)	X	X	N/A	Further investigation (10/96) CMS[g] (9/97)	Contamination not bounded Highly contaminated soils	5.2.10

[a] PRS = Potential release site.
[b] An X in this column indicates that the site is listed on the Hazardous and Solid Waste Amendments (HSWA) Module (Module VIII) of the Laboratory's RCRA operating permit.
[c] An X in this column indicates that the site has a known radionuclide component.
[d] NFA = No further action.
[e] N/A = Not applicable.
[f] CMI = Corrective Measures Implementation.
[g] CMS = Corrective measures study.

SUMMARY OF PRSs

PRS 16-003(k) consists of 13 HE sumps and drain lines associated with TA-16-260. The sump outlets to the outfall are currently scheduled to be plugged during fall 1996. After the sumps are plugged they will continue to receive large amounts of HE-bearing process water, which will be collected in vacuum trucks and transported to the TA-16 Burning Ground rather than be discharged at the outfall. Barium, chromium, cobalt, copper, lead, nickel, silver, uranium and zinc were found above LANL upper tolerance limits (UTLs). The HE 4-amino-dinitrotoluene (4-ADNT), HMX, TNB, and TNT were found above analytical detection limits. These analytes were found in soils near the sumps and troughs. Small amounts of VOCs and SVOCs were found. No analytes above SALs were found. A multiple constituent evaluation (MCE) suggests that the cumulative risk from both carcinogens and noncarcinogens is small. However, potential releases from this unit have not been fully characterized. Thus, PRS 16-003(k) is recommended for further characterization and VCA in conjunction with CMS/CMI activities at PRS 16-021(c). The drain lines and troughs are currently scheduled to be deactivated during fall 1996. LANL will remove those drain lines and troughs, and complete additional characterization sampling in the locations of these removed structures. The active portions of PRS 16-003(k) beneath the sumps will be characterized as part of the VCA. Details of these activities will be provided in a VCA plan that will be submitted concurrently with the CMS report. VCA activities will occur concurrently with CMI activities.

PRS 16-021(c) is the outfall associated with the 13 HE sumps on the northeast side of TA-16-260. The outfall will no longer receive HE-bearing wastewater following plugging of the sumps. Barium, chromium, copper, lead, nickel, silver, uranium, vanadium, and zinc were found in soils above LANL UTLs. Barium was found well above SALs throughout the PRS. The HE 2-amino-dinitrotoluene (2-ADNT), 4-ADNT, DNB, DNT, HMX, nitrobenzene (NB), 3-nitrotoluene (NT), RDX, TNB, and TNT were all found at this PRS. DNT, HMX, RDX, TNB, and TNT were all found at levels in soils well above SALs for a distance of 600 ft from the outfall. SVOCs and VOCs were detected above analytical detection limits - including anthracene and bis(2-ethylhexyl)phthalate at levels greater than SALs. Although no formal risk assessment was performed, risks are estimated to be in the range of 10^{-2} to 10^{-3} for carcinogens and a hazard index greater than 1 based under comparison with EPA Region IX calculations made under a generic industrial exposure scenario. In addition, HE levels in the PRS represent an acute (explosive) hazard due to HE levels greater than five weight percent. Nearby springs and surface waters are contaminated at levels greater than background and MCLs, potentially due

to contaminants derived from PRS 16-021(c). Several best-management practices (BMPs), including hay bale dams, sandbag barriers, and geotextile matting in the highly-contaminated zone, have been implemented at this PRS to minimize run-on and runoff.

A Phase II sampling plan is proposed to: 1) determine the extent of contamination requiring remediation, 2) investigate the hydrologic connection between the PRS and contaminated surface waters and groundwaters, and 3) examine the potential for off-site migration of contaminants from the PRS. This Phase II sampling and analysis plan is designed to support the CMS plan for this PRS. The CMS plan is currently scheduled for delivery to the New Mexico Environment Department in September 1997.

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1.0 INTRODUCTION

This report presents the results of the Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) for two potential release sites (PRSs) associated with Technical Area (TA) 16 at Los Alamos National Laboratory (LANL). The two PRSs are the outfall and sumps from a high explosives (HE) machining building, TA-16-260. This report describes the sampling conducted during Phase I, examines the analytical results, and proposes future action for the PRSs.

1.1 General Site History

TA-16 is located in the southwest corner of the Laboratory (Fig. 1.1-1 and Fig. 1.1-2). It contains 2 410 acres or 3.8 square miles. The land is a portion of that acquired by the Department of Army for the Manhattan Project in 1943. It was used prehistorically by the ancestral Indians of the Pajarito Plateau and prior to World War II for farming and a sawmill operation. TA-16 is bordered by Bandelier National Monument along State Road 4 to the south and the Santa Fe National Forest along State Road 501 to the west. To the north and east, it is bordered by TAs 8, 9, 14, 15, and 49. TA-16 is fenced and posted along State Road 4. Water Canyon, a 200-ft-deep ravine with steep walls, separates State Road 4 from active sites at TA-16. Cañon de Valle forms the northern border of TA-16. Security fences surround the production facilities.

TA-16 was established to develop explosive formulations, cast and machine explosive charges, and assemble and test explosive components for the US nuclear weapons program. Almost all of the work was conducted in support of the development, testing, and production of explosive charges for the implosion method. Present day use of this site is essentially unchanged, although facilities have been upgraded and expanded as explosive and manufacturing technologies advanced.

TA-16-260 is located on the north side of TA-16. The structure was originally built in 1951, with minor modifications to the structure made later. It is an HE machining facility that processes large quantities of explosives. Machine turnings and HE washwater are routed to the 13 sumps as waste. The drainage channel from the outfall is contaminated with high-explosive waste and barium. The outfall is currently scheduled to be deactivated; however, it is still permitted as Environmental Protection Agency (EPA) 05A056. The sumps, drain lines, and troughs have been designated PRS 16-003(k) and the outfall as PRS 16-021(c).

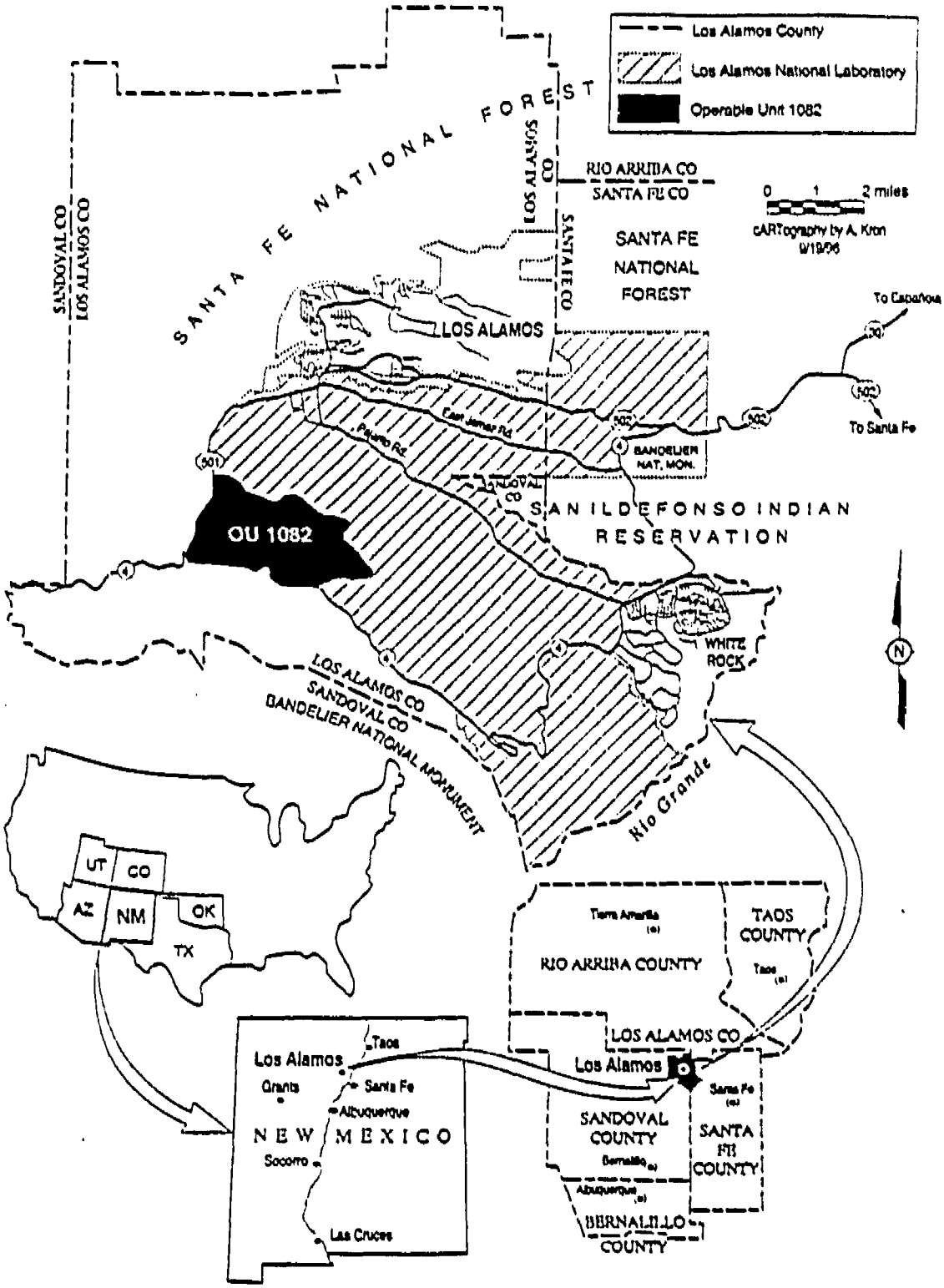

Fig. 1.1-1. Location of Operable Unit 1082.

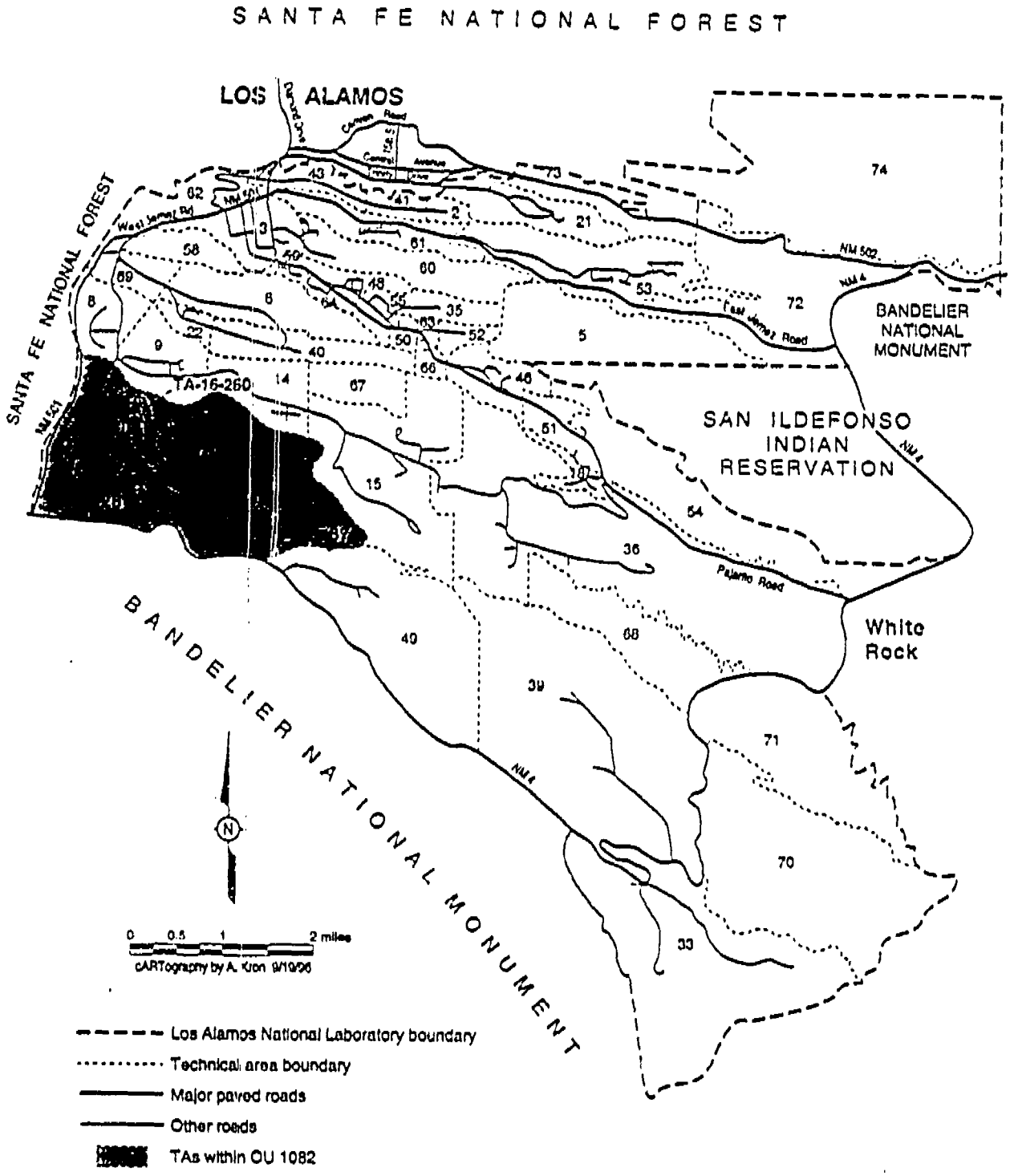

Fig. 1.1-2. Location of Operable Unit 1082 with respect to Laboratory technical areas and surrounding landholdings. Building TA-16-260 within TA-16 is also shown.

Chemicals of potential concern (COPCs) at this site include various types of HE, HE impurities and degradation products, uranium, metals (especially barium), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and cyanide.

1.2 RFI Overview

The sampling plans for the PRSs discussed in this document are contained in subsection 5.3 of the RFI Work Plan for Operable Unit (OU) 1082 (LANL 1993 1094). This work plan was submitted to the EPA Region 6 in July 1993. A notice of deficiency (NOD) was received in July 1994. LANL's response was submitted to the Los Alamos Area Office of the Department of Energy (DOE) in August 1994. EPA' s approval of the work plan with modifications was received during December 1994 (Taylor 1995, 1357)

The technical approach of the work plan included phased sampling to locate the sources and types of contamination associated with LANL activities. Contaminants detected during Phase I reconnaissance sampling may be subject to subsequent sampling to ensure that contamination is investigated in compliance with the Hazardous and Solid Waste Amendments (HSWA) Module VIII of the LANL Hazardous Waste facility permit (EPA 1990, 0306).

The conceptual model for this site is referenced in subsection 4.3 of the RFI work plan for Operable Unit 1082 (LANL 1993, 1094). The primary exposure routes for continued industrial operations include ingestion and inhalation, dermal contact, external radiation, and potential HE detonation. Further work at these PRSs includes: 1) Phase II sampling followed by the corrective measures study (CMS)/corrective measures implementation(CMI) process, and 2) further characterization associated with voluntary corrective action (VCA).

1.3 Field Activities

1.3.1 Sample Collection Activities

The fieldwork for the PRSs in this report began in June 1995 and ended in October 1995. Sampling was limited to Fridays due to safety requirements dictated by the operating group. Sampling was completed by ICF Kaiser Engineers. All applicable LANL Environmental Restoration (ER) standard operating procedures (SOPs) were followed, unless otherwise noted in Chapter 5 of this document.

Field screening for HE by spot test, volatiles by photoionization detector (PID), and radionuclides by hand-held sodium-iodide (NaI_2) detector occurred at both PRSs. The purpose of field screening was to bias core samples to locations with the highest contamination at

PRS 16-003(k) and to aid in bounding extent of contamination at PRS 16-021(c). Screening was also needed to ensure compliance with shipping requirements for explosive materials. HE spot test results were particularly important for biasing laboratory sampling locations and to support bounding of the extent of contamination.

PRS 16-003(k) sampling consisted of remote-drilled vertical boreholes adjacent to the sumps and drainage troughs that constitute this PRS. PRS 16-021(c) sampling consisted of surface and near-surface sampling using spade and scoop and hand-auger methods. Each sample was photographed and all sampling data were loaded into a field 4-D database that was later uploaded into the facility for information management and display (FIMAD).

Land surveys were conducted between January and March 1995 and June 1996. All surface samples were taken to an approximate depth of 6 in. within a diameter of 6–8 in. VOC samples were taken from a depth of greater than 6 in. but less than 6 ft. Soil was collected from each sampling location using dedicated nonsparking aluminum sampling implements. Augered samples were collected with a remote drill rig (SIMPCO™) operated from a distance of greater than 30 ft with all operators shielded behind a bullet-proof polycarbonate shield. Wet drilling was required to comply with operational health and safety requirements. These sampling safety precautions are required in areas containing potentially-explosive levels of HE.

1.3.2 Field Quality Assessment Activities

Field quality assessment (QA) samples, in the form of collocated and performance evaluation (PE) samples, were collected as specified and defined in the site-specific quality assurance/quality control (QA/QC) plan for the fiscal year (FY) 95 TA-16 field campaign (ICF-Kaiser 1995, 15-16-628). Collocated surface samples, designated as field duplicates in the RFI work plan, were established less than 1 ft north of their respective RFI-mandated sample locations. Split subsurface samples were collected from 1–2 ft intervals of core.

The PE samples were collected to check for contamination that may have been introduced from ambient conditions or improper handling procedures, to evaluate matrix effects on analytical laboratory recovery of inorganics and radioactive constituents, and to evaluate the overall process of sample handling and analysis. Because most of the PE samples were submitted to support the entire FY95 TA-16 field campaign, a detailed discussion of those samples is provided in the RFI report for the other 35 PRSs sampled in FY95. This report will be submitted by October 31, 1996. As described in that report, no problems were noted with the PE samples.

1.3.3 Deviations from the RFI Work Plan

Three deviations from the RFI work plan and its NOD occurred:

1) At PRS 16-003(k) two vertical boreholes were collected at each sampled sump rather than the angled borehole proscribed in the work plan NOD. This change was necessitated by HE safety concerns promulgated by the LANL operating group. The operating group requires all drilling in HE areas to be completed wet, and it was deemed impossible to maintain a wet borehole using angled drilling. Two vertical boreholes were estimated to be as effective at determining whether a large plume of HE existed beneath a sump as a single angled borehole. A large plume of HE would likely extend beyond the borders of an HE sump in one or more directions, and not be confined to the soils directly beneath the sump structure.

2) At PRS 16-003(k) only two of the five sumps and two of the five trough locations that were planned to be characterized according the work plan and its NOD were sampled during FY95. It was believed that partial implementation of the sampling plan would adequately determine whether a major release from this unit had occurred. In addition, the full sampling plan could not be completed within the budget for fiscal year 1995. This deviation from the work plan was discussed with representatives of EPA Region 6 during spring 1995, and the decision to complete only this portion of the Phase I RFI sampling was communicated to EPA Region 6 in a letter dated May 24, 1995 (Jansen and Taylor 1995, 15-16-627). Cores were screened on 12-in. intervals rather than 6-in. intervals in order to provide enough material for analysis.

3) Four waste-characterization samples , which were not included in the work plan, from two locations were collected in anticipation of soil removal and treatment. These samples were analyzed for toxicity characteristic leaching procedure (TCLP) metals and organics and for herbicides and pesticides.

2.0 ENVIRONMENTAL SETTING

The environmental setting of the Laboratory is described in Subsection 2.4 of the Installation Work Plan (IWP) for Environmental Restoration (LANL 1995, 1164). A discussion of the environmental setting, including climate, geology, hydrology, and a conceptual hydrogeologic model for the area and surroundings, is presented in Chapter 3 of the work plan for OU 1082 (LANL 1993, 1094). A summary of that and new data collected since 1993 are presented in the following sections.

2.1 Climate

Los Alamos County has a semiarid, temperate, mountain climate. Summers are generally sunny with moderate, warm days and cool nights. High altitude, light winds, clear skies, and dry atmosphere allow mean summer temperatures to range from 60° F to 68° F at TA-16. Winter mean temperatures typically range from 30° F to 37° F. The average annual rainfall in the area of TA-16 is estimated to range from 18 to 20 in. (Bowen 1990, 0333). Of this total, 40% occurs as brief, intense thunderstorms during July and August.

2.2 Geology

2.2.1 Geologic Setting

A detailed discussion of the geology of the entire Los Alamos area can be found in Subsection 2.5.1 of the IWP (LANL 1995, 1164). The geology of TA-16 is described in Subsection 3.4 of the work plan (LANL 1993, 1094). However, significant additional information on the geology of TA-16 has become available during the last three years. These new data are described below.

The operations area at TA-16 is bounded on the south by Water Canyon and on the north by Cañon de Valle. Cañon de Valle is a tributary to Water Canyon; they join at the east end of TA-16 approximately 3 miles downstream from the drainage for PRS 16-021(c), which is located 600 ft south of Cañon de Valle. Water Canyon drains into the Rio Grande approximately 7 miles east of the easternmost boundary of TA-16.

Operational areas at TA-16 are located on the mesa tops, composed of Unit 4 (QBT-4) of the Tshirege Member of the Bandelier Tuff. Unit 3 (QBT-3) of the Tshirege Member of the Bandelier Tuff crops out on the mesa tops at the east end of TA-16 and in the bottoms and walls of Cañon de Valle and Water Canyon. Correlation of recent mapping to the east of PRS 16-021(c) at Material Disposal Area (MDA)-P with the recently-released bedrock geologic map of Rogers (Rogers 1995, 1353) suggests that mesa top portions of PRS 16-021(c) are underlain by approximately 80—110 ft of Unit 4 of the Tshirege Member of the Bandelier Tuff.

At MDA-P, QBT 4 is a lithologically complex unit consisting of in ascending order: 1) a poorly indurated, white to light-gray, nonwelded ignimbrite, 2) an indurated light tan, nonwelded, cliff-forming tuff overlain by a broad bench, 3) a varicolored, nonwelded cliff-forming tuff with devitrified base and a 10-ft thick glassy upper part, 4) a crystal-rich surge bed up to 1 ft thick, and 5) a hard, densely-welded tuff that forms the caprock for the mesa (Broxton et al. 1996, 1305). The latter subunit correlates with Unit QBT_4 and the first 3 units correlate with Unit QBT_4 of Rogers (Rogers 1995, 1353). The crystal-rich surge bed was mapped by Rogers as the boundary between her units QBT_4 and QBT_1. This high-permeability sandy parting may represent a possible perched zone - provided it also overlies a low-permeability zone. Examination of this contact in the walls of Cañon de Valle between MDA-P and PRS 16-021(c) suggests that the surge bed is discontinuous. Rogers subunit QBT_4 contains a unit characterized by horizontal fractures that also may represent a possible perched-flow pathway.

QBT 3 in Cañon de Valle adjacent to MDA-P consists of two hard, pinkish-brown, partially to moderately welded, cliff-forming ignimbrites that are separated by a soft, pinkish-orange, nonwelded, slope-forming tuff. The uppermost subunit within Unit 3 contains significant horizontal fractures.

Detailed information on the mineralogy, modes, whole-rock chemistry, and outcrop characteristics of Unit 3 and Unit 4 at TA-16 are provided in Broxton et al. (1996, 15-16-1305).

A large, near-vertical fault, the Frijoles segment of the Pajarito fault zone, has been mapped to the west of OU 1082. This fault is the largest segment of the Pajarito fault system in the Los Alamos area, with down-to-the-east displacement ranging up to 400 ft during the last 1.1 million years. Fault zones may provide pathways for water flow.

2.2.2 Soils

A discussion of soils in the Los Alamos area can be found in Subsection 2.5.1.3 of the IWP (LANL 1995, 1164). Soil at TA-16 is described in Subsection 3.4.3.2 of the work plan (LANL 1993, 1094). As described in that subsection, the area surrounding PRS 16-021(c) was

mapped as fine typic Eutroboralfs by Nyhan (Nyhan et al. 1978, 0161). Examination of soils at PRSs around TA-16-260 suggests loamy fine soils. A recent study of background soils on the north and south slopes of Cañon de Valle near the TA-16 Burning Ground suggests that: 1) soil horizons ranged from 40 to 237 cm in depth, 2) soils are poorly developed and consist of A-R, A-Bw-R, or A-Bw-C soil profiles, and 3) soils are classified as Lithic Ustorthents, Typic Haplumbredt, Cumulic Haplumbredt, Typic Ustochrept, and Udic Paleoustalf soils (McDonald et al. 1996, 1354). The geomorphic environment of these soils, on the slopes of Cañon de Valle, is probably similar to that in the vicinity of PRS 16-021(c).

2.3 Hydrology

The hydrology of the Pajarito Plateau is summarized in Subsection 2.5.2 of the IWP (LANL 1995, 1164). The shallowest depth to groundwater at TA-16 is unknown. This question will be investigated as part of Phase II sampling for PRS 16-021(c). Shallow perched aquifers at TA-16 are likely quite heterogeneous. Several moderate depth (up to 200 ft) boreholes drilled at the TA-16 Burning Ground near MDA-P did not contain a saturated zone. The depth to the main aquifer at TA-16 is estimated to be greater than 1 000 ft. Four deep groundwater wells to the main aquifer are scheduled in and around TA-16 as part of sitewide hydrogeologic studies scheduled for FY97 to FY01. These wells will be located: 1) in Cañon de Valle near MDA P 2) at the confluence of Cañon de Valle and Water Canyon 3) at New Mexico State Road 501 and Cañon de Valle, and 4) at New Mexico 501 and Water Canyon.

2.3.1 Surface Water

Surface water issues at TA-16 are described in Subsection 3.5.1 of the work plan (LANL 1993, 1094). Additional information on surface waters, collected since 1993, is summarized below.

Perennial and intermittent surface water exist at many locations at TA-16, due both to natural and anthropogenic sources. Cañon de Valle contains what appears to be a perennial reach, the surface water between TA-16-260 outfall and a location beyond MDA-P has flowed continuously since initial investigations in 1992. Several small saturated areas are present in small, tributary, drainages to Cañon de Valle and Water Canyon. Many of these zones are due to the discharge of process waters from TA-16 operations. Figure 2.3.1-1 shows locations of possible wetlands-type vegetation, HE-process outfalls (as of 1994), and other surface water locations.

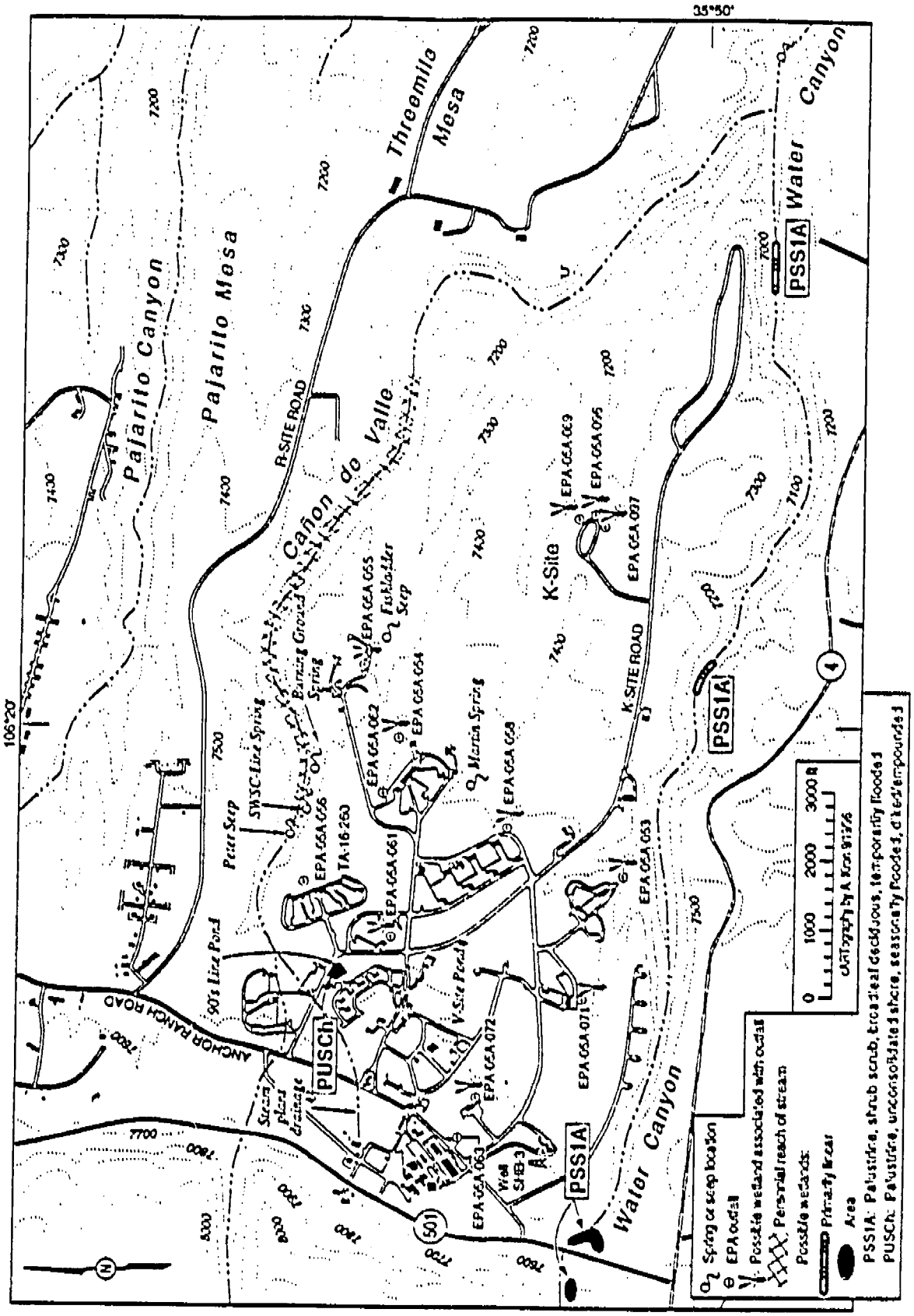

Fig. 2.3.1-1. Topography, springs, seeps, National Wetlands Inventory, and LANL-defined wetlands associated with National Pollution Discharge Elimination System (NPDES) HE outfalls (active and inactive) at TA-16.

Surface waters in many of these locations have been analyzed as part of Framework Studies surface water characterization activities, by New Mexico Environment Department (NMED) Agreement in Principle (AIP) personnel as part of their surveillance activities, and as part of non-RFI hydrogeologic sampling at TA-16. Complete water analyses, maps showing sampling locations, and more detailed discussions of these data are provided in Appendix C. Information on constituents above background in surface waters is provided in Appendix C and is summarized below.

Certain surface waters in Cañon de Valle are contaminated with several constituents at levels above screening action levels (SALs) and above background. Barium in Cañon de Valle ranges from 2 to 3 ppm, which is above the New Mexico maximum concentration level (MCL) of 1 ppm. The high explosive RDX is also consistently at levels above 100 ppb, which is greater than the New Mexico MCL for that constituent. Several other constituents in Cañon de Valle are at levels above regional spring background. These constituents include HMX, chlorine, sodium, and manganese (see Appendix C).

Other surface waters at TA-16 that have anomalously high levels of constituents include the pond behind the 90s-Line, which contains barium at levels above screening action levels (SALs), and a surface water zone at K-Site, which contains barium and boron above background.

Further analyses of these surface waters will be completed during Phase II sampling activities.

2.3.2 Groundwater

Groundwater issues at TA-16 are described in Subsection 3.5.2 of the work plan. Additional information on groundwaters, collected or reinterpreted since 1993, are summarized below. Information on constituents above background in groundwaters at TA-16 are described in detail in Appendix C.

Borehole SHB-3 (Fig. 2.3.1-1), drilled in November 1991, contained perched groundwater, hypothesized to have been derived from a depth of between 750-350 ft. (Gardner et al. 1993, 0848). This water may represent a perched zone or it could represent the regional aquifer. Water and swab samples were taken from SHB-3 during the summer of 1993. These data show sporadic elevated values of lead, phosphate, rubidium, and ammonium relative to background spring data (Blake et al. 1995, 1355). Static water depth in SHB-3 was roughly 664 ft during 1992 (EPG 1994, 1179)

Several springs and seeps have been identified at TA-16 during the past four years. Locations of these springs are shown on Fig. 2.3.1-1. SWSC Line and Burning Ground spring discharge from within the uppermost, platy, subunit of Tshirege Unit 3. Martin spring apparently discharges from the lower portion of Tshirege Unit 4. All of the springs and seeps are contaminated with constituents (barium, boron, HE, solvents) at levels above background. All of these springs are also contaminated at levels above SALs for RDX (see Appendix C). Martin spring appears to be most highly contaminated.

The presence of these springs suggests the existence of one or more perched zones at a shallow level beneath TA-16. Determination of the depth and nature of the uppermost of these perched zones is one of the goals of the Phase II sampling described in Subsection 5.2.11 of this document.

2.4 Biological and Cultural Surveys

Biological and cultural surveys were performed at TA-16 prior to sampling.

Appendix A to the work plan (LANL 1993, 1094) identifies thirty-three cultural sites eligible for inclusion on the National Register of Historic Places under Criterion D within OU 1082. However, that Appendix also notes that the attributes that make these sites eligible for inclusion on the National Register will not be affected by ER project sampling activities.

Appendix B to the RFI work plan for OU 1082 and Raymer (1996, 15-16-621) describe the results of field surveys for threatened, endangered, and sensitive species (LANL 1993, 1094). Ten plant and animal species of concern were identified in those surveys. These species were: the Jemez Mountain salamander, northern goshawk, peregrine falcon, Mexican spotted owl, broad billed hummingbird, pine marten, meadow jumping mouse, spotted bat, checker lily, and wood lily. Appropriate notifications and mitigation measures for each species were also identified in Appendix B to the work plan. One of these species is known to reside in Cañon de Valle (Dunham 1996, 15-16-622; Raymer 1996 15-16-621).

3.0 APPROACH TO DATA ASSESSMENT AND ANALYSIS

The approach to data assessment used by the ER Project is described in the "Technical Approach to Data Assessment for ER Project Site Characterization Decisions" (Knudsen et al. 1996, 1299). The approaches used in this RFI report included

- sampling and analysis design,
- field investigation and collection of field and quality assurance (QA) samples,

- chemical and radiological analyses of samples and reporting of analytical data,
- routine verification and validation of analytical data,
- organization of field and analytical data into PRS-specific data packages,
- exploratory data analysis,
- comparison of validated analytical results with LANL background data,
- comparison of validated analytical results with SALs,
- assessment of human health risk, and
- formulation of decisions.

The following subsections provide overviews of the methods used to complete these steps for the PRSs discussed in this RFI report.

3.1 Sample Analysis

Samples were collected in accordance with sample design specified in the work plan (LANL 1993, 1094). All samples requiring chemical and radiological analyses and chain-of-custody documentation were submitted to the sample management office (SMO) for analyses. Analytical suites used for samples at these PRSs include VOCs, SVOCs, inorganics, HE, and uranium.

3.1.1 Analytical Methods

All samples were analyzed by contract analytical laboratories using methods specified in ER SMO analytical subcontracts. The allowed methods are EPA SW-846 (EPA 1992, 1207) and contract laboratory program (CLP) methods or equivalent for inorganics including mercury, VOCs, SVOCs, and HE. The subcontracts specify LANL-approved methods for radiochemical analyses. Analytical method selection is described in Appendix II of the ER Project Quality Assurance Project Plan (QAPP) Requirements for Sampling and Analysis (LANL 1996, 1292). For each analyte, a lower, contract-required quantitation limit is specified. These values, estimated detection limits for inorganics and estimated quantitation limits (EQLs) for organics and radionuclides, are listed in Appendix III of the ER Project QAPP. Analytes for each suite are listed in Appendix A.

A few samples, all of those that failed the HE spot test, were analyzed for the non-standard explosive TATB using a LANL in-house analytical method. No effective commercial method exists for this compound due to its insolubility.

3.1.2 Data Verification and Validation

Data verification and baseline validation procedures are used to determine whether analytical data packages have been generated according to specifications and contain the information necessary to determine data sufficiency for decision making. For analytical data used for decisions discussed in this RFI report, routine data validation under the ER protocol was performed as described in Technical Approach to the RFI Report (Knudsen et al. 1996, 1299).

PRS-specific quality assurance/quality control details are presented in Section 4 of this RFI report. Qualifiers resulting from baseline validation are shown in analytical results tables included in Section 5 of this RFI report. Summaries of data quality evaluations for analytical data packages relevant to this RFI report are given in Appendix B.

3.2 Background Comparisons

The purpose of background comparisons is to determine if chemicals that have natural or anthropogenic background distributions should be retained as COPCs or eliminated from further consideration. Background data for decision-making concerning PRSs in this RFI report are from two sources:

- Soil samples collected throughout Los Alamos County for which chemical analyses were performed for certain inorganic (metal) chemicals and naturally occurring radioactive chemicals (Longmire et al. 1995, 1142; 1266).
- Background concentrations of radioactive chemicals associated with global fallout from atmospheric nuclear testing (e.g., plutonium, cesium, strontium, and tritium) reported in LANL Environmental Surveillance reports (i.e., Purtymun et al. 1987, 0211; ESG 1988, 0408; ESG 1989, 0308; EPG 1992, 0740).

Comparisons between site data and background data are initially performed by comparing each observed concentration datum with an upper tolerance limit (UTL) estimated from background data. Details of statistical methods used to generate UTLs from the background data sets and suggestions for statistical methods for comparing site and background concentration distributions are presented in the guidance document, Application of LANL Background Data to ER Project Decision-Making, Part I: Inorganics (Ryti et al. 1996, 1298).

3.3 Detected Organic Constituents

Background data are not available for organic chemicals. Organic chemicals that are reported as detected are carried forward to the screening assessment process in this RFI report. Chemicals reported as not detected in any sample analyses are removed from further consideration.

3.4 Human Health Assessment

3.4.1 Risk Due to Background

Background risks can result from inorganics that are naturally occurring at a site. Calculation of background risks using the same methodology as site risk estimates provides a frame of reference for risk levels calculated at a site. This information provides a basis for determining risk-based remediation goals, which in some circumstances may be set at target risks comparable to background rather than default values, i.e., cancer risk of 1E-6 or hazard index of 1. Background risks can also affect decisions at sites that have constituents for which there is a threshold of toxicity. For some inorganics, background intakes may be near a toxicity threshold so that incremental intakes associated with contamination may be unacceptable.

Background risks calculated here use the same exposure assumptions by which SALs are calculated. SALs are based on health-protective assumptions for a residential scenario (EPA 1995, 1307). For soil exposure, the pathways include incidental soil ingestion, inhalation of resuspended dust, and dermal contact with soil. Because background soil data represent geographically diverse locations, background risks are estimated for both a median concentration and the UTL from the entire background data set to present the range of potential risk associated with different soil constituent concentrations found in and around Los Alamos. The background risks based on the SAL residential exposure model are provided in Table 3.4.1-1.

Risks due to background are presented for both noncarcinogenic and carcinogenic outcomes. The potential for adverse noncarcinogenic health effects is estimated by a hazard quotient. Intakes leading to a hazard quotient up to 1 are not associated with adverse health effects. None of the median background concentrations result in hazard quotients greater than 1. The hazard quotient of the UTL concentration for manganese exceeds 1 (1.9). However, given the unlikely occurrence of this concentration, the conservative assumptions in the exposure assessment, the margin of safety in the reference dose, and the exceedance of less than a factor of two, this intake estimate is not expected to be associated with adverse health effects.

Four of the background inorganics are also carcinogens, although the cancer-risk due to Cr(vi) is not shown, because it is assumed that naturally occurring chromium is in the trivalent state. According to the default exposure assumptions used for SALs, the lifetime cancer risks due to background residential soil exposure are estimated at 1 to 2 in 100 000 for arsenic and beryllium.

These background risk estimates provide a frame of reference for the screening assessment and site decisions. If a site-specific risk assessment is necessary to further evaluate risks, background risks can also be calculated using the site/scenario-specific assumptions to assist in the remedial action decisions for the site.

TABLE 3.4.1-1

RISK DUE TO BACKGROUND CONCENTRATIONS OF SOIL INORGANICS ASSUMING A RESIDENTIAL SCENARIO[a]

SOIL INORGANIC	SOIL CONCENTRATION (mg/kg)		HAZARD QUOTIENT		LIFETIME CANCER RISK	
	MEDIAN	UTL	MEDIAN	UTL	MEDIAN	UTL
Aluminum	10 000	38 700	0.13	0.5	nc[b]	nc
Antimony	0.6	1.0	0.019	0.032	nc	nc
Arsenic	4.0	7.82	0.18	0.36	1.2E-5	2.4E-5
Barium	130	315	0.025	0.059	nc	nc
Beryllium	0.895	1.95	0.0027	0.0059	6.4E-6	1.4E-5
Cadmium[c]	0.20	2.7	0.0053	0.071	1.4E-10	1.9E-9
Chromium[d]	7.2	16.1	0.00009	0.0002	nc	nc
Cobalt	6.0	19.2	0.0013	0.0042	nc	nc
Copper	5.75	30.7	0.0021	0.011	nc	nc
Lead	12	23.3	0.03	0.058	nc	nc
Manganese	320	714	0.84	1.9	nc	nc
Mercury	0.05	0.1	0.0022	0.0043	nc	nc
Nickel	7.0	15.2	0.0047	0.01	nc	nc
Selenium	0.3	1.7	0.00078	0.0045	nc	nc
Thallium	0.2	1.0	0.033	0.16	nc	nc
Uranium	0.9	1.87	0.0039	0.0081	nc	nc
Vanadium	21	41.9	0.039	0.078	nc	nc
Zinc	30.7	50.8	0.0013	0.0022	nc	nc

[a] Risk estimates are based on reference doses, slope factors, and EPA Region IX default exposure assumptions effective in April 1996.
[b] nc= noncarcinogen.
[c] Cancer risks for cadmium are based solely on inhalation of resuspended dust.
[d] Naturally-occurring chromium is assumed to exist in a trivalent state.

3.4.2 Screening Assessment

The purpose of this decision step is to determine if contaminants should be retained as COPCs)or eliminated from further consideration based on comparisons with SALs. This is the last step in the screening assessment process for human health concerns. If COPCs remain after this step, then further action or a risk assessment may be proposed. If no COPCs remain after this step, then no further action (NFA) may be proposed based on the absence of human health concerns. The screening assessment considered the following questions for the PRSs in this RFI report:

- Are reported concentrations or radiological activities due to analytical laboratory/field bias or contamination?
- Are site data greater than background UTLs and fail a multiple chemical evaluation (MCE)?
- Is the maximum site concentration greater than the SAL?
- If a SAL does not exist for a detected chemical, should that chemical be carried forward as a COPC?

SALs are calculated using chemical-specific toxicity information and conservative, default exposure assumptions. Soil and water media have separate SALs for each contaminant. The decision to identify a contaminant as a COPC when a SAL is not available is made on a case-by-case basis, taking into account the availability of process knowledge and toxicological information. A complete description of the methods used to generate SALs is provided in Screening Assessment Methodology (McCann et al. 1996, 1300).

If more than one chemical or radionuclide was present above UTL at the site, an MCE was performed in which the reported concentration for each chemical was divided by its respective SAL. If the sum of the normalized values was less than 1, then the chemicals are removed from further consideration. If the total normalized value is greater than 1, then chemicals having an individual normalized value greater than or equal to 0.1 are retained as COPCs pending further evaluation. For further information on the calculation of MCEs see Screening Assessment Methodology (McCann et al. 1996, 1300).

3.4.3 Risk Assessment

The human health risk assessments follow the policy document Risk-Based Corrective Action Process (Dorries 1996, 1297). The human health risk assessment process consists of the following four steps:

- identification of COPCs,
- exposure assessment,
- toxicity assessment, and
- risk characterization.

No site-specific human health risk assessments were performed for PRSs 16-003(k) or 16-021(c).

3.5 Ecological Assessment

The PRSs in this RFI report are evaluated according to the Ecological Risk Assessment Approach for Los Alamos National Laboratory (Ferenbaugh et al. 1996, 1303). Each PRS is first screened for background concentrations and evaluated for presence of suitable habitat, potential for off-site transport of contaminants, and receptor access to the site or to areas impacted by off-site transport. NFA for ecological concern is recommended when background concentrations are not exceeded, suitable habitat does not exist, and/or if there is no receptor access to the site or to areas impacted by off-site transport.

Because the preliminary ecological screening for the PRS(s) indicates a potential for ecological concern, the PRS(s) will be evaluated as part of the new Ecological Exposure Unit (Ecozone) approach that is being developed by LANL in conjunction with EPA and the NMED. PRS 16-021(c) has clearly impacted environmental receptors. There are significant numbers of dead trees in and around the drainage from the outfall.

4.0 RESULTS OF QUALITY ASSURANCE/QUALITY CONTROL ACTIVITIES

This section reviews the impact on data usability of QC results, reported in Appendix B, together with results from field duplicates. Three field duplicate pairs were collected at PRS 16-021(c).

All laboratory analyses for this report were performed by a single analytical laboratory. All data were subjected to routine data validation. Field results stored in FIMAD have been edited and agree with hard copy results. However, not all QC results reported by the laboratory are either present or correct in FIMAD at this time. Flags assigned by the routine data validators are in FIMAD, but the information in Appendix B is generally more complete.

4.1 Inorganic Analysis

A total of 47 field samples were analyzed for the standard suite of inorganic chemicals. Four samples were submitted for inorganic TCLP analyses. Qualifications placed on these results by routine data validation are summarized in Appendix B, Table B-1.

Relative standard deviations (RSDs) for most inorganic chemicals, as measured by replicate analyses, were generally in the range of 10–30%. RSDs occasionally exceeded 40% for some replicate analyses of the more abundant elements (such as aluminum, iron, manganese, and sodium) and also for one cobalt pair. RSDs were less than 5% for chemicals generally reported below detection level (cadmium, selenium, silver, thorium, antimony, and cyanide). RSDs were below 10% for mercury except for one pair in request #1269, resulting in laboratory qualification of all mercury results for the nine samples in that request. However, none of the mercury results for these samples exceeded 0.1 mg/kg, and as results below 0.1 mg/kg were also obtained uniformly for the remaining 38 samples, the data from this request are likewise accepted as being representative of the very low levels of mercury at these sites.

Comparable RSDs were observed for field duplicate pairs, indicating that local heterogeneity and sample collection and handling procedures did not contribute significantly to variability in the results.

Matrix spike recoveries fell outside the acceptable values for some inorganic chemicals, as noted in Table B-1. For the purposes of this report, the primary purpose being to determine whether inorganic contamination is present, only negative biases are of concern. Negative biases were indicated primarily for selenium and less frequently for arsenic and barium. There is no process information or data to indicate that either selenium or arsenic are COPCs at this site. Barium, a constituent of many high explosives, is both expected and observed to be present at high concentrations. The inorganic data are accepted as qualified in Table B-1.

4.2 Radiochemical Analyses

A total of 46 field samples were analyzed for total uranium. Qualifications placed on these results by routine data validation are summarized in Appendix B, Table B-1.

The RSDs for the three replicated analyses (all at background levels of uranium) were less than 20%. RSDs for two field duplicate pairs were only slightly higher (11% and 29%), indicating that local heterogeneity and sample collection and handling procedures did not significantly increase variability in the results.

Data validation noted no problems with total uranium analyses. The data are considered valid without qualification.

4.3 Organic Analysis

A total of 47 field samples were analyzed for SVOCs and HE. In addition, 18 of the field samples (including all subsurface samples) were analyzed for VOCs. Four surface samples were analyzed for herbicides and four for pesticides. Qualifications placed on these results by routine data validation are summarized in Appendix B, Table B-2.

Volatiles: The RSDs for replicate analyses for the few VOCs detected at low levels (most less than 100 ug/kg) were on the order of 20—50%.

Surrogate recoveries were somewhat low (50—70%) for samples 0316-95-0044, -0045, and -0046 in request number 1173, and ethylene chloride was reported at 21 ug/kg in one QC blank associated with request number 1173. However, data validation indicated that the results associated with these samples, which were reanalyzed, could be accepted (see Table B-2).

Semivolatiles: Only two SVOCs were detected in replicate analyses: anthracene, which was J-qualified, and bis(2-ethylhexyl)phthalate, for which blank contamination was indicated. In both cases, the RSDs were less than 12%. RSDs for anthracene in field duplicate pairs ranged

up to 100% in one pair where the J-flagged values were 3.3 mg/kg in 0316-95-0031 and 6.2 mg/kg in 0316-95-2013 (request number 563). Anthracene in samples from this request is, in any case, reported well below the SAL of 19 mg/kg, so the results are accepted as correctly indicating concentrations below levels of concern at this location. (However, anthracene is a COPC at PRS 16-021(c) because it was present at levels above 100 mg/kg in samples collected near the outfall.)

Bis(2-ethylhexyl) phthalate was reported at 4 600 mg/kg in 0316-95-0044 but undetected in its field duplicate 0316-95-2015, collected from the 12—18 in. depth interval at the outfall. It should also be noted that the semivolatile detection levels were very high for this pair, which contained greater than one weight percent levels of HE.

Di-n-butyl-phthalate was identified (J-flagged at 130 ug/kg) in one QC blank associated with request 1102, and bis(2-ethylhexyl)phthalate was reported at 560 ug/kg in a QC blank associated with request 1173. Data validators note additional phthalate contamination (see Table B-2). However, these low levels of possible laboratory contamination are inadequate to explain some very high observations obtained at samples near the PRS 16-021(c) outfall. These high observations are accepted as representing potential phthalate contamination in those areas, despite difficulties with their replication in one field duplicate pair (see above).

Some low surrogate recoveries (less than 40%) were reported for 0316-95-0037 (request number 563). However, there is nothing in nearby samples, including several closer to the outfall, to indicate that SVOC contamination is present below the former pond area at PRS 16-021(c), and the results for this sample are accepted.

High explosives: Many of the HE results were qualified "PM" (i.e., manual review of raw data recommended to determine if data are usable) by the routine data validators. A limited review was performed of four data packages. Most of the problems observed related to the extremely high levels of HE contamination in many of these samples. These required numerous dilutions and, in some cases, special sample preparation techniques, which complicated the interpretation of the high-pressure liquid chromatography (HPLC) chromatograms.

No replicate analyses were performed for HE. Results for the HE compounds detected at high levels in field duplicate pairs (TNT, HMX, RDX) were replicated with RSDs below 40% for these pairs, except for TNT at the outfall pair which was almost twice as high in 0316-95-0044 as in 0316-95-2015. More variability was also observed for some of the DNTs and ADNTs reported close to detection levels for these compounds. Dilution factors of at least 10, and as high as 5 000, were required for all of these samples.

No blank contamination was reported in HE runs.

Surrogate recoveries were sometimes affected by the high concentrations of TNT and RDX (especially in confirmation column results, where the surrogate elutes at almost the same time as RDX). In most cases, however, surrogate recoveries were well within standard limits for the primary runs.

Recovery of seven spiked analytes in the lab control samples (LCSs) was within control limits except as noted in Table B.

Quantitative results for bounding samples with little or no HE are considered valid. Samples with very high concentrations represent areas that will be the subject of further investigation and remediation. These latter results are entirely adequate for the generally qualitative purposes for which they are used in this report, and quantitatively acceptable provided that it is recognized that the very high concentrations of HE may lead to larger than average uncertainties.

5.0 SPECIFIC RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

PRS 16-003(k) is recommended for voluntary corrective action (VCA) in conjunction with corrective measures study (CMS)/corrective measures implemenation (CMI) activities at PRS 16-021(c) (Table 5.0-1). PRS 16-021(c) is recommended for Phase II sampling and analysis to support the development of a CMS plan and CMS/ CMI.

TABLE 5.0-1

SUMMARY OF PRSs IN THIS RFI REPORT

SECTION	PRS ID	DESCRIPTION	COPCs	RECOMMENDATION
5.1	16-003(k)	HE sumps and drain lines	None detected - potential releases not fully characterized.	Voluntary corrective action
5.2	16-021(c)	TA-16-260 drainage	Barium, HE, anthracene, bis(2-ethylmethyl) phthalate	Phase II sampling, corrective measures study/ corrective measures implementation

5.1 PRS 16-003(k)

PRS 16-003(k) consists of 13 HE sumps, their drain lines, and concrete troughs associated with TA-16-260. No contaminants at levels greater than SALs were found in a limited number of core holes adjacent to a few of the sumps and troughs. These data suggest that contaminant levels do not present a current risk to human health and the environment. However, potential releases from this unit have not been fully characterized. Drain line and trough contamination is often localized near leak points and structural flaws, which are best observed during drain line and trough removal. It is anticipated that drain line, trough, and soil contamination may be located during removal of drain lines and concrete troughs at PRS 16-003(k). Thus, the PRS is recommended for VCA. This VCA will accompany CMI at TA-16-260.

5.1.1 History

PRS 16-003(k) is discussed in the RFI Work Plan for OU 1082, Subsection 5.3 (LANL 1993, 1094). TA-16-260 is an HE machining facility, which was constructed in 1951 and continues as an active HE facility. Machine turnings are routed to the sumps as waste. Sumps collect HE wastewater generated during HE machining, then HE particulates are captured in the sumps, which are cleaned periodically. Historically the sumps have discharged to drain lines that discharge into a concrete trough that discharges at an outfall [PRS 16-021(c)]. Currently the sumps are still active, but the drain lines and troughs are currently scheduled to be removed from service during fall 1996. In 1994 roughly 2.5 million gal. of HE wastewater were discharged at TA-16-260 under National Pollution Discharge Elimination System (NPDES) Permit EPA 05A056 (No author 1994, 15-16-629).

In 1966, the 10-ft-wide loading dock on the rear (northeast) of TA-16-260 was removed. All new sumps with water-tight aluminum liners were installed adjacent to the northeast wall of TA-16-260. HE-contaminated soil under the old sumps was removed and replaced with clean, compacted soil.

The discharge points to the HE sumps are currently scheduled to be plugged during fall 1996. The sumps will still receive wastewater; however, this material will be collected periodically with a vacuum truck rather than discharged to the outfall. The vacuum trucks will transport the wastewaters to the TA-16 Burning Ground where they will be treated at the HE-wastewater treatment facility and discharged at NPDES outfall EPA 05A055. Volumes of HE wastewater generated at TA-16-260 have decreased significantly due to waste minimization efforts, particularly the installation of recirculating vacuum pumps. The vitrified-clay pipes and troughs will be considered inactive. The NPDES Permit for the outfall will probably soon be deactivated.

Known and potential contaminants listed in the work plan included HE, inorganics particularly barium, SVOCs, VOCs, and uranium.

5.1.2 Description

PRS 16-003(k) is 13 concrete HE sumps, drain lines and troughs associated with TA-16-260. Sump dimensions are 90 in. long by 36 in. wide by 31 in. deep (1 each) and 176 in. long by 36 in. wide by 31 in. deep (12 each). The HE sumps are connected by vitrified-clay pipe to a 4-ft-deep concrete trough that parallels TA-16-260. This feeder trough discharges into a second concrete trough oriented northeast-southwest that discharges into outfall and drainage PRS 16-021(c). The area surrounding the sumps is a level parking lot, the concrete trough is situated in a fairly level woodland characterized by ponderosa pines.

5.1.3 Previous Investigations

A limited number of analytical data for PRS 16-003(k) exist. In 1972, contaminants in TA-16-260 sump water ranged from 0–3.2 ppm HMX-RDX, 7–18 ppm TNT, and 70–1 587 ppm barium nitrate (Roybal 1972, 15-16-439) (Tables 5.1.3-1 and 5.1.3-2). As part of an NPDES permit application, sump waters from TA-16-260 were analyzed for TNT, yielding values ranging from <0.4–78 ppm (LASL 1977, 15-16-426). A site worker sampled water in the HE sumps in 1988. Water samples from the sumps were analyzed for three HE (HMX, RDX, and TNT) and four VOCs (acetone, methyl ethyl ketone, n-butyl acetate, and toluene). Analytes detected are summarized in Tables 5.1.3-3 and 5.1.3-4. Both HE (HMX, TNT, and RDX) and VOCs (toluene) were present at levels greater than water SALs. EQLS and QA results were not reported for any of these analyses.

TABLE 5.1.3-1

PRS 16-003(k) WATER CONCENTRATIONS FOR HIGH EXPLOSIVES[a]

SAMPLE ID	HE	RESULT (µg/L)	SAL (µg/L)
7/7/72	HMX/RDX	3 200	1 800/0.061[b]
7/14/72	HMX/RDX	3 000	1 800/0.061
7/21/72	HMX/RDX	2 600	1 800/0.061
7/28/72	HMX/RDX	2 100	1 800/0.061
8/4/72	HMX/RDX	2 500	1 800/0.061
8/11/72	HMX/RDX	2 000	1 800/0.061
6/30/72	TNT	13 000	2.2
7/7/72	TNT	10 000	2.2
7/14/72	TNT	10 000	2.2
7/21/72	TNT	18 000	2.2
7/28/72	TNT	13 000	2.2
8/4/72	TNT	8 000	2.2
8/11/72	TNT	7 000	2.2

[a] Roybal, 1972, 15-16-439.
[b] Where two values are shown, these are the SALs for the two constituents listed in the HE column. The analytical method did not differentiate between these two constituents.

TABLE 5.1.3-2

PRS 16-003(k) WATER CONCENTRATIONS FOR BARIUM NITRATE[a]

SAMPLE ID	MEDIA	BARIUM NITRATE (µg/L)
SAL	N/A[b]	1 000[c]
LANL UTL	NA	NA
6/30/72	WATER	1 587 000
7/7/72	WATER	167 000
7/14/72	WATER	196 000
7/21/72	WATER	520 000
7/28/72	WATER	228 000
8/4/72	WATER	371 000
8/11/72	WATER	70 000

[a] Roybal, 1972, 15-16-439.
[b] N/A = Not applicable.
[c] SAL is for total barium in water.
[d] NA = Not available.

TABLE 5.1.3-3

PRS 16-003(k) WATER CONCENTRATION FOR HIGH EXPLOSIVES[a]

SAMPLE ID	HE	RESULT (µg/L)	SAL (µg/L)
1	HMX	1 290	1 800
2	HMX	2 060	1 800
3	HMX	1 960	1 800
4	HMX	1 920	1 800
5	HMX	1 530	1 800
6	HMX	2 700	1 800
7	HMX	1 470	1 800
8	HMX	1 530	1 800
9	HMX	1 610	1 800
10	HMX	2 470	1 800
1	RDX	2 250	0.061
3	RDX	30	0.061
4	RDX	20	0.061
6	RDX	34	0.061
8	RDX	40	0.061
9	RDX	30	0.061
10	RDX	1 190	0.061
1	TNT	60	2.2
4	TNT	20	2.2
6	TNT	40	2.2
9	TNT	10	2.2
10	TNT	190	2.2

[a] Baytos 1993, 15-16-266.

TABLE 5.1.3-2

PRS 16-003(k) WATER CONCENTRATION FOR VOLATILE ORGANIC COMPOUNDS[a]

SAMPLE ID	VOC	RESULT (µg/L)	SAL (µg/L)
6	Acetone	300	610
8	Acetone	100	610
9	Acetone	200	610
10	Acetone	100	610
7	Toluene	7 700	1 000
8	Toluene	100	1 000

a Baytos 1988, 15-16-266.

5.1.4 Field Investigation

Boreholes were drilled at six locations, two each at the northeast and southeast corners of sumps 4 and 13 and two biased to zones of extensive cracking under the troughs (Fig. 5.1.4-1). Sumps 4 and 13 were identified by the operating group as the two sumps that had received the most HE waste over the past two decades (Hyde 1995, 15-16-584). Drilling was difficult at this PRS and core recovery was poor. In some core holes only a single laboratory sample was taken due to poor recovery. This lack of recovery did not affect the ultimate decision to VCA this PRS. A hollow-stem auger was used to a depth of 2–3 feet, then a coring method using a specially designed carbide tip cutting shoe and split spoon was used to drill to the final depth. Cores were screened on 12-in. intervals, rather than the 6-in. intervals prescribed in the work plan because the 6-in. intervals did not provide enough material for an analytical sample.

Twenty-two subsurface screening samples were taken and analyzed by HE spot test, PID for VOCs, and hand-held Sodium Iodide detector for radionuclides. Screening results above background are reported in Table 5.1.4-1.

The other screening results did not detect constituents or were at or below background. The shallowest and deepest positive screening intervals in any borehole were submitted for laboratory analysis. In some cores, only a single positive interval was found.

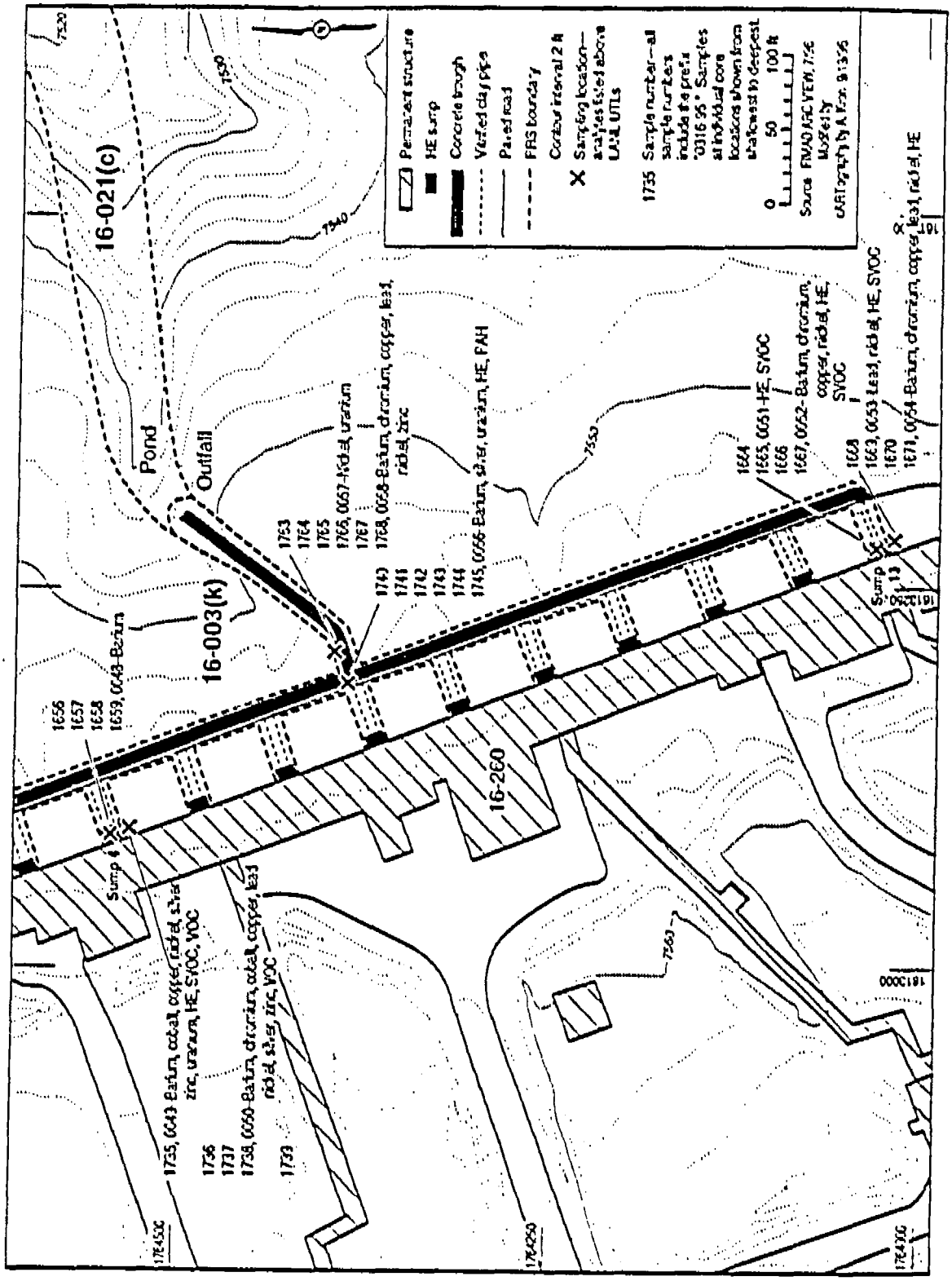

Fig. 5.1.4-1. PRS 16-003(k), HE sumps and drainlines at TA-16-260.

TABLE 5.1.4-1

FIELD SCREENING RESULTS FOR PRS 16-003(k)

SAMPLE ID	LOCATION ID	SCREENING METHOD/RESULT
0316-95-1656	16-1361	PID: 13 ppm
0316-95-1665	16-1365	PID/ 5 ppm; HE spot test/ positive
0316-95-1667	16-1365	HE spot test/ positive
0316-95-1671	16-1646	HE spot test/ positive
0316-95-1735	16-1645	HE spot test/ positive
0316-95-1738	16-1645	HE spot test/ positive
0316-95-1740	16-1356	PID/ 1 ppm
0316-95-1741	16-1356	PID/ 1 ppm
0316-95-1742	16-1356	PID/ 2 ppm
0316-95-1743	16-1356	PID/ 2 ppm
0316-95-1744	16-1356	PID/ 2 ppm
0316-95-1763	16-1357	PID/ 30 ppm
0316-95-1764	16-1357	PID/ 30 ppm
0316-95-1765	16-1357	PID/ 30 ppm
0316-95-1766	16-1357	PID/ 110 ppm
0316-95-1767	16-1357	PID/ 110 ppm
0316-95-1768	16-1357	PID/ 1 ppm

Ten subsurface laboratory samples were collected for this PRS (Table 5.1.4.2). The work plan and its NOD called for angled drilling a single borehole beneath five sumps and at five locations beneath the drainage troughs. Because of budgetary constraints, only two sumps and only two locations beneath the troughs were drilled. In addition, rather than angled drilling beneath the sumps, two vertical boreholes were drilled at each sump. Vertical boreholes were drilled because the operating group would not agree to angled drilling at PRS 16-003(k). Wet drilling is required at potentially HE-contaminated locations and angled holes are difficult to drill wet. There are potential explosive safety hazards associated with drilling dry core holes at potentially HE-contaminated locations. These deviations from the RFI work plan and its NOD were discussed with EPA representatives and communicated to EPA in a letter dated May 24, 1996 (Jansen and Taylor 1995, 15-16-627).

TABLE 5.1.4-2

SUMMARY OF LABORATORY SAMPLES TAKEN AND REQUEST NUMBERS FOR PRS 16-003(k)

LOCATION ID	SAMPLE ID	DEPTH (ft)	MATRIX	VOCs	SVOCs	HE	INORGs	URANIUM
16-1361	0316-95-0048	3–4	Soil	1102	1102	1102	1106	1108
16-1645	0316-95-0049	0–1	Soil	1203	1203	1203	1204	1205
16-1645	0316-95-0050	3.5–4.5	Soil	1203	1203	1203	1204	1205
16-1365	0316-95-0051	1–2	Soil	1102	1102	1102	1106	1108
16-1365	0316-95-0052	2.5–3.5	Soil	1102	1102	1102	1106	1108
16-1646	0316-95-0053	1.5–2.3	Soil	1102	1102	1102	1106	1108
16-1646	0316-95-0054	3.7–4.25	Soil	1102	1102	1102	1106	1108
16-1356	0316-95-0056	5–6	Soil	1222	1222	1222	1223	1224
16-1357	0316-95-0057	3–4.5	Soil	1222	1222	1222	1223	1224
16-1357	0316-95-0058	5–6	Soil	1222	1222	1222	1223	1224

5.1.5 Background Comparison

Barium, chromium, cobalt, copper, lead, nickel, silver, uranium, and zinc were found above background UTLs but below SALs (Table 5.1.5-1). Barium and lead in samples 0316-95-0056, 0316-95-0057, and 0316-95-0058 (RN 1123) had poor duplicate recoveries. Cobalt, copper, nickel, and zinc in samples 0316-95-0049 and 0316-95-0050 (RN 1204) similarly had poor duplicate recoveries. These data should be considered estimated, but the values are far enough below SALs that the decisions, based on these data, and described below are valid.

TABLE 5.1.5-1

INORGANIC ANALYTES AND URANIUM WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 16-003(k)[a]

SAMPLE ID	DEPTH (ft)	SOIL/ ROCK UNIT	BARIUM (mg/kg)	CHROMIUM (mg/kg)	COBALT (mg/kg)	COPPER (mg/kg)	LEAD (mg/kg)	NICKEL (mg/kg)	SILVER (mg/kg)	TOTAL URANIUM (mg/kg)	ZINC (mg/kg)
LANL UTL (all soil)	N/A	N/A[b]	315	19.3	19.2	30.7	23.3	12.2	N/A	1.87	50.8
LANL UTL (Qbt4)	N/A	N/A	42	5.4	25	1.6	4	<2	<1	2.93	47
SAL	N/A	N/A	5 300	210	4 600	2 800	400	1 530	380	29	23 000
0316-95-0048	3.0–4.0	Soil	2 030	10.1	3.8	6.1	10.2	7.9	0.59(U)[c]	1.73	21.7
0316-95-0049	0–1	Soil	805	17	34.6(P)[d]	317(P)	8.5(J+)	70.4 (J+[e]P)	0.63	2.07	200 (J+P)
0316-95-0050	3.5–4.5	Qbt4	352	116	38.5(P)	228(P)	6.5(J+)	103 (J+P)	3.7	1.42	155 (J+P)
0316-95-0052	2.5–3.5	Qbt4	318	6.5	1.1(U)	2.3	3.4	3.2(U)	0.56(U)	1.76	20.4
0316-95-0053	1.3–2.3	Qbt4	24.4	5.5	1(U)	1.6	316	2.7	0.52(U)	2.89	32.1
0316-95-0054	3.67–4.25	Qbt4	311	30	2	6	6.1	6.1	0.6(U)	1.67	27.8
0316-95-0056	5.0–6.0	Soil	557 (J-[f]P)	10.7	3.5	6.7	17.2(P)	8.8	1.7	2.77	37.1
0316-95-0057	3–4.5	Soil	79.1 (J-P)	15.2	6.3	21.7	13.4(P)	15.4	0.61(U)	2.27	49
0316-95-0058	5.0–6.0	Qbt4	125 (J-P)	17.6	8	67.2	11.4(P)	23.7	0.59(U)	2.61	79.7

[a] Analytes greater than UTLs are enclosed in double lines.
[b] Not available.
[c] U = Analyte positively identified in the samples and the associated value is the sample-specific EQL/EDL.
[d] P = Professional judgment should be applied to using this data in decision making.
[e] J+ = The analyte was positively identified and the result is likely to be biased high.
[f] J- = The analyte was positively identified and the result is likely to be biased low.

5.1.6 Evaluation of Organics

HE, SVOCs, and the organic analyte methylene chloride were reported for this PRS (Tables 5.1.6-1, 5.1.6-2, and 5.1.6-3). None of these analytes were present at levels above SALs. Data for several undetected SVOC compounds in sample 031-95-0051 were rejected. These compounds were not detected in the two other samples from the same borehole, so it is unlikely that they were present at high levels in this sample.

TABLE 5.1.6-1

PRS 16-003(k) SOIL CONCENTRATIONS FOR HIGH EXPLOSIVES WITH VALUES GREATER THAN THE REPORTING LIMIT[a]

SAMPLE ID	DEPTH (ft)	4-ADNT (mg/kg)	HMX (mg/kg)	1,3,5-Trinitrobenzene (mg/kg)	2,4,6-Trinitrotoluene (mg/kg)
SAL	N/A[b]	NC[c]	3 300	3.3	15
EQL	N/A	ND[d]	2.2	0.25	0.25
0316-95-0049	0–1	0.092 (U)[e]	0.228	0.085 (U)	0.09 (U)
0316-95-0051	1–2	0.142	0.165 (U)	0.084 (U)	0.225
0316-95-0052	2.5–3.5	0.147	2.3	0.272	0.911
0316-95-0053	1.5–2.3	0.09 (U)	0.304	0.084 (U)	0.089 (U)
0316-95-0054	3.7–4.25	0.091 (U)	3.84	0.085 (U)	0.09 (U)
0316-95-0056	5–6	0.095 (U)	1.15	0.088 (U)	0.093 (U)

[a] Analytes greater than EQLs enclosed in double lines.
[b] N/A = Not applicable.
[c] NC = Not calculated.
[d] ND = Not determined.
[e] U = The analyte was not positively identified in the sample and the associated valued is the sample-specific EQL/EDL.

TABLE 5.1.6-2

PRS 16-003(k) SOIL CONCENTRATIONS FOR SEMIVOLATILE ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT[a]

SAMPLE ID	DEPTH (ft)	BENZOIC ACID (mg/kg)	DIETHYLPHTHALATE (mg/kg)	FLUORANTHENE (mg/kg)	2-METHYLNAPHTHALENE (mg/kg)	PYRENE (mg/kg)
SAL	N/A[b]	100 000	52 000	2 600	NC[c]	2 000
EQL	N/A	3.3	0.33	0.33	0.33	0.33
0316-95-0049	0–1	3.8 (U)[d]	0.08 (J)[e]	0.38 (U)	0.38 (U)	0.38 (U)
0316-95-0051	1–2	7.4 (U)	0.74 (U)	0.74 (U)	0.26 (J)	0.74 (U)
0316-95-0052	2.5–3.5	3.7 (U)	0.48	0.37 (U)	0.37 (U)	0.37 (U)
0316-95-0053	1.5–2.3	0.056 (J)	0.35 (U)	0.35 (U)	0.35 (U)	0.35 (U)
0316-95-0056	5–6	3.8 (U)	0.099 (J)	0.046 (J)	0.38 (U)	0.04 (J)

[a] Analytes greater than EQLs enclosed in double lines.
[b] N/A = Not applicable.
[c] NC = Not calculated.
[d] U = The analyte was not positively identified in the sample and the associated valued is the sample specific EQL/EDL.
[e] J = The analyte was positively identified and the associated numerical value is more uncertain than would normally be expected for that analyte.

TABLE 5.1.6-3

PRS 16-003(k) SOIL CONCENTRATIONS FOR VOLATILE ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	METHYLENE CHLORIDE (mg/kg)
SAL	N/A[a]	11
EQL	N/A	0.05
0316-95-0049	0–1	0.003 (J)[b]
0316-95-0050	3.5–4.5	0.004 (J)

[a] N/A = Not applicable.
[b] J = The analyte was positively identified and the associated numerical value is more uncertain than would normally be expected for that analyte.

5.1.7 Human Health

5.1.7.1 Screening Assessment

No constituents were detected at levels greater than SALs at PRS 16-003(k). No COPCs were identified during this portion of the screening assessment.

Noncarcinogenic contaminants greater than LANL background UTLs were submitted for an MCE for noncarcinogenic effects. Lead is excluded from this grouping because its toxicity is based on the uptake of lead in children as modeled by EPA's Integrated Exposure Uptake Biokinetic (IUBEK) Model (EPA 119, 1178). The sum of the maxima for the noncarcinogenic group is 0.66, which is well below the target value of 1. This indicates a low potential for adverse effects due to exposure to this grouping (Table 5.1.7-1).

TABLE 5.1.7-1

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 16-003(k)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Barium	2 030	5 300	0.38
Cobalt	38.5	4 600	0.008
Copper	317	2 800	0.11
Nickel	103	1 500	0.069
Silver	3.7	383	0.009
Zinc	200	23 000	0.008
HMX	3.84	3 300	0.001
TNB	0.272	3.3	0.08
Benzoic acid	0.056	100 000	0.0000006
Diethylphthalate	0.48	52 000	0.000009
Fluoranthene	0.046	2 600	0.00002
Pyrene	0.04	2 000	0.00002
Total			0.66

Carcinogenic contaminants greater than LANL background UTLs were submitted for an MCE for carcinogenic effects. The sum of the maxima for the carcinogenic group is 0.61, which is below the target value of 1. This result indicates a low potential for adverse effects due to exposure to carcinogens (Table 5.1.7-2).

TABLE 5.1.7-2

MCE FOR CARCINOGENIC EFFECTS AT PRS 16-003(k)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Chromium	116	210	0.55
TNT	0.911	15	0.06
Methylene chloride	0.004	11	0.004
Total			0.61

Only a single radionuclide, uranium, was found at PRS 16-003(k), so no MCE was performed for this constituent.

5.1.7.2 Risk Assessment

No risk assessment was performed at this PRS.

5.1.8 Preliminary Ecological Assessment

In accordance with conversations between LANL ER Project personnel, DOE/Los Alamos Area Office (LAAO), and the regulators, discussion of ecological risk assessment methodology will be deferred until the Ecological Exposure Unit (Ecozone) methodology that is being developed by LANL in conjunction with EPA Region 6 and the NMED has been approved by the regulators.

5.1.9 Extent of Contamination

Although inorganic constituents were identified above UTL values at this PRS, and organic constituents were measured above EQL values, no risk-based COPCs were identified in Subsection 5.1.7.1 above. As described in Subsection 5.1.4, the sampling activities were biased toward areas where residual contamination was expected (highly used sumps and leak points in the troughs).

Although the extent of contamination cannot be defined with certainty based on the data for these sampling locations, additional sampling for this PRS is not proposed at this time. Rather, full characterization of the extent of contamination at this PRS will be performed during the VCA activities that are described below.

5.1.10 Conclusions and Recommendations

PRS 16-003(k) is recommended for VCA associated with CMS/CMI at PRS 16-021(c) (see Subsection 5.2). No large-scale release of constituents to the environment has occurred at PRS 16-003(k) at four locations, two sumps, and two drain line leak points, identified as high probability locations for such a release. No constituents were found above SALs and MCE calculations indicate low probability of impact to receptors due to multiple constituent effects. Full characterization of potential releases within this unit has not occurred because characterization of active sumps, drain lines, and troughs is logistically difficult. The vitrified-clay pipe and troughs can now be characterized because they are currently scheduled to be abandoned as active units during fall 1996. The most cost-effective time to complete such characterization is during VCA accompanying CMI at PRS 16-021(c), when heavy equipment will be deployed. LANL proposes that: 1) the drain lines and troughs be removed as a VCA, 2) soil beneath these structures be further characterized at that time, 3) if characterization data indicate that constituents are present at levels that represent a risk to human health and the environment, the soils be removed and treated concurrently with soils undergoing remediation at PRS 16-021(c), and 4) characterization adequate to support NFA beneath the active sumps occur at that time. Such characterization beneath the sumps will be accomplished using heavy equipment. Characterization via angled drilling is not allowed at TA-16 and characterization using vertical boreholes is not fully effective. A VCA plan describing these activities in detail will be provided along with the CMS report.

5.2 PRS 16-021(c)

PRS 16-021(c) is the outfall area for HE machining building TA-16-260. The outfall receives HE wastewater discharge from the 13 HE sumps that constitute PRS 16-003(k), described in Subsection 5.1 of this report. The outfall is currently active, but is currently scheduled to be deactivated during fall 1996. The outfall is permitted as EPA 05A056. Because the extent of HE contamination is not defined with certainty, the PRS is recommended for Phase II sampling to support the CMS/CMI process. The level of contamination and the presence of HE constituents in surface waters and groundwater, suggest that the CMS/CMI process is appropriate for PRS 16-021(c).

5.2.1 History

PRS 16-021(c) is discussed in work plan, Subsection 5.2 (LANL 1993, 1094). PRS 16-021(c) has received HE wastewater since construction of TA-16-260 in 1951. As described in Subsection 5.1, TA-16-260 is an industrial-scale HE machining building. HE in the drainage

area have been recognized as being at potentially dangerous levels since at least 1960 when the first known soil samples from the outfall were analyzed for HE. Known contaminants prior to RFI investigations included barium, RDX, TNT, and HMX. Suspected contaminants were other HE constituents, additional inorganics, VOCs, SVOCs, and uranium.

5.2.2 Description

PRS 16-021(c) is the outfall associated with the 13 HE sumps on the northeast side of TA-16-260. The drainage channel from the outfall flows approximately 600 ft to the bottom of Cañon de Valle over a drop in elevation of 80 ft. The drainage channel from the outfall is well defined, with apparent high-water marks. The water flows over a 15-ft-high cliff approximately 500 ft from the outfall. A small pond approximately 55-ft long was formed by a rock dam located 93 ft from the outfall. HE-contaminated water from the outfall enters the former pond about 40 ft from the outfall. The longitudinal axis of the former pond is oriented east-west with flow in the easterly direction. The dam is about 9-ft thick, but only the first 2 ft of rock are closely packed. At present, there is no water in the former pond, although the soil and sediment are wet sporadically. Rainwater from the roadway on the northeast side of TA-16-260 flowed into the former pond prior to installation of hay bales, sandbags, and diversionary piping as an interim action.

Stressed vegetation is evident within the PRS boundaries between the rock dam and the cliff. Most trees in this area have died. One or two dead trees, possibly associated with TA-16-260 discharge, are present within Cañon de Valle downstream from PRS 16-021(c).

A series of best management practices (BMPs) were instituted at PRS 16-021(c) during FY95 and FY96 as an interim action. These BMPs were implemented when a significant amount of inorganic and HE contamination became evident in nearby springs and surface waters (see Appendix C and Subsection 2.3). The BMPs consist of four engineered controls: 1) a sandbag dam and diversion pipe upgradient from the former HE pond; 2) a sandbag dam located east of the parking lot behind TA-16-260; 3) the application of geotextile fabric matting in the former HE pond area; and 4) eight hay-bale check dams within the PRS drainage between the rock dam and the 15-ft high cliff. The rationale for these BMPs is to minimize infiltration, run-on, and runoff from the contaminated area, thereby decreasing contaminant migration to surface water and groundwaters. These BMPs are inspected regularly (at least quarterly) and will be maintained and upgraded to ensure that run-on and run-off from this site are minimized.

5.2.3 Previous Investigations

Existing data for the TA-16-260 outfall, PRS 16-021(c) collected prior to RFI sampling are extensive and show widespread HE contamination extending from the discharge point to Cañon de Valle (Table 5.2.3-1) (i.e. Baytos 1970, 15-16-278; Turner and Schwartz 1971, 15-16-284; King 1991, 15-16-381; and King 1992, 15-16-380). Values range up to four orders of magnitude greater than SALs for RDX.

Baytos analyzed sediment samples taken from the channel during the period 1970 through 1985 (Table 5.2.3-1). His studies extended several hundred feet from the outfall. The highest concentrations of HMX-RDX and TNT were found in the former pond. Concentrations of total HE in the former pond have remained uniformly high, from a low of 10.8 wt % in 1971 to 27.0 wt % in 1976 (Baytos 1971, 15-16-277; and Baytos 1976, 15-16-271). Baytos cited an unpublished report from 1960 in which the total HE concentration was 9.8 wt % (Baytos 1972, 15-16-275). In 1991, Barr and King found concentrations as high as 34.1 wt % in the former pond (King 1991, 15-16-381; King 1992, 15-16-380). Barr and King also found that HE concentrations were high (4.4 wt %) for a distance of over 200 ft down the drainage. In dry soil, such high concentrations could be considered explosive mixtures under certain conditions (Urizar 1984, 15-16-353).

Baytos' distances from the outfall are approximate (i.e., within 10 ft). Distances that the samples were taken from the centerline of the former pond were not always recorded. Therefore, there may be some inconsistencies in the data.

TABLE 5.2.3-1

HIGH EXPLOSIVES IN THE TA-16-260 DRAINAGE CHANNEL BASED ON EXISTING DATA

SAMPLE ID	HIGH EXPLOSIVE	RESULT (mg/kg)	SAL (mg/kg)	EQL
4/29/70 Outfall	HMX/RDX[a]	70 000	3 300/4[b]	NA[c]
4/29/70 Pond center	HMX/RDX	205 000	3 300/4	NA
4/29/70 1 ft below dam	HMX/RDX	48 000	3 300/4	NA
4/29/70 Between dam and cliff	HMX/RDX	129 000	3 300/4	NA
4/29/70 Cliff	HMX/RDX	39 000	3 300/4	NA
11/18/70 10 ft from outfall	HMX/RDX	32 000	3 300/4	NA
11/18/70 Inlet to pond	HMX/RDX	141 000	3 300/4	NA
11/18/70 10 ft above dam	HMX/RDX	221 000	3 300/4	NA
11/18/70 5 ft below dam	HMX/RDX	145 000	3 300/4	NA
11/5/71 10 ft from outfall	HMX/RDX	29 000	3 300/4	NA
11/5/71 Pond inlet	HMX/RDX	108 000	3 300/4	NA
11/5/71 10 ft above dam	HMX/RDX	257 000	3 300/4	NA
11/5/71 10 ft below dam	HMX/RDX	225 000	3 300/4	NA
8/22/73 10 ft from outfall	HMX/RDX	13 000	3 300/4	NA
11/14/74 Outfall	HMX/RDX	17 000	3 300/4	NA
11/14/74 1 ft above dam	HMX/RDX	171 000	3 300/4	NA
11/14/74 50 ft below dam	HMX/RDX	137 000	3 300/4	NA
12/5/75 10 ft from outfall	HMX/RDX	2 000	3 300/4	NA
12/5/75 1 ft above dam	HMX/RDX	92 000	3 300/4	NA
11/19/76 10 ft from outfall	HMX/RDX	2 000	3 300/4	NA
11/19/76 50 ft from outfall	HMX/RDX	30 000	3 300/4	NA
11/19/76 65 ft from outfall	HMX/RDX	267 000	3 300/4	NA
11/19/76 250 ft from outfall	HMX/RDX	173 000	3 300/4	NA
7/18/84 3 ft from outfall	HMX/RDX	3 000	3 300/4	NA
7/18/84 30 ft from outfall	HMX/RDX	104 000	3 300/4	NA
7/18/84 50 ft from outfall	HMX/RDX	167 000	3 300/4	NA
9/12/85 30 ft from outfall	HMX/RDX	20 000	3 300/4	NA
9/12/85 110 ft from outfall	HMX/RDX	266 000	3 300/4	NA
9/12/85 230 ft from outfall	HMX/RDX	17 000	3 300/4	NA
7/21/91 1 ft from outfall	HMX	26 400	3 300	NA
7/21/91 20 ft from outfall	HMX	4 000	3 300	NA
7/21/91 40 ft from outfall	HMX	1 000	3 300	NA
7/21/91 45 ft from outfall	HMX	29 400	3 300	NA
7/21/91 50 ft from outfall - center pool	HMX	43 800	3 300	NA
7/21/91 60 ft from outfall - center pool	HMX	40 000	3 300	NA

TABLE 5.2.3-1 (CONTINUED)

HIGH EXPLOSIVES IN THE TA-16-260 DRAINAGE CHANNEL BASED ON EXISTING DATA

SAMPLE ID	HIGH EXPLOSIVE	RESULT (mg/kg)	SAL (mg/kg)	EQL
7/21/91 70 ft from outfall	HMX	39 000	3 300	NA
7/21/91 80 ft from outfall	HMX	97 000	3 300	NA
7/21/91 90 ft from outfall	HMX	13 250	3 300	NA
7/21/91 110 ft from outfall	HMX	62 000	3 300	NA
7/21/91 60 ft from outfall, north edge of pond	HMX	5 000	3 300	NA
7/21/91 70 ft from outfall, north edge of pond	HMX	90 000	3 300	NA
7/21/91 90 ft from outfall, north edge of pond	HMX	23 000	3 300	NA
11/15/91 90 ft from outfall, 12 in. from north edge	HMX	56 300	3 300	NA
11/15/91 91 ft from outfall	HMX	29 100	3 300	NA
11/15/91 91 ft from outfall, 2 in. deep	HMX	66 800	3 300	NA
11/15/91 91 ft from outfall, 8 in. deep	HMX	54 100	3 300	NA
11/15/91 91 ft from outfall, 13 in. deep	HMX	96 000	3 300	NA
11/15/91 91 ft from outfall, 8 in. from edge 13 in. deep	HMX	92 400	3 300	NA
11/15/91 91 ft from outfall 12 in. from edge 13 in. deep	HMX	106 300	3 300	NA
11/15/91 135 ft from outfall	HMX	20 900	3 300	NA
11/15/91 210 ft from outfall	HMX	37 300	3 300	NA
3/11/60 Pond center	RDX	85 000	4	NA
3/11/60 Pond center	RDX	35 000	4	NA
3/11/60 20 ft below dam	RDX	43 000	4	NA
3/11/60 30 ft below dam	RDX	33 000	4	NA
3/11/60 100 ft below dam	RDX	27 000	4	NA
3/11/60 150 ft below dam	RDX	5000	4	NA
7/21/91 1 ft from outfall	RDX	8 000	4	100[d]
7/21/91 20 ft from outfall	RDX	14 000	4	100
7/21/91 40 ft from outfall	RDX	100	4	100
7/21/91 45 ft from outfall	RDX	< 100	4	100
7/21/91 50 ft from outfall, center pool	RDX	5 000	4	100
7/21/91 60 ft from outfall, center pool	RDX	24 000	4	100
7/21/91 70 ft from outfall	RDX	51 800	4	100
7/21/91 80 ft from outfall	RDX	126 000	4	100
7/21/91 90 ft from outfall	RDX	134 700	4	100
7/21/91 110 ft from outfall	RDX	14 000	4	100
7/21/91 60 ft from outfall, north edge of pond	RDX	400	4	100

TABLE 5.2.3-1 (CONTINUED)

HIGH EXPLOSIVES IN THE TA-16-260 DRAINAGE CHANNEL BASED ON EXISTING DATA

SAMPLE ID	HIGH EXPLOSIVE	RESULT (mg/kg)	SAL (mg/kg)	EQL
7/21/91 70 ft from outfall, north edge of pond	RDX	100 000	4	100
7/21/91 90 ft from outfall, north edge of pond	RDX	340 000	4	100
11/15/91 90 ft from outfall, 12 in. from north edge	RDX	19 700	4	100
11/15/91 91 ft from outfall	RDX	700	4	100
11/15/91 91 ft from outfall, 2 in. deep	RDX	9 600	4	100
11/15/91 91 ft from outfall, 8 in. deep	RDX	7 100	4	100
11/15/91 91 ft from outfall, 13 in. deep	RDX	38 900	4	100
11/15/91 91 ft from outfall, 8 in. from edge, 13 in. deep	RDX	155 200	4	100
11/15/91 91 ft from outfall, 12 in. from edge, 13 in. deep	RDX	171 800	4	100
11/15/91 135 ft from outfall	RDX	1 900	4	100
11/15/91 210 ft from outfall	RDX	6 300	4	100
3/11/60 Pond center	TNT	13 000	15	NA
3/11/60 Pond center	TNT	13 000	15	NA
3/11/60 20 ft below dam	TNT	17 000	15	NA
3/11/60 30 ft below dam	TNT	7 000	15	NA
3/11/60 100 ft below dam	TNT	400	15	NA
3/11/60 150 ft below dam	TNT	200	15	NA
4/29/70 Outfall	TNT	0	15	NA
4/29/70 Pond center	TNT	37 000	15	NA
4/29/70 1 ft below dam	TNT	700	15	NA
4/29/70 Between dam and cliff	TNT	1 200	15	NA
4/29/70 Cliff	TNT	1 000	15	NA
11/18/70 10 ft from outfall	TNT	0	15	NA
11/18/70 Inlet to pond	TNT	1 000	15	NA
11/18/70 10 ft above dam	TNT	5 000	15	NA
11/18/70 5 ft below dam	TNT	2 000	15	NA
11/5/71 10 ft from outfall	TNT	0	15	NA
11/5/71 Pond inlet	TNT	0	15	NA
11/5/71 10 ft above dam	TNT	0	15	NA
11/5/71 10 ft below dam	TNT	0	15	NA
8/22/73 10 ft from outfall	TNT	0	15	NA
11/14/74 Outfall	TNT	0	15	NA
11/14/74 1 ft above dam	TNT	1 000	15	NA
11/14/74 50 ft below dam	TNT	2 000	15	NA

TABLE 5.2.3-1 (CONTINUED)

HIGH EXPLOSIVES IN THE TA-16-260 DRAINAGE CHANNEL BASED ON EXISTING DATA

SAMPLE ID	HIGH EXPLOSIVE	RESULT (mg/kg)	SAL (mg/kg)	EQL
12/5/75 10 ft from outfall	TNT	0	15	NA
12/5/75 1 ft above dam	TNT	0	15	NA
11/19/76 10 ft from outfall	TNT	0	15	NA
11/19/76 50 ft from outfall	TNT	1 000	15	NA
11/19/76 65 ft from outfall	TNT	3 000	15	NA
11/19/76 250 ft from outfall	TNT	3 000	15	NA
7/18/84 3 ft from outfall	TNT	0	15	NA
7/18/84 30 ft from outfall	TNT	9 000	15	NA
7/18/84 50 ft from outfall	TNT	23 000	15	NA
9/12/85 30 ft from outfall	TNT	1 000	15	NA
9/12/85 110 ft from outfall	TNT	48 000	15	NA
9/12/85 230 ft from outfall	TNT	1 000	15	NA
7/21/91 1 ft from outfall	TNT	700	15	100
7/21/91 20 ft from outfall	TNT	10 000	15	100
7/21/91 40 ft from outfall	TNT	< 100	15	100
7/21/91 45 ft from outfall	TNT	< 100	15	100
7/21/91 50 ft from outfall, center pool	TNT	< 100	15	100
7/21/91 60 ft from outfall, center pool	TNT	< 100	15	100
7/21/91 70 ft from outfall	TNT	6 000	15	100
7/21/91 80 ft from outfall	TNT	30 000	15	100
7/21/91 90 ft from outfall	TNT	20 000	15	100
7/21/91 110 ft from outfall	TNT	3 000	15	100
7/21/91 60 ft from outfall, north edge of pond	TNT	< 1 00	15	100
7/21/91 70 ft from outfall, north edge of pond	TNT	20 000	15	100
7/21/91 90 ft from outfall, north edge of pond	TNT	71 000	15	100
11/15/91 91 ft from outfall	TNT	300	15	100
11/15/91 91 ft from outfall, 2 in. deep	TNT	< 100	15	100
11/15/91 91 ft from outfall, 8 in. deep	TNT	2 200	15	100
11/15/91 91 ft from outfall, 13 in. deep	TNT	4 200	15	100
11/15/91 91 ft from outfall, 8 in. from edge, 13 in. deep	TNT	93 400	15	100
11/15/91 91 ft from outfall, 12 in. from edge, 13 in. deep	TNT	9 700	15	100
11/15/91 135 ft from outfall	TNT	300	15	100
11/15/91 210 ft from outfall	TNT	100	15	100

[a] Early HE determinations were by ultraviolet spectrophotometric methods that did not quantitatively distinguish RDX from HMX.
[b] SALs for HMX/RDX respectively.
[c] NA = Not available.
[d] Estimated from minimum reported values.

All samples are surface (0-6 in.) soil samples taken from drainage centerline unless otherwise indicated. Distances are approximate. Data are from Baytos (1970 to 1985, 15-16-278 to 15-16-268) and King (1991 15-16-381; 1992, 15-16-380).

5.2.4 Field Investigation

Surface laboratory samples were collected at 31 locations and subsurface samples were collected at 3 locations (Table 5.2.4-1 and Fig. 5.2.4-1). Three collocated/split duplicate samples were also collected. All laboratory samples were analyzed for HE, SVOCs, total uranium, and inorganics. Subsurface samples were also analyzed for volatiles. Four samples from two locations within the highly-contaminated zone were analyzed for waste characterization purposes by TCLP and for pesticides/herbicides. Samples in the center of the channel were collected at prescribed locations as delineated in the work plan (LANL 1993, 1094) and its notice of deficiency. Bounding samples were taken at 5 ft intervals along traverses located at 100 ft intervals from the outfall at HE-spot test screening locations that tested negative for HE.

All sampling locations were screened for HE by spot test, volatile organics by PID, and radionuclides by hand-held Sodium Iodide detector. Screening results above background are reported in Table 5.2.4-2. Samples that failed the HE spot test were also screened for TATB content by LANL group DX-2. Only one sample, (0316-95-0038) from PRS 16-021(c) contained measurable TATB. This sample contained 880 mg/kg of TATB. No SAL or toxicological data exists for this compound but due to its low solubility in all reagents, it is likely to be non-toxic. Additional HE positive results were found on the bounding traverses at the outfall, at 100 ft (1 positive), at 300 ft (3 positives), and at 400 ft (3 positives). These bounding locations do not have location or sample IDs, so they are not included in Table 5.2.4-2. The other screening results were nondetects or were within the background range.

A total of 37 laboratory samples, including duplicates, were collected at PRS 16-021(c) (Table 5.2.4-1). The subsurface PID screening did not result in elevated readings. Therefore the subsurface analytical samples were biased to the three areas believed to have the greatest possibility for contamination, at the outfall and at the two surface sample locations in the former HE-pond area. Laboratory duplicates were taken at surface locations 16-1382 and 16-1383 and at subsurface location 16-1379.

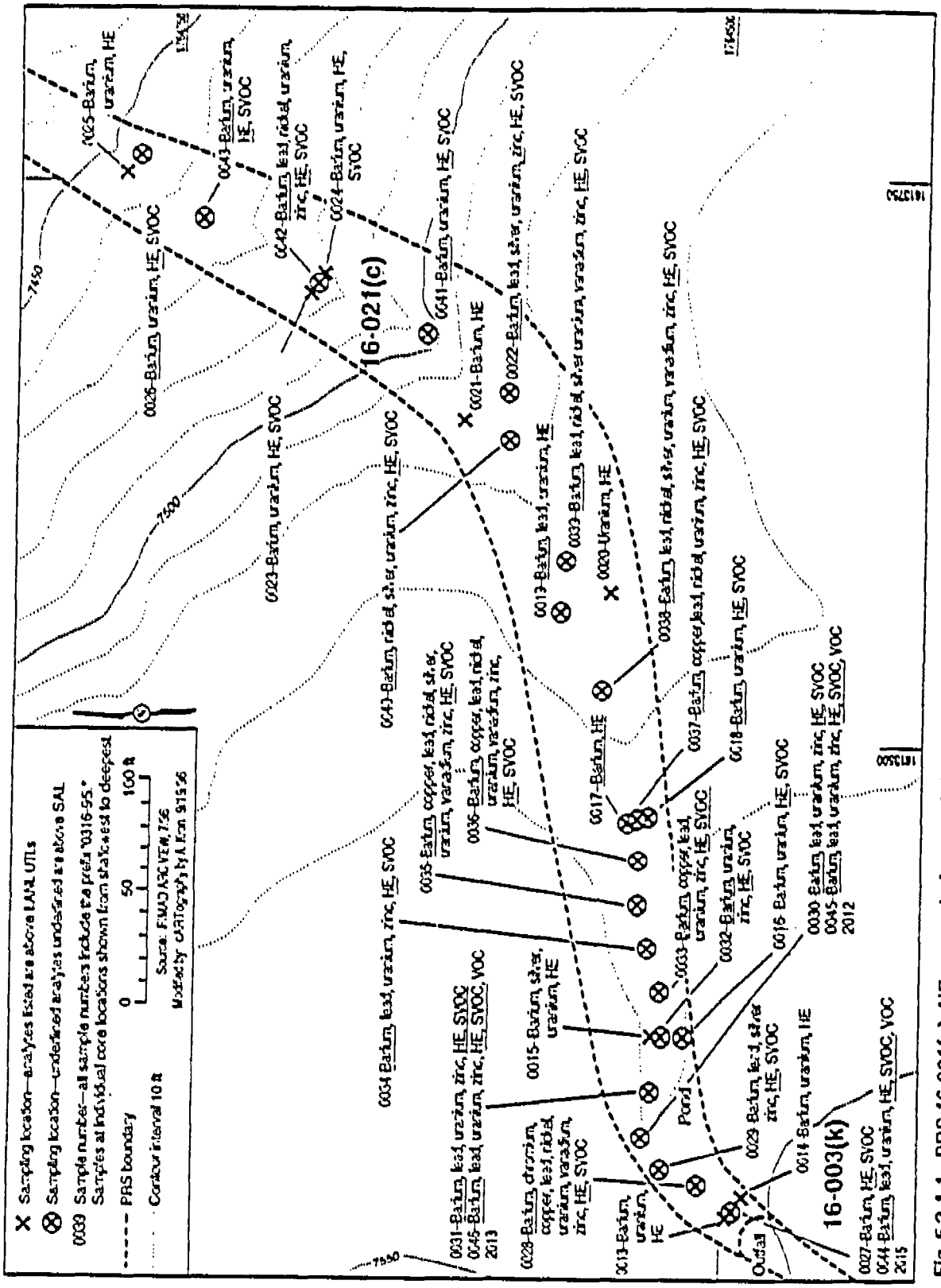

Fig. 5.2.4-1. PRS 16-021(c), HE sump drainage at TA-16-260.

TABLE 5.2.4-1

SUMMARY OF LABORATORY SAMPLES TAKEN AND REQUEST NUMBERS FOR PRS 16-021(c)

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	HERB/ PEST	TCLP[a]	VOCs	SVOCs	HE	INORGs	URANIUM
0316-95-0013	16-1397	0-0.5	Soil	NA[b]	NA	NA	972	972	978	979
0316-95-0014	16-1396	0-0.5	Soil	NA	NA	NA	972	972	978	979
0316-95-0015	16-1399	0-0.5	Soil	NA	NA	NA	972	972	978	979
0316-95-0016	16-1398	0-0.5	Soil	NA	NA	NA	972	972	978	979
0316-95-0017	16-1401	0-0.5	Soil	NA	NA	NA	972	972	978	979
0316-95-0018	16-1400	0-0.5	Soil	NA	NA	NA	972	972	978	979
0316-95-0019	16-1403	0-0.5	Soil	NA	NA	NA	972	972	978	979
0316-95-0020	16-1402	0-0.5	Soil	NA	NA	NA	972	972	978	979
0316-95-0021	16-1405	0-0.5	Soil	NA	NA	NA	972	972	978	979
0316-95-0022	16-1404	0-0.5	Soil	NA	NA	NA	972	972	978	979
0316-95-0023	16-1407	0-0.5	Soil	NA	NA	NA	1222	1222	1223	1224
0316-95-0024	16-1406	0-0.5	Soil	NA	NA	NA	1222	1222	1223	1224
0316-95-0025	16-1409	0-0.5	Soil	NA	NA	NA	1222	1222	1223	1224
0316-95-0026	16-1408	0-0.5	Soil	NA	NA	NA	1222	1222	1223	1224
0316-95-0027	16-1379	0-0.5	Soil	NA	NA	NA	1268	1268	1269	1270
0316-95-0028	16-1380	0-0.5	Soil	NA	NA	NA	1268	1268	1269	1270
0316-95-0029	16-1381	0-0.5	Soil	NA	NA	NA	563	563	564	565
0316-95-0030	16-1382	0-0.5	Soil	563	563	NA	563	563	564	565
0316-95-0031	16-1383	0-0.5	Soil	563	563	NA	563	563	564	565
0316-95-0032	16-1384	0-0.5	Soil	NA	NA	NA	1268	1268	1269	1270
0316-95-0033	16-1385	0-0.5	Soil	NA	NA	NA	563	563	564	565
0316-95-0034	16-1386	0-0.5	Soil	NA	NA	NA	563	563	564	565
0316-95-0035	16-1387	0-0.5	Soil	NA	NA	NA	563	563	564	565
0316-95-0036	16-1388	0-0.5	Soil	NA	NA	NA	563	563	564	565
0316-95-0037	16-1389	0-0.5	Soil	NA	NA	NA	563	563	564	565
0316-95-0038	16-1390	0-0.5	Soil	NA	NA	NA	1268	1268	1269	1270
0316-95-0039	16-1391	0-0.5	Soil	NA	NA	NA	1268	1268	1269	1270
0316-95-0040	16-1392	0-0.5	Soil	NA	NA	NA	1268	1268	1269	1270
0316-95-0041	16-1393	0-0.5	Soil	NA	NA	NA	1268	1268	1269	1270
0316-95-0042	16-1394	0-0.5	Soil	NA	NA	NA	1268	1268	1269	1270
0316-95-0043	16-1395	0-0.5	Soil	NA	NA	NA	1268	1268	1269	1270
0316-95-0044	16-1379	1-1.5	Soil	NA	NA	1173	1173	1173	1174	1175
0316-95-0045	16-1382	1.5-1.9	Soil	NA	NA	1173	1173	1173	1174	1175
0316-95-0046	16-1383	1.7-2.2	Soil	NA	NA	1173	1173	1173	1174	1175
0316-95-2012	16-1382	0-0.5	Soil	563	563	NA	563	563	564	565
0316-95-2013	16-1383	0-0.5	Soil	563	563	NA	563	563	564	565
0316-95-2015	16-1379	1-1.5	Soil	NA	NA	1173	1173	1173	1174	1175

[a] TCLP = Toxicity characteristic leaching procedure
[b] NA = Not analyzed

TABLE 5.2.4-2

FIELD SCREENING RESULTS FOR PRS 16-021(c)

SAMPLE ID	LOCATION ID	SCREENING METHOD/ RESULT
0316-95-0016	16-1398	PID/ 18 ppm
0316-95-0018	16-1400	PID/ 20 ppm
0316-95-0027	16-1379	HE Spot Test/ positive
0316-95-0028	16-1380	HE Spot Test/ positive
0316-95-0029	16-1381	HE Spot Test/ positive
0316-95-0030	16-1382	HE Spot Test/ positive
0316-95-0031	16-1383	HE Spot Test/ positive
0316-95-0032	16-1384	HE Spot Test/ positive
0316-95-0033	16-1385	HE Spot Test/ positive
0316-95-0034	16-1386	HE Spot Test/ positive
0316-95-0035	16-1387	HE Spot Test/ positive
0316-95-0036	16-1388	HE Spot Test/ positive
0316-95-0037	16-1389	HE Spot Test/ positive
0316-95-0038	16-1390	HE Spot Test/ positive
0316-95-0039	16-1391	HE Spot Test/ positive
0316-95-0040	16-1392	HE Spot Test/ positive
0316-95-0041	16-1393	HE Spot Test/ positive
0316-95-0042	16-1394	HE Spot Test/ positive
0316-95-0043	16-1395	HE Spot Test/ positive
0316-95-0044	16-1379	HE Spot Test/ positive
0316-95-0045	16-1382	HE Spot Test/ positive
0316-95-0046	16-1383	HE Spot Test/ positive

5.2.5 Background Comparison

Barium, chromium, copper, lead, nickel, silver, uranium, vanadium, and zinc were found above background UTLs (Table 5.2.5-1). Barium was found at levels well above SALs. The highest barium values were found between 100 and 400 ft downgradient from the outfall, not in the former HE pond. Scattered high values (greater than 20 000 ppm) are found as far as 600 ft downgradient from the outfall. Barium values do not appear to exhibit systematic increases or decreases in concentration with depth. Other metals (copper, lead, nickel, zinc) and radionuclides (uranium) also appear to be concentrated in the 100–400 ft downgradient interval. Other low-level metals values are widely distributed. Duplicate recovery for several inorganic analytes (i.e barium, copper, chromium, lead, zinc) was consistently outside of the acceptable range. These data are P-qualified in Table 5.2.5-1. These data are acceptable for decision making purposes. Barium is well above SALs in virtually all P-qualified samples, and the other analytes are typically well-below SALs in the P-qualified samples. P-qualified samples are most common within the highly HE-contaminated areas, where sample heterogeneity is a significant problem.

TCLP data for four samples from two locations are presented in Table 5.2.5-2. All metals were below TCLP detection limits except barium and cadmium. Barium results were at a level roughly one-half the level at which the soil would qualify as a RCRA metals waste for barium (D005).

TABLE 5.2.5-1

INORGANIC ANALYTES AND URANIUM WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLS FOR PRS 16-021(c)[a]

SAMPLE ID	DEPTH (ft)	SOIL/ ROCK UNIT	BARIUM (mg/kg)	CHROMIUM (mg/kg)	COPPER (mg/kg)	LEAD (mg/kg)	NICKEL (mg/kg)	SILVER (mg/kg)	TOTAL URANIUM (mg/kg)	VANADIUM (mg/kg)	ZINC (mg/kg)
LANL UTL (all soil)	N/A[b]	N/A	315	19.3	30.7	23.3	15.2	NA[c]	1.87	41.9	50.8
LANL UTL (Qbt4)	N/A	N/A	42	5.4	1.6	4	<2	<1	2.93	9.5	47
SAL	N/A	N/A	5 300	210	2 800	400	1 500	380	29	540	23 000
0316-95-0013	0-0.5	Soil	583 (J+P)[d,e]	14.8	9.4	15.2 (P)	11.5	0.62 (U)[f]	2.39	29.2	32.7
0316-95-0014	0-0.5	Soil	498 (J+P)	6.7	4.2	10.7 (P)	7.5	0.55 (U)	2.51	22.2	16.7
0316-95-0015	0-0.5	Soil	1 170 (J+P)	5	5.3	10.8 (P)	4.7	0.64	1.68	12.3	21.9
0316-95-0016	0-0.5	Soil	693 (J+P)	6.7	6.3	14.4 (P)	6.1	0.62 (U)	2.08	23.1	27
0316-95-0017	0-0.5	Soil		5.8	4.6	8.9 (P)	6	0.59 (U)	1.73	15.6	24.3
0316-95-0018	0-0.5	Soil		6.1	6.1	11.1 (P)	6.8	0.61 (U)	2.16	15.4	24.4
0316-95-0019	0-0.5	Soil		6.1	5.3	30.3 (P)	6.2	0.61 (U)	1.7	15.9	25.7
0316-95-0020	0-0.5	Soil	172 (J+P)	7.9	4.3	11.4 (P)	6.4	0.58 (U)	2.01	25.3	21.6
0316-95-0021	0-0.5	Soil	3 790 (J+P)	5	4.8	9.8 (P)	3.7	0.58 (U)	1.27	13.2	23.3
0316-95-0022	0-0.5	Soil		10	16.1	39.4 (P)	10.2	1.2	3.58	22.8	62.2
0316-95-0023	0-0.5	Soil	619 (J+P)[g]	4.8	7.3	19 (P)	4.3	0.63 (U)	3.62	12.4	21.8
0316-95-0024	0-0.5	Soil	412 (J+P)	3	5.2	14.3 (P)	2.2	0.53 (U)	2.92	7.6	24.1
0316-95-0025	0-0.5	Soil	3 000 (J+P)	4.8	5.1	10.1 (P)	3.9	0.59 (U)	2.48	16.7	23.9
0316-95-0026	0-0.5	Soil		6.8	12.1	16 (P)	8.3	0.65 (U)	3.16	21.2	42.7
0316-95-0027	0-0.5	Soil	5 270	9.5 (P)	9.3	18.7	10.3	0.64 (U)	1.82	26.7	46.3
0316-95-0028	0-0.5	Soil		26.8 (P)	40.5	107	37.3	0.985 (U)	3.17	55.7	226
0316-95-0029	0-0.5	Soil	2 730 (P)[h]	4.5 (P)	10.4 (P)	27.2	2.9	0.59 (U)	2.2	11.4	86.1 (J+P)
0316-95-0030	0-0.5	Soil		9.5 (P)	19.9 (P)	36.7	11.2	0.66 (U)	3.25	24.3	104 (J+P)
0316-95-0031	0-0.5	Soil		11.7 (P)	25.2 (P)	43.1	10.9	0.73 (U)	5.77	33.7	116 (J+P)
0316-95-0032	0-0.5	Soil		9.1 (P)	12.5	19	6.3	0.61 (U)	3.11	28.5	85.2
0316-95-0033	0-0.5	Soil		16.8 (P)	35.9 (P)	58	12.8	0.75 (U)	5.07	40.1	150 (J+P)
0316-95-0034	0-0.5	Soil		9.6 (P)	17.5 (P)	35.5	13.3	0.67 (U)	6.98	24.8	76.8 (J+P)
0316-95-0035	0-0.5	Soil		16.4 (P)	31.8 (P)	57.8	51.9	1.1	6.39	48.8	152 (J+P)
0316-95-0036	0-0.5	Soil		18.9 (P)	38.5 (P)	47.3	16.3	0.75 (U)	6.43	42.5	151 (J+P)
0316-95-0037	0-0.5	Soil		15.1 (P)	31.3 (P)	46.5	30.1	1.6	8.71	40.7	133 (J+P)
0316-95-0038	0-0.5	Soil		18.3 (P)	26.8	46.3	25.9	4.1	4.84	48	139
0316-95-0039	0-0.5	Soil		11 (P)	9.5	38.8	31.9	1.31	2.94	42	68.2
0316-95-0040	0-0.5	Soil		13 (P)	17.5	22.4	21.3	0.95	6.69	37	76
0316-95-0041	0-0.5	Soil		4 (P)	4.8	14.2	6.5	0.57 (U)	2.58	21.8	44.8
0316-95-0042	0-0.5	Soil		10.5 (P)	14.4	33.8	20.1	0.63 (U)	4.08	29.9	62.6
0316-95-0043	0-0.5	Soil		6.2 (P)	5.8	22.5	5.1	0.62 (U)	2.73	25.8	42.3
0316-95-0044	1-1.5	Soil		9.7 (P)	11.8	46.2	11.8	0.67 (U)	4.08	31.7	46 (P)
0316-95-0045	1.5-2	Soil		7.1 (P)	8.8	46.5	10.8	0.70 (U)	2.53	27.3	53.7 (P)
0316-95-0046	1.7-2.2	Soil		12.2 (P)	22.4	46.5	8.9	0.75 (U)	4.21	30.5	97.9 (P)
0316-95-2012	0-0.5	Soil		10.5 (P)	17.8 (P)	38.5	9.9	0.64 (U)	4.3	28.2	100 (J+P)
0316-95-2013	0-0.5	Soil		11.2 (P)	20.1 (P)	41.2	9.4	0.71 (U)	4.32	32	113 (J+P)
0316-95-2015	1-1.5	Soil		8.4 (P)	10.4	42.7	11.5	0.70 (U)	3.88	29.1	40.1 (P)

[a] Analytes within double-lines are greater than UTLs. Analytes with shaded background are at levels greater than SALs.
[b] N/A = Not applicable.
[c] NA = Not available.
[d] J+ = Analyte was positively identified and the result is likely to be biased high.
[e] P = Professional judgment needed prior to use of data in decision making.
[f] U = The analyte was not positively identified in the sample and the associated value is the sample-specific EQL/EDL.
[g] J = Analyte was positively identified but the associated numerical value is more uncertain than would normally be expected for the analysis.
[h] J- = Analyte was positively identified and the result is likely to be biased low.

TABLE 5.2.5-2

TCLP RESULTS AT PRS 16-021(C)

SAMPLE ID	DEPTH (ft)	SOIL/ ROCK UNIT	BARIUM (µg/L)	CADMIUM (µg/L)
TCLP LIMIT	NA[a]	NA	100 000	1 000
0316-95-0030	0–0.5	Soil	49 800	6.5
0316-95-0031	0–0.5	Soil	52 400	7.1
0316-95-2012	0–0.5	Soil	63 600	7.1
0316-95-2013	0–0.5	Soil	57 100	6.8

[a] Not applicable.

5.2.6 Evaluation of Organics

HE, SVOCs, and VOCs were all reported for this PRS (Table 5.2.6-1, 5.2.6-2, and 5.2.6-3). The HE DNT, HMX, RDX, TNB, and TNT were all present at levels above SALs. HMX, RDX, and TNT were all found at levels well above SALs in most samples collected along the centerline of the drainage. The SVOCs trichlorophenol, anthracene, benzoic acid, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, phenanthrene, and pyrene were all detected. Anthracene and bis(2-ethylhexyl)phthalate were found at levels greater than SALs. As noted in Subsection 4, bis-(2ethylhexyl)phthalate was also found in the blanks for some SVOC analyses. Low-levels of several VOCs (acetone, dichlorobenzene, p-isopropyltoluene, sec-butlybenzene, trichloroethane, and trimethylbenzene) were also reported. Many of these constituents do not have adequate toxicological criteria to calculate SALs.

HMX levels are highest (greater than 100 000 ppm) in surface samples, particularly between 80 and 200 ft down drainage from the outfall. RDX levels are highest (greater than 50 000 ppm) in subsurface samples that were taken in the 0 to 100 ft interval. TNT is also at the highest levels (>30 000 ppm) in these subsurface samples. This increase in TNT and RDX concentration with depth may reflect either differing transport properties of TNT/RDX compared with HMX. Or, it may reflect that HMX has been used more heavily recently, whereas TNT/RDX were used more heavily during the 1950s and 1960s. Because of the chemical similarities between HMX and RDX, the latter explanation is more likely.

The SVOCs found at levels greater than SALs were also concentrated in the subsurface samples. The SVOCs, particularly anthracene, are most common in samples collected within 200 ft of the outfall in the center of the drainage channel. An exception in benzoic acid, which is found most commonly in bounding samples.

The sample-specific detection limits are high for many organic constituents in the highly-HE-contaminated samples. Low-levels of non-detected HE and SVOC analytes may be present in these samples at levels greater than SALs. The decision to identify virtually all HE constituents as COPCs in the main drainage at PRS 16-021(c) will not be affected by this analytical difficulty. SVOCs may be incorrectly identified as non-detected in samples where they occur. However, sufficient samples with low detection limits exist within the drainage that it is unlikely that a significant SVOC COPC was missed by the sampling. The sample-specific detection limits for bounding samples are at typical levels, so the decision whether an analyte is bounded in the drainage is probably correct.

TAI[illegible] 2.6-1

PRS 16-021(c) SOIL CONCENTRATIONS FOR HIGH EXPLOSIVES WITH VALUES GREATER THAN THE REPORTING LIMIT[a]

SAMPLE ID	DEPTH (ft)	2-AMNT (mg/kg)	4-AMNT (mg/kg)	1,3-DINITROBENZENE (mg/kg)	2,4-DINITROTOLUENE (mg/kg)	2,6-DINITROTOLUENE (mg/kg)	HMX (mg/kg)	NITROBENZENE (mg/kg)	3-NITROTOLUENE (mg/kg)	RDX (mg/kg)	1,3,5-TRINITROBENZENE (mg/kg)	2,4,6-TRINITROTOLUENE (mg/kg)
SAL	N/A[b]	NC[c]	NC	6.5	0.65	0.65	3300	33	NC	4	3.3	15
EQL	N/A	0.26	ND[d]	0.25	0.25	0.26	2.2	0.28	0.25	1	0.25	0.25
0316-95-0013	0-0.5	0.283	0.093 (U)[e]	0.07 (U)	0.055 (U)	0.061 (U)	22.4	0.092 (U)	0.157 (U)	1.38	0.066 (U)	0.091 (U)
0316-95-0014	0-0.5	0.077 (U)	0.092 (U)	0.069 (U)	0.057 (U)	0.08 (U)	0.822	0.091 (U)	0.155 (U)	0.175 (U)	0.065 (U)	0.09 (U)
0316-95-0015	0-0.5	0.274	0.091 (U)	0.068 (U)	0.057 (U)	0.08 (U)	6.28	0.09 (U)	0.154 (U)	0.541 (U)	0.064 (U)	0.09 (U)
0316-95-0016	0-0.5	0.285	0.093 (U)	0.07 (U)	0.058 (U)	0.081 (U)	16.5	0.092 (U)	0.157 (U)		0.066 (U)	0.091 (U)
0316-95-0017	0-0.5	25.4	20.1	0.069 (U)	0.446	0.08 (U)	2.590	0.091 (U)	0.155 (U)		0.159	
0316-95-0018	0-0.5	42.2	21.6	0.07 (U)		0.081 (U)	172	0.092 (U)	2.12		0.066 (U)	5.45
0316-95-0019	0-0.5	2.82	1.63	0.069 (U)	0.305	0.081 (U)	39.3	0.091 (U)	0.155 (U)		0.065 (U)	0.091 (U)
0316-95-0020	0-0.5	0.077 (U)	0.091 (U)	0.069 (U)	0.057 (U)	0.08 (U)	4.02	0.091 (U)	0.155 (U)	0.175 (U)	0.065 (U)	0.09 (U)
0316-95-0021	0-0.5	8.38	2.49	0.069 (U)	0.437	0.08 (U)	1.89	0.091 (U)	0.155 (U)	0.349	0.065 (U)	0.09 (U)
0316-95-0022	0-0.5	27.7	17.9	0.072 (U)		0.084 (U)	367	1.2	0.162 (U)	2.44	0.069 (U)	0.094 (U)
0316-95-0023	0-0.5	0.078 (U)	0.093 (U)	0.07 (U)	0.058 (U)	0.081 (U)	0.969	0.092 (U)	0.157 (U)	0.178 (U)	0.066 (U)	0.091 (U)
0316-95-0024	0-0.5	0.079 (U)	0.094 (U)	0.071 (U)	0.059 (U)	0.082 (U)	0.424	0.093 (U)	0.159 (U)	0.18 (U)	0.067 (U)	0.092 (U)
0316-95-0025	0-0.5	2.8	1.63	0.07 (U)	0.144	0.081 (U)	108	0.092 (U)	0.157 (U)	1.21	0.066 (U)	0.091 (U)
0316-95-0026	0-0.5	82.7	64.1	0.072 (U)		0.084 (U)	379	0.095 (U)	0.162 (U)		0.129	
0316-95-0027	0-0.5	6.55	6.85	0.09 (U)	0.122	0.105 (U)	1.360	0.118 (U)	0.203 (U)		0.113 (U)	
0316-95-0028	0-0.5	5.26	0.237 (U)	0.094 (U)		0.208 (U)		0.235 (U)	0.401 (U)		0.458	
0316-95-0029	0-0.5	2.29 (U)	5.31	0.204 (U)	0.233	0.238 (U)		0.269 (U)	0.46 (U)	5.2 (U)	0.251 (U)	
0316-95-0030	0-0.5	14	3.11 (U)	2.34 (U)	1.94 (U)	2.73 (U)		3.09 (U)	5.27 (U)		2.88 (U)	
0316-95-0031	0-0.5	43.2	22.8 (U)	17.1 (U)	14.2 (U)	20 (U)		22.6 (U)	33.5 (U)		21.1 (U)	
0316-95-0032	0-0.5	41.4	0.566 (U)	0.425 (U)		0.496 (U)		0.561 (U)	0.958 (U)		0.524 (U)	
0316-95-0033	0-0.5	28	8.18 (U)	6.15 (U)	5.1 (U)	7.17 (U)		8.11 (U)	13.8 (U)		7.57 (U)	
0316-95-0034	0-0.5	27.8	17 (U)	2.52 (U)	2.09 (U)	2.94 (U)		3.33 (U)	5.68 (U)		3.11 (U)	
0316-95-0035	0-0.5	25.6	3.51 (U)	2.64 (U)	2.13 (U)	3.08 (U)		3.45 (U)	5.98 (U)		3.25 (U)	
0316-95-0036	0-0.5	53.6	36 (U)	27.1 (U)	22.5 (U)	31.6 (U)		35.7 (U)	61 (U)		33.4 (U)	
0316-95-0037	0-0.5	35.9	3.27 (U)	2.46 (U)	2.04 (U)	2.87 (U)		3.24 (U)	5.54 (U)		3.03 (U)	
0316-95-0038	0-0.5	38.3	34.7	0.501 (U)		0.584 (U)		0.66 (U)	1.13 (U)		0.617 (U)	
0316-95-0039	0-0.5	11.5	10.1	0.065 (U)	0.308	0.144	2.750	0.112 (U)	0.131 (U)		0.276	
0316-95-0040	0-0.5	64.4	60.8	0.676 (U)		0.789 (U)		0.831 (U)	1.52 (U)		0.833 (U)	
0316-95-0041	0-0.5	13.2	10.5	0.405 (U)		0.472 (U)		0.534 (U)	0.912 (U)		0.499 (U)	
0316-95-0042	0-0.5	39.2	33	0.446 (U)		0.537		0.559 (U)	1 (U)		0.735	
0316-95-0043	0-0.5	33.1	27.3	0.435 (U)		0.507 (U)		0.573 (U)	0.979 (U)		0.535 (U)	14.3
0316-95-0044	1-1.5	0.782 (U)	0.928 (U)	0.658 (U)		0.814 (U)		0.92 (U)	1.57 (U)		1.66	
0316-95-0045	1.5-2	0.392 (U)	0.465 (U)	2.04		0.408 (U)		0.461 (U)	0.787 (U)			
0316-95-0046	1.7-2.2	1.97 (U)	2.34 (U)	1.76 (U)		2.05 (U)		2.32 (U)	3.96 (U)	116000 (U)		
0316-95-2012	0-0.5	17.2	8.4 (U)	6.32 (U)	5.24 (U)	7.37 (U)		8.33 (U)	14.2 (U)		7.78 (U)	
0316-95-2013	0-0.5	32.5 (U)	38.6 (U)	29 (U)	24.1 (U)	33.9 (U)		38.3 (U)	65.4 (U)		35.8 (U)	
0316-95-2015	1-1.5	1.96 (U)	2.32 (U)	1.75 (U)	1.45 (U)	2.04 (U)		2.3 (U)	3.93 (U)		2.15 (U)	

[a] Analytes within double-lines are greater than EQLs. Analytes with shaded background are at levels greater than SALs.
[b] N/A = Not applicable.
[c] NC = Not calculated.
[d] ND = Not determined.
[e] U = Analyte not positively identified in sample and the associated numerical value is the sample-specific EQL/EDL.

TABLE 5.2.6-2

PRS 16-021(c) SOIL CONCENTRATIONS FOR SEMI-VOLATILE ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT[a]

SAMPLE ID	DEPTH (ft)	2,4,6-Trichlorophenol (mg/kg)	2,4-Dinitrotoluene (mg/kg)	2,6-Dinitrotoluene (mg/kg)	Anthracene (mg/kg)	Benzoic Acid (mg/kg)	Bis(2-Ethylhexyl)Phthalate (mg/kg)	Di-N-Butylphthalate (mg/kg)	Phenanthrene (mg/kg)	Pyrene (mg/kg)
SAL	N/A[b]	40	0.65	0.65	19	100 000	32	6 500	NC[c]	2 000
EOL	N/A	0.33	0.33	0.33	0.33	3.3	0.33	0.33	0.33	0.33
0316-95-0016	0-0.5	0.41 (U)[d]	0.41 (U)	0.41 (U)	0.41 (U)	0.08 (J)[e]	0.41 (U)	0.41 (U)	0.41 (U)	0.41 (U)
0316-95-0017	0-0.5	0.33 (U)	0.1 (J)	0.33 (U)	0.33 (U)	3.9 (U)	0.33 (U)	0.33 (U)	0.33 (U)	0.33 (U)
0316-95-0018	0-0.5	0.82 (U)	0.31 (J)	0.82 (U)	0.82 (U)	0.13 (J)	0.82 (U)	0.82 (U)	0.82 (U)	0.82 (U)
0316-95-0021	0-0.5	0.33 (U)	0.5	0.33 (U)	0.33 (U)	3.9 (U)	0.33 (U)	0.33 (U)	0.33 (U)	0.33 (U)
0316-95-0022	0-0.5	0.53 (U)		0.53 (U)	0.53 (U)	0.43 (J)	1.9 (U)	0.53 (U)	0.53 (U)	0.53 (U)
0316-95-0023	0-0.5	0.43 (U)	0.43 (U)	0.43 (U)	0.43 (U)	0.12 (J)	0.43 (U)	0.43 (U)	0.43 (U)	0.43 (U)
0316-95-0024	0-0.5	0.33 (U)	0.33 (U)	0.33 (U)	0.33 (U)	0.07 (J)	0.16 (J)	0.33 (U)	0.33 (U)	0.33 (U)
0316-95-0025	0-0.5	0.33 (U)	0.094 (J)	0.33 (U)	0.33 (U)	3.9 (U)	0.33 (U)	0.33 (U)	0.33 (U)	0.33 (U)
0316-95-0026	0-0.5	0.58 (U)	0.5 (J)	0.084 (J)	0.58 (U)	0.12 (J)	0.58 (U)	0.58 (U)	0.58 (U)	0.58 (U)
0316-95-0027	0-0.5	0.048 (J)	0.048 (J)	0.44 (U)	0.44 (U)	4.4 (U)	0.41 (J)	0.44 (U)	0.44 (U)	0.44 (U)
0316-95-0028	0-0.5	13 (U)	13 (U)	13 (U)	13 (U)	130 (U)	4 (J)	13 (U)	13 (U)	13 (U)
0316-95-0029	0-0.5	0.4 (U)	0.09 (J)	0.4 (U)	0.4 (U)	4 (U)	2.1 (B)[f]	0.054 (J)	0.4 (U)	0.4 (U)
0316-95-0030	0-0.5	2.3 (U)	0.33 (J)	0.44 (J)	2.3 (U)	23 (U)	0.3 (B)	2.3 (U)	0.44 (J)	2.3 (U)
0316-95-0031	0-0.5	9.6 (U)	9.6 (U)	9.6 (U)	3.3 (J,PJ,B)	96 (U)		9.6 (U)	9.6 (U)	9.6 (U)
0316-95-0032	0-0.5	2 (U)	0.61 (J)	2 (U)	2 (U)	20 (U)	16	2 (U)	4.6	2 (U)
0316-95-0033	0-0.5	10 (U)	10 (U)	10 (U)	6.1 (J)	100 (U)		10 (U)	10 (U)	10 (U)
0316-95-0034	0-0.5	9.2 (U)	9.2 (U)	9.2 (U)	0.95 (J,PJ)	92 (U)	23 (U)	9.2 (U)	9.2 (U)	9.2 (U)
0316-95-0035	0-0.5	10 (U)	10 (U)	10 (U)	1.1 (J,PJ)	100 (U)	15 (U)	10 (U)	10 (U)	10 (U)
0316-95-0037	0-0.5	4.8 (U)		4.8 (U)	0.87 (J)	48 (U)	12 (U)	4.8 (U)	4.8 (U)	4.8 (U)
0316-95-0038	0-0.5	0.45 (U)	0.79	0.34 (J)	0.45 (U)	4.5 (U)	4.3	0.45 (U)	0.23 (J)	0.071 (J)
0316-95-0039	0-0.5	0.81 (U)	0.2 (J)	0.81 (U)	0.81 (U)	8.1 (U)	0.59 (J)	0.81 (U)	0.81 (U)	0.81 (U)
0316-95-0040	0-0.5	0.51 (U)	0.5 (J)	0.2 (J)	0.51 (U)	5.1 (U)	1.4	0.51 (U)	0.51 (U)	0.51 (U)
0316-95-0041	0-0.5	0.33 (U)	0.28 (J)	0.063 (J)	0.33 (U)	3.9 (U)	0.77	0.33 (U)	0.052 (J)	0.33 (U)
0316-95-0042	0-0.5	0.44 (U)	0.33 (J)	0.1 (J)	0.44 (U)	4.4 (U)	0.86	0.44 (U)	0.44 (U)	0.44 (U)
0316-95-0043	0-0.5	0.43 (U)	0.28 (J)	0.053 (J)	0.43 (U)	4.3 (U)	0.45	0.43 (U)	0.43 (U)	0.43 (U)
0316-95-0044	1-1.5	110 (U)	110 (U)	110 (U)	110 (U)	1 100 (U)		110 (U)	110 (U)	110 (U)
0316-95-0045	1.5-1.9	120 (U)	120 (U)	120 (U)		1 200 (U)	120 (U)	120 (U)	120 (U)	120 (U)
0316-95-0046	1.7-2.2	130 (U)	130 (U)	130 (U)		1 300 (U)		130 (U)	130 (U)	130 (U)
0316-95-2012	0-0.5	8.7 (U)	8.7 (U)	8.7 (U)	1.9 (J)	87 (U)	26 (U)	8.7 (U)	8.7 (U)	8.7 (U)
0316-95-2013	0-0.5	9 (U)		9 (U)	6.2 (J)	90 (U)		9 (U)	9 (U)	9 (U)

[a] Analytes within double lines are greater than EOLs. Analytes with black background are at levels greater than SALs.
[b] N/A = Not applicable
[c] NC = Not calculated
[d] U = Analyte not positively identified in sample and the associated numerical value is the sample specific EOL/EDL.
[e] J = Analyte positively identified and associated numerical value is more uncertain than would normally be expected for the analysis.
[f] PJ = Professional judgment should be used in applying the data in decision making; manual review of data suggested.
B = Found in blank.

TABLE 5.2.6-3

PRS 16-021(c) SOIL CONCENTRATIONS FOR VOLATILE ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT[a]

SAMPLE ID	DEPTH (ft)	Acetone (mg/kg)	1,2-dichlorobenzene (mg/kg)	p-isopropyltoluene (mg/kg)	sec-butylbenzene (mg/kg)	1,1,1-trichloroethane (mg/kg)	1,2,4-trimethylbenzene (mg/kg)
SAL	N/A[b]	2 000	2 300	NC[c]	NC	3 000	8
EQL	N/A	0.2	0.05	0.05	0.05	0.05	0.05
0316-95-0044	1–1.5	0.06 (J)[d]	0.007 (UJ)[e]	0.022 (J)	0.007 (UJ)	0.007 (UJ)	0.007 (UJ)
0316-95-0045	1.5–1.9	0.016 (J)	0.007 (UJ)	0.051 (J)	0.007 (UJ)	0.007 (U)	0.052 (J)
0316-95-0046	1.7–2.2	0.031 (UJ)	0.005 (J)	0.008 (UJ)	0.008 (UJ)	0.014 (J)	0.008 (J)
0316-95-2015	1–1.5	0.014 (J)	0.007 (U)	0.007 (U)	0.007 (U)	0.007 (U)	0.007 (U)

[a] Analytes within double-lines are greater than EQLs
[b] N/A = Not applicable.
[c] NC = Not calculated.
[d] J = Analyte positively identified and associated numerical value is more uncertain than would normally be expected for the analysis.
[e] U = Analyte not positively identified in sample and the associated numerical value is the sample-specific EQL/EDL.

TCLP organic results showed no constituents above analytical detection limits.

5.2.7 Human Health Assessment

5.2.7.1 Screening Assessment

The noncarcinogens barium, HMX, TNB, and anthracene were found at levels greater than SALs (Table 5.2.5-1, 5-2.6-1 and 5.2.6-2). The carcinogens DNT, RDX, TNT, and bis(2-ethylhexyl)phthalate were also found at levels greater than SALs (Table 5.2.6-1, 5.2.6-2). All of these constituents will be carried through the RFI/CMS process as COPCs. No radionuclides were found at levels greater than SALs.

MCEs were performed for both carcinogens and non-carcinogens that were not already identified as COPCs.

Noncarcinogenic contaminants identified to be greater than LANL background UTLs but below SALS were submitted for an MCE for noncarcinogenic effects. Lead is excluded from this grouping because its toxicity is based on the uptake of lead in children as modeled by EPA's IUBEK Model (EPA 1994, 1178). The sum of the maxima for the noncarcinogenic group is 0.51, which is well below the target value of 1, indicating a low potential for adverse effects due to exposure to this grouping (Table 5.2.7.1-1).

Carcinogenic contaminants with levels greater than LANL background UTLs but below SALs were submitted for an MCE for carcinogenic effects. The sum of the maxima for the carcinogenic group is 0.13, well below the target value of 1. This indicates a low potential for adverse effects due to exposure to carcinogens other than those already identified as COPCs because these carcinogens are at levels above SALs (Table 5.2.7.1-2).

Only a single radionuclide, uranium, was identified at levels above background, so no MCE was performed for the radionuclides.

TABLE 5.2.7.1-1

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 16-021(c)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Copper	40.5	2 800	0.014
Nickel	37.3	1 500	0.025
Silver	4.1	383	0.011
Vanadium	55.7	540	0.10
Zinc	226	23 000	0.003
1,3-Dinitrobenzene	2.04	6.5	0.31
Nitrobenzene	1.2	33	0.036
3-Nitrotoluene	2.12	650	0.0033
Benzoic acid	0.43	100 000	0.000004
Di-n-butylphthalate	0.054	6 500	0.000008
Pyrene	0.071	2 000	0.00004
Acetone	0.067	2 000	0.00003
1,2 Dichlorobenzene	0.007	2 300	0.000003
1,2,4-Trimethylbenzene	0.052	8	0.0065
1,1,1-Trichloroethane	0.014	3 000	0.000005
Total			0.51

TABLE 5.2.7.1-2

MCE FOR CARCINOGENIC EFFECTS AT PRS 16-021(c)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Chromium	26.8	210	0.13
2,4,6-Trichlorophenol	0.048	40	0.0012
Total			0.13

5.2.7.2 Risk Assessment

No human health risk assessment was performed at this PRS. A human health risk assessment is not needed to define the decision. A CMS/CMI will be required. The constituents RDX, HMX, and TNT are present at levels several orders of magnitude greater than SALs over much of the area of PRS 16-021(c). A human health risk assessment under either a residential or industrial scenario would yield carcinogenic and systemic risks far greater than the EPA's target range of 10^{-4} to 10^{-6} for carcinogens and a hazard index of 1 for systemic toxicants. In addition, the distribution of contaminant concentrations is so non-normal that a realistic 95 UCL on the mean, as prescribed in Risk Assessment Guidance for Superfund (RAGS) (EPA 1989, 0305) guidance, cannot legitimately be calculated. Using maximum concentrations in lieu of 95 UCLs, as is done for background constituents with non-normal or non-log normal distributions, suggests that risks are on the order of 10^{-2} and 10^{-3} for RDX and TNT and a hazard index greater than 1 for HMX under an industrial scenario. In addition, the high levels of HE in the soil (greater than 5 wt %) suggest that the soils pose an acute (explosive) hazard not just a chronic hazard to receptors.

A more detailed baseline risk assessment, which includes Phase II information on surface and groundwaters, may be completed as part of the CMS/CMI process.

5.2.8 Preliminary Ecological Assessment

In accordance with conversations between LANL ER Project personnel, DOE/LAAO, and the regulators, discussion of ecological risk assessment methodology will be deferred until the Ecological Exposure Unit (Ecozone) methodology that is being developed by LANL in conjunction with EPA Region 6 and the NMED has been approved by the regulators.

PRS 16-021(c) is known to have impacted ecological receptors. Dead trees are present in the drainage that are almost certainly due to impacts of COPCs from the outfall.

5.2.9 Extent of Contamination

The extent of contamination is not fully characterized for PRS 16-021(c) in either the lateral or vertical directions. None of the COPCs were bounded in the vertical direction. Table 5.2.9-1 and Fig. 5.2.9-1 indicate the status of lateral bounding relative to SALs for COPCs identified as part of the screening assessment.

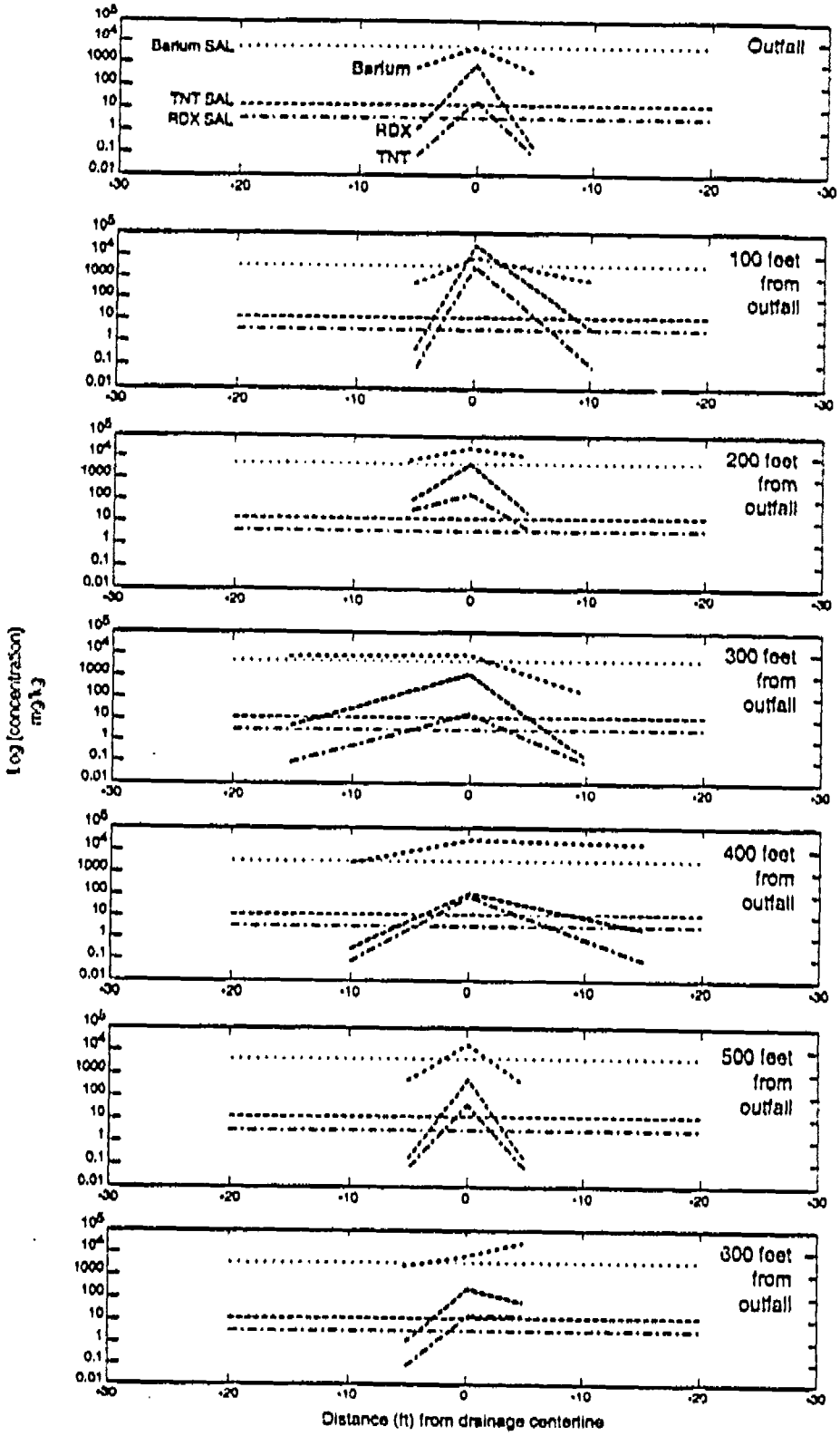

Fig. 5.2.9-1. Centerline and lateral bounding sample concentrations for barium, RDX, and TNT at PRS 16-021(c).

TABLE 5.2.9-1

STATUS OF LATERAL BOUNDING FOR PRS 16-021(c)

COPC	OUTFALL	100 FT	200 FT	300 FT	400 FT	500 FT	600 FT
Barium	Yes	Yes	No	No	No	Yes	No
DNT	Yes	Yes	No	Yes	No	Yes	Yes
HMX	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RDX	Yes	Yes	No	No	Yes	Yes	No
TNB	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TNT	Yes	Yes	No	Yes	Yes	Yes	Yes
Anthracene	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bis(2-ethylhexyl) phthalate	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Lateral traverses at the outfall, 100 ft, and 500 ft are bounded with more certainty for all COPCs. Traverses at 300 ft and 400 ft have COPCs at levels only slightly greater than SALs for barium, RDX, and DNT in lateral bounding samples. These traverses are bounded relative to EPA Region 9 industrial PRGs. Traverses at 200 and 600 ft have RDX in lateral bounding samples at levels significantly greater than SALs and EPA Region 9 industrial PRGs. Phase II sampling will focus on these traverses.

The extent of COPCs due to releases at PRS 16-021(c) to surface and groundwater is also unknown, and will be investigated as described in the Phase II sampling and analysis plan.

5.2.10 Conclusions and Recommendations

PRS 16-021(c) is contaminated with several constituents at levels that present a risk to human health and the environment. BMPs have been implemented at the PRS to minimize migration of COPCs to surface and groundwater.

COPCs identified in the screening assessment include: barium, DNT, HMX, RDX, TNB, TNT, anthracene, and bis(2-ethylhexyl)phthalate. Of these COPCs, barium, DNT, HMX, RDX, and TNT are widely distributed along the centerline of the drainage at PRS 16-021(c) from the outfall for at least a distance of 600 ft downgradient. The other COPCs are present in localized zones. The contaminated zone ranges up to 25 ft wide in traverses where bounding relative to SALs was achieved. At 200 ft and 600 ft the zone may be greater than 25 ft wide. Vertical bounding and knowledge the extent of contamination of downgradient surface and groundwater were not achieved in the Phase I sampling.

An explicit human health risk assessment for PRS 16-021(c) was not completed as part of Phase I characterization. It is clear, however, that both carcinogenic and noncarcinogenic risks are at unacceptable levels under any realistic exposure scenario for a distance of 600 ft down the drainage from the TA-16-260 outfall. Acute (explosive) risks are also present due to levels of HE in soil that are above explosive limits.

Potential waste types for PRS 16-021(c) may include D003 (RCRA reactive), D005 (TCLP for barium), and D030 (TCLP for 2,4 DNT). Radioactive and mixed waste are also possible due to the small amounts of uranium found at some locations.

This PRS is recommended for continued sampling to support a CMS. The sampling and analysis plan is provided in Subsection 5.2.11 of this report. Goals of this sampling are to determine extent of COPCs needing remediation and the impacts of COPCs from PRS 16-021(c) on surface and groundwater.

This PRS is also recommended for a CMS. Levels of COPCs present a risk to human health and the environment. Surface and groundwater in the vicinity of PRS 16-021(c) have been impacted at levels greater than MCLs, and that PRS is the most likely source for the water contamination. At the present time, there is no obvious, simple, or presumptive remedy for cleanup of COPCs, so VCA or expedited cleanup are not plausible decisions. A CMS is required. A CMS plan will be submitted to the NMED by September 30, 1997.

5.2.11 Phase II Sampling and Analysis Plan for PRS 16-021(c)

5.2.11.1 Problem Definition

Phase I sampling at the TA-16-260 outfall, PRS 16-021(c), included only surface samples of soils from the drainage below the outfall, plus a few near-surface samples (not more than 2 ft in depth) in the pond area within 100 ft of the outfall. Very high levels of HMX, RDX, TNT and barium, together with elevated levels of other HE, HE byproducts, and inorganics, were found in many of these samples, from the outfall down to the end of the drainage in Cañon de Valle. Concentrations of the major contaminants appeared to be decreasing with distance from the outfall, but the concentrations in near-surface samples were sometimes larger than on the surface, as discussed in Section 5.2.6.

HE contamination has also been observed in several TA-16 springs and seeps. Some springs and seeps emerge on the slopes of Cañon de Valle within 1 000 ft of the TA-16-260 outfall. Others are on the southeast side of TA-16. Whether any of these springs are hydrologically connected to the TA-16-260 area is not known. There are several other potential sources of

HE contamination at TA-16 that could be affecting springs both in Cañon de Valle and to the southeast. Existing surface and groundwater data are presented in Appendix C and summarized in Subsection 2 of this report.

Because the available information is limited, additional RFI investigations are being proposed in this Phase II sampling and analysis plan. This additional data will provide the information that is needed to prepare a CMS plan for source removal at the TA-16-260 outfall and that supports remediation or monitoring of perched groundwater and alluvial groundwater. This work will also provide data to support a baseline risk assessment, a required component of CMS planning. Specific questions and associated decisions to be addressed in Phase II include.

1) What are the lateral and vertical extents of contaminated soils requiring remediation at the outfall?

   Neither the lateral nor the vertical extent of contamination was entirely bounded by Phase I sampling. Any of the remediation options likely to be considered in CMS planning, including bioremediation, are expected to require at least temporary removal of the soil to be treated. Phase II sampling is designed to provide an upper bound on the amount and waste types of soil requiring remediation.

   The decision that will be affected by these data is what the ultimate cost of remediation will be under different remediation scenarios explored under a CMS. It is likely that different remediation methods will be more cost-effective, depending on the total volume and type of waste that needs to be remediated. These data will also facilitate waste minimization/segregation efforts.

2) What groundwater pathways, if any, connect the TA-16-260 outfall to TA-16 perched aquifers, seeps, and springs?

   As mentioned above, HE contamination has been observed both at springs near the TA-16-260 outfall [e.g., the sanitary wastewater system consolidation (SWSC) Line and Burning Ground Springs] and at more distant springs (Martin Spring, Fish Ladder Seep). There are unanswered questions both about the hydrologic connectivity between the TA-16-260 outfall and those springs and about the connections between those springs and other potential sources of HE contamination. The Phase II studies proposed below extend preliminary work in which springs, streams, and outfalls have been sampled on an irregular basis.

In particular, these studies will identify COPCs, if any, in perched aquifers that might require remediation, and assist in the siting of potential long-term monitoring wells and in designing a systematic monitoring program. Although deep groundwaters are not being investigated in this sampling and analysis plan, these studies will also support future investigations of deep groundwater at TA-16 that will be completed as part of site-wide hydrogeologic studies.

The decisions associated with these data are the following. 1) If the groundwater pathways connecting the TA-16-260 outfall with springs are identified and contain constituents at levels greater than MCLs, then implement groundwater monitoring in those pathways. 2) If the TA-16-260 outfall is shown to be contributing constituents to intermediate perched groundwater that present a current or future risk to human health and the environment, then evaluate appropriate remedial actions within the context of the CMS. A plausible remediation option for perched groundwater is pump and treat. Conceptual models for risk assessments at TA-16 are presented in the RFI work plan for OU 1082 (LANL 1993, 1094). 3) If groundwater pathways connecting the TA-16-260 outfall with springs are not identified, then examine other TA-16 discharge areas associated with other PRSs as potential sources.

3) What is the impact of contamination released through the TA-16-260 outfall on surface and alluvial water in Cañon de Valle?

Surface water and sediment sampling in Cañon de Valle are proposed in Subsection 5.9 of the work plan. That sampling will be supplemented in this sampling and analysis plan by alluvial wells in Cañon de Valle and by additional sediment and water samples in Cañon de Valle. The siting of this well is strongly constrained by access considerations and it will not be possible to distinguish the TA-16-260 outfall contribution from that of other sources to the west of MDA-P, such as the former 90s-Line outfalls. However, if it appears that remediation of sediment or water in Cañon de Valle may be required, this will be addressed in the CMS plan for PRS 16-021(c).

The decision associated with these data is: if contamination in surface and alluvial water or sediments present a current or future risk to human health and the environment under realistic exposure scenarios, then implement appropriate

corrective action (interim action or remediation). Ecological risk assessment will be considered where appropriate.

A decision flow diagram for this sampling and analysis plan is presented in Fig. 5.2.11-1.

In addition to the investigations described in this document, upcoming RFI Phase I sampling scheduled for other PRSs may be augmented to determine the vertical extent of contamination at those sites that may have affected shallow perched groundwaters at TA-16: the V-Site pond (PRS 16-029(x), Subsection 5.25 in the work plan); the 90s-Line pond (PRS 16-008(a), Subsection 5.12 in the work plan); and the 300-Line outfall (PRS 16-003(d-g), Subsection 5.2 in the work plan) (LANL 1993, 1094; LANL 1994, 1160; LANL 1995, 1342). The RFI Phase I sampling plans for these sites presented in the work plan are intended primarily to identify the COPCs and obtain samples representing the highest levels of contamination present. These sampling plans may be augmented by boreholes and subsurface sampling in order to bound the vertical extent of contamination, and additional surface locations may be sampled in order to bound the lateral extent of contamination if necessary. The decision to collect additional sampling data will be based on evaluation of RFI sampling data. If constituent levels are not bounded in the vertical direction during RFI sampling, then additional samples will be collected. If remediation appears to be required at these sites, Phase II RFI sampling and analysis plans, VCA plans or expedited cleanup (EC) plans will be prepared as needed.

5.2.11.2 Sampling and Analysis Plan (SAP) Design

Seven components of RFI Phase II studies are described in the following subsections. They include a geological/geophysical survey, surface and subsurface sampling in and near the TA-16-260 outfall, mesa-top wells, alluvial wells in Cañon de Valle, additional sampling beyond that described in the work plan in Cañon de Valle, and systematic spring and seep sampling supporting tracer studies.

5.2.11.2.1 Geological/Geophysical Surveys

A geologic map of Bandelier Tuff units and subunits will be prepared for the north portion of TA-16. This mapping will focus on Cañon de Valle within one mile of TA-16-260. Other mapping will be reconnaissance in nature and will be tied to the existing map of Rogers (Rogers 1995, 1353) and the three-dimensional site-wide stratigraphic model. Emphasis of this mapping will be on the nature, structural dips, and continuity of units identified as potential high permeability units (i.e., the surge beds within Unit 4 and the spring-bearing units within the horizontal-fractured subunit of Unit 3). A detailed stratigraphic log, including whole-rock chemical analyses, will be completed near TA-16-260 for lithologic correlation purposes. Fracture characterization will be completed in Cañon de Valle near PRS 16-021(c).

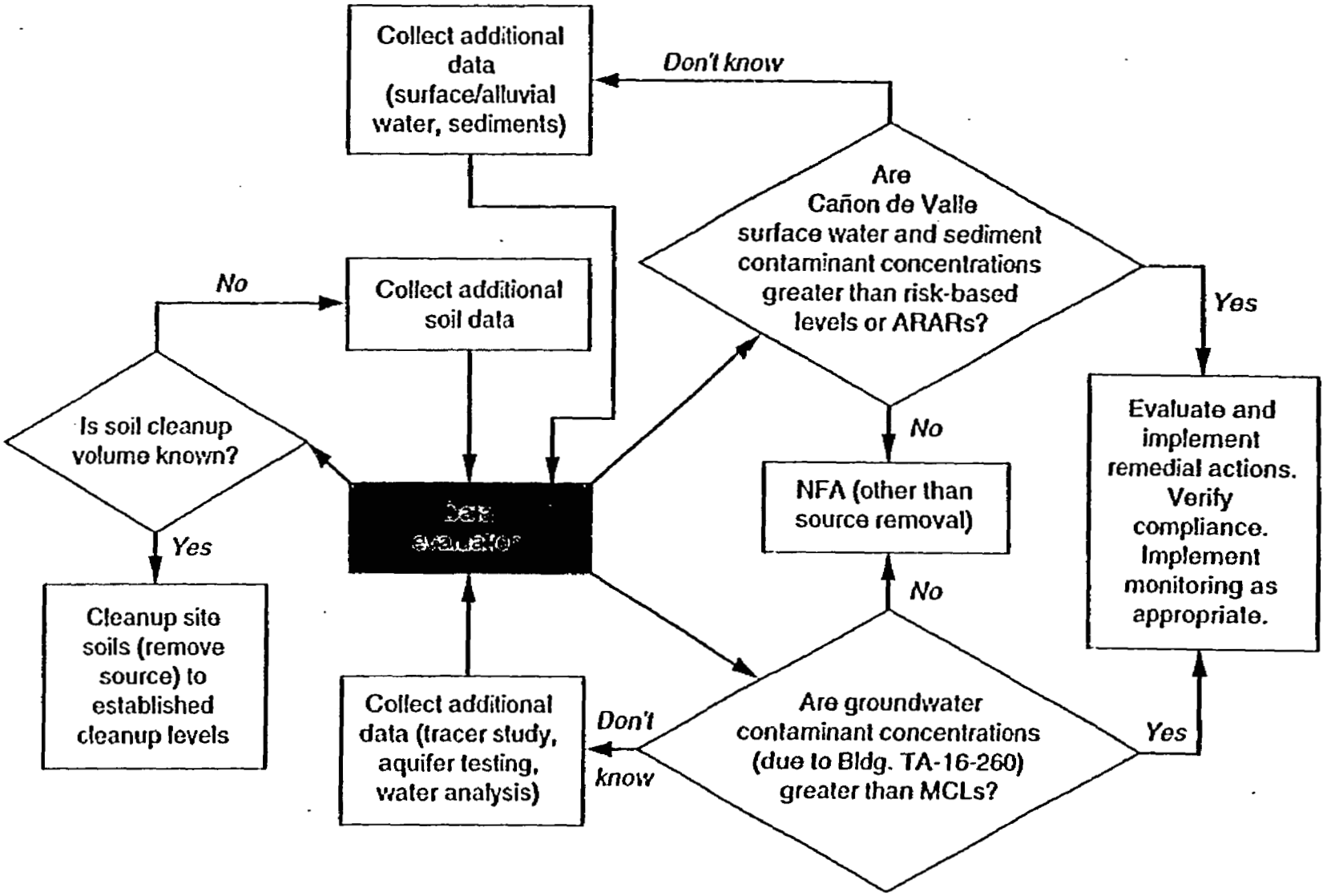

Fig. 5.2.11-1. TA-16-260 outfall decision flow.

If the known contaminated springs (SWSC Line Spring, Burning Ground Spring, Martin Spring, and Fish Ladder Seep) are fed primarily by fracture flow through welded tuff or if the saturated layer is thin and discontinuous, it may not be possible to detect saturated zones by surface geophysical methods. Saturated zones or perched water might be found either above the cliff-forming unit that crops out in Cañon de Valle and is approximately 10–40 ft below the surface at the TA-16-260 outfall, or in the surge bed that separates this cooling unit from the next lower cooling unit, at a depth of approximately 50–70 ft (Broxton et al. 1996, 1305). An attempt will be made to locate and trace saturated zones using Schlumberger resistivity and other electrical and magnetic methods, both in the neighborhood of the TA-16-260 outfall (Fig. 5.2.11.2.1-1) and also near the springs on the mesa tops at TA-16 (Fig. 5.2.11.2.1-2). If flow paths can be traced in this way, these results will be used to help locate the wells proposed in Sections 5.2.11.2.3 and 5.2.11.2.4.

5.2.11.2.2 Surface and Near-surface Sampling at the TA-16-260 Outfall

The lateral extent of sampling below the TA-16-260 outfall was determined during Phase I sampling using a field spot test HE kit with a relatively high detection level (nominally 100 ppm). While in general the lateral bounding samples selected in this way contained much lower concentrations of HE than the samples collected in the center of the drainage, some of the bounding samples had concentrations exceeding SALs. In particular, high RDX concentrations were found in the bounding samples collected 200 ft below the outfall and at the base of the outfall (600 ft below the outfall in Cañon de Valle, where the drainage is less well defined than it is higher up). In addition, no subsurface samples were collected downgradient from the dam that is located approximately 100 ft below the outfall.

Additional bounding samples will be collected along transects 200 and 600 ft below the outfall, at 5-ft lateral intervals for surface samples and 10-ft lateral intervals for subsurface samples (Fig. 5.2.11.2.1-1). Subsurface samples will be collected in soil at depths of 12–36 in., with greater depth preferred where practical. Subsurface sampling is constrained both by the large cobbles found in the outfall area and by restrictions on the use of power equipment in this HE area. Where the soil/tuff interface is encountered at a depth of less than 12 in., no sample will be collected. Each sample will be tested using the field spot-test kit, followed by an immunoassay test, if the spot-test result is negative. These data will be used to estimate the lateral extent of contamination. Once the lateral extent is believed to have been bounded based on these field results, surface and subsurface laboratory samples will be collected from each end of each transect. Splits of these homogenized samples will be submitted, both for immunoassay, and for laboratory HE and inorganic analyses.

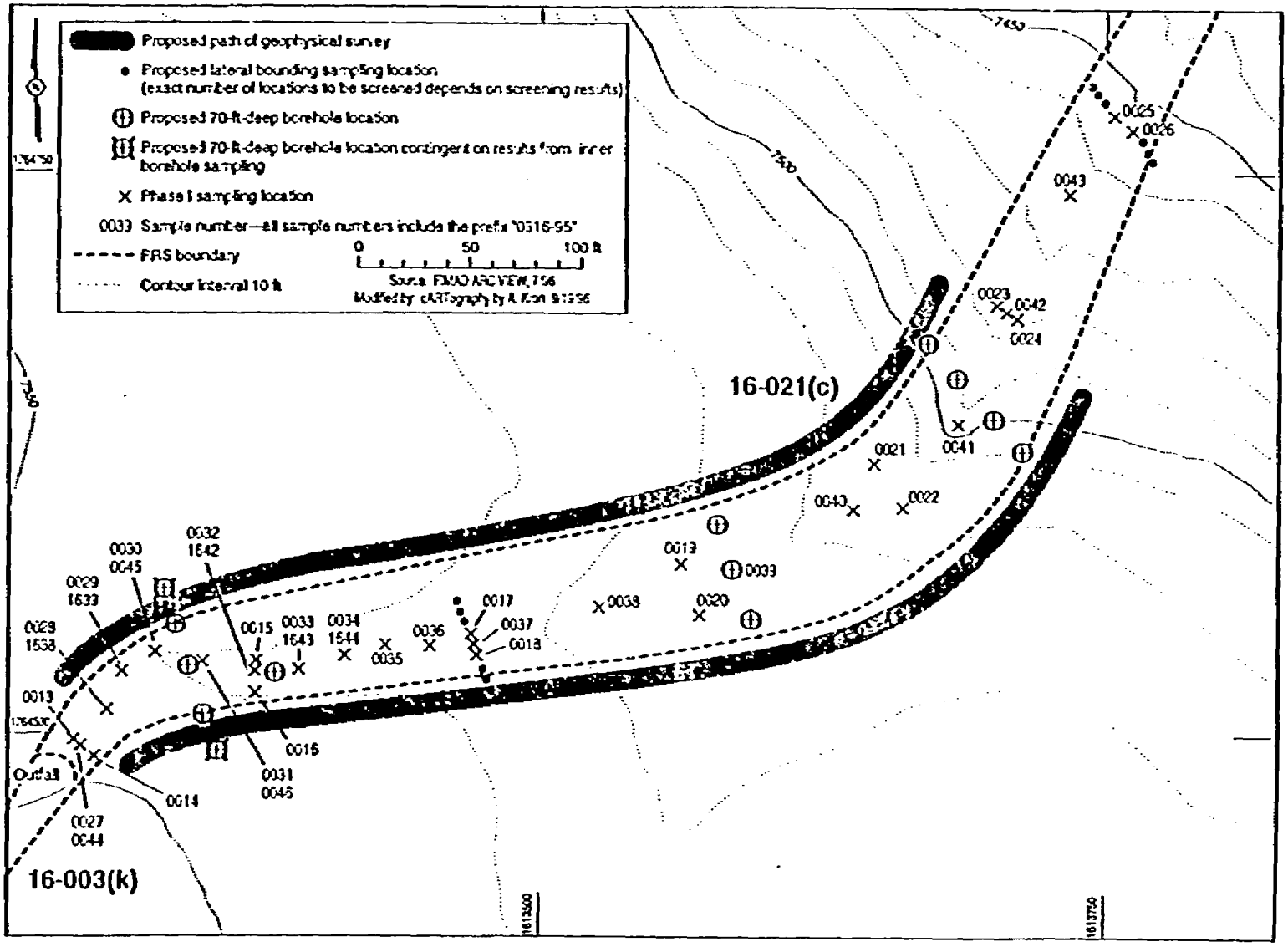

Fig. 5.2.11.2.1-1. Proposed Phase II sampling locations at PRS 16-021(c).

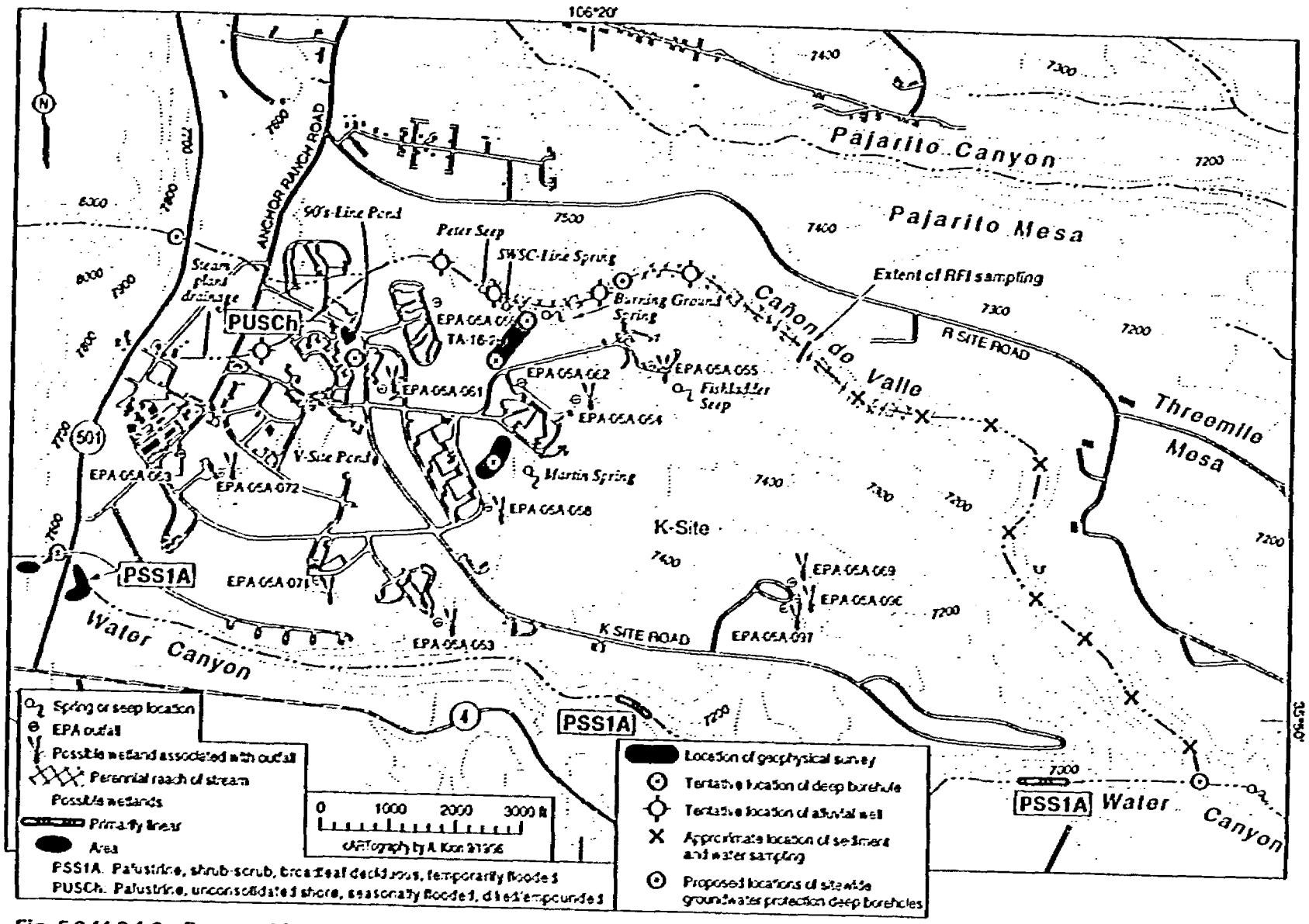

Fig. 5.2.11.2.1-2. Proposed locations of hydrogeologic monitoring stations and boreholes at TA-16.

One collocated sample (i.e., an independent sample from an adjacent point or segment of core, not a split of a homogenized sample) will be collected from one end of each transect for a total of two in order to estimate the effect of local heterogeneity, if any, in areas with low levels of contamination. One of these collocated samples should be a subsurface sample.

These observations (both field and laboratory results) will supplement Phase I data and data from additional transects described in Subsection 5.2.11.2.3 to bound the volume of soil requiring remediation and estimating the total amount of HE in the drainage. The laboratory results will also be used in conjunction with Phase I laboratory data for preliminary risk assessments.

5.2.11.2.3 Subsurface Sampling at the TA-16-260 Outfall

Eleven to 13 boreholes will be drilled with a remote-drilling rig, along three transects across the TA-16-260 drainage.

- Three to five boreholes will be drilled across the pond (approximately 75 ft below the outfall); drilling of the outermost boreholes is contingent on field test results for the adjacent boreholes closer to the centerline of the drainage.
- Three boreholes will be drilled along a transect where the drainage widens (approximately 320 ft below the outfall).
- Four boreholes will be drilled along a transect where a second drainage merges into the TA-16-260 line drainage from the south, providing access for the drill rig (approximately 450 ft below the outfall).

In addition, a single borehole in the center of the drainage will be drilled just below the dam of the pond (approximately 100 ft below the outfall). The placement of these boreholes, which is shown in Fig. 5.2.11.2.1-1, is based largely on logistical considerations for the remote drilling rig. If any geophysical anomalies that could be due to saturated zones are found by the geophysical survey, one or more of the boreholes proposed in this section will be resited to the location of the geophysical anomaly. The decision will to resite this borehole will be made by the field team in consultation with the Field Unit 3 technical team.

The central borehole in each transect will be drilled first (or the south-central borehole in the case of the transect 450 ft below the outfall). The total depth of contamination in that borehole, as determined by field test results, will determine the minimum depth for other boreholes in the same transect. Remaining boreholes in each transect will be drilled to at least five feet below

the depth of contamination of the center borehole, making adjustments as needed to account for the fact that the surface elevation for some of these boreholes may be several feet above the center of the drainage. No borehole will be drilled deeper than the surge bed that is expected to lie between 50 and 70 ft below the surface, or deeper than 70 ft if the surge bed is not observed. The contingent outer borehole on each end of the first transect (75 ft below the outfall) will be drilled only if field-measured contamination is encountered deeper than 12 in. in either of the two boreholes to the north and south of the center borehole.

The deepest recovered segment of each five-foot core interval in each borehole will be field screened for HE using the field spot-test kit first, followed by an RDX-sensitive immunoassay measurement if spot-test results are negative. Additional screening samples will be taken based on visual inspection that reveals anomalies such as fractured zones or wet areas. A sample for laboratory analysis will be collected in each borehole from the first 5-ft interval, from a depth of at least 24 in. Surface laboratory samples will also be collected from the two inner drilling locations in the transect at 450 ft. A laboratory sample will be collected from the first 5-ft interval below the depth of contamination in the central borehole for which the field screening results are clean. If the surge bed (or the 70-ft depth) is reached before a clean interval is observed, the second laboratory sample will be collected from this final interval, if possible from surge bed material.

Laboratory samples will be analyzed for HE, VOCs, SVOCs, and inorganics.

The outermost boreholes on the transects at 75 and 450 ft below the outfall will be drilled to the surge bed (or 70 ft) regardless of field screening results. If permitted by requirements for drilling near HE-contaminated zones, at least the lower half of those deeper boreholes will be drilled dry to permit geologic logging of the core, borehole logging, and detection of saturated zones. Laboratory samples will be collected from the bottom of each borehole (specifically, from surge bed material if that is distinguishable in the cores) to be analyzed for HE, VOCs, and inorganics. If saturated zones are found, at least one of the two deep boreholes in each transect will be completed as a potential monitoring well. Both boreholes in a transect may be completed if saturated zones are found at different depths (in stratigraphically distinct layers).

If saturated zones are encountered in any borehole, water samples will be collected for laboratory analysis for the full suite of COPCs at TA-16-260 (HE, inorganics, SVOCs) and for VOCs. One sample for field and laboratory geotechnical parameter characterization will be collected in each distinct saturated zone. These analyses may include: pH, temperature, specific conductance, alkalinity, turbidity, and dissolved oxygen, hydraulic head measurements, bulk density, saturated moisture content, saturated hydraulic conductivity, moisture retention data, and whole-rock geochemistry of rock units (for lithologic correlations).

Laboratory data will supplement data from the TA-16-260 outfall collected in RFI Phase I and as described in Section 5.2.11.2.2 to bound the volume of soil requiring remediation. Contaminant and geotechnical analyses, if obtained from saturated zones, will provide some preliminary information on subsurface transport of HE contamination away from the outfall.

5.2.11.2.4 Mesa-top Wells

Four wells will be placed at mesa-top locations in the north-central portion of TA-16, which includes the TA-16-260 area. The nominal total depth of each of these wells is 200 ft, but if a saturated zone is encountered, the wells will be completed at shallower depths so that a potentiometric surface is defined. A depth of 200 ft penetrates Unit 3 to a depth equivalent to that of the SWSC Line and Burning Ground Springs. These multipurpose wells will provide geologic logs for the TA-16 mesas, and groundwater samples if a saturated zone is encountered. They may also become long-term monitoring wells if contaminants are observed above MCLs in groundwater samples.

The default locations for these four wells are shown on Fig. 5.2.11.2.1-2. Two are sited along the SWSC line cut, which runs between TA-16-260 and the SWSC Line and Burning Ground Springs in Cañon de Valle. In the absence of more specific indications from the geophysical survey (Section 5.2.11.2.1), one of these will be located near the canyon rim, on the line between the TA-16-260 outfall and Burning Ground Spring, and the second will be located near the line from the TA-16-260 outfall and Martin Spring to the southeast. A third well will be located between the V-Site Pond and Martin Spring, southwest of TA-16-340, its precise location may be determined by the geophysics survey results. The fourth will be sited east of the 90s-Line near the 90s-Line Pond.

One of these wells, probably the southern well within the SWSC Line cut, will be continuous cored (without casing). The others will be drilled (4-in. diameter) using air rotary methods (without casing). Geologic and fracture logs will be prepared for all boreholes based on either cuttings or cores. A teleview and neutron log will be prepared for each borehole. All lithologic and geologic variations will be noted during the drilling process. Particular note will be made of fractures and other potential water pathways. The continuously cored borehole will be sampled within each distinct lithologic unit for hydrologic and geologic parameters including: bulk density, saturated moisture content, moisture content, field saturation, saturated hydraulic conductivity, moisture retention parameters, and whole-rock geochemistry of rock units (for lithologic correlations). However, if a saturated zone or perched water is encountered at shallower depths, the well will be completed as a monitoring well at that depth.

Wells completed as monitoring wells will be redrilled to 6-in. diameter and will be completed at the depth of the uppermost saturated zone with a stainless steel screen. A dedicated pump and pressure transducer will be installed and a water monitoring program will be initiated. Seasonal response of the potentiometric surface will be monitored. The pressure transducer will be installed with an automated data-logging system.

If saturated zones are encountered, field measurements on water may include pH, temperature, specific conductance, alkalinity, turbidity, dissolved oxygen, and hydraulic head measurements. Field measurements may include pump and slug tests to determine *in-situ* saturated hydraulic conductivity. Lab measurements will include saturated hydraulic conductivity, grain size distribution, effective porosity, moisture retention parameters, and bulk density. Initial water samples from such wells (collected in four consecutive quarters) will be analyzed for the full suite of potential contaminants: VOCs, SVOCs, HE, and inorganics. In addition, they will be analyzed for concentrations of cations and anions, particularly the tracer constituent bromine. These analyses will be used to determine whether COPCs exist in perched groundwater below TA-16 and to characterize groundwater pathways between TA-16 source areas and springs.

Four deep-groundwater wells to the main aquifer are scheduled for the TA-16 area as part of site-wide groundwater protection investigations. These wells will be located within Water Canyon and Cañon de Valle at West Jemez Road, at the confluence of Water Canyon and Cañon de Valle, and in Cañon de Valle near MDA-P. These wells are currently scheduled to be drilled in FY97–01, at the earliest. Data from these wells will be used to support CMS/CMS decisions for PRS 16-021(c).

5.2.11.2.5 Alluvial Wells

Two to five shallow alluvial wells will be completed in Cañon de Valle and in the steam plant outfall drainage, which drains into Cañon de Valle. Five alluvial well locations are proposed, only the first two can be accessed with a drill rig with certainty: 1) at a point upstream from MDA-P, where the existing road that skirts MDA-P to the west provides access to the canyon bottom (Fig. 5.2.11.2.1-2). 2) in the drainage from the steam plan at a location upgradient from the 90s-Line drainage (Fig. 5.2.11.2.1-2); 3) at a location upgradient of the TA-16-260 outfall drainage but downgradient of MDA-R (Fig. 5.2.11.2.1-2); 4) at a location upgradient from SWSC Line Spring in Cañon de Valle (Fig. 5.2.11.2.1-2); and 5) at a location east of MDA-P in Cañon de Valle (Fig. 5.2.11.2.1-2). If any well location is inaccessible to an appropriate drill rig, then it will not be drilled. All wells will be drilled to five feet beneath the alluvium/tuff interface.

The shallow boreholes will be completed as alluvial monitoring wells with 3–4-in.-diameter polyvinyl chloride (PVC), or suitable equivalent. Each well screen is expected to be 5–10 ft in length. Each borehole will be completed in accordance with applicable guidance from the LANL SOPs listed in Subsection 5.2.11.3 of this document.

Water samples will be collected quarterly for one year from each well and analyzed for HE, VOCs, inorganics, and anions, including bromide. These data will be used to identify COPCs and seasonal variations in Cañon de Valle alluvial water. One or more of the wells will subsequently be used as a monitoring well in evaluating the effectiveness of corrective actions at several locations, including the 90s-Line, the silver outfall (PRS 16-020), and the TA-16-260 outfall.

5.2.11.2.6 Spring Sampling and Tracer Studies

A monitoring program for TA-16 springs and seeps will be instituted. The schedule for analyses for springs and seeps at TA-16 is provided in Table 5.2.11.2.6-1. Flow rates will also be monitored. A water balance calculation relating outfall and spring discharges will be completed. This schedule will be reevaluated following the first year (FY97) of sampling. These analyses are designed both to support tracer studies (described below) and to represent ongoing monitoring of constituents in springs. Locations of springs and seeps are shown on Fig. 5.2.11.2.1-2.

TABLE 5.2.11.2.6-1

SCHEDULE FOR SPRING AND SEEP SAMPLING

Spring	Bromide	Major and trace ions	RCRA Inorganics	HE	VOCs	SVOCs
SWSC Line Spring	Weekly	Quarterly	Quarterly	Quarterly	Quarterly	Annually
Burning Ground Spring	Weekly	Quarterly	Quarterly	Quarterly	Quarterly	Annually
Martin Spring	Weekly	Quarterly	Quarterly	Quarterly	Quarterly	Annually
Peter Seep	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Annually
Fish Ladder Seep	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Annually

A potassium bromide tracer will be deployed at PRS 16-021(c) during FY97. Approximately 100 kg of potassium bromide in solution will be deployed within the trough exiting the TA-16-260 sumps. Autosamplers for SWSC Line Spring, Burning Ground Spring, and Martin Spring will also be deployed prior to injecting the tracer. Baseline bromide levels in these springs will be determined based on existing data (see Appendix C) combined with 10 additional bromide samples collected prior to potassium bromide deployment. The autosampler will collect several milliliters of spring water daily; those samples will be collected every two weeks and one sample for each week will be submitted for anion, including bromide, analysis. If bromide levels appear to be elevated relative to baseline levels, then all samples from the two-week sampling interval will be submitted for anion analysis. All samples will be preserved pending analysis of the first sample. Sampling at an individual spring will continue for at least one year, then the data will be evaluated and it will be decided whether to continue sampling. Based on the tritium model ages of spring waters (see Appendix C) bromide breakthrough is anticipated in five years or less.

5.2.11.2.7 Sediment and Water Sampling in Cañon de Valle

Sediment and water sampling in Cañon de Valle between MDA-R and a distance of 2 500 ft downstream from MDA-P is described in Subsection 5.9 of the work plan (LANL 1993, 1094). This sampling is currently scheduled to be completed during FY97. However, non-RFI sampling (see Appendix C) indicates surface water contamination at levels greater than MCLs at a distance of roughly 7 000 ft downstream from MDA-P. The currently proposed Cañon de Valle sampling will not bound the downstream extent of contamination from PRS 16-021(c) and other PRSs that drain into Cañon de Valle. Thus, additional sediment and water sampling in Cañon de Valle is proposed in this Phase II sampling and analysis plan.

The existing sampling in Cañon de Valle, which is confined to the central channel, will be augmented with samples taken in the overbank region. Three locations, selected based on a geomorphologic survey, will be sampled in overbank sediments on both the north and south banks of the Cañon de Valle channel. These samples will be analyzed for HE, inorganics, SVOCs, and VOCs.

Sediment and water samples will be collected every 1 000 ft, starting at the last point of the currently-proposed Cañon de Valle sampling plan (see Fig. 5.2.11.2.1-2). This sampling will be terminated at the first point beyond the confluence of Cañon de Valle and Water Canyon. If contamination is still present in Water Canyon, it will be deferred to the ER Canyons OU. These samples will be submitted for HE and inorganic analysis.

5.2.11.2.8 Schedule constraints

Geophysics will be completed in October following the rainy season when saturation levels in the tuff may be highest. Operations in TA-16-260 permit surface and subsurface sampling directly behind TA-16-260 only on Fridays and weekends. Drilling operations will be closely coordinated with the site operating group. Tracers will be deployed prior to winter snowmelt.

5.2.11.3 Implementation

General Sampling and Screening (5.2.11.2.1 to 5.2.11.2.7)

All samples for laboratory analysis will be collected using the most current applicable LANL-ER SOPs for the collection, preservation, identification, storage, transport, and documentation of environmental samples, as described in the ER Project QAPP (LANL 1996, 1292).

General field activities will be controlled by the following SOPs: LANL-ER-SOP-01.01, General Instruction for Field Investigations, LANL-ER-SOP-01.02, Sample Container and Preservation, LANL-ER-SOP-01.03, Handling, Packaging and Shipping of Samples, LANL-ER-SOP-01.04, Sample Control and Field Documentation, LANL-ER-SOP-01.05, Field Quality Control Samples, and LANL-ER-SOP-03.01, Land Surveying Procedures. This sampling will be governed by LANL-ER-SOP-01.07, Operational Guidelines for Taking Soil and Water Samples in Explosives Areas because of the explosives hazards at this site. Applicable site safety SOPs will also be followed.

Field screening will be completed for radionuclides with a sodium iodide detector using LANL-ER-SOP-06.23, Measurement of Gamma-ray field using a Sodium Iodide Detector and LANL-ER-SOP-10.10, Radiation Scoping Surveys, and high explosives by spot test following LANL-ER-SOP-10.06, High Explosives Spot Test.

Field activities will be documented according to LANL-ER-SOP-03.12, Field and Laboratory Notebook Documentation for Environmental Restoration Earth Sciences Studies. In particular, all field test results will be recorded, whether or not they correspond to locations and depths where laboratory samples are collected.

Decontamination of sampling equipment will be performed in accordance with LANL-ER-SOP-01.08, Field Decontamination of Drilling and Sampling Equipment. Wash water and other wastes generated during the sampling operation will be managed and disposed of in accordance with LANL-ER-AP-05.3, Management of ER Program Wastes.

Borehole samples will be transmitted to the SMO following LANL-ER-SOP-12.02, Transportation, Receipt, and Admittance of Borehole Samples for the Sample Management Facility. Non-borehole samples will follow LANL-ER-SOP-12.03, Acceptance of Non-Borehole Samples by the Sample Management Facility. Sample management facility personnel follow LANL ER-SOP-12.04, Physical Processing and Storage of Borehole Samples at the Sample Management Facility.

The Sample Management Organization tracks samples between LANL and the external laboratories and uploads laboratory and QA data into FIMAD. The field team will upload the field database information into FIMAD and will generate a post-field operations report.

Geophysical survey method(s) (5.2.11.2.1).

Geophysical studies will be completed following LANL-ER-SOP-03.02, General Surface Geophysics. Specific procedures used for the Schlumberger resistivity, electromagnetic, magnetic and any other methods used will follow the manufacturers' instructions.

Geological survey method(s) (5.2.11.2.1)

Geologic mapping will be completed following LANL-ER-SOP-03.09, Geologic Mapping of Bedrock Units. Fracture characterization will follow methods outlined in LANL-ER-SOP-03.06, Fracture Characterization. Documentation of results from these investigations will follow LANL-ER-SOP-03.12, Field and Laboratory Notebook Documentation for Environmental Restoration Earth Science Studies.

Surface and near-surface sample collection methods in outfall area (5.2.11.2.2)

Surface sampling will be completed using LANL-ER-SOP-06.09, Spade and Scoop Method for Collection of Soil Samples. Shallow subsurface sampling will be completed using LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler, where this procedure is allowed by the operating group. In HE-contaminated regions a remote auger rig is required.

Borehole drilling methods with modifications as required in HE areas (5.2.11.2.3).

Drilling at the TA-16-260 outfall will be controlled by LANL-ER-SOP-04.01, Drilling Methods and Drill Site Management. These boreholes will be drilled remotely and will be drilled wet, due to site safety requirements concerning drilling in HE-contaminated areas. Wells will be logged using LANL-ER-SOP 04.04, General Borehole Logging. Core holes will also be handled following LANL-ER-SOP-12.01, Field Logging, Handling, and Documentation of Borehole Samples.

Mesa-Top Wells and Alluvial Wells (5.2.11.2.4 and 5.2.11.2.5)

Drilling at the TA-16-260 outfall will be controlled by LANL-ER-SOP-04.01, Drilling and Drill Site Management. Core hole samples will also be handled following LANL-ER-SOP-12.01, Field Logging, Handling, and Documentation of Borehole Samples. Wells will be logged using LANL-ER-SOP 04.04, General Borehole Logging. Any mesa-top wells completed as monitoring wells will follow LANL-ER-SOP-5.01, Monitor Well Construction and LANL-ER-SOP-05.02, Well Development. Depth to saturated water will be determined using LANL-ER-SOP-07.02, Fluid Level Measurements. Slug tests for saturated hydraulic conductivity will be completed using LANL-ER-SOP-07.03, Well Slug Tests. Pump tests will be completed using LANL-ER-SOP-07.04, Aquifer Pumping Tests. Water samples from mesa-top wells will be collected using LANL-ER-SOP-06.01, Purging of Wells for Representative Sampling of Ground Water, and LANL-ER-SOP-06.02, Field Analytical Measurements of Groundwater Samples. Soil pH will be measured using LANL-ER-SOP-11.04, Soil and Core pH. Volatile organics samples of groundwater will be taken following LANL-ER-SOP-06.03, Sampling for Volatile Organics. If pressure transducers are installed in saturated zones follow LANL-ER-SOP-07.01, Pressure Transducers.

Spring and Surface water Sampling (5.2.11.2.6)

Quarterly surface water, including spring discharge, will be sampled following LANL-ER-SOP-06.13, Surface Water Sampling.

Cañon de Valle Sampling (5.2.11.2.7)

Sediment samples will be collected following LANL-ER-SOP-06.14, Sediment Material Collection. Water samples will follow LANL-ER-SOP-06.13, Surface Water Sampling.

5.2.11.4 Data Assessment

Laboratory data packages will be checked for completeness (LANL 1996, 1292). Focused validation will be performed only if verification or subsequent data assessment indicates possible problems with analytes of concern. Data packages will be retained under chain-of-custody control by the SMO.

Hydrogeologic data will be reviewed by a hydrologist and will be compared with existing data for Bandelier Tuff at LANL, particularly with data for Unit 3 and Unit 4.

5.2.11.5 Administration

Records Maps will be prepared of all sampling localities and each sample will be photographed. These maps will be based in FIMAD. Core logs based on chips or cuttings will be prepared for all core holes. Copies of field logs and other field information will be supplied to the records processing facility, together with information captured in the field database.

Reports A field summary report prepared following the field activities will be submitted to the ER records processing facility.

Field data will be preserved in a 4-D™ database and provided to FIMAD. The analytical laboratories will prepare electronic deliverables, as well as hard copy reports of the results.

Training Field personnel will complete all training as identified in the Field Unit 3 training matrix.

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APPENDIX A ANALYTICAL SUITES

Results of analyses can be found in the Facility for Information Management and Display (FIMAD). Hard copies of supporting information will be provided upon request.

Chemicals that are reported by analytical laboratories as not detected have not been included in the tables of this RFI report. Nonetheless, undetected analytes are often part of the decision-making process and it is important to note that these chemicals were analyzed for (Tables A-1 to A-6). This appendix lists the target analytes in each analytical suite included in the Tables 5.x.4.x.

TABLE A-1

INORGANIC SUITE

Aluminum	Beryllium	Cobalt	Lead	Nickel	Sodium
Antimony	Cadmium	Copper	Magnesium	Potassium	Thallium
Arsenic	Calcium	Cyanide	Manganese	Selenium	Vanadium
Barium	Chromium	Iron	Mercury	Silver	Zinc

TABLE A-2

RADIONUCLIDES

Total Uranium

TABLE A-3

VOLATILE ORGANIC COMPOUND (VOC) SUITE

Acetone	1,2-Dibromoethane	Methyl iodide
Benzene	Dibromomethane	4-Methyl-2-pentanone
Bromobenzene	1,2-Dichlorobenzene	Methylene chloride
Bromochloromethane	1,3-Dichlorobenzene	n-Propylbenzene
Bromodichloromethane	1,4-Dichlorobenzene	Styrene
Bromoform	Dichlorodifluoromethane	1,1,1,2-Tetrachloroethane
Bromomethane	1,1-Dichloroethane	1,1,2,2,-Tetrachloroethane
2-Butanone	1,2-Dichloroethane	Tetrachloroethene
n-Butylbenzene	1,1-Dichloroethene	Toluene
sec-Butylbenzene	cis-1,2-Dichloroethene	Trichlorotrifluoroethane
tert-Butylbenzene	trans-1,2-Dichloroethene	1,1,1-Trichloroethane
Carbon disulfide	1,2-Dichloropropane	1,1,2-Trichloroethane
Carbon tetrachloride	1,3-Dichloropropane	Trichloroethene
Chlorobenzene	2,2-Dichloropropane	Trichlorofluoromethane
Chlorodibromomethane	1,1-Dichloropropene	1,2,3-Trichloropropane
Chloroethane	cis-1,3-Dichloropropene	1,2,4-Trimethylbenzene
Chloroform	trans-1,3-Dichloropropene	1,3,5-Trimethylbenzene
Chloromethane	Ethylbenzene	Vinyl chloride
2-Chlorotoluene	2-Hexanone	o,m,p-Xylene (mixed)
4-Chlorotoluene	Isopropylbenzene	
1,2-Dibromo-3-chloropropane	p-Isopropyltoluene	

TABLE A-4

SEMIVOLATILE ORGANIC COMPOUND (SVOC) SUITE

Acenaphthene	Chrysene	Isophorone
Acenaphthylene	Dibenzo(a,h)anthracene	2-Methyl-4,6-dinitrophenol
Aniline	Dibenzofuran	2-Methylnaphthalene
Anthracene	1,2-Dichlorobenzene	2-Methylphenol
Azobenzene	1,3-Dichlorobenzene	4-Methylphenol
Benzo(a)anthracene	1,4-Dichlorobenzene	Naphthalene
Benzo(b)fluoranthene	3,3'-Dichlorobenzidine	2-Nitroaniline
Benzo(k)fluoranthene	2,4-Dichlorophenol	3-Nitroaniline
Benzo(g,h,i)perylene	Diethylphthalate	4-Nitroaniline
Benzo(a)pyrene	Dimethylphthalate	Nitrobenzene
Benzoic acid	Di-n-butylphthalate	2-Nitrophenol
Benzyl alcohol	Di-n-octyl phthalate	4-Nitrophenol
Bis(2-chloroethoxy)methane	2,4-Dimethylphenol	N-Nitrosodimethylamine
Bis(2-chloroethyl)ether	2,4-Dinitrophenol	N-Nitrosodiphenylamine
Bis(2-chloroisopropyl)ether	2,4-Dinitrotoluene	N-Nitroso-di-n-propylamine
Bis(2-ethylhexyl)phthalate	2,6-Dinitrotoluene	Pentachlorophenol
4-Bromophenylphenyl ether	Fluoranthene	Phenanthrene
Butylbenzylphthalate	Fluorene	Phenol
4-Chloroaniline	Hexachlorobenzene	Pyrene
4-Chloro-3-methylphenol	Hexachlorobutadiene	1,2,4-Trichlorobenzene
2-Chloronaphthalene	Hexachlorocyclopentadiene	2,4,5-Trichlorophenol
2-Chlorophenol	Hexachloroethane	2,4,6-Trichlorophenol
4-Chlorophenylphenyl ether	Indeno(1,2,3-cd)pyrene	

TABLE A-5

PESTICIDE AND POLYCHLORINATED BIPHENYL SUITES

gamma-BHC (Lindane)	Heptachlor epoxide
Chlordane	Methoxychlor
Endrin	Toxaphene
Heptachlor	

TABLE A-6

HIGH EXPLOSIVES SUITE

2, Amino-4,6-Dinitrotoluene	HMX	RDX
4, Amino-2,6-Dinitrotoluene	Nitrobenzene	Tetryl
1,3 Dinitrobenzene	2-Nitrotoluene	1,3,5-Trinitrobenzene
2,4 Dinitrotoluene	3-Nitrotoluene	2,4,6-Trinitrotoluene
2,6 Dinitrotoluene	4-Nitrotoluene	

APPENDIX B DATA VALIDATION

The following tables summarize the results of quality assurance/quality control data validation for all analytical results used to support recommendations in this RFI report. Tables are presented in order of request number for each sample delivery group sent for laboratory analysis. Request numbers for each PRS are cited in Subsection 5.X.4 in Table 5.X.4-1.

TABLE B-1

DATA VALIDATION TABLE FOR INORGANIC SAMPLES

SUITE[a]	REQUEST NUMBER	COMMENTS
Inorganics	564	Spike recoveries for manganese and zinc were outside the acceptable value of 125%. All manganese and zinc data were qualified as J+[b]. Spike recoveries for selenium and arsenic were below the acceptable value of 75%. All selenium data were qualified as UJ[c]. All arsenic data were qualified as J-[d]. Duplicate recovery for aluminum, barium, chromium, copper, iron, zinc, and manganese was outside the acceptable 20% range. This did not affect the quality of the data for the purposes of this report. All data are considered valid.
Inorganics	978	Spike recovery for barium was outside the acceptable value of 125%. All barium data were qualified as J+. Spike recovery for selenium was below the acceptable value of 75%. All selenium data were qualified as UJ. Matrix spike criteria for lead were not met in sample 0316-95-0110, but this does not affect the quality of the data for the purposes of this report. Duplicate recovery for barium, lead, and manganese was outside the acceptable 20% range. This did not affect the quality of the data for the purposes of this report. All data were accepted as valid with qualification.
Inorganics	1106	Calibration blank for mercury was out of control. All mercury values were less than five times the value found in the blank and thus U-qualified. Spike recovery for selenium and cyanide was outside the acceptable range. However, all selenium and cyanide data were below the detection limit and thus qualified as UJ. All data were accepted as valid with qualification.
Inorganics	1174	Duplicate recovery for aluminum, chromium, iron, manganese, and zinc was outside the acceptable 20% range. This did not affect the quality of the data for the purposes of this report. All data are valid.
Inorganics	1204	Duplicate recovery for cobalt, copper, manganese, nickel, and zinc was outside the acceptable 20% range and qualified as P[e]. This did not affect the quality of the data for the purposes of this report. Spike recovery for lead, nickel, and zinc was well above the recommended 125%. These data were qualified as J+. The spike recovery for selenium was 66%, but all selenium values were below the detection limit and thus qualified as UJ. All data are valid as qualified.
Inorganics	1223	Spike recovery for selenium was 45% and all selenium data were UJ-qualified. Spike recovery for arsenic and barium was lower than the acceptable 75% and all arsenic and barium data were qualified as estimated with a low bias (J-). Duplicate recovery for barium, lead, and calcium was outside the acceptable 20% range. This did not affect the quality of the data for the purposes of this report. All data were accepted as valid with qualification.
Inorganics	1269	Duplicate recovery for chromium and iron was outside the acceptable 20% range. This did not affect the quality of the data for the purposes of this report. All data for this report are considered valid. (Samples 0316-95-0164 and -0165 had chromium values near the action levels and should be J-qualified.)
TU[f]	565	All data are valid.
TU	979	All data are valid.
TU	1108	All data are valid.
TU	1175	All data are valid.
TU	1205	All data are valid.
TU	1224	All data are valid.
TU	1270	All data are valid.
Inorganic TCLP[g]	563	All data are valid.

[a] This is a table reference text.
[b] J+ = The analyte was positively identified, and the result is likely to be biased high.
[c] UJ = The analyte was not positively identified in the sample, and the associated value is an estimate of the sample-specific EQL/EDL.
[d] J- = The analyte was positively identified, and the result is likely to be biased low.
[e] P = Professional judgment should be applied to using the data in decision making.
[f] TU = Total uranium.
[g] Inorganic TCLP = Inorganic toxicity characteristic leaching procedure.

TABLE B-2

DATA VALIDATION TABLE FOR ORGANIC SAMPLES

SUITE	REQUEST NUMBER	COMMENTS
VOCs	1102	Acetone, trichlorofluoromethane, and methylene chloride were found in the blank analysis. These analytes were qualified as U[a] in all samples because sample contained less than 10 times the concentration found in the blank. All data are valid.
VOCs	1173	One internal standard did not meet QC criteria for all samples. Sample 0316-95-0046 had three internal standards that did not meet QC criteria. Surrogate recovery was poor in all samples. Samples 0316-95-0044 through -0046 were reanalyzed. The reanalyzed results should be considered valid and the original results invalid. Methylene chloride was present in the method blank due to lab contamination.
VOCs	1222	Acetone, trichlorofluoromethane, and methylene chloride were found in the blank analysis. These analytes were qualified as U in all samples because sample contained less than 10 times the concentration found in the blank. All data are valid.
HE	563	Data considered valid.
HE	972	All data are valid for the purposes of this report.
HE	1102	Data are considered valid for the purposes of this report.
HE	1173	Samples were extracted and analyzed twice. The first extraction showed high concentrations of HE that may have saturated the extract. The second analysis showed that extract was not saturated. The first set of analytical results are valid without qualification.
HE	1203	Data are considered valid for the purposes of this report.
HE	1222	Data are considered valid for the purposes of this report.
HE	1268	Lab control sample recovery was poor. Data are considered valid for the purposes of this report.
Pesticides	563	Validation incorrectly indicated that holding times were missed. Data were qualified PM[b] as a results. Data are valid without qualification.
SVOCs	563	Phthalate contamination of method blank due to lab contamination. Internal standards did not meet QC criteria. As a result, some data are PM-qualified. For the purposes of this report, data are considered acceptable.
SVOCs	972	Phthalate contamination of method blank due to lab contamination. All data are valid.
SVOCs	1102	Phthalate contamination of blank due to lab contamination. Phthalate data qualified as U because it was below 10 times the detection limit One internal standard for sample 316-95-0048 was below the acceptable 50% level and some undetected compounds were qualified as UJ[c]. One internal standard for sample 0316-95-0051 was significantly below the acceptable 50% level and some undetected compounds were rejected.
SVOCs	1173	All data are valid.
SVOCs	1203	Phthalate contamination of method blank. All data are valid.
SVOCs	1222	Phthalate contamination of method blank due to lab contamination. Sample 0316-95-0024 missed holding times by one day. Usability of data was not affected. QC results within allowable limits; all data are valid.
SVOCs	1268	All data are valid.
SVOCs TCLP[d]	563	All data are valid.

[a] U = The analyte was not positively identified in the samples and the associated value is the sample-specific EQL/EDL.
[b] PM = Professional judgment should be applied to using the data in decision-making. A manual review of the raw data is recommended.
[c] UJ = The analyte was not positively identified in the sample, and the associated value is an estimate of the sample-specific EQL/EDL.
[d] SVOCs TCLP = Semivolatile organics toxicity characteristic leaching procedure.

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APPENDIX C PRELIMINARY ENVIRONMENTAL GEOCHEMISTRY OF SURFACE AND SPRING WATERS AT TA-16, LOS ALAMOS NATIONAL LABORATORY, NEW MEXICO

1.0 INTRODUCTION

This appendix provides chemical data and preliminary interpretations of the data for spring, surface, and outfall waters collected in the high explosives (HE) area at Technical Area (TA)-16, Los Alamos National Laboratory (LANL), New Mexico. These data are compared with data from background springs issuing from similar rock units in the Jemez Mountains. These data are provided in this Resource Conservation and Recovery Act (RCRA) Facilities Investigation (RFI) report because PRS 16-021(c) is the most likely source of contamination found in surface and groundwaters at TA-16. The primary constituents of concern are listed in Table C-1. These are constituents that were consistently found at levels greater than regional backgrounds and that, in some cases, exceed screening action levels (SALs).

TABLE C-1

CONTAMINANTS OF CONCERN IN THE SPRINGS AND SEEPS AT TA-16

SPRING/SEEP	BANDELIER TUFF UNIT	CONSTITUENTS
Burning Ground Spring	3	Barium, HMX, RDX
Fish Ladder Seep	3	Barium, HMX, RDX
Martin Spring	4	Barium, boron, HMX, RDX
Peter Seep	3	Barium[a]
SWSC Line Spring	3	Barium, HMX, RDX

[a] Peter seep was not analyzed for high explosives.

2.0 METHODS AND PROCEDURES

TA-16 water sampling began in April 1994 and has continued through fiscal year (FY) 1996. Surface water sampling in canyons and outfalls began in March 1995 and also has continued through FY96. All spring, outfall, surface water, and assorted sampling locations are shown in Fig. C-1 and C-2. All TA-16 springs issue from the Upper Bandelier Tuff. Two springs, Burning Ground and SWSC Line, appear to issue from Tshirege Subunit 3, and one spring, Martin Spring, appears to issue from Tshirege Subunit 4. Two sets of background spring analyses were chosen from the literature for comparison with the TA-16 data. Background springs were chosen to represent water that is "pre laboratory" in composition. These springs are located on and around the Pajarito Plateau but away from LANL, and issue from the Bandelier Tuff or similar volcanic rock units. Locations of these background springs are shown in Blake et al., 1995 (1355). These springs were also chosen because they are relatively dilute, have a neutral pH, and low temperatures (5–15°C). In addition, many of these springs have shown relatively constant abundances of background constituents over the last 20 years or more of sampling. One set of data was collected from July 1974 through April 1979, and the second set was collected from May 1987 through October 1991. Three springs in the background set were resampled in April 1996.

The waters discussed in this appendix were sampled by two organizations. Analyses labeled with NMED were collected by the New Mexico Environment Department (NMED) Agreement in Principle Group (Dale et al. in press, 15-16-630). Their samples were submitted to external Environmental Protection agency (EPA)-qualified laboratories for analysis using SW-846 methods. All other samples were collected by LANL Earth and Environmental Sciences (EES)-1 group. EES-1 procedures for sampling are as follows. Four sample splits are taken at each site. Two chemistry samples are taken, both in 125 ml polyethylene bottles, and sealed with Polyseal™ caps. These samples are filtered with 0.45 µm filter paper using a hand-operated vacuum pump. One sample is acidified with nitric acid to a pH less than two, and the other is not acidified. Two samples are left unfiltered and unacidified, one collected in a 500 ml polyethylene bottle for tritium analysis, and the other in a 30 ml glass bottle for stable isotope analysis. Both are capped with Polyseal™ caps. A colorimetric HE spot test was performed on unfiltered waters before removing samples from the high explosives area at TA-16. The detection limits of the HE spot test are at levels such that a positive reading for HE indicates a sample with contamination at a level above its SAL.

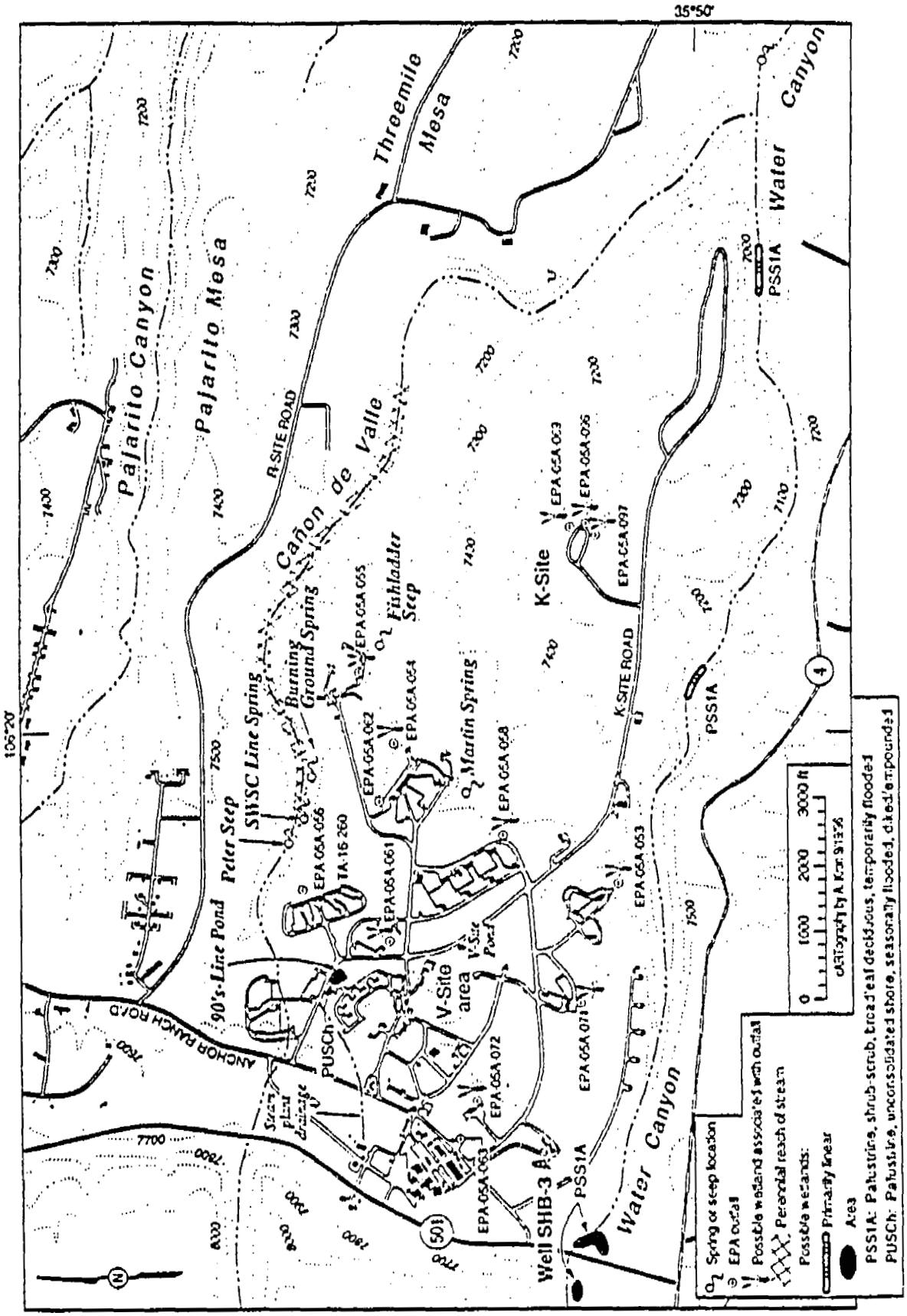

Fig. C-1. Spring, surface water and assorted sampling locations.

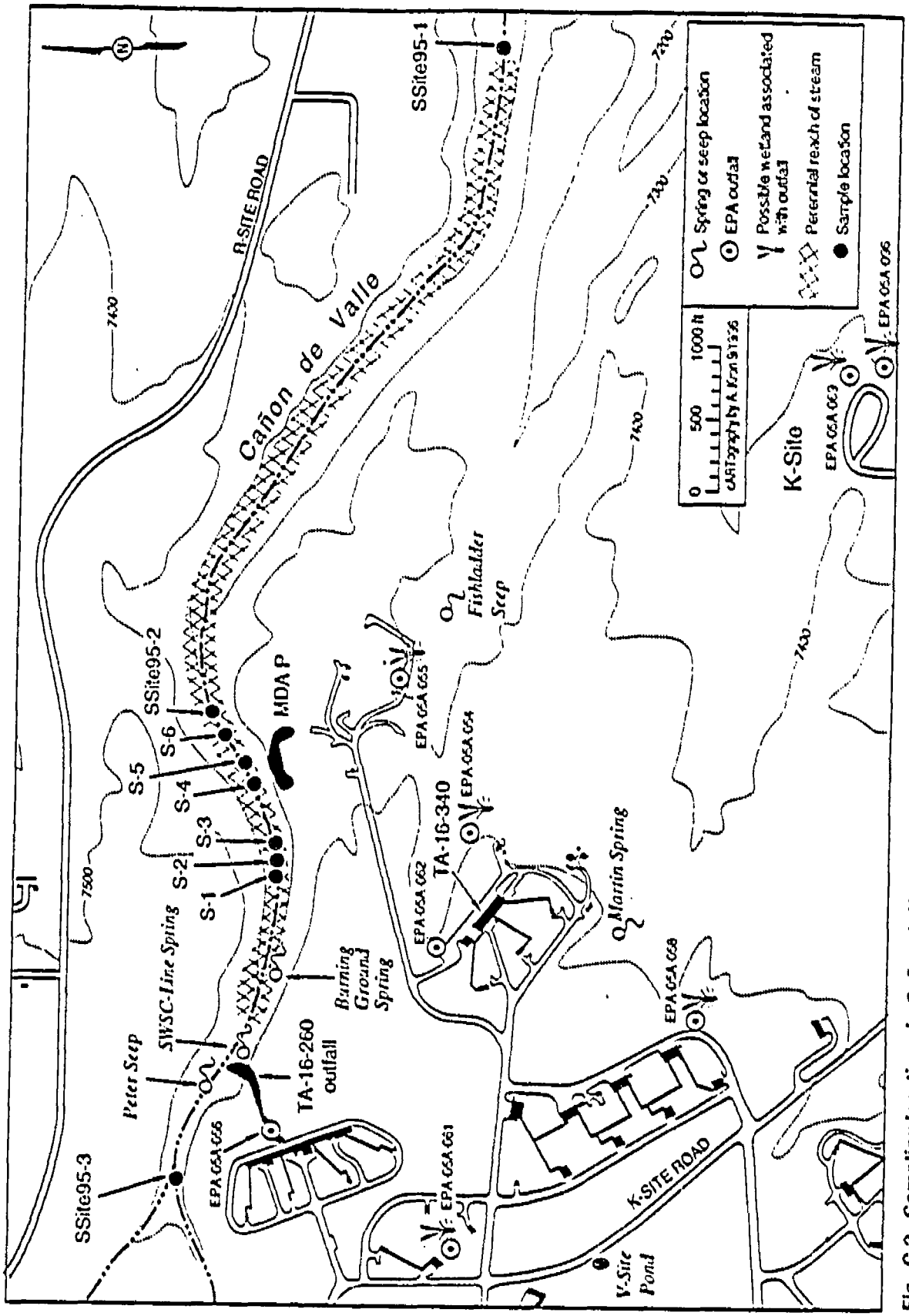

Fig. C-2. Sampling locations in Cañon de Valle.

Waters were analyzed for selected metals, anions, cations, and high explosives. For the EES-1 samples, methods of analysis and detection limits for all constituents are outlined in Table C-2. Analytes consistently below detection limits were not reported in the tables. Other analyses include tritium by the Tritium Laboratory at the University in Miami, Florida, and deuterium and oxygen-18 by Western Michigan University in Kalamazoo, Michigan. Four springs sampled by NMED were analyzed for organic constituents.

TABLE C-2

METHODS OF CHEMICAL ANALYSIS AND DETECTION LIMITS (ppm) FOR WATER SAMPLES

ANALYTE	METHOD	DETECTION LIMIT
Ag	GFAA[a]	0.0005
Al	ICP-AES[b]	0.01
As	Hydride AA[c]	0.001
B	ICP-AES	0.01
Ba	ICP-AES	0.01
Be	ICP-AES	0.002
Br	IC[d]	0.02
Ca	ICP-AES	0.01
Cd	GFAA	0.0002
Cl	IC	0.01
Co	GFAA	0.002
CO_3/HCO_3	Titration	0.5
Conductivity	Electrode	0.5
Cr	GFAA	0.002
Cs	GFAA	0.002
Cu	GFAA	0.002
F	IC	0.01
Fe	ICP-AES	0.01
Hg	Cold vapor AA	0.0002
I	IC	0.01
K	ICP-AES	0.2
Li	ICP-AES	0.01
Mg	ICP-AES	0.01
Mn	ICP-AES	0.01

ANALYTE	METHOD	DETECTION LIMIT
Mo	GFAA	0.002
Na	ICP-AES	0.05
NH_4	Electrode	0.02
Ni	GFAA	0.002
NO_2	IC	0.02
NO_3	IC	0.02
Pb	GFAA	0.002
pH	Electrode	0.01
PO_4	IC	0.05
Rb	GFAA	0.002
Sb	Hydride AA	0.001
Se	Hydride AA	0.001
Si	ICP-AES	0.02
SO_4	IC	0.02
S_2O_3	IC	0.01
Sr	ICP-AES	0.01
Ti	ICP-AES	0.002
V	ICP-AES	0.002
Zn	ICP-AES	0.005
HMX	HPLC[e]	0.02
NQ	HPLC	0.01
PETN	HPLC	0.05
RDX	HPLC	0.01
TNT	HPLC	0.01

[a] GFAA = Graphite furnace atomic absorption spectoscopy.
[b] ICP-AES = Inductively coupled plasma atomic emission spectroscopy.
[c] AA = Atomic absorption spectroscopy.
[d] IC = Ion chromatography.
[e] HPLC = High pressure liquid chromatography.

3.0 FLUID GEOCHEMISTRY

All major and minor element chemical analyses are listed in Tables C-3 and C-4. High explosives are listed in Table C-5, stable isotopes and tritium values are listed in Table C-6, and organic analyses are listed in Table C-7. SALs for each constituent are listed at the top of the HE table.

TA-16 spring data (Fig. C-1) were compared with background spring data, which are presumably free of anthropogenic contamination. Even though TA-16 waters issue from rock units similar to the background suite, the major-element water chemistries are different. Elements not of concern, but higher than background, at TA-16 include sodium, chloride, calcium, and magnesium. Sodium and chloride are possibly derived from road salt.

Boron is found in many TA-16 springs at levels above regional background. The high boron concentrations are possibly linked to the use of Boracitol, an explosive composed of boric acid and TNT used historically at TA-16 (specifically at V-Site, Fig. C-1). However, boron is also found in warmer and deeper ground waters due to water-rock interactions (Blake et al. 1995, 1355). However, it is unlikely that a connection exists between a deep aquifer and the TA-16 springs due to the differences in isotopic compositions between TA-16 waters and deep groundwaters. Because the detection limit for boron has decreased since the majority of background sampling occurred, only analyses of four background waters show detectable boron. All 1996 background samples have boron values below 0.013 ppm. Even though boron concentrations in TA-16 waters fall below SAL, the majority of the waters show boron exceeding background levels. Boron concentrations in Martin Spring (1.4—1.8 ppm) are anomalously high relative to other springs and surface waters at TA-16. These data suggest interaction of shallow groundwaters with leachable boron found in soils in the vadose zone and suggest a different source for Martin Spring than for the other springs at TA-16. Anthropogenic boron has been found in other LANL waters such as a spring at TA-21 (Blake et al. 1995,1355 Broxton and Eller 1995, 1162).

Analytes above SALs in TA-16 waters include barium, manganese, and RDX. Barium is elevated above background in all TA-16 waters except for the outfall waters collected at buildings TA-16-300, TA-16-340 and TA-16-222. High barium is related to the use of Baratol, an explosive made from barium nitrate and TNT that was used extensively site-wide in many explosive components from 1945 through the 1950s. In addition to the remobilization of barium from the soil in the outfall at PRS 16-021(c), discharges from the TA-16-260 outfall (0.5 ppm) are a potential source for elevated levels of barium in Burning Ground and SWSC Line springs

TABLE C-3

MAJOR ELEMENTS OF TA-16 WATERS

SAMPLE ID	DESCRIPTION	DATE	BORON (ppm)	BROMINE (ppm)	CALCIUM (ppm)	CHLORINE (ppm)	FLUORINE (ppm)	HYDROGEN CARBONATE (ppm)	LITHIUM (ppm)	MAGNESIUM (ppm)	POTASSIUM (ppm)	SODIUM (ppm)	SILICATE (ppm) calc	SULFATE (ppm)	STRONTIUM (ppm)	TOTAL DISSOLVED SOLVENTS (ppm)	CATION SUM	ANION SUM
Springs/Seeps																		
FP94 50	Burning Ground Spring	4/15/94	0.01	0.08	19.7	21.8	0.20	87.4	<0.01	4.66	3.50	21.4	43.66	8.31	0.14	220.5	2.451	2.273
NMED	Burning Ground Spring	8/12/94	<0.1	NA*	20	15	0.2	92	NA	4.9	5	19	NC*	10	0.1	NC	NC	NC
NMED	Burning Ground Spring	3/17/95	<0.01	<0.4	14	19	<0.5	85	<0.01	4.5	3	25	NC	30	<0.01	180	NC	NC
SSite95-5	Burning Ground Spring	3/01/96	0.021	0.09	17.5	16.6	0.16	104	<0.01	5.03	3.33	25.4	47.72	9.84	0.11	206.8	0.121	4.651
SSite95-17	Burning Ground Spring	4/10/96	0.021	0.07	16.4	14.3	0.14	100	<0.01	4.71	3.26	24.0	46.44	9.02	0.11	223.8	2.335	2.313
NMED	Martin Spring	5/12/95	1.4	<0.5	24	19	<0.5	104	<0.01	6	3	22	NC	20	0.12	200	NC	NC
FP95-132	Martin Spring	7/21/95	1.58	0.13	24.6	20.2	0.61	122	0.01	5.71	3.31	30.9	47.08	17.9	0.13	250.2	3.164	3.253
SSite95-4	Martin Spring	3/01/96	1.81	0.16	28.1	20.6	0.75	133	0.01	6.45	2.83	34.1	51.36	20.7	0.14	275.3	0.552	6.047
SSite95-15	Martin Spring	4/10/96	1.81	0.16	28.1	20.3	0.67	137	0.01	6.47	2.65	36.4	52.00	21.0	0.16	325.9	3.618	3.675
FP94-74	SWSC Spring	8/12/94	0.026	0.09	19.4	17.3	0.18	92.9	<0.01	4.97	3.04	20.2	45.37	10.2	0.13	219	2.318	2.322
NMED	SWSC Spring	8/12/94	<0.1	NA	19	15	0.2	90	NA	5.4	5	19	NC	10	0.1	NC	NC	NC
NMED	SWSC Spring	3/17/95	<0.01	<0.4	15	19	<0.5	80	<0.01	4.8	3	24	NC	31	<0.01	174	NC	NC
SSite95-18	SWSC Spring	4/10/96	0.023	0.09	15.3	14.3	0.13	100	<0.01	4.83	3.26	24.8	46.44	9.18	0.11	225.2	2.419	2.324
SSite95-6	SWSC Spring	3/01/96	0.033	0.10	18.2	16.8	0.16	104	<0.01	5.19	3.33	25.4	44.94	10.1	0.12	205.6	0.132	4.651
NMED	Fish Ladder Seep	6/2/95	0.2	NA	4	7	<0.5	25	0.02	1	<1	12	NC	84	0.04	250	NC	NC
SSite95-11	Fish Ladder Seep	3/27/95	0.045	<0.01	5.44	5.21	0.07	11.5	0.04	1.63	3.10	9.36	72.55	17.7	0.04	130.2	1.141	0.709
NMED	Peter Seep	6/2/95	0.04	NA	15	16	<0.5	83	<0.01	4	3	16	NC	19	0.11	140	NC	NC
Outfalls																		
—	260 outfall	—	0.02	NA	11	NA	NA	NA	NA	3	NA	NA	NC	NA	0.05	NC	NC	NC
FP95-133	300 outfall	7/21/95	0.035	<0.02	8.95	2.55	0.20	64	0.02	2.21	2.25	10.8	63.56	1.82	0.05	159.2	1.226	1.137
—	300 outfall	—	0.02	NA	9	NA	NA	NA	NA	3	NA	NA	NC	NA	0.05	NC	NC	NC
—	340 outfall	—	0.02	NA	10	NA	NA	NA	NA	4	NA	NA	NC	NA	0.05	NC	NC	NC
SSite95-10	340 outfall	3/27/95	0.021	0.04	11.1	2.94	0.21	67.6	0.03	3.68	2.58	12.7	84.32	2.32	0.05	195.5	1.436	1.500
SSite95-21	Silver outfall	4/10/96	0.020	0.04	9.09	2.63	0.18	66.5	0.03	3.03	2.31	11.7	81.32	3.75	0.04	183.7	1.306	1.236
Creeks																		
FP95-134	300 line Canyon TA-16	7/21/95	0.21	0.03	13.4	3.73	0.21	83	0.01	3.41	5.36	13.6	33.17	5.16	0.09	163.2	1.741	1.609
SSite95-1	Cañon de Valle Creek	3/17/95	0.038	0.03	13.5	15.8	0.14	63.9	<0.01	4.12	3.08	18.2	23.10	15.5	0.13	175.5	1.933	1.653
SSite95-2	Cañon de Valle Creek	3/17/95	0.033	0.07	14.8	20.9	0.20	81.0	<0.01	4.43	3.24	22.1	35.74	9.78	0.11	196.8	2.222	2.143
SSite95-3	Cañon de Valle Creek	3/17/95	0.015	0.08	13.6	22.9	0.27	92.6	<0.01	5.43	3.63	22.7	47.08	11.1	0.12	233.6	2.583	2.47
MDA P S-1	Cañon de Valle Creek	4/94	NA	NA	19	NA	NA	NA	NA	5.6	3	21	NC	NA	NA	NC	NC	NC
MDA P S-2	Cañon de Valle Creek	4/94	NA	NA	19	NA	NA	NA	NA	5.5	3.1	20	NC	NA	NA	NC	NC	NC
MDA P S-3	Cañon de Valle Creek	4/94	NA	NA	19	NA	NA	NA	NA	5.5	2.5	20	NC	NA	NA	NC	NC	NC
MDA P S-4	Cañon de Valle Creek	4/94	NA	NA	18	NA	NA	NA	NA	5.3	2.7	20	NC	NA	NA	NC	NC	NC
MDA P S-5	Cañon de Valle Creek	4/94	NA	NA	18	NA	NA	NA	NA	5.2	2.8	20	NC	NA	NA	NC	NC	NC
MDA P S-6	Cañon de Valle Creek	4/94	NA	NA	17	NA	NA	NA	NA	5.1	2.5	20	NC	NA	NA	NC	NC	NC
FP94 52	Sheamen, Cañon de Valle	4/15/94	<0.01	<0.02	7.56	1.50	0.04	33.0	<0.01	2.26	1.47	3.29	25.89	3.33	0.07	84.4	0.827	0.733
FP94 51	Werlbox, Cañon de Valle	4/15/94	0.04	0.07	15.5	13.8	0.23	82.0	<0.01	4.09	2.83	20.0	35.31	7.76	0.14	131.3	2.147	2.075

TABLE C-3 (CONTINUED)

MAJOR ELEMENTS OF TA-16 WATERS

SAMPLE ID	DESCRIPTION	DATE	BORON (ppm)	BROMINE (ppm)	CALCIUM (ppm)	CHLORINE (ppm)	FLUORINE (ppm)	HYDROGEN CARBONATE (ppm)	LITHIUM (ppm)	MAGNESIUM (ppm)	POTASSIUM (ppm)	SODIUM (ppm)	SILICATE (ppm) calc	SULFATE (ppm)	STRONTIUM (ppm)	TOTAL DISSOLVED SOLVENTS (ppm)	CATION SUM	ANION SUM
Associated locations																		
SSrte55-8	90s fire Drainage	3/05/96	0.043	0.12	91.3	16.7	0.74	311	0.04	2.20	6.24	134	145.73	17.5	0.05	636.0	0.069	14.453
SSrte55-19	90s fire Drainage	4/10/96	0.006	0.10	13.3	27.8	0.61	345	0.06	2.36	7.97	154	150.23	13.7	0.07	743.4	7.751	7.636
SSrte55-9	90s fire Pond	3/05/96	0.007	0.01	5.06	0.93	0.14	237	<0.01	1.12	2.71	176	3.60	0.84	0.05	543	0.025	1.130
SSrte55-20	90s fire Pond	4/10/96	0.017	<0.01	7.42	1.26	0.18	322	<0.01	1.27	4.12	2.63	5.84	0.81	0.07	538	0.873	0.591
FP95-135	K-Site	7/21/95	0.74	0.11	15.3	15.4	0.28	85	0.01	3.54	8.90	24.4	23.96	14.2	0.09	208.3	2.525	2.327
SHB 3	TA-16 well	7/26/93	0.09	0.02	16	7.54	0.28	0	0.04	0.85	15.50	24	82.45	7.54	0.2	205.7	2.33	2.284
SSrte55-7	WWTP	3/05/96	0.022	0.03	30.2	21.6	0.30	101	0.04	9.17	9.65	117	76.61	3.60	0.14	319.5	0.411	4.751
SSrte55-16	WWTP	4/10/96	0.017	<0.01	23.5	13.6	0.11	932	0.02	7.87	6.03	60.9	83.03	3.06	0.11	440.1	5.677	5.452
Background springs																		
SSrte55-13	Apache Spring	4/05/96	0.005	0.01	13.9	7.72	0.04	65.0	<0.01	4.86	4.75	9.77	56.07	5.93	0.10	171.1	1.532	1.458
46	Cold Spring west cal	6/1/80	0.73	0.06	12	1.9	0.25	537	0.03	1.5	3	8	30.00	5.5	0.06	NC	NC	NC
62	Frijoles Spring #13	5/22/91	<0.01	<0.02	8	14	0.33	37	<0.01	2.56	2.9	6.8	17.00	3.85	0.09	NC	NC	NC
63	Frijoles Spring #50	5/22/91	<0.01	<0.02	7.9	6.11	0.04	536	<0.01	3.71	2.5	7.2	25.00	2.66	0.07	NC	NC	NC
66	Pine Spring	5/24/91	<0.01	<0.02	10.7	1.47	0.06	61	<0.01	3.55	3.6	6.4	25.00	7.7	0.08	NC	NC	NC
0	Pine Spring	3/20/95	0.02	<0.4	11	<5	<0.5	NA	0.01	3.6	3	5.1	NC	6.6	0.09	NC	NC	NC
0	Pine Spring	10/18/95	<0.1	NA	13	2	<0.2	48	<0.01	3	3	6	NC	<10	0.07	NC	NC	NC
44	Seven Springs	10/1/79	<0.03	NA	12.3	3.6	0.21	43	0.018	1.54	2.1	7.23	41.00	8.7	0.071	NC	NC	NC
44	Seven Springs	5/1/83	NA	0.27	11	1.9	0.25	537	0.05	1.4	4	8	30.00	5.9	0.06	NC	NC	NC
76	Seven Springs	5/10/91	<0.02	<0.02	12.9	1.22	0.16	61	<0.01	1.71	2.4	6.3	31.00	3.65	0.06	NC	NC	NC
SSrte55-12	Seven Springs	4/3/95	0.013	<0.01	12.5	1.85	0.12	535	<0.01	1.63	2.13	7.26	31.03	4.03	0.06	121.5	1.143	1.137
52	Unnamed Cold	7/1/83	<0.01	<0.2	10.6	7.1	0.3	75	0.024	3.4	3.1	9.4	65.00	3.4	0.043	NC	NC	NC
53	Unnamed Cold	7/1/83	<0.01	<0.2	10.4	7.5	0.35	73	0.024	3.4	3.2	9	69.00	2.4	0.031	NC	NC	NC
67	Unnamed Spring	5/28/91	<0.01	<0.02	9.1	1.34	0.14	561	<0.01	2.44	4.6	7	21.00	5.73	0.05	NC	NC	NC
63	Unnamed Spring	5/10/93	<0.05	0.02	11.4	4.33	0.34	608	0.03	2.9	2.49	16.2	60.10	4.04	0.1	NC	NC	NC
1	Water Canyon Gallery	8/1/78	<0.05	NA	7	NA	0.12	62	0.02	3.3	1.4	5.8	43.00	NA	0.05	NC	NC	NC
25	Water Canyon Gallery	8/18/92	<0.05	<0.02	7.2	0.64	0.05	528	<0.01	3.05	1.72	6.3	43.70	1.05	0.07	NC	NC	NC
25	Water Canyon Gallery	5/20/93	<0.01	0.01	6.94	0.03	0.06	446	0.01	2.73	1.73	4.9	35.60	2.85	0.07	NC	NC	NC
SSrte55-14	Water Canyon Gallery	4/03/96	0.004	<0.01	6.13	0.77	0.03	459	0.02	3.15	1.75	5.93	44.30	1.20	0.05	113.6	0.900	0.865

[a] NA = Not analyzed.
[b] NC = Not calculated

TABLE C-4

MINOR ELEMENTS OF TA-16 WATERS

SAMPLE ID	DESCRIPTION	DATE	SILVER (ppm)	ALUMINUM (ppm)	ARSENIC (ppm)	BARIUM (ppm)	CADMIUM (ppm)	COBALT (ppm)	CHROMIUM (ppm)	CESIUM (ppm)	COPPER (ppm)	IRON (ppm)	MERCURY (ppm)	IODINE (ppm)	MANGANESE (ppm)	MOLYBDENUM (ppm)	AMMONIUM (ppm)	NICKEL (ppm)	NITRITE (ppm)	NITRATE (ppm)	LEAD (ppm)	PHOSPHATE (ppm)	RUBIDIUM (ppm)	ANTIMONY (ppm)	SELENIUM (ppm)	[illegible] (ppm)	ZINC (ppm)
Springs/Seeps																											
[illegible]	Burning Ground Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
NMED	Burning Ground Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	NA	[illegible]	NA	[illegible]	[illegible]	NA	NA	NA	[illegible]	NA	[illegible]
NMED	Burning Ground Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	NA	[illegible]	NA	[illegible]	[illegible]	NA	NA	NA	[illegible]	NA	[illegible]
[illegible]	Burning Ground Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Burning Ground Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
NMED	Martin Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	NA	[illegible]	NA	NA	[illegible]	NA	NA	NA	[illegible]	NA	[illegible]
[illegible]	Martin Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Martin Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Martin Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	SWSC Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
NMED	SWSC Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	NA	[illegible]	NA	NA	[illegible]	NA	NA	NA	[illegible]	NA	[illegible]
NMED	SWSC Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	NA	[illegible]	NA	NA	[illegible]	NA	NA	NA	[illegible]	NA	[illegible]
[illegible]	SWSC Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	SWSC Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
NMED	Fish Ladder Seep	[illegible]	[illegible]	1	[illegible]	17	[illegible]	[illegible]	[illegible]	NA	[illegible]	1	[illegible]	NA	[illegible]	[illegible]	NA	[illegible]	NA	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	NA	[illegible]
[illegible]	Fish Ladder Seep	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
NMED	[illegible] Seep	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	NA	[illegible]	NA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	NA	[illegible]
[illegible]																											
—	[illegible] Outfall	—	NA	NA	NA	[illegible]	NA	NA	NA	NA	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
[illegible]	[illegible] Outfall	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
—	[illegible] Outfall	—	NA	NA	NA	NA	NA	NA	NA	NA	[illegible]	NA	NA	NA	NA	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
—	[illegible] Outfall	—	NA	NA	NA	NA	NA	NA	NA	NA	[illegible]	NA	NA	NA	NA	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
[illegible]	[illegible] Outfall	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] Outfall	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Streams																											
[illegible]	[illegible] Canyon TA-16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Cañon de Valle Creek	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Cañon de Valle Creek	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Cañon de Valle Creek	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MCAPS 1	Cañon de Valle Creek	[illegible]	NA[a]	[illegible]	ND	3	ND	ND	ND	NA	ND	ND	ND	NA	ND	NA	NA	ND	NA	[illegible]	ND	NA	NA	ND	ND	NA	ND
MCAPS 2	Cañon de Valle Creek	[illegible]	ND	[illegible]	ND	3	ND	ND	ND	NA	ND	[illegible]	ND	NA	ND	NA	NA	ND	NA	[illegible]	ND	NA	NA	ND	ND	NA	ND
MCAPS 3	Cañon de Valle Creek	[illegible]	ND	[illegible]	ND	[illegible]	ND	ND	ND	NA	ND	[illegible]	ND	NA	ND	NA	NA	ND	NA	ND	ND	NA	NA	ND	ND	NA	ND
MCAPS 4	Cañon de Valle Creek	[illegible]	ND	[illegible]	ND	[illegible]	ND	ND	ND	NA	ND	[illegible]	ND	NA	ND	NA	NA	ND	NA	ND	ND	NA	NA	ND	ND	NA	ND
MCAPS 5	Cañon de Valle Creek	[illegible]	ND	[illegible]	ND	[illegible]	ND	ND	ND	NA	ND	ND	ND	NA	ND	NA	NA	ND	NA	ND	ND	NA	NA	ND	ND	NA	ND
MCAPS 6	Cañon de Valle Creek	[illegible]	ND	ND	ND	[illegible]	ND	ND	ND	NA	ND	ND	ND	NA	ND	NA	NA	ND	NA	ND	ND	NA	NA	[illegible]	ND	NA	ND
[illegible]	[illegible] Cañon de Valle	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] Cañon de Valle	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Springs/Seeps																											
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] Pond	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] Pond	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] Site	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Background Springs																											
[illegible]	Apache Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Cold Spring [illegible]	[illegible]	NA	NA	NA	[illegible]	[illegible]	NA	NA	NA	NA	[illegible]	NA	[illegible]	NA	NA	[illegible]	NA	NA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Frijoles Spring [illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Frijoles Spring [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] Spring	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Seven Springs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Seven Springs	[illegible]	NA	[illegible]	NA	[illegible]	[illegible]	NA	[illegible]	NA	NA	[illegible]	NA	NA	[illegible]	[illegible]	NA	NA	NA	[illegible]	[illegible]	NA	NA	NA	NA	NA	[illegible]
[illegible]	Seven Springs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Seven Springs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Unnamed Cold	[illegible]	[illegible]	NA	NA	[illegible]	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	NA	[illegible]	[illegible]	[illegible]	NA	[illegible]	NA	[illegible]	[illegible]	[illegible]	[illegible]	NA	NA	NA	[illegible]
[illegible]	Unnamed Cold	[illegible]	NA	NA	NA	[illegible]	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	NA	[illegible]	[illegible]	[illegible]	NA	[illegible]	NA	[illegible]	[illegible]	NA	NA	NA	NA	NA	[illegible]
[illegible]	Unnamed Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Unnamed Spring	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Water Canyon Gallery	[illegible]	[illegible]	NA	NA	[illegible]	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	NA	NA	[illegible]	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	NA	NA	NA	[illegible]	[illegible]	[illegible]
[illegible]	Water Canyon Gallery	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Water Canyon Gallery	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Water Canyon Gallery	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[a] NA = Not analyzed
[b] NC = Not calculated

TABLE C-5

HIGH EXPLOSIVES IN TA-16 WATERS

SAMPLE ID	DESCRIPTION	DATE	2,4-DNT (ppm)	2,6-DNT (ppm)	HMX (ppm)	RDX (ppm)	PETN (ppm)	TNB (ppm)	TNT-ND (ppm)	TNT (ppm)
SAL[a]	N/A[b]	N/A	NC[c]	NC	1.8	1.7	0.7	0.0001	0.0018	0.0027
Springs/seeps										
[illegible]	(Burning Ground Spring)	[illegible]	NA[d]	NA	<0.02	<0.01	<0.05	<0.02	NA	<0.02
NMED	(Burning Ground Spring)	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
NMED	(Burning Ground Spring)	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
[illegible]	(Burning Ground Spring)	[illegible]	NA	NA	[illegible]	<0.01	<0.05	[illegible]	NA	<0.01
[illegible]	(Burning Ground Spring)	[illegible]	NA	NA	<0.02	<0.01	<0.05	<0.01	NA	<0.01
NMED	Martin Spring	5/12/94	0.0013	ND[e]	0.011	NA	NA	0.1	ND	ND
[illegible]	Martin Spring	[illegible]	NA	NA	[illegible]	<0.01	<0.05	[illegible]	NA	<0.01
[illegible]	Martin Spring	[illegible]	NA	NA	[illegible]	<0.01	<0.05	[illegible]	NA	<0.01
[illegible]	Martin Spring	[illegible]	NA	NA	[illegible]	<0.01	<0.05	[illegible]	NA	<0.01
[illegible]	SWSC Spring	[illegible]	NA	NA	<0.02	<0.01	<0.05	<0.02	NA	<0.02
NMED	SWSC Spring	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
NMED	SWSC Spring	[illegible]	0.0013	ND	0.0015	NA	NA	[illegible]	ND	ND
[illegible]	SWSC Spring	[illegible]	NA	NA	<0.02	<0.01	<0.05	<0.01	NA	<0.01
[illegible]	SWSC Spring	[illegible]	NA	NA	[illegible]	<0.01	<0.05	[illegible]	NA	<0.01
NMED	Fish ladder seep	[illegible]	ND	ND	[illegible]	NA	NA	[illegible]	ND	ND
[illegible]	Fish ladder seep	[illegible]	NA	NA	<0.02	<0.01	<0.05	<0.01	NA	<0.01
NMED	Water seep	[illegible]	ND	ND	ND	NA	NA	ND	ND	ND
Outfalls										
—	250 outfall	—	NA	NA	[illegible]	NA	NA	[illegible]	NA	[illegible]
[illegible]	250 outfall (filtered)	[illegible]	NA	0.145	1.13	NA	NA	0.284	0.418	[illegible]
[illegible]	250 outfall (unfiltered)	[illegible]	NA	0.145	[illegible]	NA	NA	0.419	NA	[illegible]
[illegible]	300 outfall	[illegible]	NA	NA	[illegible]	<0.01	<0.05	[illegible]	NA	<0.02
—	300 outfall	—	NA	NA	NA	NA	NA	NA	NA	[illegible]
—	340 outfall	—	NA	NA	[illegible]	NA	NA	NA	NA	[illegible]
[illegible]	140 outfall	[illegible]	NA	NA	<0.02	<0.01	<0.05	<0.01	NA	<0.01
[illegible]	Silver outfall	[illegible]	NA	NA	<0.02	<0.01	<0.05	<0.01	NA	<0.01
Creeks										
[illegible]	100-line canyon TA-16	[illegible]	NA	NA	<0.02	<0.01	<0.05	<0.02	NA	<0.02
[illegible]	Cañon de Valle Creek	[illegible]	NA	NA	[illegible]	<0.01	<0.05	[illegible]	NA	<0.02
[illegible]	Cañon de Valle Creek	[illegible]	NA	NA	[illegible]	<0.01	<0.05	[illegible]	NA	<0.02
[illegible]	Cañon de Valle Creek	[illegible]	NA	NA	NA	NA	NA	[illegible]	NA	NA
[illegible]	Cañon de Valle Creek	[illegible]	NA	NA	NA	NA	NA	[illegible]	NA	NA
[illegible]	Cañon de Valle Creek	[illegible]	NA	NA	NA	NA	NA	[illegible]	NA	NA
[illegible]	Cañon de Valle Creek	[illegible]	NA	NA	NA	NA	NA	[illegible]	NA	NA
[illegible]	Cañon de Valle Creek	[illegible]	NA	NA	NA	NA	NA	[illegible]	NA	NA
[illegible]	Cañon de Valle Creek	[illegible]	NA	NA	NA	NA	NA	[illegible]	NA	NA
[illegible]	Cañon de Valle Creek	[illegible]	NA	NA	<0.02	<0.01	<0.05	<0.02	NA	<0.02
[illegible]	Trowbridge, Cañon de Valle	[illegible]	NA	NA	<0.02	<0.01	<0.05	<0.02	NA	<0.02
[illegible]	Weirbis, Cañon de Valle	[illegible]	NA	NA	[illegible]	<0.01	<0.05	[illegible]	NA	<0.02
Assorted locations										
[illegible]	90-line Drainage	[illegible]	NA	NA	[illegible]	[illegible]	<0.05	<0.01	NA	<0.01
[illegible]	90-line Drainage	[illegible]	NA	NA	<0.02	[illegible]	<0.05	<0.01	NA	<0.01
[illegible]	90-line Pond	[illegible]	NA	NA	[illegible]	[illegible]	<0.05	<0.01	NA	<0.01
[illegible]	90-line Pond	[illegible]	NA	NA	<0.02	<0.01	<0.05	<0.01	NA	<0.01
[illegible]	K-pit	[illegible]	NA	NA	<0.02	<0.01	<0.05	<0.02	NA	<0.02
[illegible]	WWTP	[illegible]	NA	NA	[illegible]	<0.01	<0.05	<0.01	NA	<0.01
[illegible]	WWTP	[illegible]	NA	NA	<0.02	<0.01	<0.05	<0.01	NA	<0.01
Background springs										
[illegible]	Acequia Spring	[illegible]	NA	NA	<0.02	<0.01	<0.05	<0.01	NA	<0.01
44	Cold Spring east cal	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
[illegible]	Pueblo Spring #4a	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
63	Pueblo Spring #6a	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
[illegible]	Pine Spring	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
[illegible]	Pine Spring	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
[illegible]	Pine Spring	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
44	Seven Springs	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
44	Seven Springs	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
[illegible]	Seven Springs	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
[illegible]	Seven Springs	[illegible]	NA	NA	<0.02	<0.01	<0.05	<0.01	NA	<0.01
[illegible]	Unnamed Cold	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
[illegible]	Unnamed Cold	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
[illegible]	Unnamed Spring	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
[illegible]	Unnamed Spring	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
[illegible]	Water Canyon Gallery	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
[illegible]	Water Canyon Gallery	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
[illegible]	Water Canyon Gallery	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA
[illegible]	Water Canyon Gallery	[illegible]	NA	NA	<0.02	<0.01	<0.05	<0.01	NA	<0.01

[a] SAL=Screening action level.
[b] N/A= Not applicable.
[c] NC=Not calculated.
[d] NA=Not analyzed.
[e] ND=Not detected.

TABLE C-6

TRITIUM AND STABLE ISOTOPES IN TA-16 WATERS

SAMPLE ID	DESCRIPTION	DATE	∂D (‰)	∂18O (‰)	TRITIUM UNITS
Springs/Seeps					
SSite96-5	Burning Ground Spring	3/01/96	NA*	NA	-33.5
SSite96-17	Burning Ground Spring	4/10/96	-79.0	-11.8	NA
SSite96-27	Burning Ground Spring	7/12/96	-71.0	-11.1	NA
PP95-132	Martin Spring	7/21/95	-73.0	-11.2	-32.9
SSite96-4	Martin Spring	3/01/96	NA	NA	-0.2
SSite96-15	Martin Spring	4/10/96	-73.0	-11.2	NA
SSite96-23	Martin Spring	7/12/96	-66.0	-9.9	NA
SSite96-6	SWSC Spring	3/01/96	NA	NA	-35.7
SSite96-18	SWSC Spring	4/10/96	-76.0	-11.7	NA
SSite96-26	SWSC Spring	7/12/96	-64.0	-11.1	NA
SSite96-11	Fish ladder Seep	3/27/96	-70.0	-10.4	-11.3
Outfalls					
SSite96-10	340 outfall	3/27/96	NA	NA	-1.0
Assorted locations					
PP95-134	300-line canyon TA-16	7/21/95	-70.0	-7.6	-3.1
PP95-135	K-Site	7/21/95	-52.0	-7.9	-46.3
SSite96-8	90s-line Drainage	3/05/96	-64.0	-9.2	-3.9
SSite96-9	90s-line Pond	3/05/96	-43.0	-3.1	-51.9
SHB-3	TA-16 well	7/20/93	-75.1	-11.3	-0.9
SSite96-7	WWTP	3/05/96	NA	NA	-4.5

* NA=Not analyzed.

TABLE C-7

ORGANICS IN TA-16 WATERS

SAMPLE ID	DESCRIPTION	DATE	CIS-1,2-DICHLOROPROPENE (ppm)	TETRACHLOROETHENE (ppm)	TRICHLOROETHENE (ppm)
Springs/Seeps					
NMED	Burning Ground Spring	3/17/95	ND*	0.0028	0.0026
NMED	Burning Ground Spring	5/12/95	ND	0.0032	0.0034
NMED	Martin Spring	5/12/95	ND	ND	0.0009
NMED	SWSC Spring	3/17/95	ND	0.0023	0.0022
NMED	SWSC Spring	5/12/95	ND	0.0022	0.0024
NMED	Fish ladder Seep	6/2/95	ND	ND	0.0003
NMED	Peter Seep	6/2/95	0.021 D(5)	0.015	0.0031

* ND=Not detected

(all approximately 0.3 ppm). These spring levels have remained fairly constant over the sampling period, but fall below the SAL. The highest levels of barium (≤ 3.28 ppm) occur in Cañon de Valle surface waters and in seeps (Peter and Fish Ladder) located in canyon bottoms. Fish Ladder Seep, which contained 1.7 ppm barium in 1995, was resampled in 1996 and showed lower levels of barium (0.29 ppm). Elevated levels of barium (2.27 and 1.44) were also found in the 90s-Line pond, which is located in the middle of the mesa. A complete sampling effort is needed to determine if barium levels are still high in surface waters and to determine connection with site-wide source waters. However, due to the differences in stable isotopic composition between springs and outfall waters, elevated barium is most likely related to leaching of historically-contaminated soils by rainwater.

Most background waters are below detection limits for manganese. Most TA-16 waters fall above background, but below SAL. However, one surface water sample (located at K-Site, Fig. C-1) had a value (0.32 ppm) above SAL. The reason for elevated levels of manganese in this sample has not been determined.

Many water samples at TA-16 contain high explosives (Table C-5). HMX, NQ, and TNT were detected, but are all at levels below SALs. Almost all positive analyses for RDX, a commonly used explosive at TA-16, fall above SAL levels. The water SAL for RDX is 0.006 ppm and TA-16 sample concentrations range up to 0.15 ppm. High levels of RDX (approximately 0.11 ppm) are found consistently in Martin Spring. Values at that spring appear to have increased slightly since 1995. Two Cañon de Valle creek samples collected in 1994 also gave high values. Not surprisingly, the highest RDX level recorded (0.484 ppm) was from waters collected at the TA-16-260 outfall. The TA-16-260 outfall also contains extremely high values of RDX in the soil (up to 118 000 ppm). Discharges from TA-16-260 contributed to contamination of the soils and potentially to spring waters until the outfall, which is currently scheduled to be plugged in fall 1996.

The limited set of tritium and stable isotope data (Table C-6) gives variable results for TA-16 spring, surface water, and outfall samples. The variability seen in the stable isotope data of TA-16 surface waters and springs most likely reflects isotopic changes associated with different storm events. All TA-16 waters analyzed are isotopically heavier than background spring waters because of the lower elevation at TA-16, but fall along the meteoric water line for the Jemez Mountains (Vuataz and Goff 1986, 0390). Pooling surface waters such as those collected below K-Site must reflect isotopically heavy, monsoon-season rainfall that has not had time to evaporate. The exceptionally heavy values for the 90s Line Pond are due to evaporation.

Burning Ground, SWSC, and Martin Springs have tritium values generally ranging from 29 to 36 tritium units (T.U.), and surface water samples reached values of ≤47 T.U. Tritium values of outfall waters are consistently ≤ 5 T.U., similar to waters from the main aquifer, implying that these waters contain a component that is much older than the recharge waters for TA-16 springs. Pre-bomb tritium was about 6 T.U. in precipitation. Tritium in precipitation today has decreased to 10 T.U. from a high of 2 700 T.U. in 1963, and will continue to decrease. Rainwaters at TA-16 and around LANL however are significantly higher, with values of about 12 to 60 T.U. from 1990—1993. Because TA-16 rain waters have shown evidence of anthropogenic impact, and because spring and surface waters give similar tritium results, it is believed that spring waters are recharged through local precipitation and are possibly ≤ 5 years old.

4.0 CONCLUSIONS

The purpose behind the systematic sampling of springs and outfalls at TA-16 was to link contamination in spring waters with known sources using the information already available for the springs. This study has shown possible chemical connections of outfall sediments to spring waters. Stable isotope data link spring and surface water recharge with local and relatively young precipitation. It is likely that the contamination in the Burning Ground and SWSC Springs are connected to the TA-16-260 outfall, whereas the source of contamination for Martin Spring is not as easily identified.

Martin Spring has a unique chemistry when compared with other TA-16 waters, consistently showing higher levels of boron and RDX. This spring appears to issue from Unit 4 of the Upper Bandelier Tuff, whereas Burning Ground and SWSC Line Springs issue from unit 3. Tritium values suggest that Martin Spring has a similar residence time (approximately 5 years) to the other springs at TA-16. Although more outfalls need to be sampled, the contamination is likely a product of precipitation-induced leaching of historically-contaminated soils into a saturated zone that surfaces at Martin Spring. V-site (Fig. C-1) is possibly the site of chemically-similar historic soil contamination because it is a site that is known to have handled boracitol. The potential release sites (PRSs) at V-site are scheduled to be investigated and remediated in association with decommissioning and decontamination (D&D) in 1997.

Burning Ground and SWSC Line Springs are located downgradient of the TA-16-260 outfall. It is believed that contamination seen in these springs is due to historic TA-16-260 discharges. Waters in the outfall have been analyzed twice revealing elevated RDX, HMX, TNT, 1,3,5-TNB and 2,4-DNT. Soil samples at depth in the TA-16-260 outfall have had up to 25 wt % HE.

Because SWSC Line and Burning Ground Springs have tritium values similar to local precipitation, rainwater is the likely main recharge source. Thus, contamination in these spring waters is likely a product of leaching of historically-contaminated soils and tuff from PRS 16-021(c). A potassium bromide tracer is scheduled to be introduced at the TA-16-260 outfall during FY97. This study may confirm that PRS 16-021(c) is the source of contamination for the Burning Ground and SWSC Line Springs.

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505-667-7203/FAX 505-665-4504

Date: September 26, 1996
Refer to: EM/ER:96-S01

Mr. Benito Garcia
NMED-HRMB
P.O. Box 26110
Santa Fe, NM 87502

SUBJECT: SCHEDULE FOR CORRECTIVE MEASURES STUDY PLAN FOR SWMU 16-021(c)

Dear Mr. Garcia:

The Los Alamos National Laboratory's Environmental Restoration (ER) Project requests a meeting with your staff to discuss an extension for delivery of the corrective measures study (CMS) plan for solid waste management unit (SWMU) 16-021(c). The letter from the New Mexico Environment Department (NMED) dated April 3, 1996, that required delivery of the CMS plan by October 1, 1996, apparently was lost at the Los Alamos Area Office. The ER Project recently became aware of that letter and received a copy of it on September 17, 1996. We cannot meet the October 1, 1996, deadline and request a meeting to discuss both the deadline for the CMS plan and the current status of the ongoing investigation of SWMU 16-021(c).

The Resource Conservation and Recovery Act facility investigation report summarizing the first phase of characterization sampling will be delivered to NMED on September 30, 1996. This report includes a sampling plan to determine the nature and extent of contamination at SWMU 16-021(c) and to evaluate impact of that SWMU on surface waters and ground waters. This Phase II sampling is scheduled for fall 1996. The data from this sampling are essential to evaluating remedial options that will be addressed in the CMS plan. It is our opinion that a comprehensive CMS plan cannot be prepared until results of the Phase II sampling are analyzed.

The CMS plan for SWMU 16-021(c) will be the first submitted by the ER Project to NMED. Field Unit 3 desires to work closely and expeditiously with NMED to ensure that the format and technical content of this document meet the needs of the regulatory authorities. We believe that allowing the CMS plan to be completed following sampling during Fiscal Year 1997 will increase the likelihood that NMED can be involved in the early stages of the CMS/Corrective Measures Implementation (CMI). Ultimately, allowing more time up-front for planning and interacting with the regulatory authorities will yield a CMS/CMI that better fulfills the needs of NMED, DOE, and members of the public.

Roy Michelotti, (505) 665-7444, and Joe Mose, (505) 667-5808, of our staffs will call Mr. Stu Dinwiddie of your staff to arrange a time and place for a meeting to discuss the schedule of activities for SWMU 16-021(c). If you have any questions or concerns, please call Roy or Joe at the numbers indicated. Thank you for considering this request.

Sincerely,

for Jorg Jansen, Program Manager
LANL/ER Project

Sincerely,

Theodore J. Taylor, Program Manager
DOE/LAAO

JJ/TT/bp

Cy: T. Baca, EM, MS J591
T. Glatzmaier, DDEES/ER, MS M992
D. Griswold, AL-ERD, MS A906
J. Harry, EES-5, MS M992
B. Hoditschek, NMED-HRMB
M. Leavitt, NMED-GWQB
J. Levings, AL-ERD, MS A906
D. McInroy, EM/ER, MS M992
R. Michelotti, CST-18, MS E525
J. Mose, LAAO, MS A316
N. Naraine, DOE-HQ, EM-453
D. Neleigh, EPA, R.6, 6PD-N
J. Piatt, NMED-SWQB
M. Shaner, CIO, MS A117
L. Soholt, EM/ER, MS M992
W. Spurgeon, DOE-HQ, EM-453
T. Taylor, LAAO, MS A316
J. Vozella, LAAO, MS A316
N. Weber, NMED-AIP
J. White, ESH-19, MS K498
S. Yanicak, NMED-AIP, MS J993
K. Zamora, LAAO, MS A316
EM/ER File, MS M992
RPF, MS M707

cy Don
John

State of New Mexico
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EDGAR T. THORNTON, III
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1.4.2.6.1.7.2

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

4/3/96

Mr. Joseph C. Vozella, Chief
Environment, Safety, and Health Branch
Los Alamos Area Office
Department of Energy
Los Alamos, New Mexico 87544

RE: Corrective Measure Study for SWMU 16-021(c)
Los Alamos National Laboratory (NM0890010515)

Dear Mr. Vozella:

The New Mexico Environment Department (NMED)-Hazardous and Radioactive Materials Bureau (HRMB) and the U.S. Environmental Protection Agency (EPA), recently reviewed Los Alamos National Laboratory's (LANL) Interim Action Report dated February 12, 1996, for Solid Waste Management Unit (SWMU) 16-021(c). SWMU 16-021(c) is an area of significant high-explosive contamination that discharges into Cañon de Valle.

During a site visit by NMED-HRMB/EPA in October 1995, LANL staff indicated that SWMU 16-021(c) was the possible source of high explosives found in nearby springs. Based upon a review of the above- mentioned report and previous documentation of extensive contamination, NMED-HRMB/EPA recommends that a Corrective Measure Study (CMS) be conducted for this site and that a CMS Workplan for this site be submitted by LANL by October 1, 1996.

Should you have any questions concerning this letter, please contact either Mr. Robert Dinwiddie at 505/827-1561 or Ms. Teri Davis at 505/827-1558 concerning permitting or technical issues, respectively.

Sincerely,

Barbara Hoditschek

Barbara Hoditschek,
RCRA Permitting Program Manager

enclosures

cc: Benito Garcia, Bureau Chief, NMED-HRMB
Ronald Kern, Technical Compliance Program Manager, NMED-HRMB
David Neleigh, Chief, US EPA Region 6

FACSIMILE TRANSMITTAL SHEET

UNCLASSIFIED

U.S. DEPARTMENT OF ENERGY

LOS ALAMOS AREA OFFICE

Office of Environment and Projects

FAX Number: (505) 665-4504 (Unclassified)

DATE: 9/18/96

PAGES TO FOLLOW: 2

TO: Roy

FROM: Joseph H. Mose

FAX NO: 5-4632

PHONE NO: (505) 667-5808

PHONE NO: 5-7440

REMARKS:

We are checking to see if this letter was Received by LAAO in April. I will also Call Stu & ask if he has the return receipt.

Please Draft a letter to NMED describing actions that are planned this year to support a CMS Workplan that will be provided by ....?

Also in this letter state that the NMED Memo was apparently not received until Sept. 17, 1996.

Thanks, Joe

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1.4.2.6.1.7.1.4

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
P 332 407 632

December 5, 1996

Mr. Theodore J. Taylor, Program Manager
Department of Energy
Los Alamos Area Office
528 35th Street, Mail Stop A316
Los Alamos, New Mexico 87544

Mr. Jorg Jansen, Program Manager
Environmental Restoration
Los Alamos National Laboratory
528 35th Street, Mail Stop A316
Los Alamos, New Mexico 87544

RE: RFI REPORT FOR POTENTIAL RELEASE SITES IN TA-16
SEPTEMBER 1996

Dear Mr. Taylor and Mr. Jansen:

The Hazardous and Radioactive Materials Bureau (HRMB) of the New Mexico Environment Department (NMED) has reviewed the above-mentioned document submitted by the Department of Energy/Los Alamos National Laboratory (DOE/LANL) and has the following comments regarding the use of field screening methodology and the investigation of potential impacts to the ground water:

- NMED HRMB questions the sole use of field methods such as spot kits and RDX immunoassay tests to estimate the lateral extent of contamination within the surface and near-surface at the TA 16 According to the document, DOE/LANL will utilize field screening techniques to bound the lateral extent of the suspected contamination. DOE/LANL shall validate the lateral extent of contamination as estimated by the field screening techniques by using fixed laboratory analytical methods.

- DOE/LANL shall install monitoring wells along the drainage from the steam plant outfall to Cañon de Valle in order to address impacts to shallow, perched ground water.

- DOE/LANL shall site deep boreholes only after the evaluation of existing data from tracer tests, mesa-top saturated alluvium, et cetera.

- DOE/LANL shall investigate the presence of shallow, perched ground water within the alluvium of Cañon de Valle. NMED recommends the installation of four monitoring wells in the following locations: west of SWSC Spring, between SWSC Spring and Burning Ground Spring; between Burning Ground Spring and MDA-P, and east of MDA-P.

The new due date for the required Corrective Measures Study Workplan for the potential release sites in TA-16 shall be 60 days after the completion and submittal of the RFI Phase II report.

Should you or your staff have any questions concerning these comments, please contact either myself or Ms. Teri Davis at 505/827-1558.

Sincerely,

Robert S. ("Stu") Dinwiddie, Manager
RCRA Permits Management Program

RSD:kth

cc: T. Davis, NMED HRMB
T. Glatzmaier, DDEES/ER, MS M992
D. Griswold, AL-ERD, MS A906
E. Kelley, Ph. D., NMED WWMD
M. Leavitt, NMED GWQB
D. McInroy, EM/ER, MS M992
D. Neleigh, EPA, 6PD-N
S. Pierce, NMED SWQB
L. Soholt, EM/ER, MS M992
J. Vozella, LAAO, MS A316
N. Weber, NMED AIP, MS J993
S. Yanicak, NMED AIP, MS J993
K. Zamora, LAAO, MS A316
LANL 96 File

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Los Alamos Area Office, MS A316
Environmental Restoration Program
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55284

Date: January 9, 1997
Refer to: EM/ER:97-003

Mr. Benito Garcia
NMED-HRMB
P.O. Box 26110
Santa Fe, NM 87502

SUBJECT: ACKNOWLEDGMENT OF LETTER DATED DECEMBER 5 1996, CONCERNING THE RFI REPORT FOR TA-16, PRSs 16-003(k) and 16-021(c)

Dear Mr. Garcia:

We acknowledge receipt of the letter dated December 5, 1996, concerning the Resource Conservation and Recovery Act Facility Investigation (RFI) Report for Potential Release Sites (PRSs) 16-003(k) and 16-021(c). The Laboratory and Los Alamos Area Office appreciate your rapid response to this RFI Report. Members of your staff and ours have agreed to discuss this letter and your concerns in a meeting on January 29, 1997.

Please ask your office to contact Roy Michelotti at (505) 665-7444 or Joe Mose at (505) 667-5808 if you have any questions.

Sincerely,

Jorg Jansen, Program Manager
LANL/ER Project

Sincerely,

Theodore J. Taylor, Program Manager
DOE/LAAO

JJ/TT/ss

JAN 2 1 1997

Cy: T. Baca, EM, MS J591
T. Glatzmaier, DDEES/ER, MS M992
D. Griswold, AL-ERD, MS A906
J. Levings, AL-ERD, MS A906
D. McInroy, EM/ER, MS M992
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M. Johansen, LAAO, MS A316
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B. Koch, LAAO, MS A316
N. Naraine, DOE-HQ, EM-453
W. Spurgeon, DOE-HQ, EM-453
D. Neleigh, EPA, R.6, 6PD-N
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[redacted]

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Date: February 26, 1997
Refer to: EM/ER:97-041

Don
John
Lynn
(last) QA file

Mr. Benito Garcia
NMED-HRMB
P.O. Box 26110
Santa Fe, NM 87502

SUBJECT: RESPONSE TO NMED LETTER CONCERNING THE RFI REPORT FOR PRSs IN TA-16 (DECEMBER 5, 1996)

Dear Mr. Garcia:

Los Alamos National Laboratory and Department of Energy (DOE) representatives met with representatives of the Hazardous and Radioactive Materials Bureau (HRMB) of the New Mexico Environment Department (NMED) on February 14, 1997. The intent of the meeting was to discuss the Resource Conservation and Recovery Act Facility Investigation (RFI) Report for Technical Area (TA) 16 potential release sites that was submitted on September 30, 1997. HRMB representatives requested a letter summarizing the responses to their concerns. The responses are provided below and each NMED-HRMB comment is restated.

- "NMED HRMB questions the sole use of field methods such as spot kits and RDX immunoassay tests to estimate the lateral extent of contamination within the surface and near surface at the TA-16. According to the document, DOE/LANL will utilize field screening techniques to bound the lateral extent of the suspected contamination. DOE/LANL shall validate the lateral extent of contamination as estimated by the field screening methods by using fixed laboratory analytical methods."

  DOE/LANL response: DOE/LANL concur. DOE/LANL will submit at least four laboratory samples per lateral boundary traverse.

- "DOE/LANL shall install monitoring wells along the drainage from the steam plant outfall to Canon de Valle in order to address impacts to shallow, perched ground water."

  DOE/LANL response: DOE/LANL concur. A monitoring well is scheduled for that drainage in the RFI Report (see Subsection 5.2.11.2.5).

- "DOE/LANL shall site deep boreholes only after the evaluation of existing data from tracer tests, mesa-top saturated alluvium, et cetera."

DOE/LANL response: DOE/LANL will use all data available and will consult with NMED/HRMB prior to siting any deep boreholes. Because the tracer study data schedule is inherently uncertain DOE/LANL may not be able to wait for these results.

- "DOE/LANL shall investigate the presence of shallow perched ground water within the alluvium of Canon de Valle. NMED recommends the installation of four monitoring wells in the following locations: west of SWSC Spring, between SWSC Spring and Burning Ground Spring, between Burning Ground Spring and MDA P, and east of MDA P."

  DOE/LANL response: DOE/LANL will install four monitoring wells in the alluvium of Canon de Valle. The locations proposed in the RFI Report (see Subsection 5.2.11.2.5) include three out of the four above-mentioned locations (no well is scheduled between SWSC and Burning Ground Springs) and a well upgradient from the TA-16-260 outfall discharge area. Actual locations will also be constrained by the accessibility of all of these sites with a drill rig.

- "The new due date for the required Corrective Measures Study Work Plan for the potential release sites in TA-16 shall be 60 days after the completion and submittal of the RFI Phase II report."

  DOE/LANL response: DOE/LANL concur. The RFI Phase II report is currently scheduled for delivery to NMED-HRMB in December 1997.

Thank you for providing a rapid response to the above document. We appreciated the opportunity to collaborate with NMED staff. Should you have any further questions, please contact Roy Michelotti at (505) 665-7444 or Joe Mose at (505) 667-5808.

Sincerely,

Jorg Jansen, Program Manager
LANL/ER Project

Sincerely,

Theodore J. Taylor, Program Manager
DOE/LAAO

JJ/TT/rfr

Cy: T. Baca, EM, MS J591
T. Glatzmaier, DDEES/ER, MS M992
D. Griswold, AL-ERD, MS A906
J. Harry, EES-5, MS M992
B. Koch, LAAO, MS A316
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R. Michelotti, CST-18, MS E525
J. Mose, LAAO, MS A316
N. Naraine, DOE-HQ, EM-453
D. Neleigh, EPA, R.6, 6PD-N
C. Rodriguez, CIO, MS M707
T. Taylor, LAAO, MS A316

W. Spurgeon, DOE-HQ, EM-453
J. Vozella, LAAO, MS A316
J. White, ESH-19, MS K498
K. Zamora, LAAO, MS A316
EM/ER File (CT #206), MS M992
RPF, MS M707

S. Dinwiddie, NMED-HRMB
B. Hoditschek, NMED-SWQB
M. Leavitt, NMED-GWQB
J. Parker, NMED-OB
G. Saums, NMED-SWQB
S. Yanicak, NMED-AIP, MS J993

State of New Mexico
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J.8

P 181 648 703

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Rec'd
Aug 6, 1997
11:08 am

August 4, 1997

Mr. G. Thomas Todd, Area Manager
Los Alamos Area Office
Department of Energy
528 35th Street
Los Alamos, New Mexico 87544

Dr. Sigfried Hecker, Director
Los Alamos National Laboratory
P. O. Box 1663, Mail Stop A100
Los Alamos, New Mexico 87545

Copies:
Joe M.
Notebook

RE: **Request for Supplemental Information**
RCRA Facility Investigation Report
Potential Release Sites in Technical Area 16
16-003(k) and 16-021(c)
Los Alamos National Laboratory
NM0890010515

Dear Mr. Todd and Dr. Hecker:

The Resource Conservation and Recovery Act (RCRA) Permits Management Program (RPMP) of the New Mexico Environment Department has conducted an extensive review of the RCRA Facility Investigation (RFI) Report for Technical Area 16 dated September 1996 and referenced by EM/ER:96-502 and requests the attached supplemental information. LANL must respond to the request for supplemental information noted in the Attachment within thirty (30) calendar days of the receipt of this letter. If LANL does not submit the information within thirty (30) calendar days, LANL should be advised that a Notice of Deficiency will be issued.

As stated in the Environmental Restoration monthly meeting on April 15, 1997, RPMP requests that DOE/LANL continue to provide documentation detailing the various investigations which have occurred at 16-021(c) and 16-003(k) to date. Although the Data Quality Objectives remain consistent with the Phase II Sampling and Analysis Plan presented in this RFI Report, RPMP feels that new information (analytical results of surface and subsurface sampling, geophysical techniques and investigations, tracer study implementation, variations from the RFI Workplan, etc.) has been gathered which directly affects the goals and, more importantly, the direction of the continuing investigation.

To meet this request, RPMP does not require the submittal of a corrective action report, per se, but would rather, be presented with updates or addendums on a regular and reasonable basis (such as field season). Specifically, RPMP would like to be provided documentation of the investigatory activities performed to date including, but not limited to, the following activities:

Deliver summer by 8/31

- Geophysical investigations including resistivity, streaming potential, seismic refraction, etc.
- Tracer study and spring/seep evaluations
- Results of drilling activities
- Bioremediation evaluation
- Variations from the approved RFI Workplan
- Rationale for proposed variations from the RFI Workplan including drilling plan modifications
- Progress on geological surveys as proposed in Section 5.2.11.2.1 of the RFI Workplan

Should you have any questions regarding this letter, please contact me or Mr. John Kieling, RPMP's LANL Facility Manager, at (505) 827-1558.

Sincerely,

Robert S. ("Stu") Dinwiddie, Ph. D., Manager
RCRA Permits Management Program

RSD:kth

attachment

cc with attachments:

T. Baca, LANL EM-DO, MS J951 T. Davis, NMED HRMB
T. Davis, NMED HRMB
B. Garcia, NMED HRMB
T. Glatzmaier, LANL DDEES/ER, MS M992
J. Jansen, LANL EM/ER, MS M992
M. Johansen, DOE LAAO, MS A316
K. Hill, NMED HRMB
J. Kieling, NMED HRMB
M. Leavitt, NMED GWQB
H. LeDoux, DOE LAAO, MS A316
D. McInroy, LANL EM/ER, MS M992
D. Neleigh, EPA, 6PD-N
J. Parker, NMED DOE OB
G. Saums, NMED SWQB
T. Taylor, DOE LAAO, MS A316
S. Yanicak, NMED DOE OB, MS J993
File: Reading and LANL HSWA 3/1082/16
Track: LANL, see document date, NA, DOE/LANL, HRMB/kth, RE, File

ATTACHMENT
REQUEST FOR SUPPLEMENTAL INFORMATION
TA 16 RFI Report
16-003(k) and 16-021(c)
September 1996

SUMMARY:

PRS	PRS TYPE	LANL'S PROPOSED ACTION	DOES HRMB CONCUR?	HRMB'S RATIONALE
16-003(k)	13 HE sumps and drainlines associated with TA-16-260	VCA	Yes	Removal of drainlines and associated troughs with characterization
16-021(c)	Outfall associated with TA-16-260	Phase II sampling & CMS/CMI	Yes	CMS imposed by AA

COMMENTS:

1. Section 1.3.2:
   a. Pertinent sections of the quality assurance/quality control plan for FY95 TA-16 field campaign should be provided for reference.
   b. LANL should include in the text the frequency at which both field and laboratory QA/QC samples were obtained.
   c. LANL should add the locations of the QA samples to Figures 5.1.4-1 and 5.2.4-1.
2. Section 2.3: LANL should replace all references to the "main" aquifer with "regional" aquifer.
3. Section 2.3.1: LANL should include a figure indicating the barium and boron levels as indicated in the second to last paragraph of this section.
4. Section 2.3.2:
   a. LANL should explain any possible relationship between constituents identified in SHB-3 to site-related activities. And if any possible relationship exists, LANL should provide rationale for advancing boreholes to a depth less than the static water level in SHB-3. RPMP is concerned that constituents found in SHB-3 might be related to HE-related activities and that contaminants may be present in the regional aquifer since it has not been definitely constrained.
   b. LANL should also clarify if the ground water interval encountered in SHB-3 will also be intercepted during the drilling activities as discussed within this document.
   c. Please present the data, sampling dates, sampling intervals, etc. for SHB-3 and the background spring data to which it was compared.
   d. Please clarify what is meant by "swab" sample.

5. Section 3.1.1:
   a. Please define the acronym "TATB."
   b. Please provide the analytical methods, detection limits, summary of QA/QC documentation for the analyses conducted.
6. John Section 3.1.2: LANL should provide the pertinent portions of the *Technical Approach to the RFI Report* as reference documentation for this report.
7. Kathy Section 3.3: LANL should include a compilation of all analytical data, including non-detectable concentrations, in Appendix A of the RFI Report.
8. John Section 3.4.2: LANL should provide, as reference materials attached to this document, the pertinent sections of the *Screening Assessment Methodology* (McCann, et al.).
9. John Section 3.4.3: LANL should provide in the text of this section further explanation why site-specific human health risk assessments were not performed for 16-003(k) and 16-021(c).
10. Section 4.0:
    a. Kathy LANL should ensure that all QA/QC results reported by the laboratory are present and correct in FIMAD and reported within this document.
    b. LANL should collect field duplicate samples at a minimum rate of 10%.
11. Section 4.3: LANL should clarify at each mentioning that "Table B-2" is located within Appendix B.
12. Section 5.0: For additional clarification, LANL could include a figure which references the analytical data (Appendix A - see Comment 7) and indicates the locations where contaminant concentrations were below SALs.
13. Section 5.1.3:
    a. Please include the adjective "sump" in the title of Tables 5.1.3-1, 2 and 3.
14. Section 5.1.4:
    a. LANL should include pertinent information such as a tabulated summary of Photo Ionization Detector/Flame Ionization Detector (PID/FID) readings, HE spot test and sodium iodide detector results in the RFI report.
    b. Please provide an explanation of "Request Numbers" within the text of the RFI report.
    c. LANL should provide well construction diagrams for those boreholes and wells installed.
15. Section 5.1.6: LANL should detail which SVOC compounds were undetected in sample 031-95-0051 and reference a figure indicating the sample's location.
16. Section 5.1.7: LANL should clarify if any potential radiological contaminants other than uranium exist at these PRSs.
17. John Section 5.1.7.1: LANL should include the evaluation of lead in the Multiple Chemical Evaluation (Table 5.1.7-1). Section 3.4 indicates that the PRSs will be evaluated assuming a residential risk scenario; the risk posed by lead to children should, therefore, be included in the evaluation.

18. Section 5.1.10: Since no ecological risk analysis was performed, LANL should provide an errata sheet indicating the following correction to the third sentence: No constituents were found above SALs and MCE calculations indicate low probability of impact to human receptors due to the multiple constituent effects.
19. Section 5.2.2: A schematic diagram of the drainage channel and dam would be useful in visualizing the suitability of the proposed Best Management Practices.
20. Section 5.2.7.1: LANL should include the evaluation of lead in the Multiple Chemical Evaluation (Table 5.2.7-1). Section 3.4 indicates that the PRSs will be evaluated assuming a residential risk scenario; the risk posed by lead to children should, therefore, be included in the evaluation.

John

21. Section 5.2.7.2:

John

    a. The normalized concentrations of lead (0.145) and 1,3-dinitrobenzene (0.31) are greater than 0.1 in the MCE for noncarcinogenic effects (Table 5.2.7.1-1). LANL should carry forward these constituents, along with those that exceed SALs, into the Baseline Risk Assessment that is planned during the CMS/CMI process.
    b. The normalized concentration of chromium is 0.55 and is the driver for the MCE for carcinogenic effects (Table 5.2.7.1-2). LANL should carry forward these constituents, along with those that exceed SALs, into the Baseline Risk Assessment that is planned during the CMS/CMI process.
22. Section 5.2.9:
    a. Please clarify, within the text of the RFI report, the intent or purpose of presenting Table 5.2.9-1.
    b. LANL should present the traverses relative to EPA Region 9 residential PRGs in addition to the industrial PRGs.
    c. LANL should include lead, chromium and 1,3-dinitrobenzene in Table 5.2.9-1.
23. Section 5.2.11.1: LANL should state that concentrations are "greater" not "larger."
24. Section 5.2.11.2.1: Adding the pond and dam to Figure 5.2.11.2.1-1 would aid in visualizing the proposed activities.
25. Section 5.2.11.2.3:
    a. LANL must ensure that representative and confirmatory sampling for HE will occur. The HE screening kit has a detection limit of 100 ppm, whereas the SAL for HE is 15 ppm.
    b. LANL should also consult NMED DOE OB in the re-siting of boreholes to the location of geophysical anomalies.
    c. LANL should also present the sampling locations, depths, etc. provided in the text (pages 67 and 68) as a table for clarification.
    d. LANL should also provide well construction diagrams in RFI Workplans to obtain prior regulatory approval.
26. Section 5.2.11.2.5:
    a. After one year of quarterly sampling (for HE, VOCs, inorganics and anions), LANL should evaluate the data obtained from the alluvial wells and discuss the

results with the Administrative Authority to determine if continued sampling would enhance the investigation.

b. Please clarify which of the 2 well/borehole locations are accessible and tentatively accessible and discuss what will occur if a borehole is found to be completely inaccessible.

27. Appendix A, Analytical Suites: See Comment 7.
28. Appendix B, Table B-1: A crosswalk between request number and PRS/sample location would be extremely useful.
29. Appendix C, Section 1: LANL should perform or otherwise include a comparison of water balances for each of the potentially affected springs and seeps included in Table C-1.

Brent

30. Appendix C, Section 2:

Donna

a. LANL should clearly indicate the names and locations of all background springs (p. C-2, first paragraph) and provide a summary of the background water chemistry data.
b. Figure C-1 should be revised to clearly indicate sampling locations more so than NPDES outfalls.
c. LANL should include tritium and oxygen-18 in Table C-2.

31. Appendix C, Section 3.0:

Donna

a. LANL should provide a tabulation of the SALs and background concentrations for those analytes presented in paragraph 3, page C-6, Table C-3 and paragraph 3, page C-13.
b. LANL should define the acronym "NQ" in paragraph 3, page C-13.

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Los Alamos, New Mexico 87545
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U. S. Department of Energy
Los Alamos Area Office, MS A316
Environmental Restoration Program
Los Alamos, New Mexico 87544
505-667-7293/FAX 505-665-4504

Date: August 26, 1997
Refer to: EM/ER:97-334

Mr. Bonito Garcia
NMED-HRMB
P.O. Box 26110
2044 Galisteo Street, Bldg. A
Santa Fe, NM 87502

SUBJECT: REQUEST FOR EXTENSION FOR SEVERAL REQUESTS FOR SUPPLEMENTAL INFORMATION

Dear Mr. Garcia:

We recently received several requests for supplemental information (SI) and additional work (AW) for some of our Resource Conservation and Recovery Facility Investigation (RFI) Reports, Sampling and Analysis Plans (SAPs), and Notice of Deficiency (NOD) Responses, listed in the table below.

HRMB Request	Date of Request	Document Type	PRSs	Date of Document
AW	07/21/97	RFI Report	10-001(a-d)	02/96
SI	07/29/97	SAP	21-016(a,b,c)	03/96
SI	07/21/97	SAP	21-018(b)	02/96
SI	07/29/97	Phase II SAP	21-024(c,i), 21-027(a)	01/96
Comments	07/21/97	Response to Addl Info Req.	31-001	04/97
Comments	07/27/97	Corrective Action Report	18-003(d)	01/97
SI/AW	07/21/97	NOD Response	TA-36	02/96
SI	07/29/97	RFI Report	TA-39	04/95
SI	08/04/97	RFI Report	16-003(k), 16-021(c)	09/96
SI/AW	07/21/97	NOD Response	TA-33	05/95
SI	07/21/97	NOD Response	33-002(a-e)	05/96
SI	07/29/97	RFI Report	0-039	02/96

SEP 0 8 1997

Due to end-of-the-year time constraints and a desire to clarify issues with your staff in proposing no further action (NFA) for the appropriate potential release sites (PRSs) in these reports/responses, we would like to postpone submitting this information until after the beginning of the next federal fiscal year.

We hope that the Document of Understanding (DOU) Core Team can resolve some of the issues associated with proposing (NFA) for human health and ecological risk through the Integrated NFA Annex to the DOU. We look forward to this annex being generated and discussed in a workshop in mid-October. We propose to resubmit responses to the requests identified in the table above by November 15, 1997, assuming the October workshop is held as scheduled.

Please inform us of the acceptance of this request and call Dave McInroy at (505) 667-0819 or Joe Mose at (505) 667-5808 if you have any questions.

Sincerely,

Jorg Jansen, Program Manager
LANL/ER Project

Sincerely,

for Theodore J. Taylor, Program Manager
DOE/LAAO

JJ/TT/ss

Cy: G. Allen, CST-7, MS E525
J. Canepa, EM/ER, MS M992
T. Glatzmaier, DDEES/ER, MS M992
G. Gould, EES-15, J495
D. Griswold, AL-ERD, MS A906
D. McInroy, EM/ER, MS M992
R. Michelotti, CST-7, MS E525
J. Mose, LAAO, MS A316
D. Neleigh, EPA, R.6, 6PD-N
T. Taylor, LAAO, MS A316
S. Dinwiddie, NMED-HRMB
M. Leavitt, NMED-GWQB
J. Parker, NMED-OB
G. Saums, NMED-SWQB
S. Yanicak, NMED-AIP, MS J993
EM/ER File, MS M992
~~RPF, MS M707~~

Additional Information
T. Baca, EM, MS J591
T. Longo, DOE-HQ, EM-453
J. Plum, LAAO, MS A316
S. Rae, ESH-18, MS K497
G. Rael, AL-ERD, MS A906
J. Vozella, LAAO, MS A316
J. White, ESH-19, MS K498
EM/ER CT#s C304, C323, C324, C325, C326, C327, C328, C334, C337, C338, C346, MS M992

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous & Radioactive Materials Bureau
2044 Galisteo
P.O. Box 26110
Santa Fe, New Mexico 87502
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GARY E. JOHNSON
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SECRETARY

EDGAR T. THORNTON, III
DEPUTY SECRETARY

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

September 11, 1997

Mr. G. Thomas Todd, Area Manager
Los Alamos Area Office
Department of Energy
528 35th Street
Los Alamos, New Mexico 87544

Dr. Sigfried Hecker, Director
Los Alamos National Laboratory
P.O. Box 1663, Mail Stop A100
Los Alamos, New Mexico 87545

ER PROJECT OFFICE RECEIVED SEP 15 1997

RE: **Approval of a Request for Extension of Recent Requests for Supplemental Information and Additional Work for Los Alamos National Laboratory (LANL) RCRA Facility Investigation Reports - Notices of Deficiency (NOD) Responses and Sampling and Analysis Plans**

Dear Mr. Todd and Dr. Hecker:

The RCRA Permits Management Program (RPMP) of the Hazardous and Radioactive Materials Bureau (HRMB) is in receipt of the August 26, 1997 letter, referenced EM/ER: 97-334, from the Department of Energy (DOE)/LANL requesting an extension of the date for response regarding the documents as indicated below.

RPMP hereby approves DOE/LANL's request for an extension and expects to receive the responses no later than November 15, 1997, as per DOE/LANL's request.

Orig + 9 cy F42
Don
Dorothy

HRMB Request	Date of Request	Document Type	PRSs	
AW	7/21/97	RFI Report and NOD Response (2/96)	10-001(a-d)	C323
SI	7/29/97	SAP (3/96)	21-016(a,b,c)	C338
SI	7/21/97	SAP (2/96)	21-018(b)	C326
SI	7/29/97	Phase II SAP (1/96)	21-024(c,i), 21-027(a)	C334
Comments	7/21/97	Response to Addtl. Info Req. (3/97)	31-001	C328
Comments	7/27/97	Corrective Action Rpt.	18-003(d)	C304
SI/AW	7/21/97	NOD Response (2/96)	TA-36, 36-003(a,b), 36-005, C-36-003	C324
SI	7/29/97	RFI Report (4/95)	TA-39, 39-002(a-f), 39-005, 39-006(a), 39-007(a,d)	C337
☆ SI	8/4/97	RFI Report (9/96)	16-003(k), 16-021(c)	C346
☆ SI/AW	7/21/97	NOD Response (5/95)	TA-33	C327
☆ SI	7/21/97	NOD Response (5/96)	33-002(a-e) MDA K	C325
SI	7/29/97	RFI Report (2/96)	0-039	C336

If you have questions concerning this letter, please contact myself or Mr. John Kieling, RPMP's LANL Facility Manager at (505) 827-1558.

Sincerely,

Robert S. (Stu) Dinwiddie, Ph.D., Manager
RCRA Permits Management Program
Hazardous and Radioactive Materials Bureau

66

University of California
Environmental Restoration Project, MS M992
Los Alamos, New Mexico 87545
505-667-0808/FAX 505-665-4747

U. S. Department of Energy
Los Alamos Area Office, MS A316
Environmental Restoration Program
Los Alamos, New Mexico 87544
505-667-7203/FAX 505-665-4504

Date: November 14, 1997
Refer to: EM/ER:97-476

Mr. Benito Garcia
NMED-HRMB
P.O. Box 26110
Santa Fe, NM 87502

SUBJECT: RESPONSE TO REQUEST FOR SUPPLEMENTAL INFORMATION FOR THE RFI REPORT FOR TA-16, PRSs 16-003(k) AND 16-021(c) (FORMER OU 1082)

Dear Mr. Garcia:

The Environmental Restoration Project received your letter dated September 11, 1997, in which you approved a request for extension for supplemental information on the Resource Conservation and Recovery Act Facility Investigation Report for Technical Area 16, Potential Release Sites 16-003(k) and 16-021(c). In your letter, you indicated that a response should be received from the Los Alamos National Laboratory no later than November 15, 1997. Enclosed please find our response to your request.

Should you have any questions, please contact Roy Michelotti at (505) 665-7444 or Joe Mose at (505) 667-5808.

Sincerely,

Julie A. Canepa, Program Manager
LANL/ER Project

Sincerely,

NOV 19 1997

Theodore J. Taylor, Program Manager
DOE/LAAO

JC/TT/gmn

Enclosure: Response to Request for Supplemental Information for RFI Report for TA-16

An Equal Opportunity Employer Operated by the University of California

Cy (w/enc.):
D. Griswold, AL-ERD, MS A906
J. Harry, EES-5, MS M992
R. Michelotti, CST-7, MS E525
J. Mose, LAAO, MS A316
D. Neleigh, EPA, R.6, 6PD-N
C. Rodriguez, CIO/ER, MS M769
T. Taylor, LAAO, MS A316
J. White, ESH-19, MS K490
S. Dinwiddie, NMED-HRMB
M. Leavitt, NMED-GWQB
J. Parker, NMED-HRMB
G. Saums, NMED-SWQB
S. Yanicak, NMED-AIP, MS J993
RPF, MS M707

Information Only (w/o encs)
T. Baca, EM, MS J591
T. Glatzmaier, DDEES/ER, MS M992
T. Longo, DOE-HQ, EM-453
D. McInroy, EM/ER, MS M992
J. Plum, LAAO, MS A316
S. Rae, ESH-18, MS K497
G. Rael, AL-ERD, MS A906
J. Vozella, LAAO, MS A316
EM/ER File (CT# C346), MS M992
EM/ER File, MS M992

Response to Request for
Supplemental Information for
PRSs 16-021(c) and 16-003(k)

General Addenda and Corrections

1) As requested in the cover letter to this request for supplemental information, LANL will continue to provide HRMB with bi-monthly briefings on the status of the investigations of PRS 16-021(c). LANL will provide more formal written documentation of materials presented in these briefings upon request of HRMB.

2) LANL would like to note that the water SALs discussed in this document, particularly in Appendix C, primarily represent drinking water MCLs. LANL currently compares analytical concentrations to water criteria appropriate for the most likely water use (e.g. wildlife use) rather than comparing to human health levels.

3) The tritium unit values in Table C-6 should all be positive rather than negative.

4) As requested by HRMB in a telecon of September 9, 1997, LANL has identified within this response programmatic issues that have arisen while preparing this request for supplemental information.

NMED Comment 1.a. Section 1.3.2 Pertinent sections of the quality assurance/quality control plan for FY 95 TA-16 field campaign should be provided for reference.

LANL response The pertinent sections of the quality assurance/quality control plan for the FY 95 TA-16 field campaign are provided as Attachment A. Please note that this plan was written by the ICF Kaiser field team for their own use. It has not been edited by a professional editor.

NMED Comment 1.b. Section 1.3.2 LANL should include in the text the frequency at which both field and laboratory QA/QC samples were obtained

LANL response Field QA/QC samples (field duplicates) were collected at a rate of 3 out of 34 laboratory samples at PRS 16-021(c) and 0 out of 10 laboratory samples at 16-003(k) for a total of 3 out of 44 for the two PRSs. Laboratory QA/QC samples such as batch-specific QC samples (blank, matrix spike, duplicates) were obtained at a rate commensurate with LANL Environmental Restoration (ER) laboratory contracts. These contracts are based either on requirements contained in the EPA SW-846 Laboratory (CLP) SOW or guidance provided in the EPA SW-846 procedures. This rate is typically a frequency of one QC sample for each instrumental method, each sample matrix, and/or each analytical batch, whichever is more frequent. Inorganic and radiochemical methods also require the analysis of a laboratory control sample with each analytical batch. Additional non-batch QC requirements for individual instrumental techniques vary widely and cannot be easily or briefly summarized in reports.

NMED Comment 1. c. Section 1.3.2 LANL should add the locations of the QA samples to Figures 5.1.4-1 and 5.2.4-1.

LANL response Locations of the field QA samples, the duplicate samples, have been added to Figure 5.2.4-1 for PRS 16-021(c). No field QA samples were taken at PRS 16-003(k), so figure 5.1.4-1 was not modified. The modified figure 5.2.4-1 is included as Attachment B.

NMED Comment 2. Section 2.3: LANL should replace all references to the "main" aquifer with "regional aquifer".

LANL response On page 9 paragraph 2 the phrase "main" aquifer will be replaced with "regional" aquifer.

NMED Comment 3. Section 2.3.1: LANL should include a figure indicating the barium and boron levels as indicated in the second to last paragraph of this section.

LANL response LANL has included as Attachment C a figure indicating the locations of the barium and boron levels as indicated in the second to last paragraph of this section.

NMED Comment 4.a. LANL should explain any possible relationship between constituents identified in SHB-3 to site-related activities. And if any possible relationship exists, LANL should provide rationale for advancing boreholes to a depth less than the static water level in SHB-3. RPMP is concerned that constituents found in SHB-3 might be related to HE-related activities and that contaminants may be present in the regional aquifer since it has not been definitely constrained.

LANL response LANL believes that a definitive relationship between constituents identified in SHB-3 and site-related activities cannot be made at this time. The following reasoning suggests that such a relationship is unlikely: (1)The constituents lead, phosphate, rubidium, and ammonium have not been extensively used in HE-related activities at TA-16. (2) These constituents are not found at elevated levels in the HE-contaminated springs at TA-16, which suggests that these constituents are not significant HE by-products in water samples known to be HE-contaminated. (3) The levels of these constituents found are low, and may not represent contamination of SHB-3 waters. The background dataset used in these comparisons was small, and based on springs/seeps. These spring/seep data may not be representative of perched/deep groundwater such as that found in SHB-3. Further investigation of this issue will occur when an improved background dataset for groundwater is available.

Although LANL does not believe that a definitive relationship between the observed constituents in SHB-3 and site activities has been proved at this time, LANL is also concerned that constituents from site-related activities could be reaching the perched/regional water table that is present in SHB-3. LANL's rationale for advancing boreholes to a depth less than the static water level in SHB-3 is that our investigations are phased. Moderate-depth (200 ft) boreholes are planned in this RFI Report to investigate shallow perched groundwaters, which discharge as springs at TA-16. Results of these investigations will be used to help locate future, deeper boreholes that intersect the static-water table present in SHB-3. LANL currently has deep boreholes at TA-16 planned in its baseline in future fiscal years (FY 99 and FY 00). In addition, 4 sitewide hydrogeologic studies boreholes to the regional aquifer are planned in and around TA-16

during the next few years; these boreholes will provide additional information on potential TA-16 impacts to the regional aquifer.

NMED comment 4.b. LANL should also clarify if the ground water interval encountered in SHB-3 will also be intercepted during drilling activities as discussed within this document.

LANL response LANL does not believe that the ground water interval encountered at SHB-3, which was at a static water depth of 664 ft during 1992, will be intersected by the 200 ft boreholes that are discussed in this document. As noted in the response to comment 4.a. LANL anticipates drilling boreholes to depths greater than 700 ft during FY 1999 and FY 2000.

NMED comment 4.c. Please present the data, sampling dates, sampling intervals, etc. for SHB-3 and the background spring data to which it was compared.

LANL response Pertinent data are present in Attachment D. SHB-3 data were originally reported by Blake et al (Blake et al. 1995, 1335). Background data were also extracted from the Blake et al. (Blake et al., 1995, 1335) document. LANL recognizes that this background dataset is small, but it was the best available dataset at the time of these comparisons. LANL hopes to repeat these comparisons with larger sample and background datasets in the future.

NMED comment 4.d. Please clarify what is meant by "swab" sample

LANL response A swab sample is merely a water sample that is taken with a device known as a swab sampler. A swab sampler is rod that has rubber cups of slightly larger diameter than the well bore that is deployed on the end of the drillstring. These cups open up during deployment downhole. When the sampler pulls up on the wireline the water samples are trapped and raised to the surface.

NMED comment 5.a. Please define the acronym TATB

LANL response TATB is triaminotrinitrobenzene, an insensitive and highly insoluble HE used in many modern weapon systems.

NMED comment 5.b. Please provide the analytical methods, detection limits, summary of QA/QC documentation for the analyses conducted.

LANL response Attachment E provides the analytical methods, detection limits and summary of QA/QC documentation for the analyses conducted.

NMED comment 6. Section 3.1.2 LANL should provide the pertinent portions of the *Technical Approach to the RFI Report* as reference documentation for this report

LANL response The reference to Knudsen et al, 1996 in Section 3.1.2 Data Verification and Validation is no longer valid. The document referenced here, "Technical Approach to the RFI Report" was an ER Policy Paper under development at the time the 260 Outfall RFI Report was in preparation. This policy paper was never finalized or released as official ER Policy.

The appropriate reference for the ER baseline data validation protocol is now the Quality Assurance Project Plan (QAPP), LANL 1996 (ER Master Reference List No. 1292). This reference is cited in the latest version of the RFI Report Framework, Section 3.1.2 Data Validation, page 10; and is cited in recent versions of LANL RFI Reports.

Attachment F provides the pertinent portions of the QAPP.

NMED comment 7. Section 3.3 LANL should include a compilation of all analytical data, including non-detectable concentrations, in Appendix A of the RFI Report.

LANL response Attachment G (2 EXCEL disks per telecon between T. Glatzmaier and J. Kieling on 10/22/97) provides a compilation of all analytical data, including non-detectable concentrations. This attachment will be included as part of Appendix A.

Provision of all data represents a programmatic issue, which may be addressed in future programmatic discussions.

NMED comment 8. Section 3.4.2 LANL should provide as reference materials attached to this document, the pertinent sections of the *Screening Assessment Methodology* (McCann et al.).

LANL response The reference to McCann et al, 1996 (1300) is no longer valid. The document referenced here, "Screening Assessment Methodology" was an ER Policy Paper under development at the time the 260 Outfall RFI Report was in preparation. This policy paper was never finalized or released as official ER Policy.

The appropriate reference for the ER Screening methodology is "Risk-Based Corrective Action Process (Dorries 1997, 1297)." This reference is cited in the latest version of the RFI Report Framework, Section 3.2.4 Risk Based Screening Assessment, page 13; and is included in recent versions of LANL RFI Reports.

Attachment H includes the pertinent sections of the document

NMED comment 9. Section 3.4.3. LANL should provide in the text of this section further explanation why site-specific human health risk assessments were not performed for 16-003(k) and 16-021(c).

LANL response No site-specific human health risk assessments were performed in this Phase I Report because of the uncertainties in conceptual model development and lacks in data collection to perform a risk assessment at this point and time of the 260 Outfall project. The Phase II Sampling and Analysis Plan presented in Section 5.2.11 of the RFI Report details the plan to collect the data necessary to validate a conceptual model for the site and perform risk assessment evaluations. Therefore, human health risk assessments will be performed in latter stages of the RFI/CMS process for this site.

NMED comment 10a. Section 4.0 LANL should ensure that all QA/QC results reported by the laboratory are present and correct in FIMAD and reported within this document.

LANL response Per discussion in a telecon with Kim Hill (EPA and HRMB) that occurred on September 9, 1997 LANL will provide information on: (1) how LANL

handles the QA/QC results in FIMAD; (2) why we handle those data in this way; and (3) indicate where this process is going.

(1) Analytical results for batch-specific QC samples are included in FIMAD. Non batch-specific QC indicators that are measured by the analytical laboratories are not currently reported electronically. Not all of the electronically available data are currently being verified. LANL's current policy is to verify all field data and some (but not all) of the batch QC results by comparing electronic data with hard copy reports. (2) LANL handles batch QC data in this fashion because data verification is an extremely labor intensive process. LANL's current contracts with the analytical laboratories do not require that electronic deliverable are 100% in agreement with hard copy deliverables. Non- batch QC indicators are not hand entered into FIMAD because most would not fit into the current FIMAD formats. (3) These deficiencies will be remedied in upcoming contracts. In addition, the DOE Environmental Management Electronic Data Deliverable Master Specifications (DEEMS), which will guide LANLs new electronic deliverable, will make more of these indicators available electronically.

LANL believes that efficient and effective QA oversight and data validation processes are more critical to the maintenance of data integrity than the capture of all QA/QC information in FIMAD. Currently all LANL data receive at least baseline validation. Data validators have access to all of the QA/QC indicators reported by the analytical laboratories, whether or not they are in FIMAD. Where these indicators demonstrate that the laboratory process may have been out of control, this is indicated to the data user both in the validation reports and in the data validation flags that are recorded in FIMAD.

NMED comment 10b. Section 4.0 LANL should collect field duplicates at a minimum rate of 10%.

LANL response 44 laboratory samples were collected for PRSs 16-003(k) and 16-021(c). Three laboratory field duplicates were collected. This is a rate of 6.8 % At the time of the 1995 TA-16 field campaign, LANL QA documents suggested taking field duplicates at a rate of 5%. The approved RFI work plan stipulated 1 out of 14 (duplicates were not addressed in the NOD) duplicates at PRS 16-021(c) and 16-003(k), which were considered together in one SAP - a rate of 7.1 %.

This represents a programmatic issue, which may be addressed in future programmatic discussions.

NMED comment 11. Section 4.3 LANL should clarify at each mentioning that "Table B-2" is located within Appendix B.

LANL response LANL will convert each citation of "Table B-2" to "Table B-2, Appendix B".

NMED comment 12. Section 5.0 For additional clarification, LANL could include a figure which references the analytical data (Appendix A - see Comment 7) and indicates the locations where contaminant concentrations were below SALs.

LANL response: Per discussion in a telecon with Kim Hill (EPA and HRMB) that occurred on September 9, 1997 1) LANL notes that the requested information is available on existing figures (e.g. Figure 5.2.4-1); 2) LANL will note in section 5.0 that analytical suites and data are available in Appendix A.

NMED comment 13. Section 5.1.3 Please include the adjective "sump" in the titles of Tables 5.1.3-1, 2 and 3

LANL response LANL will replace "water" with "sump water" in the titles of Table 5.1.3-1, 5.1.3-2, 5.1.3-3.

NMED comment 14.a. Section 5.1.4 LANL should include pertinent information such as a tabulated summary of Photo Ionization Detector/Flame Ionization Detector (PID/FID) readings, HE spot test and sodium iodide results in the RFI report.

LANL response Pertinent field information such as a tabulated summary of PID/FID readings, HE spot test, and sodium iodide detector results is provided in Attachment I, which is extracted from the Post Field Ops Report for the FY 95 TA-16 field campaign.

NMED comment 14.b. Section 5.1.4 Please provide an explanation of "Request Numbers" within the text of the RFI report.

LANL response LANL will add the following footnote to Tables 5.1.4-2 and 5.2.4-1: "All samples with the same request number were analyzed together in a single batch at an analytical laboratory"

NMED comment 14.c. Section 5.1.4 LANL should provide well construction diagrams for those boreholes and wells installed.

LANL response Well construction drawings are provided as Attachment J. These well construction drawing s represent typical alluvial and deep wells that are being implemented as part of the TA-16-260 field campaign. Well construction is guided by LANL-ER-SOP 5.01 "Monitor Well Construction".

NMED comment 15 Section 5.1.6 LANL should detail which SVOC compounds were undetected in sample 031-95-0051 and reference a figure indicating the sample's location.

LANL response The list of undetected SVOCs is provided in Table 15-1

Table 15-1 - Semivolatile Organic Compound (SVOC) Suite

Acenaphthene	Chrysene	
Acenaphthylene	Dibenzo(a,h)anthracene	Isophorone
Aniline	Dibenzofuran	2-Methylphenol
Anthracene	1,2-Dichlorobenzene	4-Methylphenol
Azobenzene	1,3-Dichlorobenzene	Naphthalene
Benzo(a)anthracene	1,4-Dichlorobenzene	2-Nitroaniline
Benzo(b)fluoranthene	3,3'-Dichlorobenzidine	3-Nitroaniline
Benzo(k)fluoranthene	2,4-Dichlorophenol	4-Nitroaniline
Benzo(g,h,i)perylene	Diethylphthalate	Nitrobenzene

Benzo(a)pyrene	Dimethylphthalate	2-Nitrophenol
Benzoic acid	Di-n-butylphthalate	4-Nitrophenol
Benzyl alcohol	Di-n-octylphthalate	N-Nitrosodimethylamine
Bis(2-chloroethoxy)methane	2,4-Dimethylphenol	N-Nitrosodiphenylamine
Bis(2-chloroethyl)ether	2,4-Dinitrophenol	N-Nitroso-di-n-propylamine
Bis(2-chloroisopropyl)ether	4,6-Dinitro-2-methylphenol	Pentachlorophenol
Bis(2-ethylhexyl)phthalate	2,4-Dinitrotoluene	Phenanthrene
4-Bromophenylphenyl ether	2,6-Dinitrotoluene	Phenol
Butylbenzylphthalate	Fluoranthene	Pyrene
Carbazole	Fluorene	Pyridine
4-Chloroaniline	Hexachlorobenzene	1,2,4-Trichlorobenzene
4-Chloro-3-methylphenol	Hexachlorobutadiene	2,4,5-Trichlorophenol
2-Chloronaphthalene	Hexachlorocyclopentadiene	2,4,6-Trichlorophenol
2-Chlorophenol	Hexachloroethane	
4-Chlorophenylphenyl ether	Indeno(1,2,3-cd)pyrene	

Note that these analytes are tabulated in Table A-4, Appendix A.

In the second sentence of Section 5.1.6 replace "031-95-0051" with "031-95-0051 (Figure 5.1.4-1)".

NMED comment 16 Section 5.1.7 LANL should clarify if any potential radiological contaminants other than uranium exist at these PRSs.

LANL response Following the last paragraph in Section 5.1.7.1, insert the following sentences: "Interviews with several site workers suggest that the only radionuclide used in TA-16-260 was uranium. These workers suggested that: (1) HE parts that were glued to depleted uranium had occasionally been machined in TA-16-260 (Jim Griffin, personal communication 1992); and (2) other radionuclides, particularly fissile radionuclides, were kept far from HE that was being processed because of the potential safety hazards of an inadvertent detonation in the presence of radionuclides."

NMED comment 17 Section 5.1.7.1 LANL should include the evaluation of lead in the Multiple Chemical Evaluation (Table 5.1.7-1). Section 3.4 indicates that the PRSs will be evaluated assuming a residential risk scenario; the risk posed by lead to children should, therefore, be included in the evaluation.

LANL response LANL agrees that lead should be included in the MCE evaluation for this PRS. It should be noted that current LANL ER Project guidance requires lead to be included in the MCE. This guidance was not in place during FY 96 when this report was generated. The revised calculation (Table 5.1.7.1 revised - below) reflects the addition of lead to the MCE calculation. With the addition of lead, the sum of the maximum concentrations detected normalized to SALs is 1.5, indicating the potential for adverse effects due to exposure to this grouping. Therefore, those contaminants with a concentration normalized to SAL greater than 0.1 will be carried forward as COPCs. These contaminants include barium, copper, lead, nickel and TNB. The presence of these COPCs will be factored into the planning for the VCA proposed for this PRS as described in Section 5.1.10 of the RFI Report.

TABLE 5.1.7.1 Revised
MCE FOR NONCARCINOGENIC EFFECTS AT PRS 16-003(k)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Barium	2030	5300	0.4
Cobalt	38.5	4600	0.0
Copper	317	2800	0.1
Lead	316	400	0.8
Nickel	103	1500	0.1
Silver	3.7	383	0.0
Zinc	200	23000	0.0
HMX	3.84	3300	0.0
TNB	0.272	3.3	0.1
Benzoic Acid	0.056	100000	0.0
Diethylphthalate	0.48	52000	0.0
Fluoranthene	0.046	2600	0.0
Pyrene	0.04	2000	0.0
TOTAL			1.5

LANL does not agree with the statement expressed in this comment "Section 3.4 indicates that the PRSs will be evaluated assuming a residential risk scenario; the risk posed by lead to children should, therefore, be included in the evaluation." The intention of Section 3.4 is to describe the methodology for performing risk assessments, not to dictate the land use decisions to be made for individual PRSs. The methodology presented in Section 3.4 does describe the screening process used, which incorporates the use of SALs based on a residential exposure scenario. However, the SAL comparison dictates the need for further evaluation at a given site, and the subsequent development of COPCs. LANL proposes to evaluate the 260 Outfall PRSs with an industrial land use scenario. This decision is based on the fact that Building TA-16-260 is an active HE machining facility, that will remain an industrial land use according to the LANL 30-Year Plan, and therefore, will not be released to the public. Access to the 260 Outfall area is very restricted due to security clearance and safety issues. Therefore, appropriate exposure modeling (to include lead) during planning for, and conducting of, the VCA for this PRS will be based on an industrial scenario with adult receptors. LANL recognizes that a risk evaluation for a residential scenario may be performed for comparative purposes, but

the results from such an analysis will not be the primary decision focus for this particular site.

NMED comment 18 Section 5.1.10 Since no ecological risk analysis was performed, LANL should provide an errata sheet indicating the following correction to the third sentence: No constituents were found above SALs and MCE calculations indicate low probability of impact to human receptors due to multiple constituent effects.

LANL response LANL will correct the indicated sentence to read: "No constituents were found above SALs and MCE calculations indicate low probability of impact to human receptors due to multiple constituent effects." Per discussion in a telecon with Kim Hill (EPA and HRMB) that occurred on September 9, 1997 LANL will not provide an errata sheet at this time.

NMED comment 19 Section 5.2.2 A schematic diagram of the drainage channel and dam would be useful in visualizing the suitability of the proposed Best Management Practices.

LANL response A schematic diagram of the drainage channel and dam, also showing locations of the implemented Best Management Practices, is included as Attachment K.

NMED comment 20 Section 5.2.7.1 LANL should include the evaluation of lead in the Multiple Chemical Evaluation (Table 5.2.7-1). Section 3.4 indicates that the PRSs will be evaluated assuming a residential risk scenario; the risk posed by lead to children should, therefore, be included in the evaluation.

LANL response Please refer to the LANL response to NMED Comment 17 above. Table 5.2.7.1-1 revised (below) reflects the addition of lead to the MCE calculation. With the addition of lead, the sum of the maximum concentrations detected normalized to SALs is 0.8, indicating a low potential for adverse effects due to exposure to this grouping.

TABLE 5.2.7.1-1 Revised
MCE FOR NONCARCINOGENIC EFFECTS AT PRS 16-021(c)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Copper	40.5	2800	0.01
Lead	107	400	0.27
Nickel	37.3	1500	0.02
Silver	4.1	383	0.01
Vanadium	55.7	540	0.10
Zinc	226	23000	0.01
1,3-Dinitrobenzene	2.04	6.5	0.31
Nitrobenzene	1.2	33	0.04
3-Nitrotoluene	2.12	650	0.00
Benzoic Acid	0.43	100000	0.00
Di-n-butylphthalate	0.054	6500	0.00
Pyrene	0.071	2000	0.00
Acetone	0.067	2000	0.00

1,2-Dichlorobenzene	0.007	2300	0.00
1,2,4-Trimethylbenzene	0.052	8	0.01
1,1,1-Trichloroethane	0.014	3000	0.00
TOTAL			0.79

It is very important to note that this PRS is being evaluated with the formal RFI/CMS process. The first step in this process, the Phase II Sampling and Analysis Plan proposed for this PRS in Section 5.2.11 of the RFI Report, requires the collection of data for full suite analysis that includes the analysis for lead and other potential contaminants such as 1,3-dinitrobenzene and chromium. Therefore, the MCE and screening decision for this PRS at this point of the process is essentially moot, and the reader is referred to the Sampling and Analysis Plan proposed. Again, LANL requires the clarification of the land use and risk assessment issues for this PRS addressed in our response to NMED Comment 17 above.

NMED comment 21.a. Section 5.2.7.2 The normalized concentrations of lead (0.145) and 1,3-dinitrobenzene (0.31) are greater than 0.1 in the MCE for noncarcinogenic effects (Table 5.2.7.1-1). LANL should carry forward these constituents, along with those that exceed SALs, into the Baseline Risk Assessment that is planned during the CMS/CMI process.

LANL response LANL will carry these constituents (lead and dinitrobenzene) forward into the Baseline Risk Assessment that is planned during the CMS/CMI process. Per discussion in a telecon with Kim Hill (EPA and HRMB) that occurred on September 9, 1997, note that this is contrary to current LANL programmatic guidance for MCEs.

This represents a programmatic issue, which may be addressed in future programmatic discussions.

NMED comment 21.b. Section 5.2.7.2 The normalized concentration of chromium is 0.55 and is the driver for the MCE for carcinogenic effects (Table 5.2.7.1-2). LANL should carry forward these constituents, along with those that exceed SALs, into the Baseline Risk Assessment that is planned during the CMS/CMI process.

LANL response LANL will carry chromium forward into the Baseline Risk Assessment that is planned during the CMS/CMI process. Per discussion in a telecon with Kim Hill (EPA and HRMB) that occurred on September 9, 1997, note that this is contrary to current LANL programmatic guidance for MCEs.

This represents a programmatic issue, which may be addressed in future programmatic discussions.

NMED comment 22.a. Section 5.2.9 Please clarify within the text of the RFI report, the intent or purpose of presenting Table 5.2.9-1.

LANL response At the end of the first paragraph of Section 5.2.9 LANL will insert the following text: "For each COPC identified during the screening assessment, Table 5.2.9-1 indicates whether the contaminant is present at levels less than SALs in the outermost laboratory samples on a bounding traverse at a specific distance downgradient

from the TA-16-260 outfall. Contaminants present at levels less than SALs are bounded laterally relative to SALs."

NMED comment 22.b. Section 5.2.9 LANL should present the traverses relative to EPA Region 9 residential PRGs in addition to the industrial PRGs.

LANL response The traverses relative to SALs are equivalent to traverses relative to EPA Region 9 PRGs. LANL would like to clarify that the traverses shown in Figure 5.2.9-1 and the status of bounding outlined in Table 5.2.9-1 are presented relative to SALs. The text as written in not clear on this point. LANL will replace the sentence "These traverses are bounded relative to EPA Region 9 industrial PRGs" with "Although these traverses are not bounded relative to SALs (EPA Region 9 residential PRGs), they are bounded relative to EPA Region 9 PRGs for industrial soil." The industrial PRG bounding traverses are not shown.

NMED comment 22.c. Section 5.2.9 LANL should include lead, chromium and 1,3-dinitrobenzene in Table 5.2.9-1.

LANL response Below is an addition to Table 5.2.9-1 that includes lead, chromium and 1,3 dinitrobenzene"

ADDITION TO TABLE 5.2.9-1
STATUS OF LATERAL BOUNDING FOR PRS 16-021(c)

COPC	OUTFALL	100 FT	200 FT	300 FT	400 FT	500 FT	600 FT
lead	Yes	Yes	Yes	Yes	Yes	Yes	Yes
chromium	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1,3 DNB	Yes	Yes	Yes	Yes	Yes	Yes	Yes

NMED comment 23. Section 5.2.11.1 LANL should state that concentrations are "greater" not "larger".

LANL response In the last sentence of the first paragraph of Section 5.2.11-1 LANL will convert "greater" to "larger".

NMED comment 24. Section 5.2.11.2.1 Adding the pond and dam to Figure 5.2.11.2.1-1 would aid in visualizing the proposed activities.

LANL response A modified version of Figure 5.2.11.2.1-1 is included as Attachment L. This modified figure schematically shows the locations of the pond and dam relative to the sampling localities.

NMED comment 25.a. Section 5.2.11.2.3 LANL must ensure that representative and confirmatory sampling for HE will occur. The HE screening kit has a detection limit of 100 ppm, whereas the SAL for HE is 15 ppm.

LANL response All locations where HE spot test results are negative are also being screened using the RDX D-Tech immunoassay kit, which has a detection limit of less-than 1 ppm. In addition, LANL has taken additional laboratory samples in the boreholes

drilled thus far during the FY 1997 field campaign, to address concerns with the D-Tech immunoassay kits that were expressed in discussions with NMED.

NMED comment 25.b. Section 5.2.11.2.3 LANL should also consult NMED DOE OB in the re-siting of boreholes to the location of geophysical anomalies.

LANL response Thus far, LANL has discussed re-siting of boreholes with HRMB representatives. These discussions occurred in meetings on April 15, 1997 and October 9, 1997 and were subsequently communicated in writing to HRMB. In the future, LANL will consult with either NMED DOE OB or NMED HRMB prior to re-siting boreholes.

NMED comment 25.c. Section 5.2.11.2.3 LANL should also present the sampling locations, depths, etc. provided in the text (pages 67 and 68) as a table for clarification.

LANL response These sample locations, depths, etc. as outlined in this SAP are provided in Table 25.c.-1 (below). Note that these locations and sampling depths have been modified following discussions with HRMB during April and October of 1997. Note also that additional laboratory samples were taken in most of these boreholes.

Table 25.c.-1

Borehole	Location[a]	Proposed total depth	Screening depths[b]	Lab sample depths
1	75 ft - center	First clean screening interval	Every 5 ft.	1) 0-5 ft 2) total depth
2	75 ft - north	At least 70 ft	Every 5 ft.	1) 0-5 ft 2) total depth
3	75 ft - south	At least 70 ft	Every 5 ft.	1) 0-5 ft 2) total depth
4	100 ft - center	First clean screening interval	Every 5 ft.	1) 0-5 ft 2) total depth
5	320 ft - center	First clean screening interval	Every 5 ft.	1) 0-5 ft 2) total depth
6	320 ft - north	At least 5 ft deeper than hole 5	Every 5 ft.	1) 0-5 ft 2) total depth
7	320 ft - south	At least 5 ft deeper than hole 5	Every 5 ft.	1) 0-5 ft 2) total depth
8	450 ft - north central	First clean screening interval	Every 5 ft.	1) surface 2) 0-5 ft 3) total depth
9	450 ft - south central	First clean screening interval	Every 5 ft.	1) surface 2) 0-5 ft 3) total depth
10	450 ft - north	At least 70 ft	Every 5 ft.	1) 0-5 ft 2) total depth
11	450 ft - south	At least 70 ft	Every 5 ft.	1) 0-5 ft 2) total depth
12 (optional)	75 ft -north contingent	At least 70 ft	Every 5 ft.	1) 0-5 ft 2) total depth

13 (optional)	75 ft - south contingent	At least 70 ft	Every 5 ft.	1) 0-5 ft 2) total depth

a. All locations are measured downgradient from the outfall. Locations will be biased based on geophysical investigations.
b. Additional screening samples will be located in fractured zones or wet areas.

NMED comment 25.d. Section 5.2.11.2.3 LANL should also provide well construction diagrams in RFI Workplans to obtain prior regulatory approval.

LANL response Well construction diagrams are included as part of Attachment J.

NMED comment 26.a. Section 5.2.11.2.5 After one year of quarterly sampling (for HE, VOCs, Inorganics and anions), LANL should evaluate the data obtained from the alluvial wells and discuss the results with the Administrative Authority to determine if continued sampling would enhance the investigation.

LANL response After one year of quarterly sampling (for HE, VOCs, Inorganics and anions), LANL will evaluate the data obtained from the alluvial wells and discuss the results with the Administrative Authority to determine if continued sampling would enhance the investigation. LANL anticipates that the alluvial wells will be completed and developed by December 1997, thus these discussions will be tentatively scheduled for December 1998.

NMED comment 26.b. Section 5.2.11.2.3 Please clarify which of the 2 well/borehole locations are accessible and tentatively accessible and discuss what will occur if a borehole is found to be completely inaccessible.

LANL response The westernmost alluvial well location and the fourth-from-the-west (see Figure 5.2.11.2.1-2) near MDA-P are easily accessible. The other three are potentially less accessible. LANL currently anticipates being able to access all five locations using available drilling technology. If a borehole location is completely inaccessible LANL will consult with NMED DOE OB and /or NMED HRMB about alternative borehole locations.

NMED comment 27. Appendix A, Analytical Suites: See Comment 7.

LANL response Attachment G provides a compilation of all analytical data, including non-detectable concentrations. This attachment will be included as part of Appendix A

NMED comment 28. Appendix B, Table B-1 A crosswalk between request number and PRS/sample location would be extremely useful.

LANL response A crosswalk between request numbers and PRS/sample locations is provided as Attachment M.

Provision of this information is a programmatic issue, which may be addressed in future programmatic discussions.

NMED comment 29 Appendix C, Section 1 LANL should perform or otherwise include a comparison of water balances for each of the potentially affected springs and seeps included in Table C-1.

LANL response Per discussion in a telecon with Kim Hill (EPA and HRMB) that occurred on September 9, 1997 note that the cation sum/anion sum balance that is requested is available in Table C-8.

NMED comment 30.a. Appendix C, Section 2. LANL should clearly indicate the names and locations of all background springs (p. C-2, first paragraph) and provide a summary of the background water chemistry data.

LANL response LANL will replace the following sentence: "Two springs, Burning Ground and SWSC Line, appear to issue from Tshirege Subunit 3, and one spring, Martin Spring, appears to issue from Tshirege Subunit 4" with the following text "Three springs and two seeps have been identified at TA-16. Burning Ground spring, SWSC Line spring, and Martin spring all appear to issue from near the Tshirege Subunit 3/4 contact. The former two issue from the south wall of Canon de Valle northeast of TA-16-260. Martin spring discharges roughly 3000 ft southeast of TA-16-260. Two intermittent seeps, Peter Seep and Fishladder Seep, represent the alluvial discharge of water in Canon de Valle west of the intersection of PRS 16-021(c) with Canon de Valle and of water in a tributary to Canon de Valle downgradient from the TA-16-340 outfall, respectively." Current elevation data suggests that all three springs issue from very near the unit 3/4 contact.

The background water chemistry data is included as Attachment N.

NMED comment 30.b. Appendix C, Section 2. Figure C-1 should be revised to clearly indicate the sampling locations more so than NPDES outfalls.

LANL response A revised version of Figure C-1 is included as Attachment O. NPDES outfall designations have been removed and sampling locations have been more clearly delineated.

NMED comment 30.c. Appendix C, Section 2. LANL should include tritium and oxygen-18 in Table C-2.

LANL response Table 30.c.-1 (below) presents the requested information for tritium and oxygen isotopes. Note that the analytical precision of the stable isotope analyses (in per mil), rather than a detection limit, is an appropriate measure of the analytical sensitivity of this technique.

TABLE 30.c.-1
METHODS OF CHEMICAL ANALYSIS AND DETECTION LIMITS FOR WATER SAMPLES

ANALYTE	METHOD	DETECTION LIMIT
Tritium	scintillation counting	0.1 Tritium units (est.)
Oxygen isotopes	stable isotope mass spectrometer	analytical precision of .1 per mil

NMED comment 31.a. Appendix C, Section 3.0 LANL should provide a tabulation of the SALs and background concentrations for those analytes presented in paragraph 3, page C—6, Table C-3 and paragraph 3, page C-13.

LANL response Per discussion in a telecon with Kim Hill (EPA and HRMB) that occurred on September 9, 1997 LANL will provide this information on those analytes in paragraph 4 on page C-6. The analytes discussed in this paragraph are barium, manganese and RDX. These data are provided in Attachment P.

NMED comment 31.b. Appendix C, Section 3.0 LANL should define the acronym "NQ" in paragraph 3, page C-13.

LANL response NQ is nitroguanadine, a liquid HE used occasionally at TA-16.

References

Blake, W.D., F. Goff, A.I. Adams, and D. Counce, May 1995. "Environmental Geochemistry for Surface and Subsurface Waters in the Pajarito Plateau and Outlying Areas, New Mexico," Los Alamos National Laboratory Report LA-12912-MS, UC 903, Los Alamos, New Mexico. (Blake et al. 1995, 1355)

Attachment A - Comment 1.a.

Pertinent sections of the QA/QC plan for the FY 95 TA-16 Field Campaign

OU 1082 Site-Specific Quality Assurance Project Plan

1.0 Introduction

This site-specific Quality Assurance Project Plan (QAPP) has been written following guidance presented in the Environmental Restoration (ER) Project Quality Assurance Project Plan (QAPP). The QAPP is included in the latest version of the Installation Work Plan (IWP) currently under reveiw by the Environmental Protection Agency (EPA).

The primary objective of collecting QA/QC samples is to assess the quality of sampling and measurement techniques. The QA/QC samples may also be used to aid future decisions about specific samples and potential release sites. The following objectives will be met using QA/QC samples:

- to provide information on negative bias
- to estimate sample collection and total measurement error
- to evaluate if the data is complete, representative, and comparable

QA/QC samples typically submitted as part of environmental assessment programs that protect against false positive results will not be submitted as part of this plan. All positive results will either be accepted as accurate or, if the results are in question, will be confirmed by re-sampling the location in doubt. Re-sampling will be less expensive and more accurate than collecting numerous routine QA samples used to disqualify false positive results.

Section 2.0 discusses field QA/QC samples, Section 3.0 describes laboratory QA/QC samples, Section 4.0 discusses other significant issues. A summary of QA/QC samples is included in Table 1.

2.0 Field Quality Control Samples

Three types of field QA/QC samples will be collected at OU 1082: performance evaluation (PE) samples, collocated field duplicate samples, and Rinsate Blanks. PE samples are used to check the methods of the subcontract laboratories for data validation. Collocated samples measure spatial variation of contaminants and Rinsate blanks evaluate decontamination procedures.

Trip blanks and field blanks will not be collected. Typically, these samples identify false positives resulting from ambient conditions or cross contamination effects. At OU 1082, positive results that are suspect will be verified by re-sampling. Re-sampling is expected to be significantly more economical (and more accurate) than collecting multiple field and trip blanks due to the low probability of discovering multiple areas with contamination above screening action levels.

2.1 Performance Evaluation Samples

Material for the high explosives (HE) PE samples will be obtained from LANL sources; other PCOC PE samples will be purchased from off site sources. The PE soil will be supplied in bulk and placed in sample containers along with the environmental samples. The QA objectives of these samples are:

- to evaluate the accuracy of laboratory procedures
- to check laboratory recovery of HE constituents to evaluate matrix effects

The PE samples will be collected at a rate of 1 per 40 (2.5 %) and will provide sufficient statistical information to meet the QA objectives. However, PE samples will not be collected at OU 1082 if the ER Program begins sending PE samples for the entire program. If the ER Program begins to test off-site laboratory methods for all LANL samples, PE samples will not be necessary from individual Field Units and sampling efforts.

2.2 Collocated Field Duplicate Samples

Field duplicates will be collocated with other field assessment/characterization samples. In order to attain the maximum QA data, the field duplicate samples will be collocated with samples showing positive field screen data on indicator parameters. Field duplicates will be collected at a rate of 1 per 20 (5 %) as recommended in the Generic Quality Assurance Project Plan (QAPjP).

2.3 Rinsate Blank Samples

Two Rinsate samples will be collected during the initial sampling phase of the field campaign. One rinsate sample will be collected from manual sampling equipment and one sample will be collected from drilling equipment. The low frequency for collecting rinseate blanks is justified because rinseate blank results are only used to provide information on cross-contamination and potential false poitives. This information will be attained through resampling as explained above. In addition, decontamination procedures are controlled by a Standard Operating Procedure (SOP) and previous field efforts conducted by ICF KE at LANL has verified that present decontamination procedures are adequate. The samples will confirm that present decontamination procedures are also adequate at OU 1082.

2.4 Matrix Spike Samples

Matrix spike samples provide information on the effect of sample matrix on the laboratory analytical methodology (percent recovery) and provides a measure of the precision and accuracy of the analysis. Matrix spike samples are generally required by the method for chemical analyses. Typically, the subcontract laboratory will not require additional material in order to perform the MS/MSD; however, for organic analyses in waters, triple volumes will be required. These samples are not anticipated at TA-16 during the 1995 sampling season. Additional method specific QC may be performed by the subcontract laboratory.

3.0 Types of Laboratory QA/QC Samples

Laboratory QA/QC samples are mentioned herein to complete the QA/QC sample scheme. Four types of QA/QC samples are prepared by the laboratory to verify the quality of internal procedures. The frequency of these samples varies among laboratories and are designed by each laboratory to meet their individual needs.

3.1 Laboratory Blank Sample

The laboratory reagent blank is prepared and analyzed by the laboratory to demonstrate that identified constituents are not a result of laboratory contamination.

3.2 Calibration Standards

Calibration standards are prepared to cover the expected concentration ranges of samples being analyzed. These standards are used to provide a standard relationship between analyte concentration and instrument response.

3.3 Spike Samples

Specified concentrations of surrogate compounds are spiked into each blank calibration standard and environmental sample for organic analyses. Percent recoveries are calculated for each surrogate.

3.4 Laboratory Duplicates

Subsamples are independently analyzed and compared to determine laboratory measurement error.

4.0 Deviations from Prescribed Sample Plan and Analytical Methods

During the implementation of the RFI Work Plan in the field, unplanned instances can occur that will require deviations from prescribed Work Plan initiatives. Deviations from the sample plan occur when the nature of the sample location renders the prescribed sample requirements impossible to meet. For analytical methods, a change in method is needed when the analytical method's limit of detection for a PCOC is greater than the SAL. The following subsections will discuss proper protocol for deviating from sample and analytical method requirements prescribed by the RFI.

4.1 Contingency Plans

In any case where sample requirements prescribed by the RFI cannot be satisfied, the field team leader (FTL) will be consulted for guidance. The FTL will decide the proper course to proceed with sampling activities.

4.2 Estimated Quanitation Limits

To determine if the present analytical methods were suitable for the PCOCs at OU 1082, the detection limits for analyses were compared with the PCOC SALs. Not all the PCOCs have established SALs in LANL soils. For those that have SALs, the SAL limit is above the laboratory method detection limit. Also, the majority of PCOCs that do not have established SALs have very low laboratory method detection limits (below 5 ppm in most instances). For these reasons changes in analytical methods because of EQLs need not be requested of the subcontract laboratories.

5.0 Non-routine Chemical Analyses

Chemical analyses for HE will be performed in the mobile chemical van (chem van) for samples that test positive for HE on the HE spot test (>100 ppm). The analytical method performed in the chem van uses a high performance liquid chromatography (HPCL) method, similar to the SW-846 Method 8330. The detection limits for the chem van method are comparable to Method 8330, but this method includes less rigorous data confirmation than the specialized method. Adequate numbers of check standards will be run for QA purposes and 10% of the samples analyzed will be sent off-site for Method 8330 analysis as an additional check on the chem van method. Also, a prescribed number of the PE samples will be analyzed by the chem van. The number of PE samples will be proportional by percentage of HE unknown samples analyzed by the chem van.

6.0 Conclusions

This site-specific QAPP describes the QA/QC samples needed to assess the quality of data that will be used to support RFI decisions at OU 1082. This plan also addresses unplanned

deviations from prescribed RFI requirements and the protocol for the non-routine analyses planned at OU 1082. The field QA/QC samples defined in this plan deviate slightly from those recommended in the Generic QAPjP. The field QA/QC samples were selected to meet ER QAPP guidelines and specific OU 1082 QA objectives in the most efficient and economical manner.

Table 1: QA/QC Summary

Field QA/QC Samples		
Sample Type	**Frequency**	**QA Objective**
Performance Evaluation	Approx. 1 per 40	to evaluate accuarcy of laboratory procedures and negative bias
Field Duplicate (collocated)	Approx. 1 per 20	to evaluate contaminant spatial variability
Rinsate Blank	Approx. 2 total	to evaluate decontamination procedures
Laboratory QA/QC Samples		
Sample Type	**Frequency**	**QA Objective**
Laboratory Blank	Every batch	to evaluate laboratory contamination
Calibration Standard	Every 12 hours	to provide standard curve
Surrogate Spike	Every sample	to evaluate negative bias
Laboratory Duplicate	Every batvh	to determine measurement error

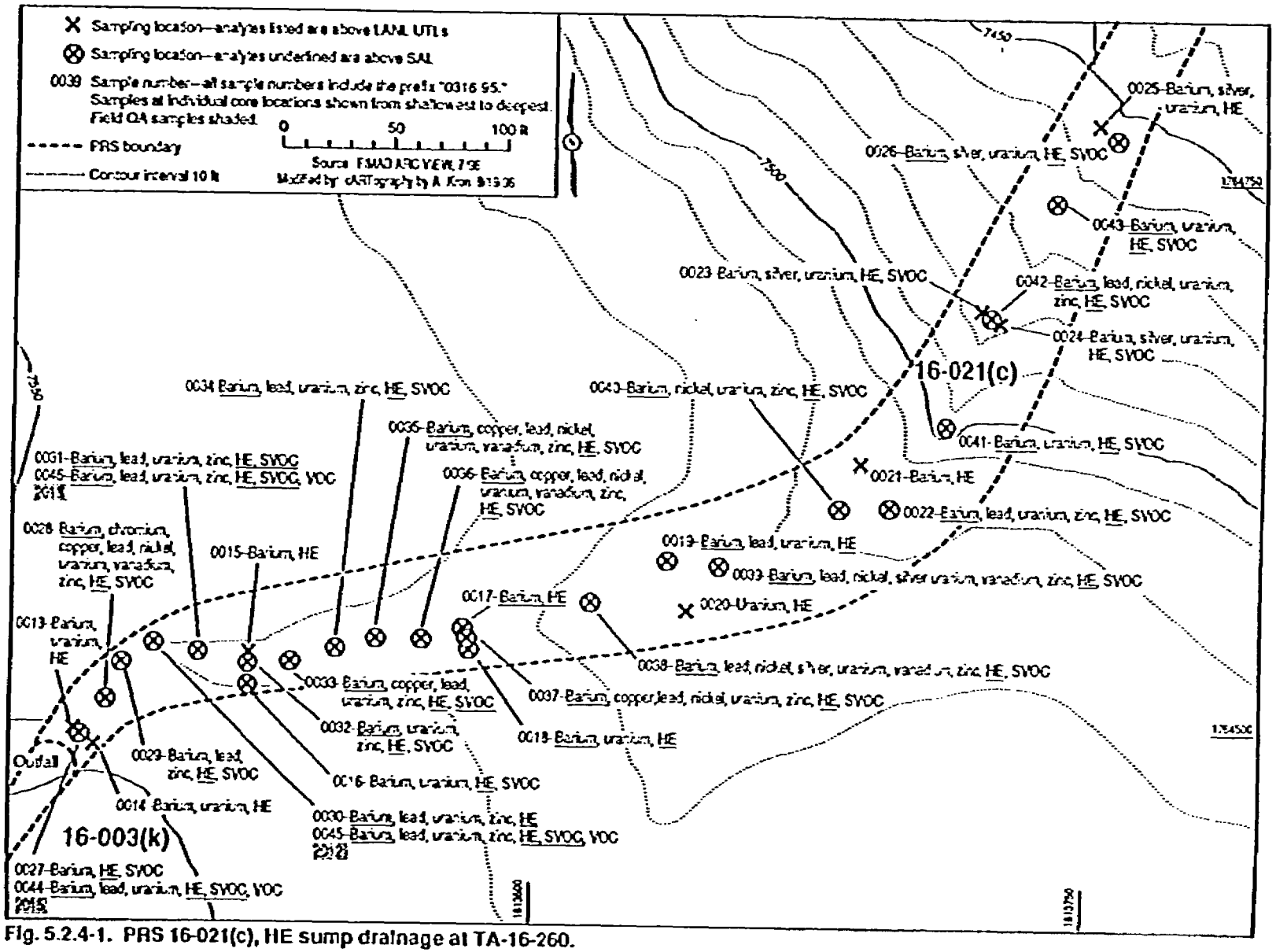


Fig. 5.2.4-1. PRS 16-021(c), HE sump drainage at TA-16-260.

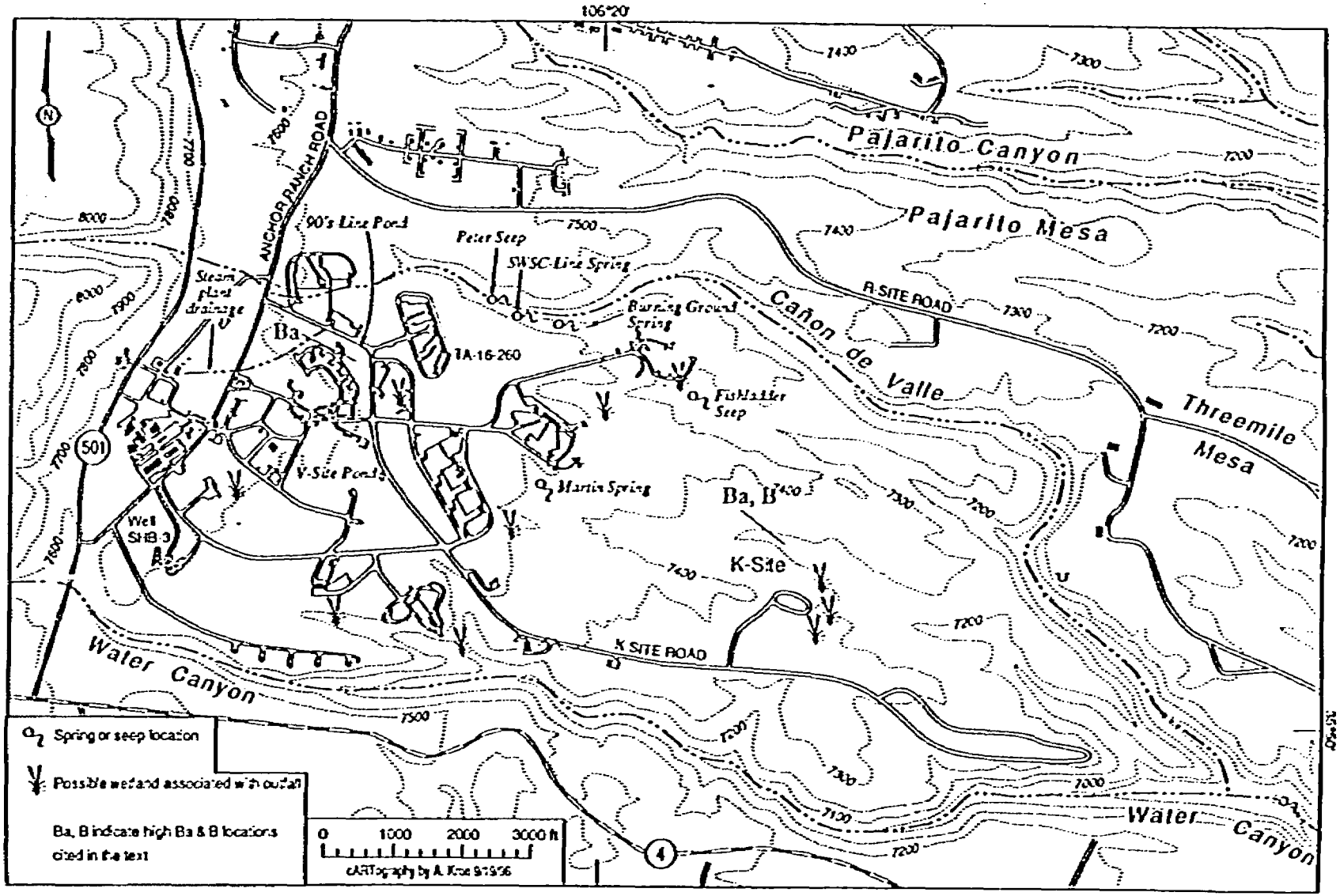


Fig. 2.3.1-1. Topography, springs, seeps, National Wetlands Inventory, and LANL-defined wetlands associated with National Pollution Discharge Elimination System (NPDES) HE outfalls (active and inactive) at TA-16.

Attachment D Table 1 Water Quality Analyses from Wells at S-@ 3

DESCRIPTION	SAMPLE NUMBER	DATE	TEMP °C	SiO2 (ppm)	Ca (ppm)	Mg (ppm)	Sr (ppm)	Na (ppm)	K (ppm)	Li (ppm)	HCO3 (ppm)	SO4 (ppm)	Cl (ppm)	F (ppm)	Br (ppm)	B (ppm)	CO3 (ppm)	TDS	CATION S.M	ANION S.M	BALANCE
Inside sample S-@ 3 Well 204-	S-@933	7/26/93	16.0	62.4	16	0.35	0.2	24	15.5	0.04	0	7.34	7.34	0.28	0.02	0.09	41.6	205.7	2.33	2.234	0.0138
Run 1, Sample S-@ 3 Well	S-@933	7/26/93	16.6	72.6	15	0.46	0.19	28.8	13.1	0.04	0	10	8.41	0.19	0.03	<0.05	35	182.3	2.208	2.223	-0.0005
Run 2, Sample S-@ 3 Well	S-@934	7/26/93	16.6	53.3	20.3	0.17	0.39	29.7	14	0.03	0	8.74	3.87	0.19	0.03	0.27	20.4	164.4	2.341	2.353	-0.005
Run 3, Sample S-@ 3 Well	S-@935	7/26/93	16.0	50.3	11.6	0.03	0.19	12.2	7.7	0.01	0.2	2.79	2.42	0.11	0.02	<0.05	28.1	129.9	1.302	1.449	-0.0506
Run 4, Sample S-@ 3 Well	S-@936	7/26/93	16.0	53.3	18.7	0.15	0.15	12.3	6	0.02	26.6	2.28	2.65	0.11	0.02	<0.05	34.2	157.6	1.631	1.735	-0.0319
Run 5, Sample S-@ 3 Well	S-@937	7/26/93	16.0	50.3	21.9	0.44	0.21	12.2	7	0.02	0	2.59	0.99	0.1	0.03	<0.05	35.7	144.3	1.875	1.851	0.0138

Attachment D Table 2 Trace Constituents from Wells at S-@ 3

DESCRIPTION	SAMPLE NUMBER	DATE	TEMP °C	Ag (ppm)	Al (ppm)	As (ppm)	Ba (ppm)	Cd (ppm)	CNO (ppm)	Co (ppm)	Cr (ppm)	Cu (ppm)	Cn (ppm)	Fe (ppm)	Hg (ppm)	I (ppm)	Mn (ppm)	Mo (ppm)	NH4 (ppm)	Ni (ppm)	NO2 (ppm)	NO3 (ppm)	Pb (ppm)	PO4 (ppm)	Rb (ppm)	Sb (ppm)	Se (ppm)	Zn (ppm)
Inside sample S-@ 3 Well 204-	S-@932	7/26/93	16.0	<0.001	<0.05	<0.001	0.08	<0.0005	NA*	<0.002	0.005	0.002	0.074	0.08	<0.001	<0.01	<0.01	0.11	0.46	0.005	<0.02	0.52	0.053	0.02	0.002	<0.001	<0.001	0.14
Run 1, Sample S-@ 3 Well	S-@933	8/93	16.6	<0.0005	<0.05	<0.002	0.04	<0.0005	<0.05	<0.002	<0.002	<0.002	<0.002	0.11	<0.0002	<0.01	<0.01	0.1	0.38	<0.002	0.17	0.58	0.014	<0.02	0.09	<0.002	<0.002	0.11
Run 2, Sample S-@ 3 Well	S-@934	8/93	16.6	<0.0005	0.06	<0.002	0.02	<0.0005	<0.05	<0.002	<0.002	<0.002	0.011	0.02	<0.0002	<0.01	<0.01	0.06	0.08	<0.002	0.06	1.03	0.007	0.02	0.11	<0.002	<0.002	0.01
Run 3, Sample S-@ 3 Well	S-@935	8/93	16.0	<0.0005	<0.05	<0.002	0.01	<0.0005	<0.05	<0.002	<0.002	<0.002	<0.002	0.02	<0.0002	<0.01	<0.01	0.11	0.1	<0.002	0.03	0.77	0.005	0.1	0.06	<0.002	<0.002	0.01
Run 4, Sample S-@ 3 Well	S-@936	8/93	16.0	<0.0005	<0.05	<0.002	<0.01	<0.0005	<0.05	<0.002	<0.002	<0.002	<0.002	0.04	<0.0002	<0.01	<0.01	0.006	0.09	<0.002	0.04	1.08	0.003	<0.02	0.05	<0.002	<0.002	<0.01
Run 5, Sample S-@ 3 Well	S-@937	8/93	16.0	<0.0005	<0.05	<0.002	0.01	<0.0005	<0.05	<0.002	<0.002	<0.002	0.009	0.02	<0.0002	<0.01	<0.01	0.01	0.12	<0.002	0.01	1.03	0.005	<0.02	0.06	<0.002	<0.002	<0.01

*NA-Not analyzed

Table D Table 3 Stable Isotopes from Wells at S-@ 3

DESCRIPTION	SAMPLE NUMBER	DATE	TEMP °C	δD (‰)	δ18O (‰)	TRITIUM (T.U.)	MIX AGE (years)	MIN AGE (years)	RECHARGE ELEV (m from 2K)	RECHARGE ELEV (m from 2K)
Inside sample S-@ 3 Well 204-	S-@932	7/26/93	16.0	-79.1	-11.29	0.59	2200	43	2218	2301
Run 1, Sample S-@ 3 Well	S-@933	7/26/93	16.6	-79.4	-10.77	NA*	NC*	NC	[illegible]	2274
Run 2, Sample S-@ 3 Well	S-@934	7/26/93	16.6	NA	NA	NA	NC	NC	NC	NC
Run 3, Sample S-@ 3 Well	S-@935	7/26/93	16.0	NA	NA	NA	NC	NC	NC	NC
Run 4, Sample S-@ 3 Well	S-@936	7/26/93	16.0	NA	NA	NA	NC	NC	NC	NC
Run 5, Sample S-@ 3 Well	S-@937	7/26/93	16.0	-77.0	-11.06	NA	NC	NC	2329	2394

*NA-Not analyzed
*NC-Not calculated

TABLE J-1 MAJOR ELEMENTS OF BACKGROUND SPRINGS

DESCRIPTION	DATE	BORON (ppm)	BROMINE (ppm)	CALCIUM (ppm)	CHLORINE (ppm)	FLUORINE (ppm)	HYDROGEN CARBONATE (ppm)	LITHIUM (ppm)	MAGNESIUM (ppm)	POTASSIUM (ppm)	SODIUM (ppm)	SILICATE (ppm) calc	SULFATE (ppm)	STRONTIUM (ppm)	TOTAL DISSOLVED SOLVENTS (ppm)	CATION SUM	ANION SUM
Apache Spring	4/03/96	0.005	0.01	10.9	7.72	0.04	69.0	<0.01	4.86	4.75	9.77	56.07	5.93	0.10	171.1	1.532	1.498
Cold Spring west cal	6/1/80	0.73	0.06	12	1.9	0.25	53.7	0.03	1.5	3	8	30.00	5.5	0.06	NC	NC	NC
Frijoles Spring #49	5/22/91	<0.01	<0.02	8	14	0.03	39	<0.01	2.93	2.9	6.8	17.00	3.65	0.09	NC	NC	NC
Frijoles Spring #50	5/22/91	<0.01	<0.02	7.9	6.11	0.04	53.6	<0.01	3.71	2.5	7.2	25.00	2.66	0.07	NC	NC	NC
Pine Spring	5/24/91	<0.01	<0.02	10.7	1.47	0.08	61	<0.01	3.55	3.6	6.4	25.00	7.7	0.08	NC	NC	NC
Pine Spring	3/26/95	0.02	<0.4	11	<5	<0.5	NA	0.01	3.6	3	5.1	NC	6.6	0.03	NC	NC	NC
Pine Spring	10/16/95	<0.1	NA	10	2	<0.2	48	<0.01	3	3	6	NC	<10	0.07	NC	NC	NC
Seven Springs	10/1/79	<0.003	NA	12.3	3.6	0.21	49	0.018	1.54	2.1	7.23	41.00	8.7	0.071	NC	NC	NC
Seven Springs	5/1/83	NA	0.27	11	1.9	0.25	53.7	0.05	1.4	4	8	30.00	5.9	0.05	NC	NC	NC
Seven Springs	5/10/91	<0.02	<0.02	12.9	1.22	0.16	61	<0.01	1.71	2.4	6.3	31.00	3.65	0.06	NC	NC	NC
Seven Springs	4/3/96	0.013	<0.01	12.5	1.85	0.12	59.5	<0.01	1.63	2.13	7.26	31.03	4.03	0.06	121.5	1.148	1.137
Unnamed Cold	7/1/80	<0.01	<0.2	10.6	7.1	0.3	75	0.024	3.4	3.1	9.4	65.00	3.4	0.049	NC	NC	NC
Unnamed Cold	7/1/80	<0.01	<0.2	10.4	7.5	0.35	73	0.024	3.4	3.2	9	69.00	2.4	0.051	NC	NC	NC
Unnamed Spring	5/28/91	<0.01	<0.02	9.1	1.34	0.14	56.1	<0.01	2.44	4.6	7	21.00	5.73	0.05	NC	NC	NC
Unnamed Spring	9/10/93	<0.05	0.02	11.4	4.38	0.34	60.8	0.03	2.9	2.49	16.2	60.10	4.04	0.1	NC	NC	NC
Water Canyon Gallery	8/1/78	<0.05	NA	7	NA	0.12	52	0.02	3.3	1.4	5.8	43.00	NA	0.05	NC	NC	NC
Water Canyon Gallery	8/18/92	<0.05	<0.02	7.2	0.64	0.05	52.8	<0.01	3.05	1.72	6.3	43.70	1.05	0.07	NC	NC	NC
Water Canyon Gallery	5/20/93	<0.01	0.01	6.94	0.69	0.06	44.6	0.01	2.79	1.79	4.9	39.80	2.65	0.07	NC	NC	NC
Water Canyon Gallery	4/03/96	0.004	<0.01	6.18	0.77	0.03	48.9	0.02	3.15	1.75	5.99	44.30	1.20	0.05	113.6	0.900	0.865

*NC = Not calculated.

*NA = Not analyzed.

TABLE [illegible] MINOR ELEMENTS OF BACKGROUND SPRINGS

DESCRIPTION	DATE	SILVER (ppm)	ALUMINUM (ppm)	ARSENIC (ppm)	BARIUM (ppm)	CADMIUM (ppm)	COBALT (ppm)	CHROMIUM (ppm)	CESIUM (ppm)	COPPER (ppm)	IRON (ppm)	MERCURY (ppm)	IODINE (ppm)	MANGANESE (ppm)	MOLYBDENUM (ppm)	AMMONIUM (ppm)	NICKEL (ppm)	NITRITE (ppm)	NITRATE (ppm)	LEAD (ppm)	PHOSPHATE (ppm)	RUBIDIUM (ppm)	ANTIMONY (ppm)	SELENIUM (ppm)	THIOSULFATE (ppm)	ZINC (ppm)
Apache Spring	4/03/96	<0.0002	0.28	<0.0002	0.07	<0.0002	<0.002	<0.0.2	<0.002	<0.002	0.10	<0.0002	<0.01	<0.01	<0.002	0.04	<0.002	0.02	1.33	<0.002	0.07	0.010	<0.0001	<0.0001	<0.01	<0.01
Cold Spring east ca'	8/1/90	NA	NA	NA	0.02	0.003	NA	NA	NA	NA	0.2	NA	NA	NA	NA	NA	NA	NA	0.15	NA	NA	NA	NA	NA	NA	NA
Filipes Spring #49	5/22/91	<0.001	1	<0.05	0.06	<0.001	<0.002	<0.002	<0.005	0.003	2.12	<0.1	<0.01	<0.02	<0.002	0.09	<0.002	<0.02	0.3	<0.002	<0.05	0.006	<0.05	<0.1	NA	<0.01
Filipes Spring #50	5/22/91	<0.001	0.5	<0.05	0.03	<0.001	<0.002	<0.002	<0.005	0.003	1.09	<0.1	<0.01	<0.02	<0.002	0.08	<0.002	<0.02	0.71	<0.002	0.11	0.007	<0.05	<0.1	NA	0.02
Pine Spring	5/24/91	<0.003	1.6	<0.05	0.05	<0.001	<0.002	0.004	0.006	0.004	4.17	<0.1	<0.01	<0.02	<0.002	0.24	<0.002	<0.02	0.04	0.003	<0.05	0.007	<0.05	<0.1	NA	0.07
Pine Spring	3/15/95	<0.01	1	<0.005	0.1	<0.005	<0.01	<0.01	NA	<0.01	0.5	<0.0002	NA	<0.01	<0.01	NA	<0.02	NA	0.2	<0.003	NA	NA	<0.08	<0.005	NA	<0.02
Pine Spring	10/15/95	<0.01	<0.2	<0.01	<0.1	<0.005	<0.01	<0.01	NA	<0.01	<0.1	<0.0002	NA	<0.01	<0.01	NA	<0.02	NA	0.1	<0.003	NA	NA	<0.02	<0.005	NA	<0.02
Seven Springs	10/1/79	<0.03	0.2	NA	0.036	<0.03	<0.08	0.001	NA	<0.04	0.036	NA	NA	0.001	0.001	NA	<0.05	NA	NA	<0.14	NA	NA	NA	NA	NA	<0.01
Seven Springs	5/1/83	NA	0.2	NA	0.02	0.003	NA	NA	NA	NA	0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Seven Springs	5/10/91	<0.001	<0.1	<0.05	0.01	<0.001	<0.002	0.011	<0.005	<0.002	0.52	<0.1	<0.01	<0.02	<0.002	0.04	<0.002	<0.02	0.47	<0.002	<0.05	0.02	<0.1	<0.1	NA	0.01
Seven Springs	4/3/96	<0.0002	0.12	0.0004	0.02	<0.0002	<0.002	<0.002	<0.002	0.002	0.02	<0.0002	<0.01	<0.01	<0.002	0.06	<0.002	<0.01	1.18	<0.002	<0.05	0.013	<0.0001	0.0003	<0.01	0.01
Unnamed Cold	7/1/80	<0.03	NA	NA	0.018	<0.001	<0.001	<0.001	NA	<0.001	0.15	NA	NA	0.002	<0.002	NA	<0.002	NA	<0.2	<0.004	<0.2	NA	NA	NA	NA	0.024
Unnamed Cold	7/1/80	<0.03	NA	NA	0.022	<0.001	<0.001	0.004	NA	<0.001	1.13	NA	NA	0.135	<0.002	NA	<0.002	NA	0.7	<0.004	<0.2	NA	NA	NA	NA	0.008
Unnamed Spring	5/23/91	<0.001	3.8	<0.05	0.08	0.001	<0.002	0.004	0.007	0.007	13.4	<0.1	<0.01	<0.02	<0.002	0.39	<0.002	<0.02	0.09	0.005	<0.05	0.01	<0.05	<0.1	NA	0.06
Unnamed Spring	9/10/93	<0.0005	0.6	0.006	0.03	<0.0002	<0.002	0.003	<0.002	0.008	0.44	<0.0002	<0.01	<0.01	<0.002	0.16	<0.002	<0.01	1.62	0.002	<0.02	0.007	<0.002	<0.002	NA	0.1
Water Canyon Gallery	8/1/78	<0.03	NA	NA	<0.12	<0.03	<0.06	<0.03	NA	<0.04	<0.04	NA	NA	<0.02	<0.1	NA	<0.05	NA	NA	<0.14	NA	NA	NA	NA	NA	<0.01
Water Canyon Gallery	8/15/92	<0.001	<0.1	<0.05	0.01	<0.001	<0.002	0.003	<0.002	<0.002	<0.01	0	<0.02	<0.01	0.009	<0.05	<0.002	<0.02	0.49	0.004	<0.05	0.004	<0.1	0	NA	0.02
Water Canyon Gallery	5/20/93	<0.001	0.2	<0.05	0.02	0.001	<0.002	<0.002	<0.002	0.002	0.05	0	<0.01	<0.01	<0.002	<0.02	<0.002	<0.01	0.95	0.005	0.07	0.006	<0.1	0	NA	0.05
Water Canyon Gallery	4/3/96	<0.0002	0.15	0.0004	0.01	<0.0002	<0.002	<0.002	<0.002	<0.002	0.05	<0.0002	<0.01	<0.01	<0.002	0.06	<0.002	0.02	0.91	<0.002	<0.05	0.006	<0.0001	<0.0001	<0.01	<0.01

NA = Not analyzed

TABLE J-3 HIGH EXPLOSIVES IN BACKGROUND SPRINGS

DESCRIPTION	DATE	HMX (ppm)	NQ (ppm)	PETN (ppm)	RDX (ppm)	TNT (ppm)
SAL[a]	N/A[b]	1.8	3.7	0.7	6E-04	0.0022
Apache Spring	4/03/96	<0.02	<0.01	<0.05	<0.01	<0.01
Cold Spring west cal	6/1/80	NA[c]	NA	NA	NA	NA
Frijoles Spring #49	5/22/91	NA	NA	NA	NA	NA
Frijoles Spring #50	5/22/91	NA	NA	NA	NA	NA
Pine Spring	5/24/91	NA	NA	NA	NA	NA
Pine Spring	3/26/95	NA	NA	NA	NA	NA
Pine Spring	10/16/95	NA	NA	NA	NA	NA
Seven Springs	10/1/79	NA	NA	NA	NA	NA
Seven Springs	5/1/83	NA	NA	NA	NA	NA
Seven Springs	5/10/91	NA	NA	NA	NA	NA
Seven Springs	4/3/96	<0.02	<0.01	<0.05	<0.01	<0.01
Unnamed Cold	7/1/80	NA	NA	NA	NA	NA
Unnamed Cold	7/1/80	NA	NA	NA	NA	NA
Unnamed Spring	5/28/91	NA	NA	NA	NA	NA
Unnamed Spring	9/10/93	NA	NA	NA	NA	NA
Water Canyon Gallery	8/1/78	NA	NA	NA	NA	NA
Water Canyon Gallery	8/18/92	NA	NA	NA	NA	NA
Water Canyon Gallery	5/20/93	NA	NA	NA	NA	NA
Water Canyon Gallery	4/03/96	<0.02	<0.01	<0.05	<0.01	<0.01

[a]SAL=Screening action level.

[b]N/A= Not applicable.

[c]NA=Not analyzed.

Attachment E - Comment 5.b.

Analytical Methods, detection limits, and summary of QA/QC documentation for the analyses conducted

The analytical methods used for the analyses in this report follow the SW-846 methodology approved by the EPA. The methods are detailed in Table 1 below. Further information about the specific method can be found in the appropriate SW-846 method description.

Table 1

Analytical Methods Used

EPA SW-846 Method	Analytical Method	Analytes
6010	Inductively coupled plasma emission spectroscopy	aluminum, antimony, barium, beryllium, calcium, cadmium, cobalt, chromium, copper, iron, magnesium, manganese, nickel, potassium, silver, sodium vanadium, zinc
7000	Graphite furnace atomic absorption spectroscopy	arsenic, lead, selenium, thallium
7470	Cold vapor atomic absorption spectroscopy	mercury
9010	Colorimetric spectrophotometry	cyanide
8081	Gas chromatography/ electron capture detection	pesticides and polychlorinated biphenyls (see Appendix A of RFI Report Table A-5)
8260	Gas chromatograph/mass spectroscopy	volatile organic compounds (see Appendix A of RFI Report Table A-3)
8270	Gas chromatograph/mass spectroscopy	semi-volatile organic compounds (see Appendix A of RFI Report Table A-4)
8330	High performance liquid chromatography	high explosives (see Appendix A of RFI Report Table A-6)
---	Inductively coupled plasma mass spectrometry or kinetic phosphorescence analysis	total uranium

Semi-volatile organics and metals were also analyzed by the Toxicity Characteristic Leaching Procedure (TCLP) for the purposes of future waste disposal. The TCLP method is described in SW-846 Method 1311 and 40 CFR 261.20 through 261.24.

The detection limits for these methods can be seen in the attached data tables (Attachment 6 of this response). In general, the analytical methods described above were able to achieve detection limits suitable for decision making purposes.

The range of detection limits for those volatile organic compounds with the lowest detection limits (i.e. not including vinyl chloride, acetone, etc.) was 0.005 ppm - 0.008 ppm. Detected values for total uranium ranged from 1.42 to 6.98 ppm. The detection limits for those inorganic compounds which were not detected or infrequently detected are listed in Table 2. Inorganic analytes not listed in Table 2 were present in all samples at levels above the detection limit, in most cases at levels at least twice or three times the detection limit.

Table 2

Detection Limits for Inorganic Compounds

Compound	Range of Detection Limits (ppm)
Antimony	5.22 - 8.2
Beryllium	0.42 - 0.82
Cadmium	0.52 - 0.85
Cobalt	1.0 - 4.3
Cyanide	1.0 - 2
Mercury	0.01 - 0.08
Selenium	0.26 - 1.5
Silver	0.52 - 0.85
Thallium	0.21 - 0.42

In some cases involving high explosives and SVOC analyses, the detection limits are elevated. This is due to the very high amounts of high explosives found in these samples. The high levels of contamination required significant dilution of the extract down to values of 5000 times lower than the original concentration. Significant dilution, occurring in request numbers 563, 1173, and 1268 as well as sample 0316-95-0019 in request number 972 for SVOCs, causes a proportional and unavoidable increase in the detection limits. LANL acknowledges that these locations will need to be resampled in the future once the major HE contamination has been reduced. Resampling at that time will determine if minor contamination from other HE constituents remains at these sample locations. Analytical techniques should be able to achieve contract required detection limits once the significant contamination has been reduced. In the remaining HE samples, detection limits range from 0.15 ppm - 0.19 ppm for the nitrotoluenes, HMX, and RDX to 0.05 ppm - 0.10 ppm for the remaining HE analytes. In the remaining SVOC samples, the range of detection limits for those SVOCs with the lowest detection limits (i.e. not benzoic acid, benzyl alcohol, etc.) was 0.33 ppm - 0.85 ppm.

Chapter 4 and Appendix B of the report contain the QA/QC documentation associated with the data and are summarized here. All sample data presented in this report were analyzed in accordance with the LANL contractual statements of work for individual laboratories as well as the Quality Assurance Project Plan. These documents dictate specific QA/QC protocols. Table 3 contains a list of QA/QC samples used during sample analysis and the purpose of that QA/QC sample.

Table 3

QA/QC Sample Description

QA/QC Sample	Purpose
Laboratory Blank (usually a clean water sample)	To indicate the presence of contamination originating at the laboratory, not at the site.
Laboratory and Field Duplicates	To estimate analytical precision and the degree of sample heterogeneity.
Surrogate (a chemically similar compound added to a sample)	To measure the efficiency of the extraction process and to indicate a potential physical or chemical interference.
Matrix Spike (a sample containing exact additional amounts of chemicals in the suite)	To measure the efficiency of the extraction process and to indicate a potential physical or chemical interference.
Laboratory Control Samples	To assess instrument performance and indicate potential sample interferences.
Internal Standards	To assess instrument performance and indicate potential sample interferences.

The QA/QC results for each analytical suite are summarized below.

Total uranium analyses are valid for use without qualification. Duplicate results were within the acceptable range. No QA/QC problems are associated with the uranium data.

No QA/QC problems were associated with the one pesticide analysis conducted.

Many inorganic data were qualified during baseline validation for a variety of reasons. The most common reason was due to poor duplicate recovery associated with sample heterogeneity common in the highly contaminated soil samples from this site. Another common problem was poor spike recovery. These occurrences did not impact decisions made at this site, although biases due to these QA/QC problems were taken into consideration during the decision making process. The only other QA/QC problem noted concerned mercury calibration, which caused some mercury data to be U-qualified. In all cases, the inorganic data obtained is valid for the decisions made at this site.

VOC samples associated with request numbers 1102 and 1222 had no significant QA/QC problems other than minor laboratory contamination of the blank sample. VOC samples 0316-95-0044 through 0046 associated with request number 1173 were reanalyzed due to significant QA/QC problems. Although the reanalysis improved the quality of the result, the reanalyzed data were still qualified due to one low internal standard and two low surrogate recoveries. The effect of these two QA/QC results places a low bias on the few VOCs detected and adds uncertainty to the detection limits indicated for the remaining undetected compounds. In no case was any VOC data rejected during baseline or focused validation. All VOC data is useable for decision making purposes although bias indicated by qualification was taken into consideration.

QA/QC issues associated with the high explosives data are a function of the extremely high levels of HE contamination found at this site. Sample variability and poor surrogate recovery are common problems in highly contaminated samples. It is assumed that the

highly contaminated areas at this site will be mitigated and resampled in the future to ensure that the remediation was effective. Analytical data obtained from less contaminated sites showed no QA/QC problems. All HE data is considered useable although the highly contaminated sample values are not considered as accurate as other sample values at this site.

SVOC results had similar QA/QC problems as those for HE discussed above, due to the high levels of HE contamination at site.The effect of the high levels of contamination caused an increase in detection limits as discussed above. Otherwise the most common QA/QC issue was minor laboratory contamination in the blank sample, causing a number of detected phthalate values to be qualified as undetected. The presence of phthalates in the QC blanks as well as the adequacy of the duplicate samples for SVOCs are further discussed in chapter 4 of this report. Other QA/QC issues affected a few SVOC samples. Sample 0316-95-0024 missed holding times by one day. This minor deviation from the required limit is not expected to significantly affect the quality of the sample results. Samples 0316-95-0048, -0051, and -0053 associated with request number 1102 were affected by a low internal standard recovery. This affected the following SVOCs: di-n-octylphthalate, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, and benzo(g,h,i)perylene. The data for these seven compounds were rejected in sample 0316-95-0051 and -0053, and the detection limits for these seven compounds, which were undetected, were considered estimated in sample 0316-95-0048. These seven compounds were not detected in any of the 27 remaining SVOC samples.

In conclusion, the most significant QA/QC problem associated with this set of data is the elevated detection limits for HE and to a lesser extent SVOCs, due to the extreme levels of contamination in the soil samples. However, the samples affected by this will be remediated and resampled in the future. The accuracy of the data is sufficient to indicate that these samples are serious problems and need reexamination. The other QA/QC issue concerning this data set is related to poor surrogate, matrix spike, and internal standard recovery. This problem was serious enough to cause some VOC, SVOC, and inorganic data to be qualified. However, only 14 values in two SVOC samples were rejected due to this QA/QC problem. The remaining data is of sufficient quality to make the decisions presented in this report.

Attachment F - Comment 6

Pertinent Sections of the QAPP

D1 DATA REVIEW: VERIFICATION AND BASELINE VALIDATION

All data generated by ER Project data collection activities will undergo a data review process that accomplishes two goals. First, "data verification" assures that needed data are available for further evaluation, assures that contract, or other, specifications have been met (or noted where not met), and provides the information needed for prompt and appropriate payment for analytical services. Second, "baseline validation" attaches qualifiers to data that do not meet specifications and provides information on potential deficiencies of that data. Reason codes for the qualifiers are also assigned to data to help users understand why a qualifier was added and the potential impacts of the data deficiency. The product of this first process is a report in FIMAD that can be used, as is, for data quality assessment (DQA) (see Section D3 of this document) and, as necessary, to focus further validation efforts. See Figure D-1 for a portrayal of the data verification/baseline validation process and Figure D-2 for a flow diagram that shows where the process fits into the entire data collection process.

For routine analytical services (RAS), the verification and baseline validation processes are carried out simultaneously. Those processes make use of a checklist for data completeness and compliance that is based on the routine analytical contracts, and that use standard validation qualifiers based on the commonly accepted contract laboratory program (CLP), "CLP Functional Guidelines" for review of analytical data. During this process, missing items are obtained from the laboratory that generated the data and any required corrections to erroneous data are made. These error corrections include both problems with compliance and problems with data entry into FIMAD.

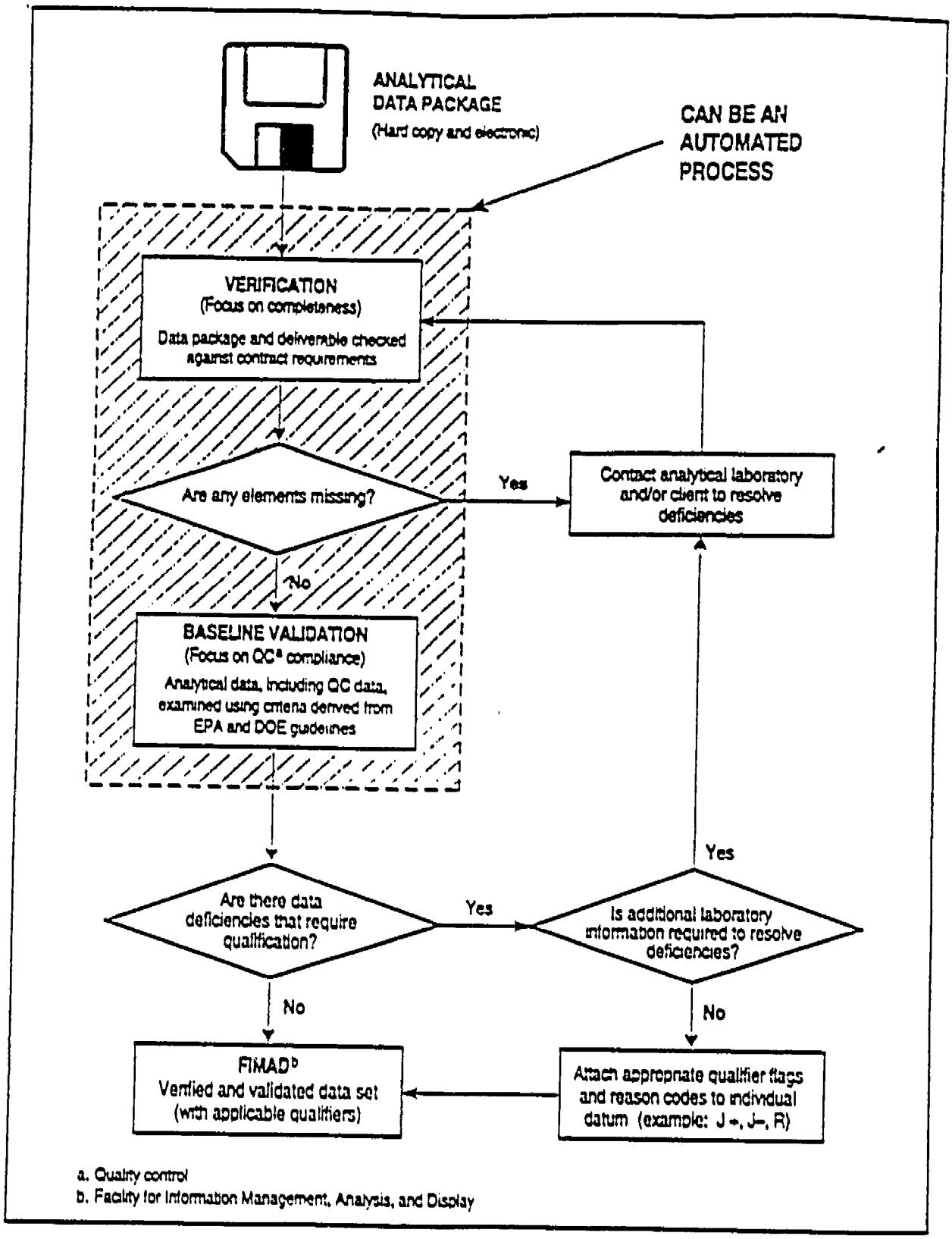
For routine analytical services, the SAP must state that the "LANL ER Checklist and Criteria for Verification and Baseline Validation" (LANL 1995, 52241), including data qualifiers and reason codes, will be used for verification and baseline validation. Forms and checklists may be provided for clarification, based on the analytical services used, e.g., organics, inorganics, high explosive (HE), radiochemistry, or commonly used mobile laboratory SOWs.

If known, the SAP should identify anticipated needs for focused validation (see Section D2 of this document). For example, when petroleum hydrocarbons are anticipated to be an interference in semivolatile analyses, the SAP should specify that the chromatograms will be reviewed to assess the effect or potential effect of interferences on the reported data.

For nonroutine analytical services (NRAS), which include off-site analytical services, field analyses, and field measurements, verification criteria must be stated in the SAP or SOP. These verification, or acceptance, criteria are most efficiently used when they are provided as a checklist or data review SOP. The qualifiers that have been stipulated for the routine analytical services should be used to provide consistent data qualifiers within FIMAD. The SOP must also provide reason codes that are appropriate for the specific analyses. In the case of NRAS, the verification and baseline validation criteria should be combined. This will create a single set of requirements that must be met. Data failing these requirements will be qualified and reason codes will be attached.

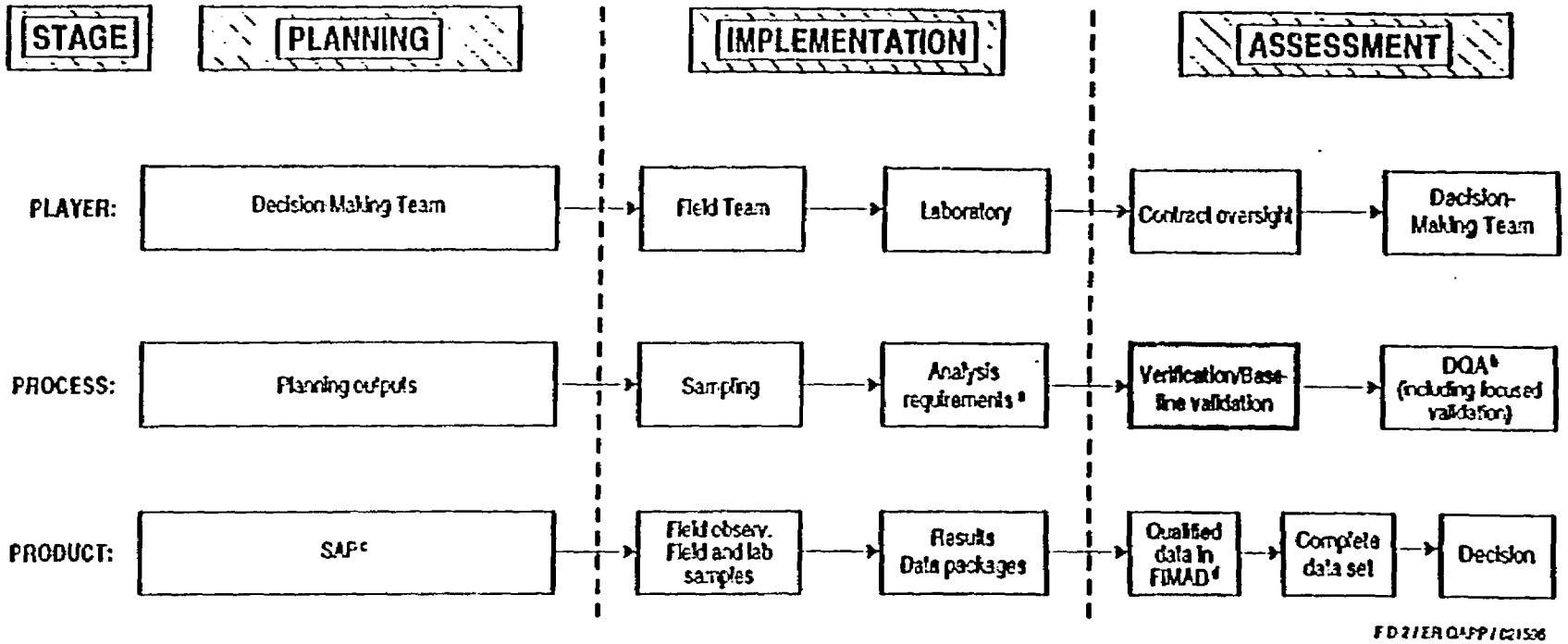
For NRAS, the SAP must provide the following:

- the problem-specific verification and baseline validation criteria (the analytical data generator must be made aware of these criteria). Note that if the nonroutine service closely resembles



F D-1 / ER QAPP / C21596

Figure D-1. The data verification/baseline validation process.



a. Analysis requirements are specified in a formal statement of work or contract.
b. Data quality assessment
c. Sampling and analysis plan
d. Facility for Information Management, Analysis, and Display

Figure D-2. Data flow diagram for the Environmental Restoration Project.

a routine service, the routine verification/baseline validation procedures may be cited, with appropriate deviations identified;

- the payment implications if measurement criteria are not met;
- the process for corrective action (e.g., completion and correction of data package); and
- if known, any need for additional focused validation (see Section D2 of this document).

These items can be provided by reference to appropriate SOPs and SOWs or by incorporating the requirements into the SAP.

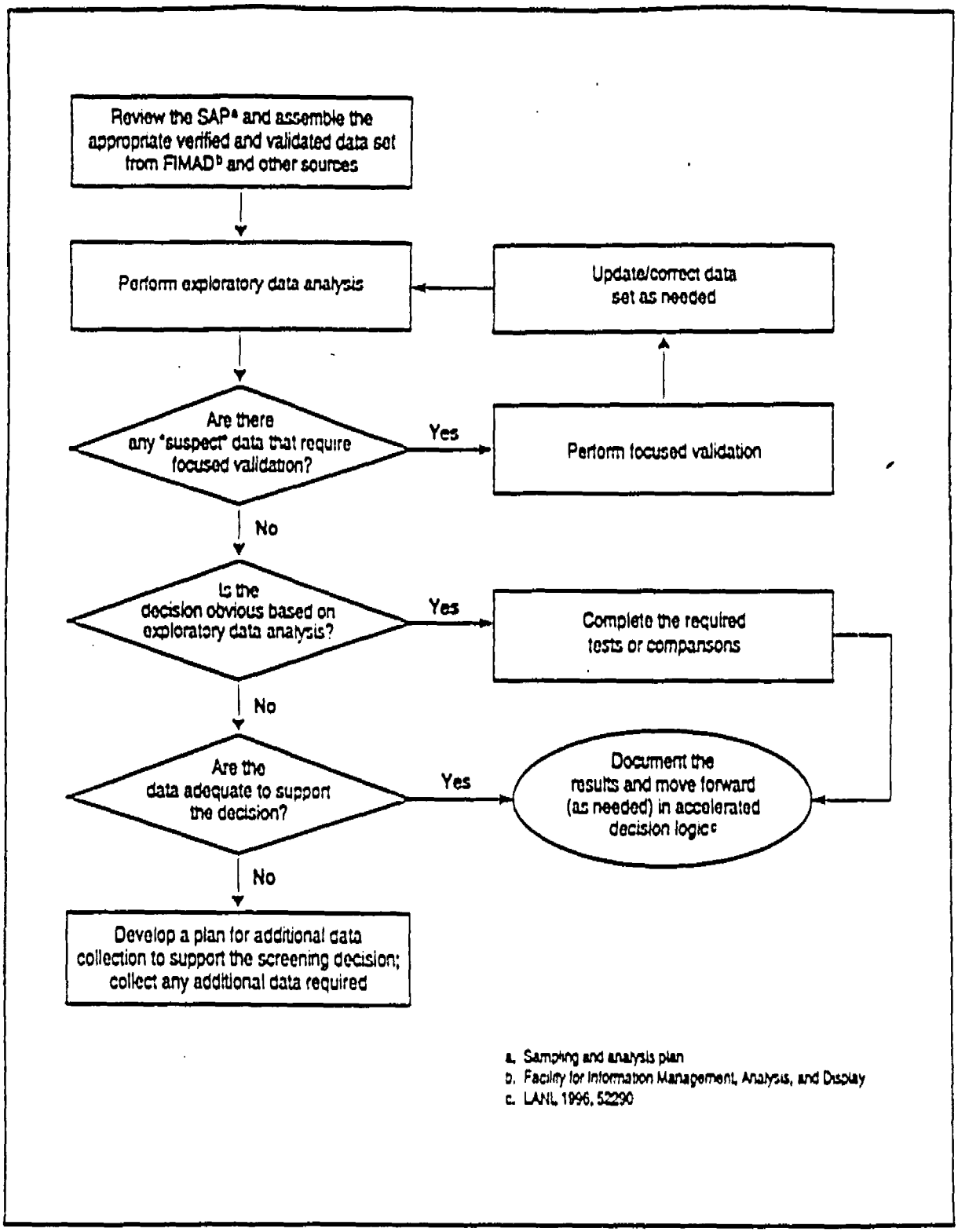
The baseline validation process focuses on the measurement data. The variability associated with the measurement process often represents only a minor component of the overall variability in the environmental data collection process. Other components of variability in a data set include, but are not limited to, spatial variability of environmental contaminants, variability in the sampling processes, and uncertainty in all other processes that occur during planning, sample collection, field data recording, and reporting. Consequently, data validation should not be overemphasized at the expense of other elements of the data collection process. To better match the cost of data validation with its comparable value, the ER Project requires only this streamlined verification/baseline validation process.

D2 FOCUSED DATA VALIDATION

The purpose of focused data validation is to determine the technical adequacy of measurement data when

- the data are qualified as deficient during the verification/baseline validation process. For example, when holding times are exceeded, interferences are present, artifacts are detected in the laboratory blank, poor sample recovery is indicated, or multiple deficiencies are noted, a focused validation may be required to assist in the determination of data adequacy for the intended use;
- the DQA process requires additional information about the variability or uncertainty of the reported data; or
- the DQA process requires additional information about the data quality prior to making a data use decision because of anomalies detected in a data set.

Figure D-3 depicts where focused validation usually occurs in the DQA process. Focused data validation usually occurs as a result of specific data use questions that arise during the DQA process, which is described in Section D3 of this document. However, unusual, excessive, or potentially fatal deficiencies noted in the report for data verification/baseline validation may trigger focused validation as an initial step in the DQA process. If this appears to be the case, the field unit technical team is notified through appropriate qualifiers and reason codes in FIMAD and must make a decision as to whether the focused validation should be initiated during DQA.



F D-4 / ER QAPP / 022096

Figure D-3. The data quality assessment process.

Focused validation for the LANL ER Project does not result in any adjustment of data (e.g., for bias), because PRS-specific data will usually be insufficient for such a purpose. However, it might be possible, based on historical ER Project-wide QA/QC data, used in conjunction with the site-specific data, to support a conclusion of a bias that can be quantitated and taken into consideration in a decision. Bias considerations must be addressed on a case-by-case basis by the DSC.

Factors which may be used to focus validation are

- qualitative QC measures,
- quantitative QC measures,
- degree of importance of the detection/quantitation limit,
- concern with detectable concentrations,
- analytical false negatives,
- analytical false positives,
- potential use of data not meeting defined performance criteria, or
- analytical uncertainty/variability, especially when results are close to action thresholds and/or detection/quantitation limits.

D3 DATA QUALITY ASSESSMENT: RECONCILIATION WITH PLANNING (SAP) OBJECTIVES

Data quality assessment (DQA) is a data analysis and interpretation process involving scientific and statistical evaluation of data sets to determine if they are sufficient to support specific decisions. To implement the DQA process, the data analyst will work closely with a multidisciplinary team, potentially including the field team leader, data manager, chemist, statistician, risk assessor, and earth scientists. Figure D-3 provides an overview of the approach the ER project uses to implement the DQA process to determine adequacy to support a decision.

The DQA process includes a review of the SAP objectives, data quality requirements, sampling design, and exploratory and confirmatory statistical analyses of the data. Initially the data analyst will assemble the data set, including field information such as sample coordinates and descriptions and associated field measurements, and review any additional reports (e.g., a data validation report).

DQA usually begins with exploratory data analysis, including a significant graphical component. An interactive statistical graphics computer program is very useful for this purpose. Because this process evaluates individual data points within the context of entire data sets, it can quickly identify both "suspect" data and critical observations that could affect decisions based on these data. If necessary, "suspect" data can be submitted for focused validation (see Section D2 of this document) to determine whether they resulted from errors in the data generation process. "Suspect" and other unusual observations may also be reviewed by experts on the natural environment and the measurement process to determine if they have scientific explanations. A third possibility is that such observations simply represent the true variability inherent in the measurement process or the environment.

Following exploratory data analyses and any required focused validation, the DQA process will determine the validity of

- removing questionable results from the data set,
- correcting incorrect data, or
- leaving the data set unaltered.

Any changes made to the data set must be fully documented.

The remainder of the DQA process is intended to reconcile the data with the requirements specified in the SAP, and to assess the adequacy of the data to support the SAP objectives. The DQA process addresses the questions "Did we get what we asked for?" and "Did we ask for what we need?" How this is done depends in part on how quantitatively the original requirements were formulated.

To assess the adequacy of the sampling design to support a decision (e.g. "Did we ask for what we need?"), the data analyst must work with other members of the DQA team to determine if the number and types of samples, as specified in the SAP and as actually collected, were appropriate. This includes

- determining if the number and location of samples required by the SAP were taken;
- determining if the appropriate media were sampled;
- judging the adequacy of the sample number and locations, given the updated understanding of the problem; and
- determining if the understanding of the problem changed since the SAP was prepared because of observations made by the field team.

While problems on one or more of the above do not automatically rule out using the data as planned, they can suggest that supplemental data must be collected before proceeding.

In some cases, the correct decision will be obvious by inspection of the data set; for example, when reported values are far above or are uniformly below SALs. Provided that the sampling design was adequate to support this obvious decision, the evaluation of data adequacy for that decision may terminate after the initial exploratory analysis and the site moves forward in the accelerated decision logic (LANL 1996, 52290).

If the decision is not obvious, either because the data do not all point in the same direction, or because of some minor problem with the design, or if the SAP specifies that the decision will be based on the results of certain statistical tests or calculations (e.g., on upper confidence bounds for certain population parameters), further examination of the analytical data is required. Qualitative evaluation of the analytical and field data will determine if

- analytical measurements for all variables specified in the SAP were generated;
- the appropriate suite(s) of analytes were requested, given the updated understanding of the problem;

- the analytical methods used were appropriate for the analytes of interest (e.g., inductively coupled plasma atomic emission spectrometry (ICPAES) is typically considered inappropriate for measuring thallium concentrations in soil);

- the detection or quantitation limits reported for "nondetects" were less than or equal to the decision levels specified in the SAP;

- measurement performance requirements (precision and bias) specified in the SAP were met; and

- data collected at different times are consistent between sampling events and between sample request/report numbers.

Beyond these qualitative evaluations, the ER Project will use the DQA process defined by EPA (EPA 1995, 52289), or its equivalent, to assess data adequacy to support a statistically based decision. This process focuses on the adequacy of the data set for decision-making, rather than the integrity of individual measurements. The EPA DQA process assumes that a statistical approach to sampling and analysis was taken, and that the basis for this design (such as the outputs of EPA's DQO process (EPA 1994, 50288) was either recorded in the SAP or can be developed retrospectively. The first two steps of this formal DQA process, review of the sampling design and preliminary data review, are as described above. The remaining three steps are summarized below.

- The data analyst will work with the DQA team to ensure that the most appropriate statistical test will be used. (If the DQO process was followed, then a statistical test was specified in the SAP. However, additional or alternate tests may be considered at this time, particularly if the understanding of the problem has been updated.) Then the underlying assumptions that must hold for the proposed statistical procedures will be evaluated for this data set. In addition, the data analyst will consult with the appropriate scientists and site experts to make sure that the comparisons implied by the statistical test are appropriate from a scientific standpoint.

- In general, the data analyst will use the site data to generate estimates of total study error and to perform the appropriate statistical tests at a significance level consistent with the decision-makers' desire to control decision errors. (Again, if the DQO process was followed, then these limits on decision errors were among its outputs.) In cases where the data set will be used to support a no further action (NFA) proposal or some other specified decision outcome, the data analyst should evaluate the confidence associated with this decision outcome and determine if the data are sufficient to support the decision in that case.

- If an adequate level of confidence was achieved at the contaminant concentrations actually observed, this observation supports the case that data are sufficient to support the proposed decision.

Results of DQA will be documented in adequate detail for the decision-maker and peer reviewers to evaluate the effect of these results on decision-making. If a decision can be made based on the data, the documentation will include both the decision outcome and also the level of confidence that can be ascribed to the decision. The data analyst and other members of the DQA team will develop recommendations in cases where the data are not deemed sufficient to support a decision, which may be included in the documentation or presented to the decision-makers in a less formal manner. If further investigations appear to be required, the data analyst will summarize information contained in the existing data as it applies to the design of subsequent SAPs for this site. As appropriate, the DQA team may recommend that limitations be placed on current or future uses of the data.

Attachment H - Comment 8

Pertinent Sections of "Risk-based Corrective Action" Document

DRAFT DRAFT DRAFT

RISK-BASED CORRECTIVE ACTION PROCESS

Revision 1 DRAFT

The Environmental Restoration Projects at
Los Alamos and Sandia National Laboratories

Prepared by the
Los Alamos National Laboratory
Environmental Restoration Decision Support Council
A. M. Dorries (Ed.)
DRAFT
August XX, 1997

LA-UR-97-2811

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APPENDIX B: DERMAL EXPOSURE ASSESSMENT B-1

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LIST OF ACRONYMS

AL	Action level
ALARA	As low as reasonably achievable
AOC	Area of concern
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMI	Corrective measures implementation
CMS	Corrective measures study
COC	Contaminant of concern
COPC	Contaminant/constituent of potential concern
COPEC	Contaminants of potential ecological concern
DOE	US Department of Energy
DOE/AL	US Department of Energy /Albuquerque Operations Office
DOU	Document of Understanding
DQO	Data quality objective
EEU	Ecological exposure unit
EM/ER	Environmental Management/Environmental Restoration Group
EPA	US Environmental Protection Agency
EQL	Estimated quantitation limit
ER	Environmental restoration
HSWA	Hazardous and Solid Waste Amendments of 1984
LANL	Los Alamos National Laboratory
MCE	Multiple chemical evaluation
NFA	No further action
NMED	New Mexico Environment Department
NPL	National Priorities List
PAH	Polyaromatic hydrocarbon
PCB	Polychlorinated biphenyl
PRS	Potential release site
RAGS	Risk Assessment Guidance for Superfund
RBCAP	Risk-Based Corrective Action Process
RCRA	Resource Conservation and Recovery Act
RESRAD	Residual radioactive material (computer code)
RFI	RCRA facility investigation
SACM	Superfund Accelerated Cleanup Model
SAL	Screening action level
SAP	Sampling and analysis plan
SSG	Soil Screening Guidelines
SNL/NM	Sandia National Laboratories, New Mexico
SWMU	Solid waste management unit
UCL	Upper confidence limit
UTL	Upper tolerance limit
VCA	Voluntary corrective action
VCM	Voluntary corrective measure

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I. INTRODUCTION

The purpose of this document is to identify the risk-based assumptions and methodologies being used by Los Alamos National Laboratory (LANL) and Sandia National Laboratories, New Mexico (SNL/NM) in the implementation of the corrective action process within their Environmental Restoration (ER) Projects. The technical approach for data collection and evaluation at LANL and SNL/NM depends on a number of assumptions related to the way in which data will be used to support decision-making and risk assessment. One of the ER Project's primary roles is to design and conduct data collection activities that will be sufficient to support each decision made during the corrective action process. LANL and SNL/NM recognize that the regulators have final decision authority and will base their decisions on data generated by the Laboratories.

Many of the assumptions that follow in the *Risk-Based Corrective Action Process* (RBCAP) are agreed upon in the Document of Understanding (DOU) (NMED et al. 1995). Specifically, Annex B, *No Further Action (NFA) Process and Criteria*; Annex C, *Voluntary Corrective Action (VCA) Process and Criteria*; Annex E, *Land Use*; Annex F, *Cleanup Levels*; Annex G, *Sampling and Analysis Guidelines*; and Annex L, *Permit Modifications (HSWA Module)* of the DOU have information relative to RBCAP assumptions. As LANL and SNL/NM regulators concur with additional RBCAP assumptions, the agreed-upon assumptions will be formalized in future annexes of the DOU or in facility-specific documents, as necessary.

The development of agreed-upon technical assumptions and definitions of terms is necessary to make RCRA requirements fully operational in planning and implementing ER work. The technical assumptions described herein are intended to supplement and be consistent with those regulations. Although the technical approaches at LANL and SNL/NM follow the same fundamental assumptions, at times the diversified nature of the environmental settings and population characteristics of the two Laboratories dictate a divergence in approach. Throughout this document, any facility-specific approaches, assumptions or nomenclature are presented in shaded boxes.

The proposed approach for implementing the corrective action process at LANL and SNL/NM is summarized in the generic decision flow illustrated in Figure 1. The overall technical approach will be carried out within the framework of a modified DOE streamlined approach that incorporates Data Quality Objectives (DQOs) and risk assessment as well as elements of EPA's Superfund Accelerated Cleanup Model (SACM) to facilitate the rapid cleanup of those units that potentially pose risk. Both the technical approach and decision logic are tied to NMED and EPA regulations and guidance. For all sites, the ultimate objective is to achieve and document that acceptable levels of risk to human health and the environment have been reached and that no further action (NFA) is necessary. Following initial identification of a solid waste management unit (SWMU) or an area of concern (AOC), archival information is reviewed to determine if existing data will support NFA. If not, sampling and analysis plans are developed and implemented. Data obtained are screened to determine whether NFA is appropriate or potential risk-based concerns exist. If so, a preliminary risk assessment may follow to determine whether potential risks suggest NFA is appropriate, or that stabilization or accelerated cleanup should be implemented. Sites posing risks but not appropriate for stabilization or accelerated action will proceed under administrative authority to a corrective measures study (CMS). Following evaluation of preliminary remediation goals, plausible remedial alternatives are evaluated and the administrative authority establishes cleanup standards and approves a remedy. Corrective measures implementation (CMI) and the results of CMI are evaluated by the administrative authority to assure that the completed remedy supports NFA.

Figure A-1 in Appendix A shows the process the Laboratories have developed with NMED to accelerate the corrective action process when appropriate. In general, the accelerated corrective action approach is the same approach stated above and shown in Figure 1. However, the intent of the accelerated approach is to undergo the standard RFI/CMS process with minimal review, thus providing more rapid decisions.

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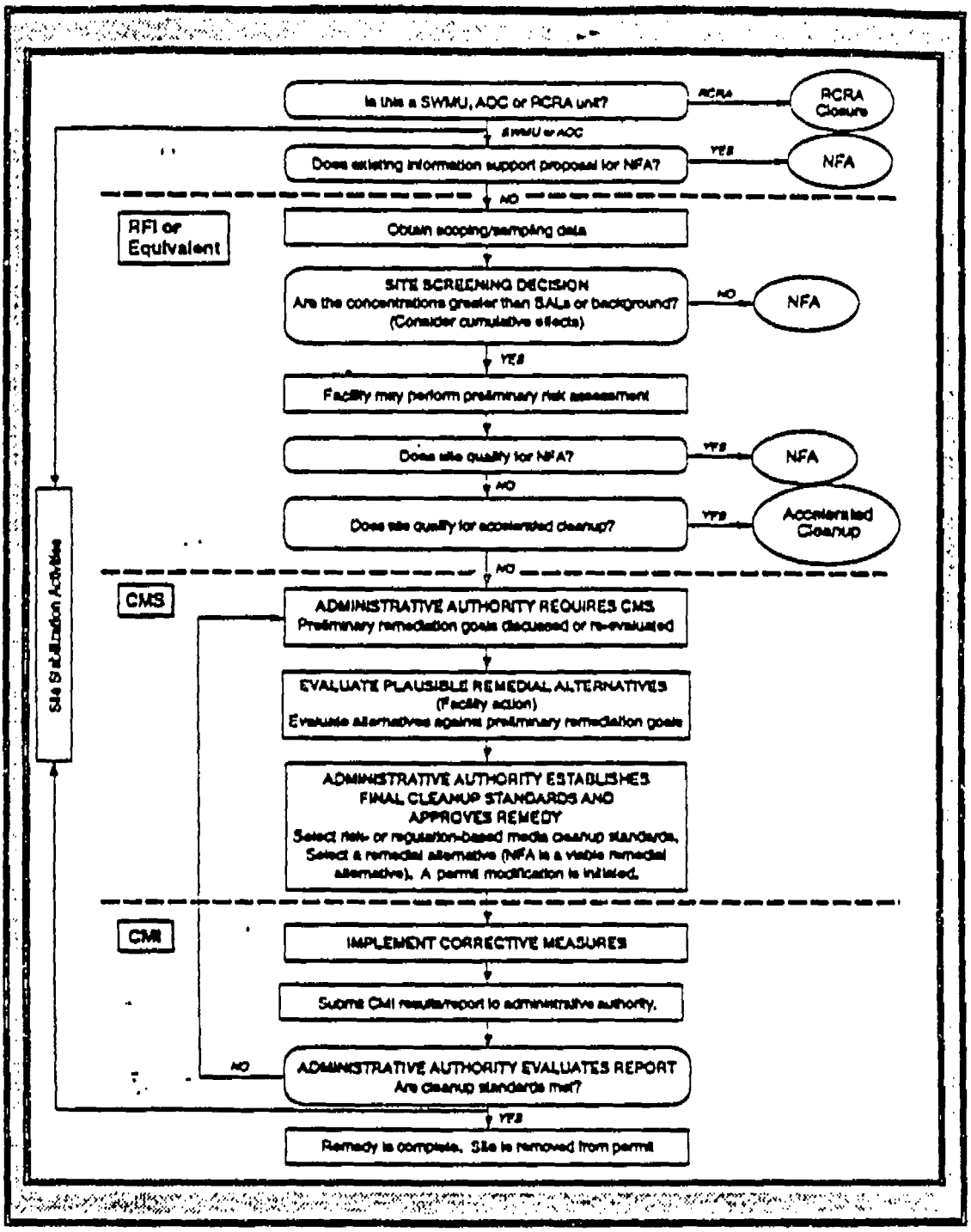
Figure 1. LANL-SNL/NM Decision Framework for the RCRA Corrective Action Process



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II. SITE SCREENING DECISION ASSUMPTIONS

I. General Assumptions

1. Sites can be proposed for NFA under the HSWA Module when sufficient archival data/ information exist(s), site characterization data is complete, or cleanup confirmation data is complete. Sufficient documentation must exist to support one or more of the five criteria listed below. These criteria were agreed upon by NMED, EPA, DOE, and the Laboratories in Annex B of the Document of Understanding (NMED et al. 1995). Upon approval from regulators, sites meeting one of the NFA criteria are removed from the HSWA Module. The same criteria are applied to sites not listed in the HSWA Module. Non-HSWA Module sites are proposed for NFA to the DOE. Upon DOE approval, the sites are removed from the total list of potential release sites (PRSs).
   - NFA Criterion 1. The site cannot be located or has been found not to exist, is a duplicate PRS, or is located within and therefore, investigated as part of another PRS.
   - NFA Criterion 2. The site has never been used for the management (that is, generation, treatment, storage, or disposal) of RCRA solid or hazardous wastes and/or constituents or other CERCLA hazardous substances.
   - NFA Criterion 3. No release to the environment has occurred, nor is likely to occur in the future.
   - NFA Criterion 4. There was a release, but the site was characterized and/or remediated under another authority which adequately addresses corrective action, and documentation, such as a closure letter, is available.
   - NFA Criterion 5. The PRS has been characterized or remediated in accordance with current applicable state or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.
2. Historical process knowledge and screening samples can be sufficient to focus the analyses of samples to those chemicals that are plausible at a site, rather than performing a full-scan analysis on all samples. However, when any degree of uncertainty is involved, a full-scan analysis may be necessary.
   - For example, where historical process information clearly shows that certain chemicals (e.g., high explosives, plutonium) were never handled at a site, analyses for these constituents need not be performed.
3. Professional judgment and/or results from field survey techniques can be used to bias the location and the number of samples needed for site characterization in order to increase the probability of detecting contaminants relative to purely random sampling approaches.

II. Background Comparison Assumptions

4. Only constituents that exceed background concentrations are considered potential contaminants. Background data sets differ for classes of contaminants and between Laboratories. Choice of appropriate background screening values is defined for each Laboratory in the boxes below. In addition,
   - Site data are considered indistinguishable from background when:
     - Site concentrations are statistically indistinguishable from background as defined below, even if observed concentrations exceed the risk-related criteria described below in Assumption 5.

— Statistical analyses can include graphical comparisons of background and PRS data; parametric statistical procedures such as the t-test and regression analysis; and non-parametric statistical tests such as the Wilcoxon Rank Sum and Quantile tests. (Project Consistency Team [EM/ER:96-PCT-010]; Ryti et al. 1996).

- Any contaminant detected for which no background data exists will be carried to the next screening step.
- Because Laboratory-specific background data sets differ, flow charts of statistical assumptions and tests used for background comparisons have been provided to regulators by LANL and SNL separately.

At LANL: [illegible]

Background can vary from site to site and for chemical classes and is defined as follows:

—LANL-wide inorganic background is used in screening comparisons. The LANL-wide background soil concentrations of inorganics have been determined for specific soil horizons; geological strata; and sediments in the canyons (Project Consistency Team [EM/ER:96-PCT-010]; Ryti et al. 1996).

—Site data are compared to the appropriate subset unless the soil horizon is neither known nor relevant (e.g., fill of unknown origin).

—Site-specific background data may be required in cases where site data exceed both LANL-wide background and screening action levels (SALs, see next section); when ecological risk is the primary decision point; or when arsenic or beryllium are known (or suspected) to have been released at the PRS (LANL-wide concentrations of these two inorganics are known to routinely exceed SALs).

—Radionuclide background values for soil, sediment, and fill material consist of the maximum and/or upper tolerance limit (UTL) from data in regional sites published in LANL environmental surveillance reports and sediment background sample data collected by the ER Project. Uranium and thorium background values for tuff are estimated based on total uranium and thorium. (Project Consistency Team [EM/ER:96-PCT-010]; Ryti et al. 1996; Ryti et al. 1997, in preparation).

—For background comparisons, contaminant values are the maximum reported values for PRS radionuclide data sets. For inorganics, the calculated 95th percentile (95% confidence) UTL for the best-fit normal, lognormal, or square root-transformed normal distribution is used when sufficient data are available to estimate a distribution. If data are insufficient, the maximum reported value is used for inorganics. UTLs are checked for consistency within the appropriate data group to ensure that inflated values are not used.

At SNL/NM:

—Site-specific contaminant concentrations (usually the maximum value obtained) are compared to background screening values as defined below. If all potential chemical of concern (COC) values are below their respective background screening values, the site is deemed suitable for an NFA proposal. Otherwise, all potential COCs are carried into the next screening step, with the exception of lead. Lead is compared to the EPA guidance screening for lead (EPA 1994).

—SNL/NM has a facility-wide background study data set approved by the NMED (IT 1996). The facility wide background study has a list of background screening values based on either the 95th UTL or percentiles, as applicable, of the populations analyzed.

—Site-specific background values may be used to compliment the site-wide background study or be used exclusively in areas where site-wide background values do not apply or exist.

III. Screening Assumptions

5. A screening assessment is performed to evaluate potential soil contaminants. The facility specific screening processes for LANL and SNL/NM are presented below. The basic concept for screening is similar between the facilities. Because SNL/NM has fewer potential release sites, the screening process has been completed at that facility.
   - At LANL, SALs are used as action levels. At SNL/NM, the functional equivalent of the SAL is the action level (AL).
   - SALs/ALs are used to identify chemicals of potential concern (COPCs) and determine the need for further investigation.
   - SALs are not used as target risk levels or cleanup standards unless supported by site-specific risk calculations.
   - A target dose[1] level is used to derive SALs/ALs for radioactive constituents. SALs/ALs for radioactive constituents are calculated using RESRAD.
     - Standard residential default exposure values are used in radionuclide models for body weight, intake rate, etc.
     - Dose is summed over multiple pathways, e.g., external irradiation, dust inhalation, and produce ingestion are considered as well as direct soil ingestion.
     - Environmental parameters required by radionuclide models are set conservatively, but appropriately, for each Laboratory.
   - In general, the maximum observed concentration, rather than an average of several observations, is compared with SALs/ALs in order to identify COPCs. SAL/AL comparisons are based on measured concentrations, unadjusted for natural or anthropogenic (e.g., atmospheric fallout) background.
     - In some cases (with prior approval from regulators), observations made on composite samples, or averages of closely related samples such as field duplicates, may be compared with SALs/ALs to identify COPCs.
     - SALs are based on exposure to contaminants in surface soils.

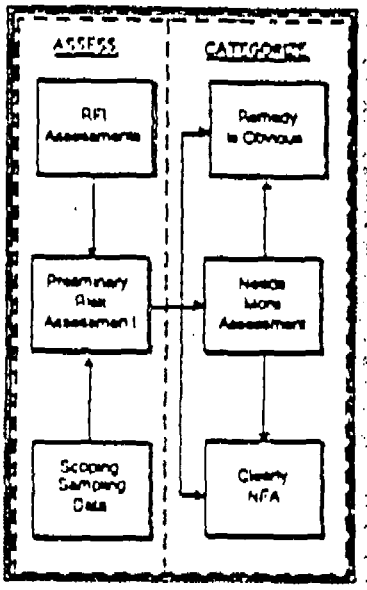
At LANL,

- Screening action levels (SALs) are used to identify chemicals of potential concern (COPCs) and determine the need for further investigation. Analytes that exceed background require further action if they also exceed SALs or if the analyte contributes significantly to the multiple chemical evaluation (MCE).
- SALs for chemical constituents are based on EPA Region IX preliminary remediation goals for residential soil. These values are based on risk at 10^{-6} and HI <1.
  - As required and when sufficient toxicity data are available in the peer-reviewed literature, LANL ER Decision Support Council personnel will calculate SALs for chemicals not included in the Region IX database. SALs are calculated using Region IX default parameters for the residential scenario. The scenario includes the ingestion pathway, the inhalation pathway, and dermal contact. When toxicity data are not available, surrogate chemicals will be chosen to evaluate toxicity.
  - For PCBs, a SAL of 1 ppm will be used for field screening at industrial sites. (EPA 1994; Section [a][3][iii]). A SAL of 0.1 ppm will be used at residential sites.
- The dose level selected to calculate radionuclide SALs is 10 mrem/yr, based on it being a fraction of the DOE's annual effective dose rate of 100 mrem/yr from all sources. DOE also requires that doses to the public exceeding 10 mrem/yr at DOE facilities be reported to DOE Headquarters (DOE 5400.5, Ch. II, Section 7). Therefore, further investigation of sites exceeding 10 mrem/yr is consistent with regulatory guidance and appropriate as a screening dose level for an area such as LANL where residential land use is frequently possible.

[1] Dose is defined as the effective dose equivalent as incurred by exposure of an individual to external radiation and to internal radiation from inhalation or ingestion of radionuclides.

At SNL/NM,

The SNL/NM ER Project has already completed its screening process. As can be seen in the figure below, sites were categorized based on scoping assessments and early RFA/RFI data. A preliminary risk evaluation was conducted to determine the likely outcome of the sites (e.g., needs remediation, likely candidate for NFA). The preliminary risk evaluations were performed with probalistic techniques (Monte Carlo) in order to assess uncertainty and predict the likely range of possible risks posed by a site. If the site posed no risk, an NFA proposal was prepared. Sometimes this included confirmatory sampling to demonstrate compliance (see Assumption 1). If the site posed a significant threat, a remedy selection process was initiated (see accelerated cleanup discussion under Assumption 8). If the preliminary risk evaluation showed that the outcome was uncertain (i.e., not clearly an NFA or remediation), additional assessment activities were planned. Following the assessment activities, another risk evaluation was or will be made to ascertain whether an NFA proposal is likely or a cleanup action is warranted.



6. Multiple contaminants below SALs/ALs may together require further evaluation due to the potential for additive or synergistic toxic effects. EPA Region IX PRGs do not address potential interactions. EPA soil screening guidelines (SSG) suggest that interactions among carcinogens are unlikely to result in an excess risk greater than 10^{-4} if screened individually to a 10^{-6}-based action level, and, therefore, recommend no additional MCE for carcinogens. For non-carcinogens, the SSG recommends interactions be considered only for contaminants having the same target organ (EPA 1996a). As a screening tool, the procedure described below is seen as consistent with and more protective than these guidelines.

   - Constituents that exceed background, but are below SALs/ALs, are screened for potential additivity by summing the normalized maximum observed concentration (maximum concentration divided by respective SAL/AL) for all constituents in this group within a given PRS or PRS aggregate. This approach is conservative because it assumes simultaneous exposure to all constituents by a given receptor.
   - Multiple chemical evaluations (MCEs) are conducted separately for carcinogens, non-carcinogens, and radionuclides. Additivity is assumed within a category.
   - If the sum of the normalized maximum values (rounded to the nearest 10th) is less than 1, no further evaluation of these constituents is required.

At LANL,

- If the sum of the normalized maximum values is greater than 1, the appropriateness of the sum-of-the-maximum approach is evaluated based on professional judgment. For example, if the PRS is larger than a predicted exposure unit (i.e., the area over which a receptor might be exposed to residual contamination), an additional evaluation such as the maximum sum of normalized values at a given sample location may also be reported to evaluate realistic exposure.
- If the results of an additional analysis (such as described in the previous bullet) also suggest that multiple chemical exposure may be of concern, then constituents will be identified as COPCs and retained for further evaluation if their individualized normalized values (i.e., the maximum or mean, for ample data sets, detected concentration divided by the SAL) are greater than or equal to 0.1. The final decision to retain a constituent as a COPC for further evaluation will also depend on other site-specific considerations and the professional judgments of the risk assessor. Constituents with normalized values less than 0.1 will be dropped from further evaluation.
- Constituents that are in more than one category (e.g., carcinogen, non-carcinogen) are typically included in the category in which they are most potent. However, when the addition of a constituent's toxicity may influence decisions in another category, it will be included in both categories. In addition, uranium is evaluated both as a radionuclide and as a noncarcinogen because these effects occur at a similar dose.
- The means of evaluating data for COPCs having concentrations less than SALs is outlined in the following table:

Detection Status	Relation Between EQLs[a] and SALs	Decision Considerations[d]	Possible Decision Actions
All non-detects	EQL > SAL[c]	Process knowledge and data for similar chemicals	COPC or elimination
All non-detects	EQL < SAL[c]	Process knowledge and data for similar chemicals	MCE[e] or elimination
Some detects[b]	EQL > SAL[c]	Process knowledge and data for similar chemicals	COPC or MCE[f]
Some detects[b]	EQL < SAL[c]	n/a	MCE[g]

a. The estimated quantitation limit (EQL) is the lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine analytical laboratory operating conditions.
b. Assumes none of the detects are at concentrations greater than SALs.
c. Considers the maximum reported EQL for the non-detects.
d. Process knowledge and sample data for similar chemicals are considered to determine the decision action under some scenarios. For example, under the first scenario, if process knowledge indicates that the analyte in question may be present at the site or similar analytes were detected, then this analyte may be retained as a COPC, otherwise it is eliminated from further consideration.
e. If the chemical is not eliminated from further consideration, then the value used in the MCE is the maximum reported EQL.
f. If the chemical is not retained immediately as a COPC based on the relation between EQLs and SAL, then the value used in the MCE is the maximum reported detected concentration.
g. The value used in the MCE is the maximum reported detected concentration.

At SNL/NM,

- Constituents that are both carcinogens and non-carcinogens are included in both categories in MCEs.

7. Appropriate choices of analytical chemistry methods can maximize the ability to detect constituents at or below SAL/AL concentrations.
   - SW 846 methods (when available) are used for fixed analytical laboratories unless other methods are justified.
   - Field measurement and analytic techniques are used where appropriate. If field analytical techniques are not sufficient to detect constituents at SAL/AL concentrations, EPA-approved fixed analytical laboratory methods are used.

- If the detection limit of the fixed analytical laboratory method is above the SAL/AL, and the chemical is expected to be present at the site, then the chemical will be identified as a COPC.

> **At LANL:**
> - If field measurement techniques are used to guide fixed analytical laboratory sampling locations and to support site decisions, correlation to laboratory analyticals will be statistically verified.

8. Identification of COPCs indicates only that a problem may exist.
   - Further action may take several forms, to be determined on a case-by-case basis.
     - Further Evaluation. More in-depth analysis of available data, e.g. using site-specific exposure assumptions, or collection of additional data following screening. Results of these further evaluations could be either NFA, baseline risk assessment, CMS, or accelerated cleanup.
     - Risk assessment. If one or more measurements at a site are found to be above SALs/ALs and background, a preliminary and/or baseline risk assessment may be used to determine if corrective action is required. Preliminary risk can be assessed using conservative assumptions and existing data. Additional data may be required for the baseline risk assessment if the current data are not adequate to support a risk assessment decision (see assumptions 10 - 17).
     - Accelerated Cleanup. Accelerated cleanups can proceed without further evaluation and/or a baseline risk assessment under the following conditions:
       - cleanup levels are based on background concentrations, promulgated standards, or previously determined site-specific risk-based levels;
       - the remedy is obvious and can be readily applied;
       - the remedy will be a final resolution in order to prevent potential releases or future migration of contaminants from the site;
       - acceptable knowledge is available to adequately identify COPCs, e.g., previous sampling data and/or existing data are available to adequately identify COPCs;
       - adequate waste treatment, storage or disposal capacity is available (including mixed waste if applicable);
       - the remedy is not worse for the ecosystem, worker safety, or public health than the problem;
       - uncertainties can be handled by contingencies in the accelerated cleanup plan, and stopping criteria are defined; and
       - the estimated cost of remediation is expected to be less than the cost of moving forward with further data collection and/or data analysis and risk assessment.

       In the case where extent of contamination is not adequately defined, the accelerated action planning document shall include a sampling and analysis plan (SAP) that outlines the procedures for bounding extent of contamination during field operations. These procedures will consider fate and transport properties for all site contaminants. Cleanup verification SAPs will be designed to confirm the adequacy of the accelerated action.

       The regulator may require and/or the facility may request enhanced regulatory involvement in some accelerated actions. These actions are referred to as voluntary corrective measures (VCMs). Enhanced involvement by the regulator includes review and approval of the VCM plan, potential involvement of the remediation activities, and review and approval of the VCM report.

       Those accelerated actions not requiring enhanced regulatory involvement are referred to as voluntary corrective actions (VCAs). The regulator will be informed of VCA activities. See Appendix A, Figure A-1, for details of where and how the accelerated cleanup approach fits into the overall accelerated corrective action process.

— Stabilization. At any time during the RFI/CMS process, sites may be considered for stabilization if all of the following are true:

- ◊ sufficient information about contaminants and the environmental setting are known, but the site fails one or more specific accelerated action criteria;
- ◊ near-term opportunities exist for significant risk reduction, prevention of further contamination, and/or long-term cost savings;
- ◊ appropriate technologies are available to deal with the known contaminants;
- ◊ proposed action will not impede or be inconsistent with the expected approach for the final remedy;
- ◊ the stabilization activity is not worse than the problem for the ecosystem, worker safety, or public health; and
- ◊ if waste is generated, adequate waste treatment, storage, or disposal capacity is available (including mixed waste if applicable).

At LANL:

- Special Considerations for Specific Constituents
  - PAHs:
    - ◊ PAHs will be carried forward as COPCs when the following conditions exist:
      - PAHs are present at a site above SALs;
      - a current source for PAHs due to non-LANL industrial operations is not identified; and
      - a Laboratory release cannot be ruled out.
    - ◊ PAHs will not be carried forward as COPCs when the following conditions exist:
      - PAHs are present above SALs; but
      - no Laboratory release is suspected; and
      - a current source for PAHs due to non-LANL industrial operations is identified.

Thus, if PAHs are not considered COPCs, a risk assessment will not be done for the site unless warranted by the presence of other constituents. If a risk assessment is done, PAHs will not be included as COPCs. However, the risk related to the PAHs will be presented as part of the background risk characterization

9. Approaches for ecological screening and risk assessment will be consistent with guidance in the EPA *Framework for Ecological Assessment* as further detailed in the draft *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments*. This approach is presented in more detail under assumption 17.

III. RISK-BASED DECISION ASSUMPTIONS

10. Human health and ecological risks can only be appropriately evaluated on a scale of relevant exposure units.
    - Individual sites will be aggregated as necessary for appropriate risk evaluation.
    - Aggregate sizes may differ for human health and ecological evaluations depending on the exposure models.

11. Risks to human health and the environment posed by contamination at the site are necessary considerations in further decisions about a site (beyond identification of COPCs and stabilization activities).
    - Decisions made after comparison of individual observations to a SAL/AL are based on generic, conservative assumptions. Appropriate site-specific risk assessments may differ from screening conclusions because the exposure assumptions underlying the SAL/AL calculation are not site-specific, and also because risk depends on the extent and distribution of contamination rather than the maximum observed concentration.
    - Chemicals identified as COPCs because the detection limit was greater than the SAL/AL may be evaluated qualitatively based on process knowledge. If a chemical is not expected to be present at a site, the chemical needs no further consideration.

- If a chemical having a detection limit greater than SAL is expected to be present, it will be included in the risk assessment calculations with the assumption that it is present at a concentration equal to one-half the detection limit.

I. Human-Health Risk Assessment

12. For sites requiring risk assessment and/or cleanup decisions, appropriate land-use scenarios can be identified based on:
    - The facility Site Development Plan; Future-Use Project Report; property management including deed restriction; and current land use.
    - Conceptual models for specific sites consider all exposure pathways appropriate for the site and all populations potentially exposed in a specific scenario. See Appendix B for considerations on the evaluation of dermal exposure.

> **At LANL:**
> - Based on the LANL 30-year Site Development Plan (LANL 1994) and other available information, appropriate site-specific scenarios are developed, including residential and commercial use for the townsite or other lands slated for release from DOE control; industrial use for sites of continued Laboratory use; recreational use for areas accessible to the public, but not appropriate for residential development (i.e., steep hillsides inappropriate for residential construction); and a Native American scenario developed in cooperation with the adjoining Pueblos for areas with potential impact on Pueblo populations (canyon regions). Parameters for evaluating these scenarios are being developed with the Accord Tribes.

> **AT SNL/NM:**
> - Land use in the future is recreational or industrial. These designations are consistent with those approved by the Citizen's Advisory Board.

13. Estimation of risks to human health is based on reasonable and site-specific exposure assumptions. In particular, site-specific land-use assumptions will be used.

14. The water exposure pathway is selected when data indicate that water resources may be impacted. Surface water pathways are also considered, as appropriate.

> **At LANL:**
> - Potential contaminant migration to groundwater may be modeled at those mesa-top sites where contamination is detected and the potential for transport to groundwater exists, as determined on a case-by-case basis.
> - The groundwater pathway will be considered for canyon-bottom sites.
> - Contaminant transport model(s), model inputs, assumptions, and uncertainties will be provided to regulators.
> - When contaminant transport/migration is a problem, further action may be triggered by finding concentrations exceeding background levels or method detection limits, because this may be an indication that migration has occurred. LANL will evaluate various contaminant transport models for application and use. Transport models will be presented to regulators prior to their use for site decision-making.

> **AT SNL/NM:**
> - The water exposure pathway will be considered for every site, although most SNL/NM sites are not expected to have a groundwater pathway. For those sites with a potential groundwater pathway, flow and transport calculations will be performed to determine the potential impact.

15. Baseline risk assessment may provide a basis for NFA at sites where COPCs have been identified.
    - Superfund's RAGS (EPA 1989) provides the basic guidance for performing baseline risk assessments.
    - If the total carcinogenic risk posed by a PRS is within the 10^{-4} - 10^{-6} risk range (or lower), and the non-carcinogenic risk threshold has not been exceeded, the site may be proposed for NFA.
    - The approach used to conduct the risk assessment will be determined by preliminary information available on the site. In some cases, deterministic approaches may be the most expedient choice, e.g. where sites are well-characterized; the number of COPCs is small; or concentrations clearly indicate a health risk. For other sites, site complexity and decision consequences may necessitate the use of more complex stochastic models or alternative approaches necessary to define sources of uncertainty to guide future decisions. The choice of specific models will be determined by site characteristics. When stochastic models are used, assumptions will be explicitly stated and a reasonable maximal exposure based on deterministic calculations will be included. Models will be presented to regulators prior to their use for site decision-making.
    - Guidelines in proposed 10 CFR 834 and DOE Order 5400.5 (Radiation Protection of the Public and the Environment) establish proper procedures for determining acceptable levels of dose for radiological evaluations. Screening and cleanup level derivation and use of RESRAD and ALARA as methods of determination are supported by these regulations. For volumetric radiological contamination (soil, rubble, etc.), cleanup levels are proposed on a site-specific basis for each nuclide present and are generally calculated using the RESRAD computer code. For unrestricted release and continued Laboratory control, a target dose limit of 15 mrem/yr above background (DOE/AL 1996) is used as a basis for cleanup level calculations.
    - In most cases, radionuclide health assessments are presented in terms of dose (the DOE and EPA measure for limiting risk associated with radionuclides). In those cases for which the risk associated with radionuclides influences decisions associated with other COPCs at the site, the radionuclide risk may also be presented in terms of carcinogenic risk (for qualitative comparison only). The Laboratories caution strongly against adding radioactive risk results with hazardous chemical carcinogen risk estimates due to the marked difference in methods for establishing the respective health effects. This cautionary note is consistent with the EPA's RAGS document (EPA 1989).

16. Exposure estimates are based on the distribution of contamination throughout areas/volumes of contaminated media and over time periods that are consistent with land use assumptions
    - Current EPA guidance for deterministic models suggests using the 95% upper confidence level (UCL) for the mean concentration within such areas/volumes as an estimate of the reasonable maximum exposure associated with that area/volume.
      - When appropriate, alternative statistical models will provide estimates of reasonable maximum exposure.
    - Exposure areas/volumes are established through the DQO process using appropriate land use assumptions.
      - In general, the areas/volumes will be consistent with the selected exposure scenario. That is, the smallest area or volume to which a receptor would be exposed over the entire exposure period determined by that scenario will be used.

II. Ecological Risk Assessment

17. Ecological risk assessment will be performed on PRSs that are aggregated by vegetation type into habitat patches that form reasonable ecological exposure units (EEUs) for ecological receptors. The general approach follows a tiered process as outlined in EPA guidance (EPA 1992; 1994; and 1996b). The final process is being developed in conjunction with NMED.
    - Ecological screening assessment will proceed using a two-step approach in which immediately available data will be used to perform a preliminary screening. Requirements for further assessment will be evaluated for those PRSs that are not screened out in the first step.
    - Contaminants of potential ecological concern (COPECs) will be selected on the basis of detected presence at PRSs.
    - Representative receptors will be selected from food webs established for EEUs in order to protect Threatened and Endangered species, general ecosystem structure, and critical ecological functions.
    - Exposures will be calculated on the basis of contaminant concentrations, contaminant distribution patterns, receptor home range sizes, and receptor foraging strategies.
    - Risk will be assessed by comparing exposures to relevant toxicity data.
    - At sites where remediation is indicated, the ecological effects of leaving COPECs in place will be balanced against the ecological effects of remediation activities.

IV. REMEDY SELECTION AND IMPLEMENTATION ASSUMPTIONS

18. Site-specific land-use assumptions and exposure scenarios (Assumptions 12 and 13) are considered in establishing preliminary remediation goals and media cleanup standards, and also in risk assessments to estimate the reduction of risk realized by a potential corrective action.

19. Target risk and dose levels will be set following EPA, NMED, and DOE guidance.
    - Following EPA guidance, preliminary remediation goals and media cleanup standards for non-radioactive carcinogens are derived using EPA's target incremental risk range of 10^{-4} to 10^{-6}. A target hazard index value of 1 is used for non-carcinogens.
    - For volumetric radiological contamination (soil, rubble, etc.), cleanup levels are proposed on a site-specific and ALARA basis for each radionuclide present. For unrestricted release of residential sites, a target level of 15 mrem/yr above background is used.
    - Cleanup levels will be presented in a table of risk levels for recreational, industrial, and residential scenarios, as appropriate. All parameters used in the derivation of cleanup levels will be detailed in appropriate reports. Although cost factors will be included, these will not form the sole basis of the cleanup level decisions.
    - Risk due to background inorganics will be calculated and presented to regulators for consideration in the establishment of appropriate cleanup levels.

20. For CMSs, media cleanup standards will be established after the results of the CMS have been considered. DOE and the Laboratories will propose a remedy selection following evaluation of alternatives as described below. The administrative authority will approve the proposed plan, negotiate changes, or select an alternative remedy.
    - Remedy selection takes into consideration the potential impacts on the health and safety of workers and the public that will be associated with increased exposure during implementation of the remedy. Other considerations for selection of a remedy may include the cost of the remedial options, Laboratory land-use needs, transportation risk, future liability concerns (e.g., off-site disposal liability), and Natural Resource Damage Assessment.

21. Cleanup actions for radionuclides will incorporate ALARA considerations.
    - The principle of ALARA was developed in the occupational radiation protection discipline in order to ensure that radiation exposure remained well below standards.
    - The ALARA principle has been adapted to radiological cleanup activities as follows:
      - Dose-based cleanup goals are based upon:
        - ◊ nature and extent of contamination,
        - ◊ anticipated future use of the site, and
        - ◊ practicality of alternative cleanup techniques.
      - ALARA takes into account technical practicability, economic factors, variability of site conditions, accessibility of pockets of contamination, access controls, and other factors that influence the costs and benefits of a remedial action.
      - ALARA considerations, at this point, may lead to selecting a goal below the dose-based goal, if the lower goal can be economically and easily achieved.
      - Conversely, ALARA considerations may lead to selection of a goal above the dose-based goal (up to 100 mrem/yr) if conditions make the ultimate goal unachievable.
    - Elements of subjectivity remain in any ALARA decision.
    - ALARA decisions must be made with input and concurrence from the DOE.
    - The principle of ALARA is consistent with the CERCLA process for remedy selection.
22. The attainment of cleanup standards is based on comparison of site verification sampling data to the cleanup standards.
    - Verification sampling plans based on nature and extent will be designed to collect the appropriate number of samples to calculate a 95% UCL to compare to cleanup levels.
    - The 95% UCL will estimate average residual concentrations in appropriate risk-based areas/volumes of contaminated media. For radionuclides, identification of hot spots and evaluation of non-uniform radiological contamination will follow RESRAD and other applicable DOE guidance.
23. If media cleanup standards are unattainable using the selected remedy, an alternative remedy (e.g., conditional) and/or cleanup goals/standards will be negotiated.

V. RISK-BASED DECISION FACTORS AND RISK MANAGEMENT ASSUMPTIONS

24. The procedures described to this point are used to develop a consistent qualitative or quantitative evaluation of site risks at LANL and SNL/NM. The results of these evaluations, however, are only one part of the basis for risk-management decisions. Within the regulatory framework, ranges of acceptable risks are defined, and where in that range a management decision will fall for any given site will be modified by factors including:
    - stakeholder concerns;
    - likelihood of the exposure pathways that were evaluated existing either now or in the future;
    - the weight of scientific evidence for toxicity of site contaminants;
    - limits of the best available technologies for mitigating the problem;
    - potential interactions with other exposure sources in the vicinity;
    - feasibility and reasonable relationship of benefits to costs;
    - other political, social, legal, and cultural considerations.

    The goal of SNL and LANL is to ensure protection of human health and the environment from any contamination that might have occurred during past Laboratory activities. For non-radionuclide contamination, the EPA has established standards by which to judge these potential effects. For radionuclides, DOE, EPA, and the Nuclear Regulatory Commission have established or are in the process of establishing standards and guidance. These risk standards are applied considering the current and potential future land-use and the other modifying factors listed above.

Noncarcinogenic health effects are evaluated by the hazard index. Sites with a hazard index less than 1 are not associated with adverse health effects (EPA 1991a).

Carcinogenic health effects for non-radionuclides are evaluated by comparison of estimated excess cancer risk to the risk range that EPA has designated in the National Contingency Plan and RCRA Subpart S. The EPA considers an excess cancer risk level of 10^{-6} as the value below which no human health effects are likely to occur. Remedial action at a site is warranted if the risk value is above approximately 10^{-4}. For calculated risks in the range of 10^{-4} to 10^{-6}, negotiations are required with the regulatory agency to determine if the excess cancer risk is acceptable.

For sites where radioactive contamination is present, the DOE has authority to protect the public from radiation and radioactive materials. DOE has published health and safety orders of which DOE Order 5400.5, Radiation Protection of the Public and the Environment (DOE 1991), is the most pertinent to development and application of cleanup guidelines. DOE Order 5400.5 requires that doses be reduced to a level as low as reasonably achievable (ALARA) below the primary dose limit of 100 mrem/yr from all DOE sources. As stated in 5400.5, radionuclides are not managed by a risk standard, but rather by dose.

The calculated risk parameter value for the contaminated site is compared to the appropriate regulatory standard. If the risk is greater than the regulatory standard for the appropriate land-use, remedial action is generally warranted. Comparison of site risk parameter values to noncarcinogenic and radiological standards is relatively direct. For sites with potential carcinogens present as contaminants of concern, the EPA has provided a range of values for comparison. The intent of both SNL and LANL is to try to clean-up sites to the lower end of the target range as practical from both technical and economic considerations. As stated in an EPA/OSWER directive (EPA 1991b):

> "Once a decision has been made to take action, the Agency has expressed a preference for cleanups achieving the more protective end of the range (i.e., 10^{-6}), although waste management strategies achieving reductions in risks anywhere within the risk range may be deemed acceptable by the EPA risk manager. Furthermore, the upper boundary of the risk range is not a discrete line at 1×10^{-4}, although EPA generally uses 1×10^{-4} in making risk management decisions. Specific risk estimates around 10^{-4} may be considered acceptable if justified based on site-specific conditions, including any remaining uncertainties on the nature and extent of contamination and associated risks. Therefore, in certain cases EPA may consider estimates slightly greater than 10^{-4} to be protective."

The concept of a range of acceptable risk is also supported in the EPA SSG which states that no evaluation of multiple contaminant interactions is deemed necessary for carcinogens screened to a 10^{-6} risk level because

> "...setting a 10^{-6} excess risk level for individual chemicals and pathways generally will lead to cumulative site risks with the 10^{-4} to 10^{-6} risk range for the combinations of chemicals typically found at NPL sites." (EPA 1996a)

Risk management decisions must involve careful consideration of the uncertainties involved in the risk assessment and the understanding of the site. For example, COPCs for which the weight of evidence for carcinogenicity in humans is high may have target risk levels that are more conservative than COPCs having a weaker weight of evidence for carcinogenicity.

As mentioned in the beginning of this section, risk management decisions must also involve the consideration of technical feasibility, cost, legal issues, potential effects on worker safety and the environment, and socio/political concerns for the remedial action. A detailed discussion of these and other risk management considerations is presented in the Presidential/Congressional Commission on Risk Assessment and Risk Management report, *Framework for Environmental Health Risk Management* (Presidential/Congressional Commission on Risk Assessment and Risk Management 1997).

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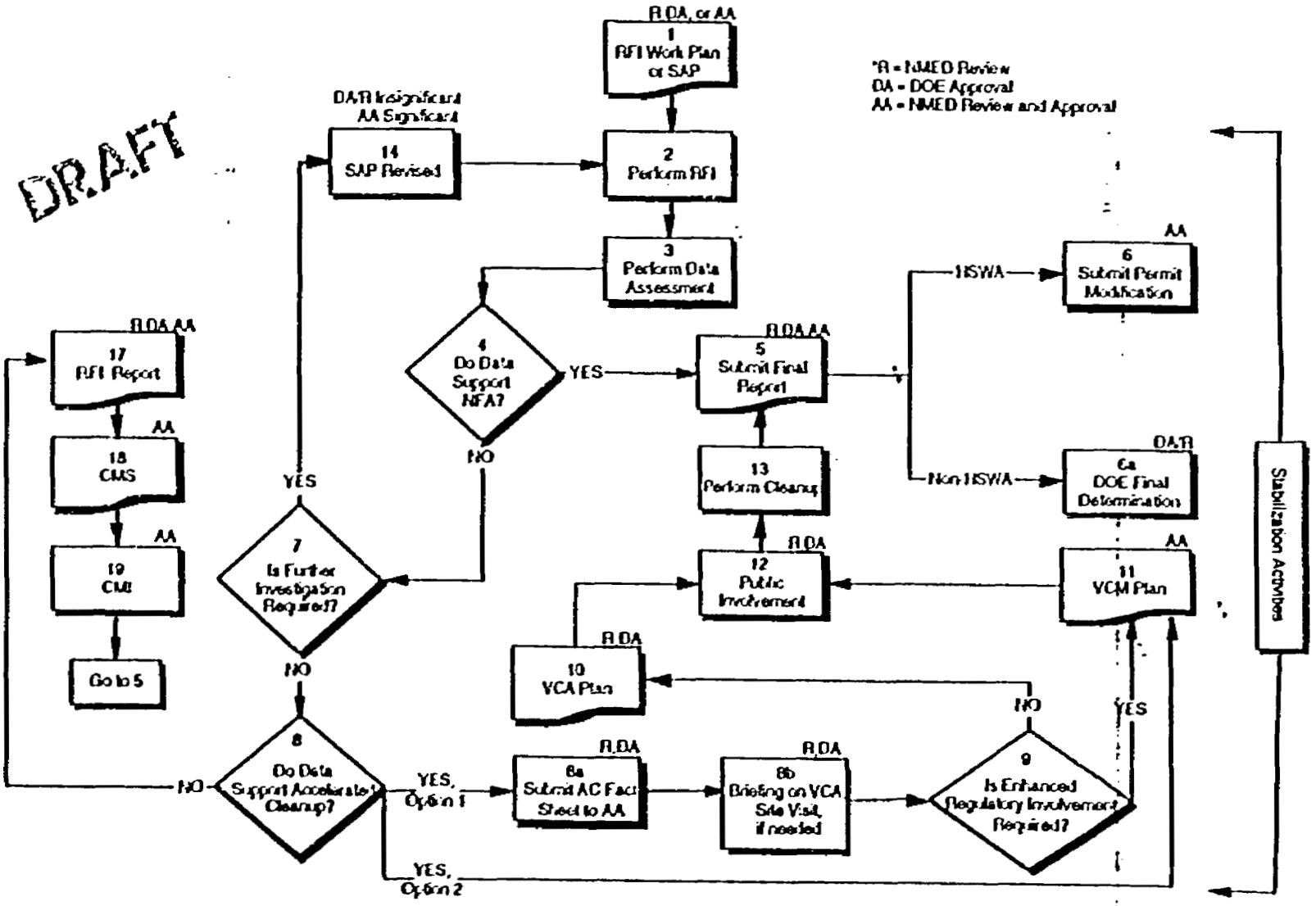
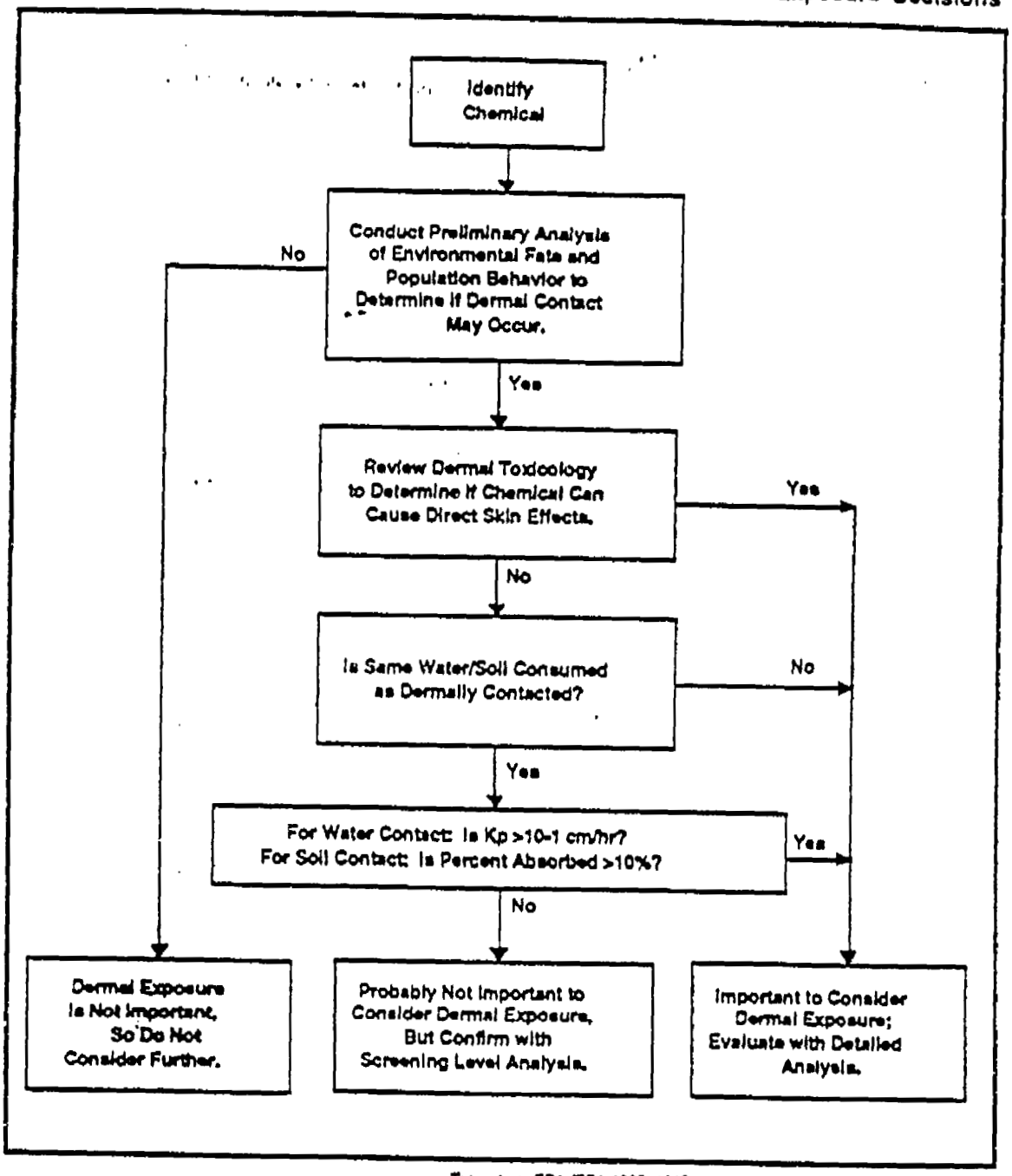
APPENDIX A: ACCELERATED CORRECTIVE ACTION PROCESS



Explanatory text for this diagram can be found in a future annex (nearly completed)of the Document of Understanding (NMED et al. 1995).

Figure B-1. Framework to Evaluate the Importance of Dermal Exposure Decisions



Taken from EPA (EPA 1992, 1012, figure, 9-1, page 9-2)

Dermal exposure assessment is associated with substantial uncertainty. For inorganic COPCs in soil, exclusion of the soil-to-dermal pathway is not likely to affect the overall risk estimate assuming other pathways such as soil ingestion are included. This occurs because inorganics are not well absorbed across the skin due to their limited water and lipid solubilities. Also these metals tend to bind strongly to soil further reducing their availability for transport across the skin. Because there are no chemical-specific skin absorption data for inorganics (with the exception of arsenic (3%) and cadmium (1%)), all inorganics are assumed to have a default dermal absorption factor of 1%. This leads to the same percent contribution to total dose regardless of the chemical, i.e., at 1% absorption, the dermal dose is estimated to be 10% of the oral dose from soil ingestion for adults. (EPA 1992)

Dermal Absorption Dose = Csoil x Dermal Absorption Rate = Csoil x Absorption Factor x Adherence Factor x Surface Area

$$\frac{\text{Dermal Absorption Dose}}{\text{Csoil}} = \text{Dermal Absorption Rate} = \text{Absorption Factor} \times \text{Adherence Factor} \times \text{Surface Area}$$

Oral Ingestion Dose = Csoil x Oral Ingestion Rate

Using the EPA Region 9 default assumptions for Adherence Factor and Surface Area, and the default Absorption Factor of 1%:

Dermal Absorption Rate = 0.01 x 0.2 mg/cm^2-day x 5000 cm^2 = 10 mg/day

Therefore, in the case of the default Ingestion Rate of 100 mg/day, the 10 mg/day Dermal Absorption Rate is estimated to contribute 10% of the Oral Ingestion Dose from soil.

Because dermal absorption factors for organics can be significant due to their greater lipid solubility, dermal exposure will be evaluated for organic COPCs. This process is consistent with the decision framework presented in EPA's *Dermal Exposure Assessment: Principles and Applications* and reproduced in Figure B-1.

REFERENCES FOR APPENDIX B

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Attachment I - Comment 14.a.

Pertinent sections of the Post-Field Ops Report showing PID/FID readings, HE spot test results, and NaI results

4.21 PRS 16-021(c)

Thirty-three surface analytical samples (including two co-located duplicates) and four subsurface analytical samples (including one co-located duplicate) were collected at PRS 16-021(c). Also, eight subsurface screening samples were collected.

4.21.1 Sample Depths and Locations

Sample depths and locations are listed in Table 4.21.1. Sample locations are also illustrated in Figure 4.21.1.

TABLE 4.21.1: Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0013	16-1397	Bldg 260 at outfall: 5' N	0-6 inches
0316-95-0014	16-1396	Bldg 260 at outfall: 10' S	0-6 inches
0316-95-0015	16-1399	Bldg 260 at 100 ft.: 5' N	0-6 inches
0316-95-0016	16-1398	Bldg 260 at 100 ft.: 10' S	0-6 inches
0316-95-0017	16-1401	Bldg 260 at 200 ft.: 5' N	0-6 inches
0316-95-0018	16-1400	Bldg 260 at 200 ft.: 5' S	0-6 inches
0316-95-0019	16-1403	Bldg 260 at 300 ft.: 10' N	0-6 inches
0316-95-0020	16-1402	Bldg 260 at 300 ft.: 15' S	0-6 inches
0316-95-0021	16-1405	Bldg 260 at 400 ft.: 15' N	0-6 inches
0316-95-0022	16-1404	Bldg 260 at 400 ft.: 10' S	0-6 inches
0316-95-0023	16-1407	Bldg 260 500 ft.: 5' N	0-6 inches
0316-95-0024	16-1406	Bldg 260 500 ft.: 5' S	0-6 inches
0316-95-0025	16-1409	Bldg 260 600 ft.: 5' N	0-6 inches
0316-95-0026	16-1408	Bldg 260 600 ft.: 5' S	0-6 inches
0316-95-0027	16-1379	Bldg 260 at outfall	0-6 inches
0316-95-0028	16-1380	Bldg 260 outfall + 20 feet	0-6 inches
0316-95-0029	16-1381	Bldg 260 outfall + 40 feet	0-6 inches
0316-95-0030	16-1382	Bldg 260 outfall + 60 feet	0-6 inches
0316-95-2012	16-1382	Bldg 260 outfall + 60 feet	0-6 inches (dup.)
0316-95-0031	16-1383	Bldg 260 outfall + 80 feet	0-6 inches
0316-95-2013	16-1383	Bldg 260 outfall + 80 feet	0-6 inches (dup.)
0316-95-0032	16-1384	Bldg 260 outfall + 100 feet	0-6 inches
0316-95-0033	16-1385	Bldg 260 outfall + 120 feet	0-6 inches
0316-95-0034	16-1386	Bldg 260 outfall + 140 feet	0-6 inches
0316-95-0035	16-1387	Bldg 260 outfall + 160 feet	0-6 inches
0316-95-0036	16-1388	Bldg 260 outfall + 180 feet	0-6 inches
0316-95-0037	16-1389	Bldg 260 outfall + 200 feet	0-6 inches
0316-95-0038	16-1390	Bldg 260 outfall + 260 feet	0-6 inches
0316-95-0039	16-1391	Bldg 260 outfall + 320 feet	0-6 inches
0316-95-0040	16-1392	Bldg 260 outfall + 380 feet	0-6 inches
0316-95-0041	16-1393	Bldg 260 outfall + 440 feet	0-6 inches
0316-95-0042	16-1394	Bldg 260 outfall + 500 feet	0-6 inches
0316-95-0043	16-1395	Bldg 260 outfall + 560 feet	0-6 inches
0316-95-0044	16-1379	Bldg 260 at outfall	1'-1'6"*
0316-95-2015	16-1379	Bldg 260 at outfall	1'-1'6"* (dup.)
0316-95-0045	16-1382	Bldg 260 outfall + 60 feet	1'6"-1'11"*
0316-95-0046	16-1383	Bldg 260 outfall + 80 feet	1'8"-2'2"*

0316-95-1637	16-1379	Bldg 260 at outfall	1'-1'6"*
0316-95-1638	16-1380	Bldg 260 outfall + 20 feet	1'9"-2'3"*
0316-95-1639	16-1381	Bldg 260 outfall + 41 feet	2.0-2.5 feet*
0316-95-1640	16-1382	Bldg 260 outfall + 60 feet	1'6"-1'11"*
0316-95-1641	16-1383	Bldg 260 outfall + 80 feet	1'8"-2'2"*
0316-95-1642	16-1384	Bldg 260 outfall + 100 feet	1'6"-1'14"*
0316-95-1643	16-1385	Bldg 260 outfall + 120 feet	0'10"-1'4"*
0316-95-1644	16-1386	Bldg 260 outfall + 140 feet	0'8"-1'2"*
0316-95-1645	16-1387	Bldg 260 outfall + 160 feet	Not Collected
0316-95-1646	16-1388	Bldg 260 outfall + 180 feet	Not Collected
0316-95-1647	16-1389	Bldg 260 outfall + 200 feet	Not Collected

*= sampled using a hand auger
dup.= QA/QC colocated duplicate sample

4.21.2 Screening Results

Significant screening results and any values above background are listed in Table 4.21.2. The other screening results were non-detects or were at or below background.

TABLE 4.21.2: Screening Results

Sample ID	Location ID	HE Spot Test	NaI2 Detector	PID Reading
0316-95-0013	16-1397	negative	22510 cpm	Background
0316-95-0014	16-1396	negative	22250 cpm	Background
0316-95-0015	16-1399	negative	24560 cpm	Background
0316-95-0016	16-1398	negative	26080 cpm	18 ppm
0316-95-0017	16-1401	negative	22550 cpm	Background
0316-95-0018	16-1400	negative	22580 cpm	20 ppm
0316-95-0019	16-1403	negative	19760 cpm	Background
0316-95-0020	16-1402	negative	23740 cpm	Background
0316-95-0021	16-1405	negative	24470 cpm	Background
0316-95-0022	16-1404	negative	26030 cpm	Background
0316-95-0023	16-1407	negative	13320 cpm	Background
0316-95-0024	16-1406	negative	13480 cpm	Background
0316-95-0025	16-1409	negative	14560 cpm	Background
0316-95-0026	16-1408	negative	14320 cpm	Background
0316-95-0027	16-1379	positive	13340 cpm	Background
0316-95-0028	16-1380	positive	10720 cpm	Background
0316-95-0029	16-1381	positive	11700 cpm	Background
0316-95-0030	16-1382	positive	9960 cpm	Background
0316-95-0031	16-1383	positive	10092 cpm	Background
0316-95-0032	16-1384	positive	13160 cpm	Background
0316-95-0033	16-1385	positive	12000 cpm	Background
0316-95-0034	16-1386	positive	11087 cpm	Background
0316-95-0035	16-1387	positive	10052 cpm	Background
0316-95-0036	16-1388	positive	10057 cpm	Background
0316-95-0037	16-1389	positive	11038 cpm	Background
0316-95-0038	16-1390	positive	12000 cpm	Background
0316-95-0039	16-1391	positive	13660 cpm	Background
0316-95-0040	16-1392	positive	11200 cpm	Background
0316-95-0041	16-1393	positive	18440 cpm	Background
0316-95-0042	16-1394	positive	19200 cpm	Background
0316-95-0043	16-1395	positive	14570 cpm	Background
0316-95-0044	16-1379	positive	9240 cpm	Background
0316-95-0045	16-1382	positive	10340 cpm	Background
0316-95-0046	16-1383	positive	10500 cpm	Background

4.21.3 Deviations from the OU 1082 RFI Work Plan

Three subsurface screening samples requiring PID analysis were not collected. The three samples were intended to be collected at sediment accumulation areas 160, 180, and 200 feet down drainage from the outfall.

TCLP extraction and metals and organics analyses were performed on samples 0316-95-0030 and 0316-95-0031 (and their duplicates) in addition to the other analyses specified in

the Work Plan . The decision to submit the TCLP analyses was made by the FU3 team during a field review of the 1995 sample locations.

4.21.4 Comments

The drainage channel (lateral) bounding samples were collected at locations that were negative for high explosives based on the HE Spot Test Kit as specified in the RFI Work Plan. The lateral bounding sample points were established by screening with the HE Spot Test Kit on five foot intervals up both banks of the drainage channel at the required down drainage distances. Multiple HE spot test analyses were conducted at each of the specified distances to determine the first HE negative horizon up on the banks of the drainage channel. The lateral sample points presented in figure 4.21.1 show the maximum width of HE contamination as determined with the HE Spot Test Kit (i.e. the figure shows the first point to test negative for HE with the spot test at the required down drainage distances).

Elevated PID readings were not observed during the subsurface screening effort in the upper 200 feet of the Building 260 outfall drainage. The subsurface analytical samples were biased to the three areas believed to have the greatest contamination. The locations are at the outfall and at the two surface sample locations within the "pond" area.

A co-located duplicate was taken at surface locations 16-1382 and 16-1383. A co-located duplicate was also taken at the hand auger location 16-1379. Sample 0316-95-2012 is a duplicate of the surface sample 0316-95-0030. Sample 0316-95-2013 is a duplicate of the surface sample 0316-95-0031. Sample 0316-95-2015 is a duplicate of the subsurface sample 0316-95-0044. All three co-located duplicates were collected at locations where an indication of contamination was observed in the field.

4.22 PRS 16-003(k)

Ten subsurface analytical samples and twenty-two subsurface screening samples were collected at PRS 16-003(k).

4.22.1 Sample Depths and Locations

Sample depths and locations are listed in Table 4.22.1. Sample locations are also illustrated in Figure 4.22.1.

TABLE 4.22.1: Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0047	16-1361	Bldg 260 Sump 4 N corner	Not collected
0316-95-0048	16-1361	Bldg 260 Sump 4 N corner	3-4 feet^
0316-95-0049	16-1645	Bldg 260 Sump 4 S corner	0-1 feet^
0316-95-0050	16-1645	Bldg 260 Sump 4 S corner	3.5-4.5 feet^
0316-95-0051	16-1365	Bldg 260 Sump 13 N corn.	1-2 feet^
0316-95-0052	16-1365	Bldg 260 Sump 13 N corn.	2.5-3.5 feet^
0316-95-0053	16-1646	Bldg 260 Sump 13 S corn.	1'4"-2'4"^
0316-95-0054	16-1646	Bldg 260 Sump 13 S corn.	3'8"-4'3"^
0316-95-0055	16-1356	Bldg 260 trough jct.	Not Collected
0316-95-0056	16-1356	Bldg 260 trough jct.	5-6 feet^
0316-95-0057	16-1357	Bldg 260 trough jct. +12 E	3.0-4.5 feet^
0316-95-0058	16-1357	Bldg 260 trough jct. +12 E	5-6 feet^
0316-95-1656	16-1361	Bldg 260 Sump 4 N corner	0-1 feet^
0316-95-1657	16-1361	Bldg 260 Sump 4 N corner	1-2 feet^ No Recov.
0316-95-1658	16-1361	Bldg 260 Sump 4 N corner	2-3 feet^ No Recov.
0316-95-1659	16-1361	Bldg 260 Sump 4 N corner	3-4 feet^
0316-95-1664	16-1365	Bldg 260 Sump 13 N corn.	0-1 feet^ No Recov.
0316-95-1665	16-1365	Bldg 260 Sump 13 N corn.	1-2 feet^
soil/ tuff interface	16-1365	1.5 feet	See Comments
0316-95-1666	16-1365	Bldg 260 Sump 13 N corn.	2-2.5 feet^ No Rec
0316-95-1667	16-1365	Bldg 260 Sump 13 N corn.	2.5-3.5 feet^
0316-95-1668	16-1646	Bldg 260 Sump 13 S corn.	0-1 feet^ No Recov.
0316-95-1669	16-1646	Bldg 260 Sump 13 S corn.	1-2 feet^
soil/ tuff interface	16-1646	1.5 feet	See Comments
0316-95-1670	16-1646	Bldg 260 Sump 13 S corn.	2-3 feet^ No Recov.
0316-95-1671	16-1646	Bldg 260 Sump 13 S corn.	3-4'3"^
0316-95-1735	16-1645	Bldg 260 Sump 4 S corner	0-1 feet^
0316-95-1736	16-1645	Bldg 260 Sump 4 S corner	1-2 feet^
0316-95-1737	16-1645	Bldg 260 Sump 4 S corner	2-3.5 feet^
0316-95-1738	16-1645	Bldg 260 Sump 4 S corner	3.5-4.5 feet^
soil/ tuff interface	16-1645	4 feet	See Comments
0316-95-1739	16-1645	Bldg 260 Sump 4 S corner	4.5-5 feet^
0316-95-1740	16-1356	Bldg 260 trough jct.	0-1 feet^
0316-95-1741	16-1356	Bldg 260 trough jct.	1-2 feet^ No Recov.
0316-95-1742	16-1356	Bldg 260 trough jct.	2-3 feet^
0316-95-1743	16-1356	Bldg 260 trough jct.	3-4 feet^
0316-95-1744	16-1356	Bldg 260 trough jct.	4-5 feet^
0316-95-1745	16-1356	Bldg 260 trough jct.	5-6 feet^
0316-95-1763	16-1357	Bldg 260 trough jct. +12 W	0-1 feet^
0316-95-1764	16-1357	Bldg 260 trough jct. +12 W	1-2 feet^
0316-95-1765	16-1357	Bldg 260 trough jct. +12 W	2-3 feet^
0316-95-1766	16-1357	Bldg 260 trough jct. +12 W	3-4 feet^
0316-95-1767	16-1357	Bldg 260 trough jct. +12 W	4-5 feet^
soil/ tuff interface	16-1357	4.5 feet	
0316-95-1768	16-1357	Bldg 260 trough jct. +12 W	5-6 feet^

^= sampled using the split spoon

4.22.2 Screening Results

Significant screening results and any values above background are listed in Table 4.22.2. The other screening results were non-detects or were at or below background.

TABLE 4.22.2: Screening Results

Sample ID	Location ID	HE Spot Test	NaI2 Detector	PID Reading
0316-95-1656	16-1361	negative	10580 cpm	13 ppm
0316-95-1659	16-1361	negative	11250 cpm	Background
0316-95-1665	16-1365	positive	N/A	5 ppm
0316-95-1667	16-1365	positive	N/A	Background
0316-95-1671	16-1646	positive	N/A	Background
0316-95-1735	16-1645	positive	11680 cpm	Background
0316-95-1736	16-1645	negative	11960 cpm	Background
0316-95-1737	16-1645	negative	11960 cpm	Background
0316-95-1738	16-1645	positive	11640 cpm	Background
0316-95-1739	16-1645	negative	11940 cpm	Background
0316-95-1740	16-1356	negative	14320 cpm	1 ppm
0316-95-1741	16-1356	no recovery	N/A	1 ppm (in hole)
0316-95-1742	16-1356	negative	N/A	2 ppm
0316-95-1743	16-1356	negative	N/A	2 ppm
0316-95-1744	16-1356	negative	N/A	2 ppm
0316-95-1763	16-1357	negative	N/A	30 ppm
0316-95-1764	16-1357	negative	N/A	30 ppm
0316-95-1765	16-1357	negative	N/A	30 ppm
0316-95-1766	16-1357	negative	N/A	110 ppm
0316-95-1767	16-1357	negative	N/A	110 ppm
0316-95-1768	16-1357	negative	N/A	1 ppm

4.22.3 Deviations from the OU 1082 RFI Work Plan

The drilling core was screened on 12 inch intervals because a 6 inch interval in a 1.55 inch ID split spoon is not enough material for full suite analysis.

Also, the borehole was drilled vertically, not at an angle. Angled boreholes were not allowed because TA-16 personnel believe there to be a greater potential for creating an HE confining hazard with this type of drilling.

The field team collected and submitted two analytical samples from borehole 16-1357 even though none of the screening samples tested positive for HE.

Boreholes were only drilled at two sumps: Sump 4 and 13. At each sump, two boreholes were drilled, one at the southeast corner and one at the northeast corner. The decision by FU3 team members not to drill and sample every sump at Building 260 was discussed with and approved by the EPA.

In addition, FU3 decided to drill only two of the feeder trough boreholes. This was also approved by the EPA.

4.22.4 Comments

Drilling at PRS 16-003(k) proved to be very challenging. The sampling team consistently met refusal at depths between 2-3 feet using the hollow-stem auger rig. The field team switched to a coring method using a specially designed carbide tipped cutting shoe and split-spoon to drill the remaining 2-3 feet in each borehole. Every borehole was drilled to the specified depth.

At the sump boreholes both the shallowest and deepest HE positive intervals were collected except at Borehole 16-1361. There was only one positive interval in Borehole 16-1361 and, therefore, only one sample was collected.

The feeder trough boreholes were biased to obvious cracks in the concrete. In both cases, the crack areas were extensive and indicated that water may have leaked at these locations. There were, however, no HE positive intervals at either of the feeder trough boreholes. Two analytical samples were collected in Borehole 16-1357.

The soil/ tuff interface in PRS 16-003(k) may be deeper than was thought during drilling. The sampling team reported finding engineering fill gravels and lenses of material more closely resembling soil horizons at deeper depths than the soil/ tuff interface. The soil horizons could be highly weathered tuff or a surge bed within the tuff. And, the engineering fill gravels and cobbles could have slid down the hole from a shallower interval. However, tuff and dacite cobbles and gravels are very common at this PRS and were identified in most of the boreholes. What was believed to be tuff (bedrock) may instead be a large tuff cobble that was intersected by the borehole. The interpretation of the depth to tuff in boreholes 16-1365 and 16-1646 is the most suspect. These boreholes have the shallowest intervals for the soil/ tuff interface and numerous dacite and tuff gravels/ cobbles were encountered during the drilling of these two boreholes.

4.23 PRS 16-030(d)

Four subsurface analytical samples and seven surface analytical samples were collected at PRS 16-030(d). Also, thirteen surface screening samples were collected.

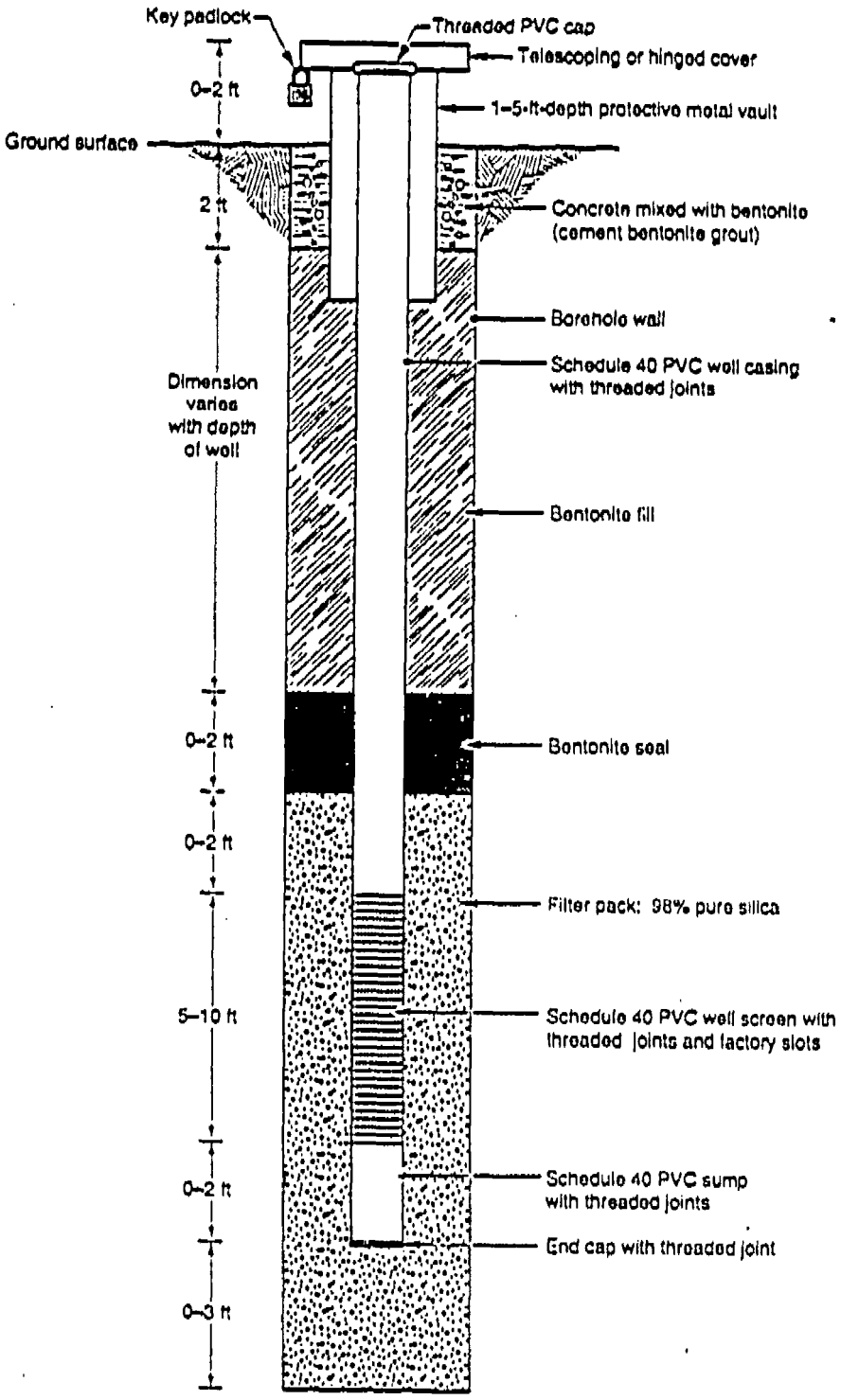

Figure Typical construction of alluvial well.

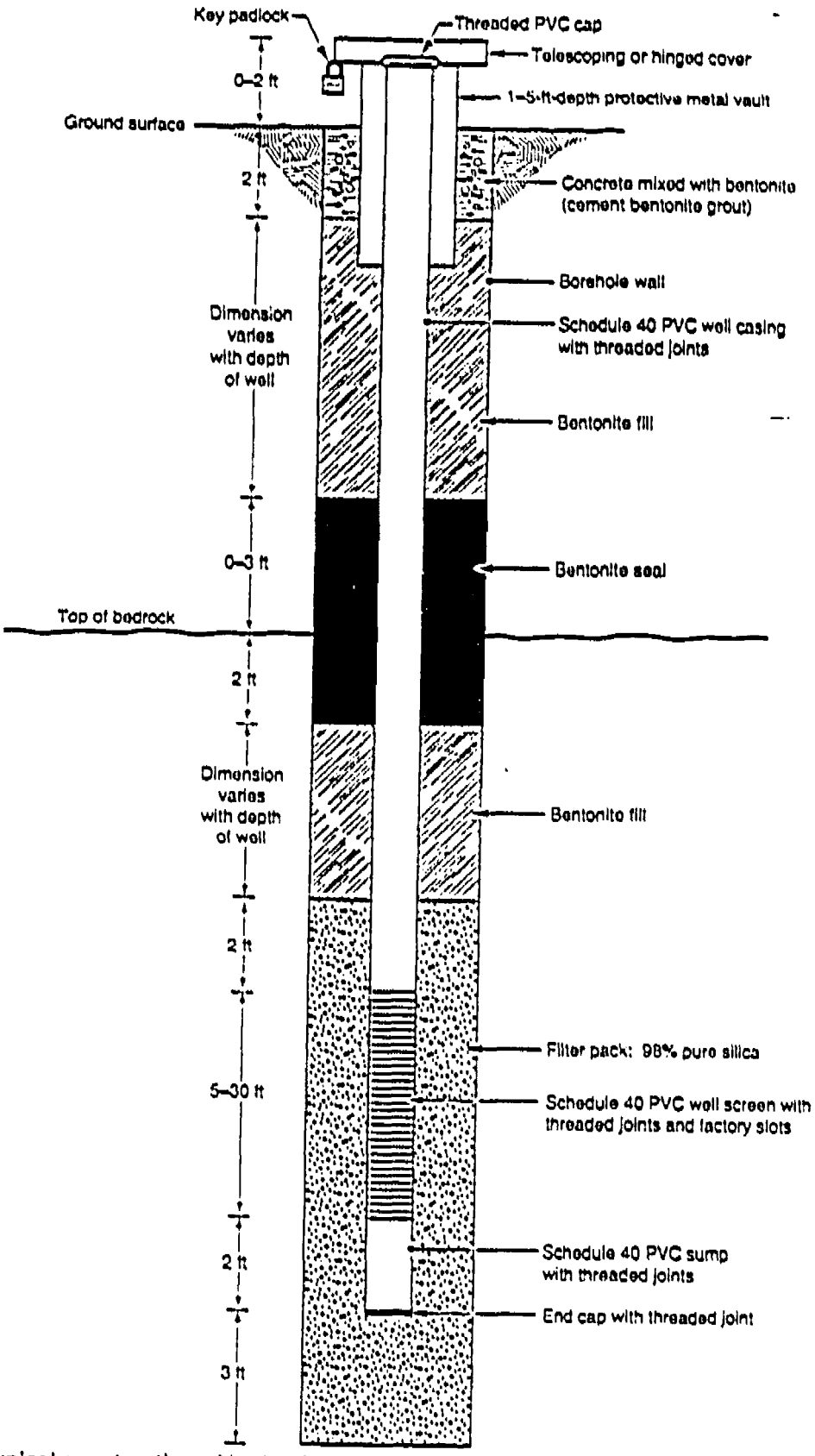

Figure Typical construction of bedrock well.

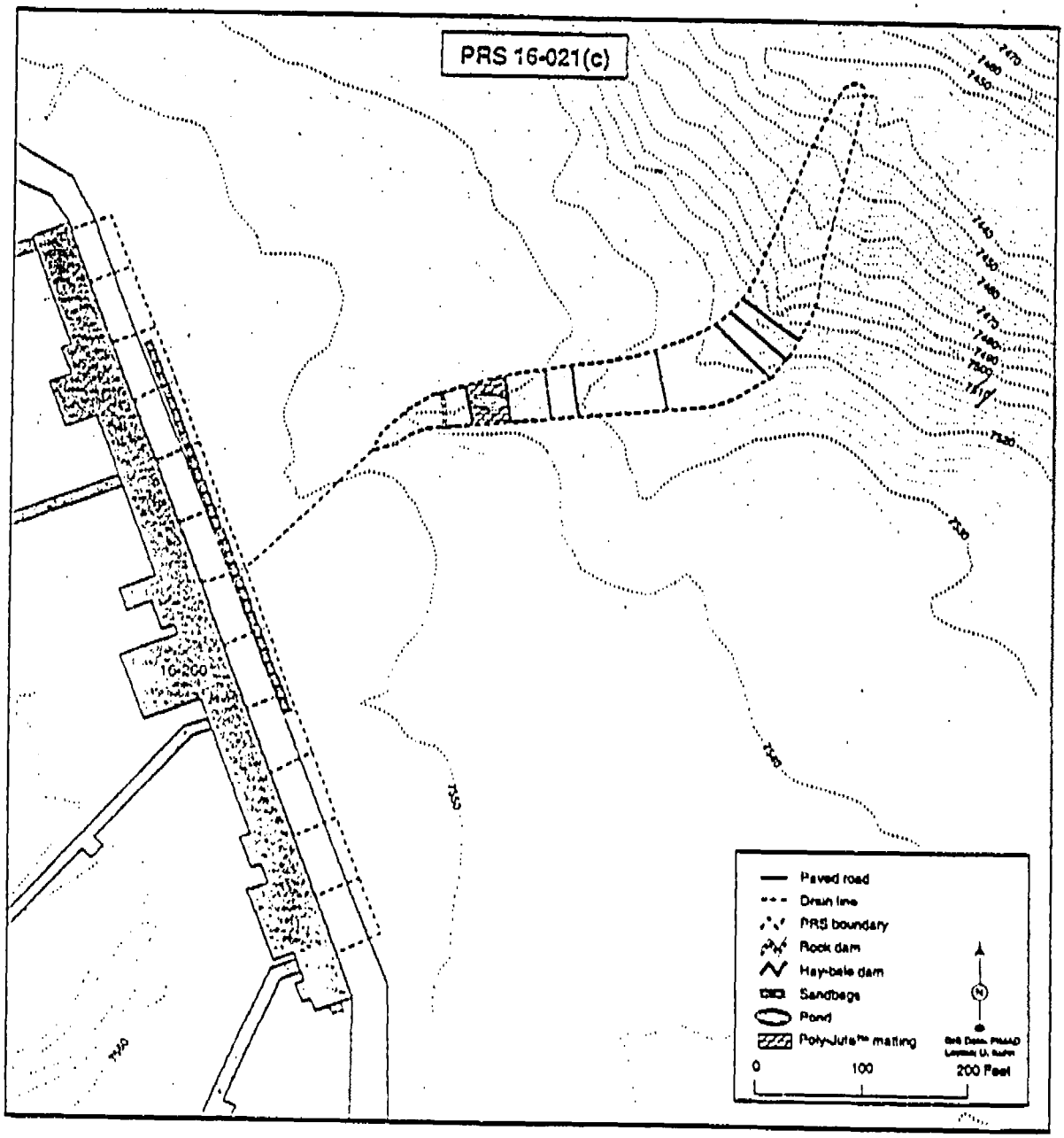

Fig. 1. PRS 16-021(c), outfall from TA-16-260.

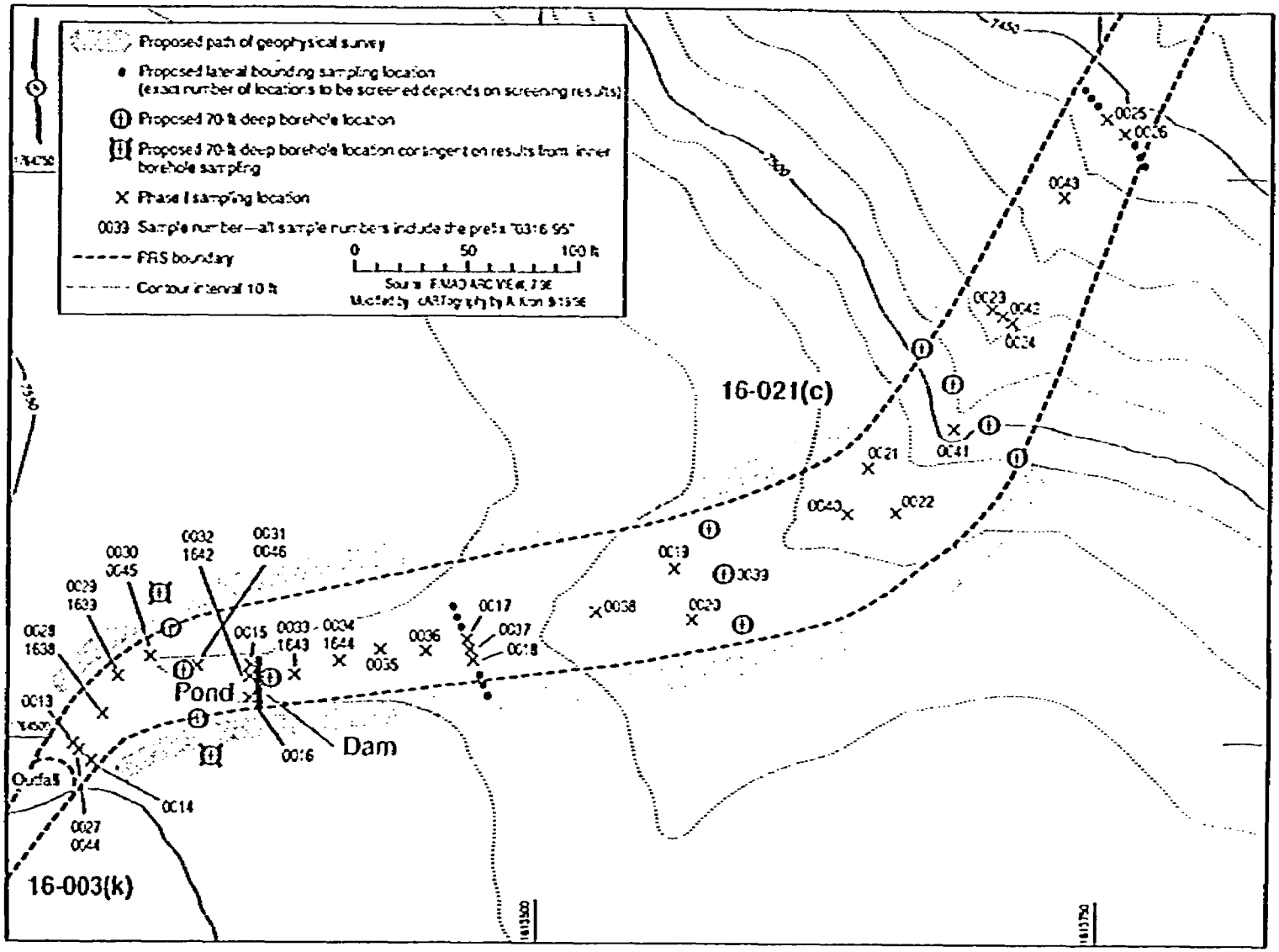

Fig. 5.2.11.2.1-1. Proposed Phase II sampling locations at PRS 16-021(c).

Attachment M - Comment 28

Crosswalk between request numbers and PRS/sample locations

Attachment M
Crosswalk between Request Numbers & PRS/sample locations

Request Number	Analyte Suite	Method *	PRS	Location ID	Sample
563	INORGANIC	METTCLP	16-021(c)	16-1382	0316-95-0030
563	INORGANIC	METTCLP	16-021(c)	16-1383	0316-95-0031
563	INORGANIC	METTCLP	16-021(c)	16-1383	0316-95-2013
563	ORGANIC	HEXP	16-021(c)	16-1381	0316-95-0029
563	ORGANIC	HEXP	16-021(c)	16-1382	0316-95-0030
563	ORGANIC	HEXP	16-021(c)	16-1383	0316-95-0031
563	ORGANIC	HEXP	16-021(c)	16-1383	0316-95-2013
563	ORGANIC	HEXP	16-021(c)	16-1385	0316-95-0033
563	ORGANIC	HEXP	16-021(c)	16-1386	0316-95-0034
563	ORGANIC	HEXP	16-021(c)	16-1387	0316-95-0035
563	ORGANIC	HEXP	16-021(c)	16-1388	0316-95-0036
563	ORGANIC	HEXP	16-021(c)	16-1389	0316-95-0037
563	ORGANIC	SEMI	16-021(c)	16-1381	0316-95-0029
563	ORGANIC	SEMI	16-021(c)	16-1382	0316-95-0030
563	ORGANIC	SEMI	16-021(c)	16-1383	0316-95-0031
563	ORGANIC	SEMI	16-021(c)	16-1383	0316-95-2013
563	ORGANIC	SEMI	16-021(c)	16-1385	0316-95-0033
563	ORGANIC	SEMI	16-021(c)	16-1386	0316-95-0034
563	ORGANIC	SEMI	16-021(c)	16-1387	0316-95-0035
563	ORGANIC	SEMI	16-021(c)	16-1388	0316-95-0036
563	ORGANIC	VOATCLP	16-021(c)	16-1382	0316-95-0030
563	ORGANIC	VOATCLP	16-021(c)	16-1383	0316-95-0031
563	ORGANIC	VOATCLP	16-021(c)	16-1383	0316-95-2013
564	INORGANIC	METTALCN	16-021(c)	16-1381	0316-95-0029
564	INORGANIC	METTALCN	16-021(c)	16-1382	0316-95-0030
564	INORGANIC	METTALCN	16-021(c)	16-1383	0316-95-0031
564	INORGANIC	METTALCN	16-021(c)	16-1383	0316-95-2013
564	INORGANIC	METTALCN	16-021(c)	16-1385	0316-95-0033
564	INORGANIC	METTALCN	16-021(c)	16-1386	0316-95-0034
564	INORGANIC	METTALCN	16-021(c)	16-1387	0316-95-0035
564	INORGANIC	METTALCN	16-021(c)	16-1388	0316-95-0036
564	INORGANIC	METTALCN	16-021(c)	16-1389	0316-95-0037
565	RAD	TU	16-021(c)	16-1381	0316-95-0029
565	RAD	TU	16-021(c)	16-1382	0316-95-0030
565	RAD	TU	16-021(c)	16-1383	0316-95-0031
565	RAD	TU	16-021(c)	16-1383	0316-95-2013
565	RAD	TU	16-021(c)	16-1385	0316-95-0033
565	RAD	TU	16-021(c)	16-1386	0316-95-0034
565	RAD	TU	16-021(c)	16-1387	0316-95-0035
565	RAD	TU	16-021(c)	16-1388	0316-95-0036
565	RAD	TU	16-021(c)	16-1389	0316-95-0037
972	ORGANIC	HEXP	16-021(c)	16-1396	0316-95-0014
972	ORGANIC	HEXP	16-021(c)	16-1397	0316-95-0013
972	ORGANIC	HEXP	16-021(c)	16-1398	0316-95-0016
972	ORGANIC	HEXP	16-021(c)	16-1399	0316-95-0015
972	ORGANIC	HEXP	16-021(c)	16-1400	0316-95-0018
972	ORGANIC	HEXP	16-021(c)	16-1401	0316-95-0017

Attachment M
Crosswalk between Request Numbers & PRS/sample locations

972	ORGANIC	HEXP	16-021(c)	16-1402	0316-95-0020
972	ORGANIC	HEXP	16-021(c)	16-1403	0316-95-0019
972	ORGANIC	HEXP	16-021(c)	16-1404	0316-95-0022
972	ORGANIC	HEXP	16-021(c)	16-1405	0316-95-0021
972	ORGANIC	SEMI	16-021(c)	16-1396	0316-95-0014
972	ORGANIC	SEMI	16-021(c)	16-1397	0316-95-0013
972	ORGANIC	SEMI	16-021(c)	16-1398	0316-95-0016
972	ORGANIC	SEMI	16-021(c)	16-1399	0316-95-0015
972	ORGANIC	SEMI	16-021(c)	16-1400	0316-95-0018
972	ORGANIC	SEMI	16-021(c)	16-1401	0316-95-0017
972	ORGANIC	SEMI	16-021(c)	16-1402	0316-95-0020
972	ORGANIC	SEMI	16-021(c)	16-1403	0316-95-0019
972	ORGANIC	SEMI	16-021(c)	16-1404	0316-95-0022
972	ORGANIC	SEMI	16-021(c)	16-1405	0316-95-0021
978	INORGANIC	METTALCN	16-021(c)	16-1396	0316-95-0014
978	INORGANIC	METTALCN	16-021(c)	16-1397	0316-95-0013
978	INORGANIC	METTALCN	16-021(c)	16-1398	0316-95-0016
978	INORGANIC	METTALCN	16-021(c)	16-1399	0316-95-0015
978	INORGANIC	METTALCN	16-021(c)	16-1400	0316-95-0018
978	INORGANIC	METTALCN	16-021(c)	16-1401	0316-95-0017
978	INORGANIC	METTALCN	16-021(c)	16-1402	0316-95-0020
978	INORGANIC	METTALCN	16-021(c)	16-1403	0316-95-0019
978	INORGANIC	METTALCN	16-021(c)	16-1404	0316-95-0022
978	INORGANIC	METTALCN	16-021(c)	16-1405	0316-95-0021
979	RAD	TU	16-021(c)	16-1396	0316-95-0014
979	RAD	TU	16-021(c)	16-1397	0316-95-0013
979	RAD	TU	16-021(c)	16-1398	0316-95-0016
979	RAD	TU	16-021(c)	16-1399	0316-95-0015
979	RAD	TU	16-021(c)	16-1400	0316-95-0018
979	RAD	TU	16-021(c)	16-1401	0316-95-0017
979	RAD	TU	16-021(c)	16-1402	0316-95-0020
979	RAD	TU	16-021(c)	16-1403	0316-95-0019
979	RAD	TU	16-021(c)	16-1404	0316-95-0022
979	RAD	TU	16-021(c)	16-1405	0316-95-0021
1102	ORGANIC	HEXP	16-003(k)	16-1361	0316-95-0048
1102	ORGANIC	HEXP	16-003(k)	16-1365	0316-95-0051
1102	ORGANIC	HEXP	16-003(k)	16-1365	0316-95-0052
1102	ORGANIC	HEXP	16-003(k)	16-1646	0316-95-0053
1102	ORGANIC	HEXP	16-003(k)	16-1646	0316-95-0054
1102	ORGANIC	SEMI	16-003(k)	16-1361	0316-95-0048
1102	ORGANIC	SEMI	16-003(k)	16-1365	0316-95-0051
1102	ORGANIC	SEMI	16-003(k)	16-1365	0316-95-0052
1102	ORGANIC	SEMI	16-003(k)	16-1646	0316-95-0053
1102	ORGANIC	SEMI	16-003(k)	16-1646	0316-95-0054
1102	ORGANIC	VOAGCMS	16-003(k)	16-1361	0316-95-0048
1102	ORGANIC	VOAGCMS	16-003(k)	16-1365	0316-95-0051
1102	ORGANIC	VOAGCMS	16-003(k)	16-1365	0316-95-0052
1102	ORGANIC	VOAGCMS	16-003(k)	16-1646	0316-95-0053
1102	ORGANIC	VOAGCMS	16-003(k)	16-1646	0316-95-0054

Attachment M
Crosswalk between Request Numbers & PRS/sample locations

1106	INORGANIC	METTALCN	16-003(k)	16-1361	0316-95-0048
1106	INORGANIC	METTALCN	16-003(k)	16-1365	0316-95-0051
1106	INORGANIC	METTALCN	16-003(k)	16-1365	0316-95-0052
1106	INORGANIC	METTALCN	16-003(k)	16-1646	0316-95-0053
1106	INORGANIC	METTALCN	16-003(k)	16-1646	0316-95-0054
1108	RAD	TU	16-003(k)	16-1361	0316-95-0048
1108	RAD	TU	16-003(k)	16-1365	0316-95-0051
1108	RAD	TU	16-003(k)	16-1646	0316-95-0053
1108	RAD	TU	16-003(k)	16-1646	0316-95-0054
1173	ORGANIC	HEXP	16-021(c)	16-1379	0316-95-0044
1173	ORGANIC	HEXP	16-021(c)	16-1379	0316-95-2015
1173	ORGANIC	HEXP	16-021(c)	16-1382	0316-95-0045
1173	ORGANIC	HEXP	16-021(c)	16-1383	0316-95-0046
1173	ORGANIC	SEMI	16-021(c)	16-1379	0316-95-0044
1173	ORGANIC	SEMI	16-021(c)	16-1379	0316-95-2015
1173	ORGANIC	SEMI	16-021(c)	16-1382	0316-95-0045
1173	ORGANIC	SEMI	16-021(c)	16-1383	0316-95-0046
1173	ORGANIC	VOAGCMS	16-021(c)	16-1379	0316-95-0044
1173	ORGANIC	VOAGCMS	16-021(c)	16-1379	0316-95-2015
1173	ORGANIC	VOAGCMS	16-021(c)	16-1382	0316-95-0045
1173	ORGANIC	VOAGCMS	16-021(c)	16-1383	0316-95-0046
1174	INORGANIC	METTALCN	16-021(c)	16-1379	0316-95-0044
1174	INORGANIC	METTALCN	16-021(c)	16-1379	0316-95-2015
1174	INORGANIC	METTALCN	16-021(c)	16-1382	0316-95-0045
1174	INORGANIC	METTALCN	16-021(c)	16-1383	0316-95-0046
1175	RAD	TU	16-021(c)	16-1379	0316-95-0044
1175	RAD	TU	16-021(c)	16-1379	0316-95-2015
1175	RAD	TU	16-021(c)	16-1382	0316-95-0045
1175	RAD	TU	16-021(c)	16-1383	0316-95-0046
1203	ORGANIC	HEXP	16-003(k)	16-1645	0316-95-0049
1203	ORGANIC	HEXP	16-003(k)	16-1645	0316-95-0050
1203	ORGANIC	SEMI	16-003(k)	16-1645	0316-95-0049
1203	ORGANIC	SEMI	16-003(k)	16-1645	0316-95-0050
1203	ORGANIC	VOAGCMS	16-003(k)	16-1645	0316-95-0049
1203	ORGANIC	VOAGCMS	16-003(k)	16-1645	0316-95-0050
1204	INORGANIC	METTALCN	16-003(k)	16-1645	0316-95-0049
1204	INORGANIC	METTALCN	16-003(k)	16-1645	0316-95-0050
1205	RAD	TU	16-003(k)	16-1645	0316-95-0049
1205	RAD	TU	16-003(k)	16-1645	0316-95-0050
1222	ORGANIC	HEXP	16-003(k)	16-1361	0316-95-0056
1222	ORGANIC	HEXP	16-003(k)	16-1361	0316-95-0057
1222	ORGANIC	HEXP	16-003(k)	16-1361	0316-95-0058
1222	ORGANIC	HEXP	16-021(c)	16-1406	0316-95-0024
1222	ORGANIC	HEXP	16-021(c)	16-1407	0316-95-0023
1222	ORGANIC	HEXP	16-021(c)	16-1408	0316-95-0026
1222	ORGANIC	HEXP	16-021(c)	16-1409	0316-95-0025
1222	ORGANIC	SEMI	16-003(k)	16-1361	0316-95-0056
1222	ORGANIC	SEMI	16-003(k)	16-1361	0316-95-0057
1222	ORGANIC	SEMI	16-003(k)	16-1361	0316-95-0058

Attachment M
Crosswalk between Request Numbers & PRS/sample locations

1222	ORGANIC	SEMI	16-021(c)	16-1406	0316-95-0024
1222	ORGANIC	SEMI	16-021(c)	16-1407	0316-95-0023
1222	ORGANIC	SEMI	16-021(c)	16-1408	0316-95-0026
1222	ORGANIC	SEMI	16-021(c)	16-1409	0316-95-0025
1222	ORGANIC	VOAGCMS	16-003(k)	16-1361	0316-95-0056
1222	ORGANIC	VOAGCMS	16-003(k)	16-1361	0316-95-0057
1222	ORGANIC	VOAGCMS	16-003(k)	16-1361	0316-95-0058
1223	INORGANIC	METTALCN	16-003(k)	16-1361	0316-95-0056
1223	INORGANIC	METTALCN	16-003(k)	16-1361	0316-95-0057
1223	INORGANIC	METTALCN	16-003(k)	16-1361	0316-95-0058
1223	INORGANIC	METTALCN	16-021(c)	16-1406	0316-95-0024
1223	INORGANIC	METTALCN	16-021(c)	16-1407	0316-95-0023
1223	INORGANIC	METTALCN	16-021(c)	16-1408	0316-95-0026
1223	INORGANIC	METTALCN	16-021(c)	16-1409	0316-95-0025
1224	RAD	TU	16-003(k)	16-1361	0316-95-0056
1224	RAD	TU	16-003(k)	16-1361	0316-95-0057
1224	RAD	TU	16-003(k)	16-1361	0316-95-0058
1224	RAD	TU	16-021(c)	16-1406	0316-95-0024
1224	RAD	TU	16-021(c)	16-1407	0316-95-0023
1224	RAD	TU	16-021(c)	16-1408	0316-95-0026
1224	RAD	TU	16-021(c)	16-1409	0316-95-0025
1268	ORGANIC	HEXP	16-021(c)	16-1379	0316-95-0027
1268	ORGANIC	HEXP	16-021(c)	16-1380	0316-95-0028
1268	ORGANIC	HEXP	16-021(c)	16-1384	0316-95-0032
1268	ORGANIC	HEXP	16-021(c)	16-1390	0316-95-0038
1268	ORGANIC	HEXP	16-021(c)	16-1391	0316-95-0039
1268	ORGANIC	HEXP	16-021(c)	16-1392	0316-95-0040
1268	ORGANIC	HEXP	16-021(c)	16-1393	0316-95-0041
1268	ORGANIC	HEXP	16-021(c)	16-1394	0316-95-0042
1268	ORGANIC	HEXP	16-021(c)	16-1395	0316-95-0043
1268	ORGANIC	SEMI	16-021(c)	16-1379	0316-95-0027
1268	ORGANIC	SEMI	16-021(c)	16-1380	0316-95-0028
1268	ORGANIC	SEMI	16-021(c)	16-1384	0316-95-0032
1268	ORGANIC	SEMI	16-021(c)	16-1390	0316-95-0038
1268	ORGANIC	SEMI	16-021(c)	16-1391	0316-95-0039
1268	ORGANIC	SEMI	16-021(c)	16-1392	0316-95-0040
1268	ORGANIC	SEMI	16-021(c)	16-1393	0316-95-0041
1268	ORGANIC	SEMI	16-021(c)	16-1394	0316-95-0042
1268	ORGANIC	SEMI	16-021(c)	16-1395	0316-95-0043
1269	INORGANIC	METTALCN	16-021(c)	16-1379	0316-95-0027
1269	INORGANIC	METTALCN	16-021(c)	16-1380	0316-95-0028
1269	INORGANIC	METTALCN	16-021(c)	16-1384	0316-95-0032
1269	INORGANIC	METTALCN	16-021(c)	16-1390	0316-95-0038
1269	INORGANIC	METTALCN	16-021(c)	16-1391	0316-95-0039
1269	INORGANIC	METTALCN	16-021(c)	16-1392	0316-95-0040
1269	INORGANIC	METTALCN	16-021(c)	16-1393	0316-95-0041
1269	INORGANIC	METTALCN	16-021(c)	16-1394	0316-95-0042
1269	INORGANIC	METTALCN	16-021(c)	16-1395	0316-95-0043
1270	RAD	TU	16-021(c)	16-1379	0316-95-0027

Attachment M
Crosswalk between Request Numbers & PRS/sample locations

1270	RAD	TU	16-021(c)	16-1380	0316-95-0028
1270	RAD	TU	16-021(c)	16-1384	0316-95-0032
1270	RAD	TU	16-021(c)	16-1390	0316-95-0038
1270	RAD	TU	16-021(c)	16-1391	0316-95-0039
1270	RAD	TU	16-021(c)	16-1392	0316-95-0040
1270	RAD	TU	16-021(c)	16-1393	0316-95-0041
1270	RAD	TU	16-021(c)	16-1394	0316-95-0042
1270	RAD	TU	16-021(c)	16-1395	0316-95-0043

a. METTCLP = TCLP metals; HEXP = high explosives; SEMI = semivolatile organics; VOAGCMS = volatile organics; METTALCN = inorganics and cyanide; TU = total uranium.

TABLE J-1 MAJOR ELEMENTS OF BACKGROUND SPRINGS

DESCRIPTION	DATE	BORON (ppm)	BROMINE (ppm)	CALCIUM (ppm)	CHLORINE (ppm)	FLUORINE (ppm)	HYDROGEN CARBONATE (ppm)	LITHIUM (ppm)	MAGNESIUM (ppm)	POTASSIUM (ppm)	SODIUM (ppm)	SILICATE (ppm) calc	SULFATE (ppm)	STRONTIUM (ppm)	TOTAL DISSOLVED SOLVENTS (ppm)	CATION SUM	ANION SUM
Apache Spring	4/03/96	0.005	0.01	10.9	7.72	0.04	69.0	<0.01	4.86	4.75	9.77	56.07	5.93	0.10	171.1	1.532	1.438
Cold Spring west cal	6/1/80	0.73	0.06	12	1.9	0.25	53.7	0.03	1.5	3	8	30.00	5.5	0.06	NC	NC	NC
Frijoles Spring #49	5/22/91	<0.01	<0.02	8	14	0.03	39	<0.01	2.98	2.9	6.8	17.00	3.65	0.09	NC	NC	NC
Frijoles Spring #50	5/22/91	<0.01	<0.02	7.9	6.11	0.04	53.6	<0.01	3.71	2.5	7.2	25.00	2.66	0.07	NC	NC	NC
Pine Spring	5/24/91	<0.01	<0.02	10.7	1.47	0.08	61	<0.01	3.55	3.6	6.4	25.00	7.7	0.08	NC	NC	NC
Pine Spring	3/26/95	0.02	<0.4	11	<5	<0.5	NA	0.01	3.6	3	5.1	NC	6.6	0.09	NC	NC	NC
Pine Spring	10/16/95	<0.1	NA	10	2	<0.2	49	<0.01	3	3	6	NC	<10	0.07	NC	NC	NC
Seven Springs	10/1/79	<0.003	NA	12.3	3.6	0.21	49	0.018	1.54	2.1	7.23	41.00	8.7	0.071	NC	NC	NC
Seven Springs	5/1/83	NA	0.27	11	1.9	0.25	53.7	0.05	1.4	4	8	30.00	5.9	0.05	NC	NC	NC
Seven Springs	5/10/91	<0.02	<0.02	12.9	1.22	0.16	61	<0.01	1.71	2.4	6.3	31.00	3.65	0.06	NC	NC	NC
Seven Springs	4/3/96	0.013	<0.01	12.5	1.65	0.12	59.5	<0.01	1.63	2.13	7.26	31.03	4.03	0.06	121.5	1.143	1.137
Unnamed Cold	7/1/80	<0.01	<0.2	10.6	7.1	0.3	75	0.024	3.4	3.1	9.4	65.00	3.4	0.049	NC	NC	NC
Unnamed Cold	7/1/80	<0.01	<0.2	10.4	7.5	0.35	73	0.024	3.4	3.2	9	69.00	2.4	0.051	NC	NC	NC
Unnamed Spring	5/28/91	<0.01	<0.02	9.1	1.34	0.14	56.1	<0.01	2.44	4.6	7	21.00	5.73	0.05	NC	NC	NC
Unnamed Spring	9/10/93	<0.05	0.02	11.4	4.38	0.34	80.8	0.03	2.9	2.49	16.2	60.10	4.04	0.1	NC	NC	NC
Water Canyon Gallery	8/1/78	<0.05	NA	7	NA	0.12	52	0.02	3.3	1.4	5.8	43.00	NA	0.05	NC	NC	NC
Water Canyon Gallery	8/18/92	<0.05	<0.02	7.2	0.64	0.05	52.8	<0.01	3.05	1.72	6.3	43.70	1.05	0.07	NC	NC	NC
Water Canyon Gallery	5/20/93	<0.01	0.01	6.94	0.69	0.06	44.6	0.01	2.79	1.79	4.9	39.80	2.65	0.07	NC	NC	NC
Water Canyon Gallery	4/03/96	0.004	<0.01	6.18	0.77	0.03	43.9	0.02	3.15	1.75	5.99	44.30	1.20	0.05	113.6	0.900	0.865

*NC = Not calculated.

*NA = Not analyzed.

TABLE 3.2 MINOR ELEMENTS OF BACKGROUND SPRINGS

DESCRIPTION	DATE	SILVER (ppm)	ALUMINUM (ppm)	ARSENIC (ppm)	BARIUM (ppm)	CADMIUM (ppm)	COBALT (ppm)	CHROMIUM (ppm)	CESIUM (ppm)	COPPER (ppm)	IRON (ppm)	MERCURY (ppm)	IODINE (ppm)	MANGANESE (ppm)	MOLYBDENUM (ppm)	AMMONIUM (ppm)	NICKEL (ppm)	NITRITE (ppm)	NITRATE (ppm)	LEAD (ppm)	PHOSPHATE (ppm)	RUBIDIUM (ppm)	ANTIMONY (ppm)	SELENIUM (ppm)	THIOSULFATE (ppm)	ZINC (ppm)
Apache Spring	4/23/96	<0.0002	0.29	<0.002	0.07	<0.002	<0.002	<0.002	<0.002	<0.002	0.13	<0.0002	<0.01	<0.01	<0.002	0.04	<0.002	0.02	0.33	<0.002	0.07	0.010	<0.0001	<0.0001	<0.01	<0.01
Cold Spring west cat	6/1/80	NA	NA	NA	0.02	0.003	NA	NA	NA	NA	0.2	NA	NA	NA	NA	NA	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA
Frijoles Spring #49	5/22/91	<0.001	1	<0.05	0.06	<0.001	<0.002	<0.002	<0.005	0.003	2.12	<0.1	<0.01	<0.02	<0.002	0.09	<0.002	<0.02	0.3	<0.002	<0.05	0.006	<0.05	<0.1	NA	<0.01
Frijoles Spring #50	5/22/91	<0.001	0.5	<0.05	0.03	<0.001	<0.002	<0.002	<0.005	0.003	1.08	<0.1	<0.01	<0.02	<0.002	0.08	<0.002	<0.02	0.71	<0.002	0.11	0.007	<0.05	<0.1	NA	0.02
Pine Spring	5/24/91	<0.003	1.4	<0.05	0.05	<0.001	<0.002	0.004	0.006	0.004	6.17	<0.1	<0.01	<0.02	<0.002	0.26	<0.002	<0.02	0.54	0.003	<0.05	0.007	<0.05	<0.1	NA	0.07
Pine Spring	3/25/95	<0.01	1	<0.005	0.1	<0.005	<0.01	<0.01	NA	<0.01	0.5	<0.0002	NA	<0.01	<0.01	NA	<0.02	NA	0.7	<0.003	NA	NA	<0.05	<0.005	NA	<0.02
Pine Spring	10/15/95	<0.01	<0.2	<0.01	<0.1	<0.005	<0.01	<0.01	NA	<0.01	<0.1	<0.0002	NA	<0.01	<0.01	NA	<0.02	NA	0.1	<0.003	NA	NA	<0.02	<0.005	NA	<0.02
Seven Springs	10/1/79	<0.03	0.2	NA	0.036	<0.03	<0.06	0.001	NA	<0.04	0.036	NA	NA	0.001	0.001	NA	<0.05	NA	NA	<0.14	NA	NA	NA	NA	NA	<0.01
Seven Springs	5/1/83	NA	0.2	NA	0.02	0.003	NA	NA	NA	NA	0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Seven Springs	5/10/91	<0.001	<0.1	<0.05	0.01	<0.001	<0.002	0.011	<0.005	<0.002	0.52	<0.1	<0.01	<0.02	<0.002	0.04	<0.002	<0.02	0.47	<0.002	<0.05	0.02	<0.1	<0.1	NA	0.01
Seven Springs	4/3/96	<0.0002	0.12	0.0004	0.02	<0.0002	<0.002	<0.002	<0.002	0.002	0.02	<0.0002	<0.01	<0.01	<0.002	0.06	<0.002	<0.01	0.16	<0.002	<0.05	0.013	<0.0001	0.0003	<0.01	0.01
Unnamed Cold	7/1/80	<0.03	NA	NA	0.018	<0.001	<0.001	<0.001	NA	<0.001	0.15	NA	NA	0.002	<0.002	NA	<0.002	NA	<0.2	<0.004	<0.2	NA	NA	NA	NA	0.024
Unnamed Cold	7/1/80	<0.03	NA	NA	0.022	<0.001	<0.001	0.004	NA	<0.001	0.13	NA	NA	0.135	<0.002	NA	<0.002	NA	0.7	<0.004	<0.2	NA	NA	NA	NA	0.008
Unnamed Spring	5/28/91	<0.001	3.8	<0.05	0.08	0.001	<0.002	0.004	0.007	0.007	13.6	<0.1	<0.01	<0.02	<0.002	0.38	<0.002	<0.02	0.09	0.005	<0.05	0.01	<0.05	<0.1	NA	0.06
Unnamed Spring	9/10/93	<0.0006	0.8	0.006	0.03	<0.0002	<0.002	0.003	<0.002	0.008	0.44	<0.0002	<0.01	<0.01	<0.002	0.16	<0.002	<0.01	1.62	0.002	<0.02	0.007	<0.002	<0.002	NA	0.1
Water Canyon Gallery	8/1/78	<0.03	NA	NA	<0.12	<0.03	<0.06	<0.03	NA	<0.04	<0.04	NA	NA	<0.02	<0.1	NA	<0.05	NA	NA	<0.14	NA	NA	NA	NA	NA	<0.01
Water Canyon Gallery	8/13/92	<0.001	<0.1	<0.05	0.01	<0.001	<0.002	0.003	<0.002	<0.002	<0.01	0	<0.02	<0.01	0.003	<0.05	<0.002	<0.02	0.48	0.004	<0.05	0.004	<0.1	0	NA	0.02
Water Canyon Gallery	5/20/93	<0.001	0.2	<0.05	0.02	0.001	<0.002	<0.002	<0.002	0.002	0.05	0	<0.01	<0.01	<0.002	<0.02	<0.002	<0.01	0.98	0.005	0.07	0.006	<0.1	0	NA	0.05
Water Canyon Gallery	4/3/96	<0.0002	0.15	0.0004	0.01	<0.0002	<0.002	<0.002	<0.002	<0.002	0.05	<0.0002	<0.01	<0.01	<0.002	0.06	<0.002	0.02	0.91	<0.002	<0.05	0.006	<0.0001	<0.0001	<0.01	<0.01

NA = Not analyzed

TABLE J-3 HIGH EXPLOSIVES IN BACKGROUND SPRINGS

DESCRIPTION	DATE	HMX (ppm)	NQ (ppm)	PETN (ppm)	RDX (ppm)	TNT (ppm)
SAL[a]	N/A[b]	1.8	3.7	0.7	6E-04	0.0022
Apache Spring	4/03/96	<0.02	<0.01	<0.05	<0.01	<0.01
Cold Spring west cal	6/1/80	NA[c]	NA	NA	NA	NA
Frijoles Spring #49	5/22/91	NA	NA	NA	NA	NA
Frijoles Spring #50	5/22/91	NA	NA	NA	NA	NA
Pine Spring	5/24/91	NA	NA	NA	NA	NA
Pine Spring	3/26/95	NA	NA	NA	NA	NA
Pine Spring	10/16/95	NA	NA	NA	NA	NA
Seven Springs	10/1/79	NA	NA	NA	NA	NA
Seven Springs	5/1/83	NA	NA	NA	NA	NA
Seven Springs	5/10/91	NA	NA	NA	NA	NA
Seven Springs	4/3/96	<0.02	<0.01	<0.05	<0.01	<0.01
Unnamed Cold	7/1/80	NA	NA	NA	NA	NA
Unnamed Cold	7/1/80	NA	NA	NA	NA	NA
Unnamed Spring	5/28/91	NA	NA	NA	NA	NA
Unnamed Spring	9/10/93	NA	NA	NA	NA	NA
Water Canyon Gallery	8/1/78	NA	NA	NA	NA	NA
Water Canyon Gallery	8/18/92	NA	NA	NA	NA	NA
Water Canyon Gallery	5/20/93	NA	NA	NA	NA	NA
Water Canyon Gallery	4/03/96	<0.02	<0.01	<0.05	<0.01	<0.01

[a]SAL=Screening action level.

[b]N/A= Not applicable.

[c]NA=Not analyzed.

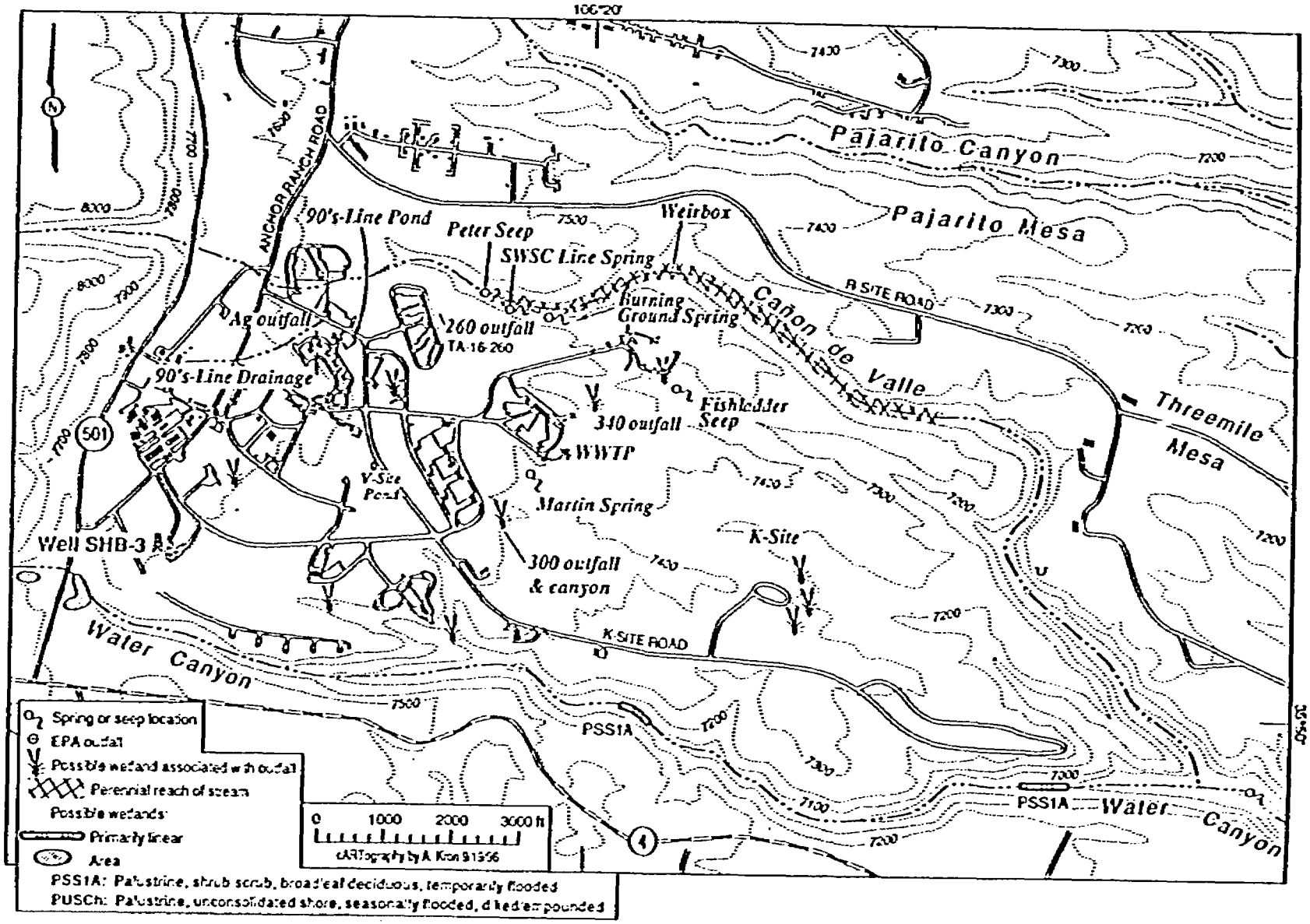

Fig. C-1. Spring, surface water and assorted sampling locations.

Attachment P

DESCRIPTION	DATE	BARIUM (ppm)	MANGANESE (ppm)	RDX (ppm)
MCL[a]	N/A[b]	2	0.05	NC[c]
SAL[d]	N/A	1	1.7	0.00061
Apache Spring	4/03/96	0.07	<0.01	<0.01
Cold Spring west cal	6/1/80	0.02	NA[e]	NA
Frijoles Spring #49	5/22/91	0.06	<0.02	NA
Frijoles Spring #50	5/22/91	0.03	<0.02	NA
Pine Spring	5/24/91	0.05	<0.02	NA
Pine Spring	3/26/95	0.1	<0.01	NA
Pine Spring	10/16/95	<0.1	<0.01	NA
Seven Springs	10/1/79	0.036	0.001	NA
Seven Springs	5/1/83	0.02	NA	NA
Seven Springs	5/10/91	0.01	<0.02	NA
Seven Springs	4/3/96	0.02	<0.01	<0.01
Unnamed Cold	7/1/80	0.016	0.002	NA
Unnamed Cold	7/1/80	0.022	0.135	NA
Unnamed Spring	5/28/91	0.08	<0.02	NA
Unnamed Spring	9/10/93	0.03	<0.01	NA
Water Canyon Gallery	8/1/78	<0.12	<0.02	NA
Water Canyon Gallery	8/18/92	0.01	<0.01	NA
Water Canyon Gallery	5/20/93	0.02	<0.01	NA
Water Canyon Gallery	4/03/96	0.01	<0.01	<0.01

[a]MCL=US EPA maximum contaminant levels (drinking water standards)

[b]N/A=Not applicable

[c]NC=Not calculated

[c]SAL=Screening action level

[d]NA=Not analyzed

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous & Radioactive Materials Bureau
2044 Galisteo
P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-1557
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GARY E. JOHNSON
GOVERNOR

MARK E. WEIDLER
SECRETARY

EDGAR T. THORNTON, III
DEPUTY SECRETARY

Julie

John McCann
response

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

January 20, 1998

Mr. Theodore Taylor, Project Manager
Los Alamos Area Office
Department of Energy
528 35th Street
Los Alamos, New Mexico 87544

Mr. John Browne, Director
Los Alamos National Laboratory
P. O. Box 1663, MS A100
Los Alamos, New Mexico 87545

RE: **Approval upon Modification**
16-003(k) & 16-021(c)
RCRA Facility Investigation Report (EM/ER:96-502) and
Response to Supplemental Information (EM/ER:97-476)
Los Alamos National Laboratory
NM0890010515

Dear Messrs. Taylor and Browne:

The Hazardous and Radioactive Materials Bureau (HRMB) of the New Mexico Environment Department conditionally approves the 16-003(k) and 16-021(c) RCRA Facility Investigation Report (dated September 23, 1996 and referenced by LA-UR-96-3191) and the Response to the Request for Supplemental Information (referenced by EM/ER:97-476) upon modification as detailed in Attachment A.

Within the above-referenced document, the Department of Energy/Los Alamos National Laboratory (DOE/LANL) references the "LANL 30-Year Plan." HRMB requests that this document be submitted under separate cover within 30 calendar days of the date of this letter.

DOE/LANL must submit to HRMB clean insertable replacement pages incorporating the modifications detailed in Attachment A within thirty (30) calendar days of the date of this letter. Upon receipt, HRMB will review the replacement pages with the intent to finalize the document's approval and shall provide DOE/LANL with this approval

4/20
Due Feb 19

documentation. However, should DOE/LANL fail to provide the replacement pages within the required time limit, HRMB will deny the aforementioned document.

Should you have any questions regarding this letter, please contact me or Mr. John Kieling, HRMB's LANL Facility Manager, at (505) 827-1558.

Sincerely,

Benito J. Garcia, Chief
Hazardous and Radioactive Materials Bureau

BJG:kth

cc: T. Baca, LANL EM, MS J591
J. Canepa, LANL EM/ER, MS M992
R. Dinwiddie, NMED RPMP
T. Glatzmaier, LANL DDEES/ER, MS M992
K. Hill, NMED HRMB
M. Johansen, DOE LAAO, MS A316
J. Kieling, NMED HRMB
M. Leavitt, NMED GWQB
H. LeDoux, DOE LAAO, MS A316
D. McInroy, LANL EM/ER, MS M992
D. Neleigh, EPA, 6PD-N
J. Parker, NMED DOE OB
G. Saums, NMED SWQB
J. Vozella, DOE LAAO, MS A316
S. Yanicak, NMED DOE OB, MS J993
File: HSWA LANL 3/1082/16/16-003(k) & 16-021(c)
Track: LANL, Doc date, NA, DOE/LANL, NMED HRMB/Garcia, RE, File

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1998 JAN 26 PM 3:14

ATTACHMENT A

Approval with Modifications.
RCRA Facility Investigation Report
16-003(k) & 16-021(c)

MODIFICATIONS TO THE REQUEST FOR SUPPLEMENTAL INFORMATION AND DOE/LANL'S RESPONSE:

8. ***LANL's Response:*** *The reference to McCann et al, 1996 (1300) is no longer valid. The document referenced here, "Screening Assessment Methodology" was an ER Policy Paper under development at the time the 260 Outfall RFI Report was in preparation. This policy paper was never finalized or released as official ER Policy.*

The appropriate reference for the ER Screening methodology is "Risk-Based Corrective Action Process (Dames 1997, 1297)." This reference is cited in the latest version of the RFI Report Framework, Section 3.2.4 Risk Based Screening Assessment, page 13; and is included in recent version of LANL RFI Reports.

Attachment H includes the pertinent sections of the document.

HRMB Modification: DOE/LANL shall revise this section to include the fact that the *Risk-Based Corrective Action Process* which is referenced in the *RFI Report Framework* requires approval by the Administrative Authority and has not, to date, received said approval.

10b. ***LANL's Response:*** *44 laboratory samples were collected for PRSs 16-003(k) and 16-021(c). Three laboratory field duplicates were collected. This is a rate of 6.8%. At the time of the 1996 TA-16 field campaign, LANL QA documents suggested taking field duplicates at a rate of 5%. The approved RFI work plan stipulated 1 out of 14 (duplicates were not addressed in the NOD) duplicates at PRS 16-003(k) and 16-021(c), which were considered together in one SAP - a rate of 7.1%...*

How are we supposed to modify your document?

HRMB Comment: HRMB does not agree with the rate at which field duplicates are obtained. HRMB is in the process of reviewing and providing DOE/LANL comments on its Standard Operating Procedures which govern this QA/QC policy.

17. ***LANL's Response:*** *...This decision is based on the fact that Building TA-16-260 is an active HE machining facility, that will remain an industrial land use according to the LANL 30-Year Plan...*

HRMB Modification: DOE/LANL must properly cite the *LANL 30-Year Plan* and provide the pertinent portions of it as supporting documentation for this RFI Report.

ADDITIONAL MODIFICATIONS: DOE/LANL must revise its evaluation of the risk to human health (Sections 5.x.7) based on the following methodology:

The screening assessment should compare the maximum concentration or activity of each contaminant at the site to a screening action level (SAL), which is a risk-based concentration calculated using a conservative target risk (use EPA Region 6 Human Health Media-Specific Screening Levels).

SALs for carcinogens are calculated based on the lower end of 1E-04 to 1E-06 "risk range" to account for multiple carcinogenic contaminants. SALs for non-carcinogens do not account for chemical mixtures. Therefore, if more than one non-carcinogen is expected at the site, then the non-carcinogenic chemical SAL should be divided by 10. Contaminants can be screened out or eliminated from further evaluation as contaminants of potential concern (COPCs) if maximum detected concentrations or activities of contaminants, in a given medium, are below 1E-06 cancer risk SAL or below 0.1 hazard quotient SAL. Remaining contaminants should be carried through a risk assessment.

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U. S. Department of Energy
Los Alamos Area Office
Environmental Restoration Program
Los Alamos, New Mexico 87544
505-667-7203/FAX 505-665-4504

Date: February 26, 1998
Refer to: EM/ER:98-056

Mr. Benito Garcia
NMED-HRMB
P.O. Box 26110
Santa Fe, NM 87502

SUBJECT: RESPONSE TO REQUEST FOR MODIFICATIONS OF RFI REPORT FOR TA-16, PRSs 16-003(k) AND 16-021(c) (FORMER OU 1082)

Dear Mr. Garcia:

Enclosed please find the Los Alamos National Laboratory's modifications to the Resource Conservation and Recovery Act Facility Investigation (RFI) Report and subsequent Response to the Request for Supplemental Information for Potential Release Sites 16-003(k) and 16-021(c). These modifications have been completed according to the requests outlined in Attachment A of your letter dated January 20, 1998, with one exception. This exception involves the final request for modification pertaining to the human health screening methodology. In this request, your Bureau indicated that the Environmental Protection Agency (EPA), Region 6 Human Health Media-Specific Screening Levels be used. Based on recent meetings with personnel from your Bureau, it was decided that the Laboratory will continue to use EPA, Region 9, Media-Specific Screening Levels until Region 6 has updated their screening levels and published them. The requested modifications to these documents are submitted as insertable replacement pages for insertion to the original documents.

As also requested in your January 20 letter, the Laboratory has submitted a copy of the most recent Site Development Plan for Los Alamos National Laboratory. This document sets forth the "30-Year Plan" for land use at the Laboratory (LANL 1995. "Site Development Plan, Annual Update 1995," Los Alamos National Laboratory Publication LALP-95-113, Los Alamos, New Mexico. (LANL 1995, ER ID Number 52976)). This document was hand delivered to your office on Monday, February 23, 1998.

Should you have any questions, please contact Roy Michelotti at (505) 665-7444 or Joe Mose at (505) 667-5808.

Sincerely,

Julie A. Canepa, Program Manager
LANL/ER Project

Sincerely,

Theodore J. Taylor, Program Manager
DOE/LAAO

JC/TT/rfr

An Equal Opportunity Employer/Operated by the University of California

Enclosures (1) Replacement pages for insertion into the LANL Response to Request for Supplemental Information (EM/ER:97-475)
(2) Replacement pages for insertion into RFI Report (EM/ER:96-502)

Cy (w/ encs.):
D. Griswold, AL-ERD, MS A906
J. Harry, EES-5, MS M992
R. Michelotti, CST-7, MS E525
J. Mose, LAAO, MS A316
D. Neleigh, EPA, R.6, 6PD-N
C. Rodriguez, CIO/ER, MS M769
T. Taylor, LAAO, MS A316
S. Dinwiddie, NMED-HRMB
M. Leavitt, NMED-GWQB
J. Parker, NMED-OB
G. Saums, NMED-SWQB
J. White, ESH-19, MS K490
S. Yanicak, NMED-AIP, MS J993
EM/ER File, MS M992
RPF, MS M707

Information Copy
T. Baca, EM, MS J591
T. George, EM/ER, MS M992
J. Plum, LAAO, MS A316
S. Rae, ESH-18, MS K497
G. Rael, AL-ERD, MS A906
J. Vozella, LAAO, MS A316

ATTACHMENT 1

Replacement pages for insertion into the LANL Response to Request for Supplemental Information

February 26, 1998

Note: Pagination of the original response has been affected by these modifications. Therefore, the full document has been submitted here. Modifications were made to comment number 8, page 3; comment number 10b, page 4; and comment number 17, pages 6–7.

Response to Request for
Supplemental Information for
PRSs 16-021(c) and 16-003(k)

General Addenda and Corrections

1) As requested in the cover letter to this request for supplemental information, LANL will continue to provide HRMB with bi-monthly briefings on the status of the investigations of PRS 16-021(c). LANL will provide more formal written documentation of materials presented in these briefings upon request of HRMB.

2) LANL would like to note that the water SALs discussed in this document, particularly in Appendix C, primarily represent drinking water MCLs. LANL currently compares analytical concentrations to water criteria appropriate for the most likely water use (e.g. wildlife use) rather than comparing to human health levels.

3) The tritium unit values in Table C-6 should all be positive rather than negative.

4) As requested by HRMB in a telecon of September 9, 1997, LANL has identified within this response programmatic issues that have arisen while preparing this request for supplemental information.

NMED Comment 1.a. Section 1.3.2 Pertinent sections of the quality assurance/quality control plan for FY 95 TA-16 field campaign should be provided for reference.

LANL response The pertinent sections of the quality assurance/quality control plan for the FY 95 TA-16 field campaign are provided as Attachment A. Please note that this plan was written by the ICF Kaiser field team for their own use. It has not been edited by a professional editor.

NMED Comment 1.b. Section 1.3.2 LANL should include in the text the frequency at which both field and laboratory QA/QC samples were obtained

LANL response Field QA/QC samples (field duplicates) were collected at a rate of 3 out of 34 laboratory samples at PRS 16-021(c) and 0 out of 10 laboratory samples at 16-003(k) for a total of 3 out of 44 for the two PRSs. Laboratory QA/QC samples such as batch-specific QC samples (blank, matrix spike, duplicates) were obtained at a rate commensurate with LANL Environmental Restoration (ER) laboratory contracts. These contracts are based either on requirements contained in the EPA SW-846 Laboratory (CLP) SOW or guidance provided in the EPA SW-846 procedures. This rate is typically a frequency of one QC sample for each instrumental method, each sample matrix, and/or each analytical batch, whichever is more frequent. Inorganic and radiochemical methods also require the analysis of a laboratory control sample with each analytical batch. Additional non-batch QC requirements for individual instrumental techniques vary widely and cannot be easily or briefly summarized in reports.

NMED Comment 1. c. Section 1.3.2 LANL should add the locations of the QA samples to Figures 5.1.4-1 and 5.2.4-1.

LANL response Locations of the field QA samples, the duplicate samples, have been added to Figure 5.2.4-1 for PRS 16-021(c). No field QA samples were taken at PRS 16-003(k), so figure 5.1.4-1 was not modified. The modified figure 5.2.4-1 is included as Attachment B.

NMED Comment 2. Section 2.3: LANL should replace all references to the "main" aquifer with "regional aquifer".

LANL response On page 9 paragraph 2 the phrase "main" aquifer will be replaced with "regional" aquifer.

NMED Comment 3. Section 2.3.1: LANL should include a figure indicating the barium and boron levels as indicated in the second to last paragraph of this section.

LANL response LANL has included as Attachment C a figure indicating the locations of the barium and boron levels as indicated in the second to last paragraph of this section.

NMED Comment 4.a. LANL should explain any possible relationship between constituents identified in SHB-3 to site-related activities. And if any possible relationship exists, LANL should provide rationale for advancing boreholes to a depth less than the static water level in SHB-3. RPMP is concerned that constituents found in SHB-3 might be related to HE-related activities and that contaminants may be present in the regional aquifer since it has not been definitely constrained.

LANL response LANL believes that a definitive relationship between constituents identified in SHB-3 and site-related activities cannot be made at this time. The following reasoning suggests that such a relationship is unlikely: (1)The constituents lead, phosphate, rubidium, and ammonium have not been extensively used in HE-related activities at TA-16. (2) These constituents are not found at elevated levels in the HE-contaminated springs at TA-16, which suggests that these constituents are not significant HE by-products in water samples known to be HE-contaminated. (3) The levels of these constituents found are low, and may not represent contamination of SHB-3 waters. The background dataset used in these comparisons was small, and based on springs/seeps. These spring/seep data may not be representative of perched/deep groundwater such as that found in SHB-3. Further investigation of this issue will occur when an improved background dataset for groundwater is available.

Although LANL does not believe that a definitive relationship between the observed constituents in SHB-3 and site activities has been proved at this time, LANL is also concerned that constituents from site-related activities could be reaching the perched/regional water table that is present in SHB-3. LANL's rationale for advancing boreholes to a depth less than the static water level in SHB-3 is that our investigations are phased. Moderate-depth (200 ft) boreholes are planned in this RFI Report to investigate shallow perched groundwaters, which discharge as springs at TA-16. Results of these investigations will be used to help locate future, deeper boreholes that intersect the static-water table present in SHB-3. LANL currently has deep boreholes at TA-16 planned in its baseline in future fiscal years (FY 99 and FY 00). In addition, 4 sitewide hydrogeologic studies boreholes to the regional aquifer are planned in and around TA-16 during the next few years; these boreholes will provide additional information on potential TA-16 impacts to the regional aquifer.

NMED comment 4.b. LANL should also clarify if the ground water interval encountered in SHB-3 will also be intercepted during drilling activities as discussed within this document.

LANL response LANL does not believe that the ground water interval encountered at SHB-3, which was at a static water depth of 664 ft during 1992, will be intersected by the 200 ft boreholes that are discussed in this document. As noted in the response to comment 4.a. LANL anticipates drilling boreholes to depths greater than 700 ft during FY 1999 and FY 2000.

NMED comment 4.c. Please present the data, sampling dates, sampling intervals, etc. for SHB-3 and the background spring data to which it was compared.

LANL response Pertinent data are present in Attachment D. SHB-3 data were originally reported by Blake et al (Blake et al. 1995, 1335). Background data were also extracted from the Blake et al. (Blake et al., 1995, 1335) document. LANL recognizes that this background dataset is small, but it was the best available dataset at the time of these comparisons. LANL hopes to repeat these comparisons with larger sample and background datasets in the future.

NMED comment 4.d. Please clarify what is meant by "swab" sample

LANL response A swab sample is merely a water sample that is taken with a device known as a swab sampler. A swab sampler is rod that has rubber cups of slightly larger diameter than the well bore that is deployed on the end of the drillstring. These cups open up during deployment downhole. When the sampler pulls up on the wireline the water samples are trapped and raised to the surface.

NMED comment 5.a. Please define the acronym TATB

LANL response TATB is triaminotrinitrobenzene, an insensitive and highly insoluble HE used in many modern weapon systems.

NMED comment 5.b. Please provide the analytical methods, detection limits, summary of QA/QC documentation for the analyses conducted.

LANL response Attachment E provides the analytical methods, detection limits and summary of QA/QC documentation for the analyses conducted.

NMED comment 6. Section 3.1.2 LANL should provide the pertinent portions of the *Technical Approach to the RFI Report* as reference documentation for this report

LANL response The reference to Knudsen et al. 1996 in Section 3.1.2 Data Verification and Validation is no longer valid. The document referenced here, "Technical Approach to the RFI Report" was an ER Policy Paper under development at the time the 260 Outfall RFI Report was in preparation. This policy paper was never finalized or released as official ER Policy.

The appropriate reference for the ER baseline data validation protocol is now the Quality Assurance Project Plan (QAPP), LANL 1996 (ER Master Reference List No. 1292). This reference is cited in the latest version of the RFI Report Framework, Section 3.1.2 Data Validation, page 10; and is cited in recent versions of LANL RFI Reports.

Attachment F provides the pertinent portions of the QAPP.

NMED comment 7. Section 3.3 LANL should include a compilation of all analytical data, including non-detectable concentrations, in Appendix A of the RFI Report.

LANL response Attachment G (2 EXCEL disks per telecon between T. Glatzmaier and J. Kieling on 10/22/97) provides a compilation of all analytical data, including non-detectable concentrations. This attachment will be included as part of Appendix A.

Provision of all data represents a programmatic issue, which may be addressed in future programmatic discussions.

NMED comment 8. Section 3.4.2 LANL should provide as reference materials attached to this document, the pertinent sections of the *Screening Assessment Methodology* (McCann et al.)

LANL response The reference to McCann et al. 1996 [illegible] is no longer valid. The document referenced here, "Screening Assessment Methodology" was an ER Policy Paper under development at the time the 260 Outfall RFI Report was in preparation. This policy paper was never finalized or released as official ER Policy.

The appropriate reference for the ER screening methodology is "Risk-Based Corrective Action Process" (Dorries 1997, 1297). This reference is cited in the latest version of the RFI report framework, subsection 3.2.4 "Risk-Based Screening Assessment," page 13, and is included in recent versions of LANL RFI reports. It should be noted that HRMB has stated in its January 20, 1998, Approval Upon Modification letter that the [illegible] and that LANL has not, to date, received this approval. Future meetings should be held between HRMB and LANL to discuss which documents are appropriate for approval by the Administrative Authority.

Attachment H includes the pertinent sections of the document

NMED comment 9. Section 3.4.3. LANL should provide in the text of this section further explanation why site-specific human health risk assessments were not performed for 16-003(k) and 16-021(c).

LANL response No site-specific human health risk assessments were performed in this Phase I Report because of the uncertainties in conceptual model development and lacks in data collection to perform a risk assessment at this point and time of the 260 Outfall project. The Phase II Sampling and Analysis Plan presented in Section 5.2.11 of the RFI Report details the plan to collect the data necessary to validate a conceptual model for the site and perform risk assessment evaluations. Therefore, human health risk assessments will be performed in latter stages of the RFI/CMS process for this site.

NMED comment 10a. Section 4.0 LANL should ensure that all QA/QC results reported by the laboratory are present and correct in FIMAD and reported within this document.

LANL response Per discussion in a telecon with Kim Hill (EPA and HRMB) that occurred on September 9, 1997 LANL will provide information on: (1) how LANL handles the QA/QC results in FIMAD; (2) why we handle these data in this way; and (3) indicate where this process is going.

(1) Analytical results for batch-specific QC samples are included in FIMAD. Non batch-specific QC indicators that are measured by the analytical laboratories are not currently reported electronically. Not all of the electronically available data are currently being verified. LANL's current policy is to verify all field data and some (but not all) of the batch QC results by comparing electronic data with hard copy reports. (2) LANL handles batch QC data in this fashion because data verification is an extremely labor intensive process. LANL's current contracts with the analytical laboratories do not require that electronic deliverable are 100% in agreement with hard copy deliverables. Non- batch QC indicators are not hand entered into FIMAD because most would not fit into the current FIMAD formats. (3) These deficiencies will be remedied in upcoming contracts. In addition, the DOE Environmental Management Electronic Data Deliverable Master Specifications (DEEMS), which will guide LANLs new electronic deliverable, will make more of these indicators available electronically.

LANL believes that efficient and effective QA oversight and data validation processes are more critical to the maintenance of data integrity than the capture of all QA/QC information in FIMAD. Currently all LANL data receive at least baseline validation. Data validators have access to all of the QA/QC indicators reported by the analytical laboratories, whether or not they are in FIMAD. Where these indicators demonstrate that the laboratory process may have been out of control, this is indicated to the data user both in the validation reports and in the data validation flags that are recorded in FIMAD.

NMED comment 10b. Section 4.0 LANL should collect field duplicates at a minimum rate of 10%.

LANL response 44 laboratory samples were collected for PRSs 16-003(k) and 16-021(c). Three laboratory field duplicates were collected. This is a rate of 6.8%. At the time of the 1995 TA-16 field campaign, LANL QA documents suggested taking field duplicates at a rate of 5%. The approved RFI work plan stipulated 1 out of 14 (duplicates were not addressed in the NOD) duplicates at PRSs 16-021(c) and 16-003(k), which were considered together in one SAP—a rate of 7.1%.

It should be noted that HRMB has stated in its January 20, 1998, Approval Upon Modification letter that it does not agree with the rate at which field duplicates are obtained. HRMB has also stated that it is in the process of reviewing and providing DOE LANL comments on its Standard Operating Procedures that govern this QA/QC policy.

This represents a programmatic issue, one which may be addressed in future programmatic discussions.

NMED comment 11. Section 4.3 LANL should clarify at each mentioning that "Table B-2" is located within Appendix B.

LANL response LANL will convert each citation of "Table B-2" to "Table B-2, Appendix B

NMED comment 12. Section 5.0 For additional clarification, LANL could include a figure which references the analytical data (Appendix A - see Comment 7) and indicates the locations where contaminant concentrations were below SALs.

LANL response: Per discussion in a telecon with Kim Hill (EPA and HRMB) that occurred on September 9, 1997 1) LANL notes that the requested information is available on existing figures (e.g. Figure 5.2.4-1); 2) LANL will note in section 5.0 that analytical suites and data are available in Appendix A.

NMED comment 13. Section 5.1.3 Please include the adjective "sump" in the titles of Tables 5.1.3-1, 2 and 3

LANL response LANL will replace "water" with "sump water" in the titles of Table 5.1.3-1, 5.1.3-2, 5.1.3-3.

NMED comment 14.a. Section 5.1.4 LANL should include pertinent information such as a tabulated summary of Photo Ionization Detector/Flame Ionization Detector (PID/FID) readings, HE spot test and sodium iodide results in the RFI report.

LANL response Pertinent field information such as a tabulated summary of PID/FID readings, HE spot test, and sodium iodide detector results is provided in Attachment I, which is extracted from the Post Field Ops Report for the FY 95 TA-16 field campaign.

NMED comment 14.b. Section 5.1.4 Please provide an explanation of "Request Numbers" within the text of the RFI report.

LANL response LANL will add the following footnote to Tables 5.1.4-2 and 5.2.4-1: "All samples with the same request number were analyzed together in a single batch at an analytical laboratory"

NMED comment 14.c. Section 5.1.4 LANL should provide well construction diagrams for those boreholes and wells installed.

LANL response Well construction drawings are provided as Attachment J. These well construction drawing s represent typical alluvial and deep wells that are being implemented as part of the TA-16-260 field campaign. Well construction is guided by LANL-ER-SOP 5.01 "Monitor Well Construction".

NMED comment 15 Section 5.1.6 LANL should detail which SVOC compounds were undetected in sample 031-95-0051 and reference a figure indicating the sample's location.

LANL response The list of undetected SVOCs is provided in Table 15-1

Table 15-1 - Semivolatile Organic Compound (SVOC) Suite

Acenaphthene	Chrysene	
Acenaphthylene	Dibenzo(a,h)anthracene	Isophorone
Aniline	Dibenzofuran	2-Methylphenol
Anthracene	1,2-Dichlorobenzene	4-Methylphenol
Azobenzene	1,3-Dichlorobenzene	Naphthalene
Benzo(a)anthracene	1,4-Dichlorobenzene	2-Nitroaniline
Benzo(b)fluoranthene	3,3'-Dichlorobenzidine	3-Nitroaniline
Benzo(k)fluoranthene	2,4-Dichlorophenol	4-Nitroaniline

Benzo(g,h,i)perylene	Diethylphthalate	Nitrobenzene
Benzo(a)pyrene	Dimethylphthalate	2-Nitrophenol
Benzoic acid	Di-n-butylphthalate	4-Nitrophenol
Benzyl alcohol	Di-n-octylphthalate	N-Nitrosodimethylamine
Bis(2-chloroethoxy)methane	2,4-Dimethylphenol	N-Nitrosodiphenylamine
Bis(2-chloroethyl)ether	2,4-Dinitrophenol	N-Nitroso-di-n-propylamine
Bis(2-chloroisopropyl)ether	4,6-Dinitro-2-methylphenol	Pentachlorophenol
Bis(2-ethylhexyl)phthalate	2,4-Dinitrotoluene	Phenanthrene
4-Bromophenylphenyl ether	2,6-Dinitrotoluene	Phenol
Butylbenzylphthalate	Fluoranthene	Pyrene
Carbazole	Fluorene	Pyridine
4-Chloroaniline	Hexachlorobenzene	1,2,4-Trichlorobenzene
4-Chloro-3-methylphenol	Hexachlorobutadiene	2,4,5-Trichlorophenol
2-Chloronaphthalene	Hexachlorocyclopentadiene	2,4,6-Trichlorophenol
2-Chlorophenol	Hexachloroethane	
4-Chlorophenylphenyl ether	Indeno(1,2,3-cd)pyrene	

Note that these analytes are tabulated in Table A-4, Appendix A.

In the second sentence of Section 5.1.6 replace "031-95-0051" with "031-95-0051 (Figure 5.1.4-1)".

NMED comment 16 Section 5.1.7 LANL should clarify if any potential radiological contaminants other than uranium exist at these PRSs.

LANL response Following the last paragraph in Section 5.1.7.1, insert the following sentences: "Interviews with several site workers suggest that the only radionuclide used in TA-16-260 was uranium. These workers suggested that: (1) HE parts that were glued to depleted uranium had occasionally been machined in TA-16-260 (Jim Griffin, personal communication 1992); and (2) other radionuclides, particularly fissile radionuclides, were kept far from HE that was being processed because of the potential safety hazards of an inadvertent detonation in the presence of radionuclides."

NMED comment 17 Section 5.1.7.1 LANL should include the evaluation of lead in the Multiple Chemical Evaluation (Table 5.1.7-1). Section 3.4 indicates that the PRSs will be evaluated assuming a residential risk scenario; the risk posed by lead to children should, therefore, be included in the evaluation.

LANL response LANL agrees that lead should be included in the MCE evaluation for this PRS. It should be noted that current LANL ER Project guidance requires lead to be included in the MCE. This guidance was not in place during FY 96 when this report was generated. The revised calculation (Table 5.1.7.1 revised - below) reflects the addition of lead to the MCE calculation. With the addition of lead, the sum of the maximum concentrations detected normalized to SALs is 1.5, indicating the potential for adverse effects due to exposure to this grouping. Therefore, those contaminants with a concentration normalized to SAL greater than 0.1 will be carried forward as COPCs. These contaminants include barium, copper, lead, nickel and TNB. The presence of these COPCs will be factored into the planning for the VCA proposed for this PRS as described in Section 5.1.10 of the RFI Report.

TABLE 5.1.7.1 Revised
MCE FOR NONCARCINOGENIC EFFECTS AT PRS 16-003(k)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Barium	2030	5300	0.4
Cobalt	38.5	4600	0.0
Copper	317	2800	0.1
Lead	316	400	0.8
Nickel	103	1500	0.1
Silver	3.7	383	0.0
Zinc	200	23000	0.0
HMX	3.84	3300	0.0
TNB	0.272	3.3	0.1
Benzoic Acid	0.056	100000	0.0
Diethylphthalate	0.48	52000	0.0
Fluoranthene	0.046	2600	0.0
Pyrene	0.04	2000	0.0
TOTAL			1.5

LANL does not agree with the statement expressed in this comment "Section 3.4 indicates that the PRSs will be evaluated assuming a residential risk scenario; the risk posed by lead to children should, therefore, be included in the evaluation." The intention : Section 3.4 is to describe the methodology for performing risk assessments, not to dictate the land use decisions to be made for individual PRSs. The methodology presented in Section 3.4 does describe the screening process used, which incorporates the use of SALs based on a residential exposure scenario. However, the SAL comparison dictates the need for further evaluation at a given site, and the subsequent development of COPCs. LANL proposes to evaluate the 260 Outfall PRSs with an industrial land use scenario. This decision is based on the fact that Building TA-16-260 is an active HE machining facility, which will remain in industrial land use according to the LANL 30-Year Plan, and therefore, will not be released to the public (Los Alamos National Laboratory 1995. "Site Development Plan, Annual Update 1995," Los Alamos National Laboratory Publication LALP-95-113, Los Alamos, New Mexico. (LANL 1995, ER ID No. 52976). Access to the 260 Outfall area is very restricted due to security clearance and safety issues. Therefore, appropriate exposure modeling (to include lead) during planning for, and conducting of, the VCA for this PRS will be based on an industrial scenario with adult receptors. LANL recognizes that a risk evaluation for a residential scenario may be performed for comparative purposes, but the results from such an analysis will not be the primary decision focus for this particular site.

NMED comment 18 Section 5.1.10 Since no ecological risk analysis was performed, LANL should provide an errata sheet indicating the following correction to the third sentence: No constituents were found above SALs and MCE calculations indicate low probability of impact to human receptors due to multiple constituent effects.

LANL response LANL will correct the indicated sentence to read: "No constituents were found above SALs and MCE calculations indicate low probability of impact to human receptors due to multiple constituent effects." Per discussion in a telecon with Kim Hill (EPA and HRMB) that occurred on September 9, 1997 LANL will not provide an errata sheet at this time.

NMED comment 19 Section 5.2.2 A schematic diagram of the drainage channel and dam would be useful in visualizing the suitability of the proposed Best Management Practices.

LANL response A schematic diagram of the drainage channel and dam, also showing locations of the implemented Best Management Practices, is included as Attachment K.

NMED comment 20 Section 5.2.7.1 LANL should include the evaluation of lead in the Multiple Chemical Evaluation (Table 5.2.7-1). Section 3.4 indicates that the PRSs will be evaluated assuming a residential risk scenario; the risk posed by lead to children should, therefore, be included in the evaluation.

LANL response Please refer to the LANL response to NMED Comment 17 above. Table 5.2.7.1-1 revised (below) reflects the addition of lead to the MCE calculation. With the addition of lead, the sum of the maximum concentrations detected normalized to SALs is 0.8, indicating a low potential for adverse effects due to exposure to this grouping.

TABLE 5.2.7.1-1 Revised
MCE FOR NONCARCINOGENIC EFFECTS AT PRS 16-021(c)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Copper	40.5	2800	0.01
Lead	107	400	0.27
Nickel	37.3	1500	0.02
Silver	4.1	383	0.01
Vanadium	55.7	540	0.10
Zinc	226	23000	0.01
1,3-Dinitrobenzene	2.04	6.5	0.31
Nitrobenzene	1.2	33	0.04
3-Nitrotoluene	2.12	650	0.00
Benzoic Acid	0.43	100000	0.00
Di-n-butylphthalate	0.054	6500	0.00
Pyrene	0.071	2000	0.00
Acetone	0.067	2000	0.00
1,2-Dichlorobenzene	0.007	2300	0.00
1,2,4-Trimethylbenzene	0.052	5	0.01
1,1,1-Trichloroethane	0.014	3600	0.00
TOTAL			0.79

It is very important to note that this PRS is being evaluated with the formal RFI/CMS process. The first step in this process, the Phase II Sampling and Analysis Plan proposed for this PRS in Section 5.2.11 of the RFI Report, requires the collection of data for full suite analysis that includes the analysis for lead and other potential contaminants such as 1,3-dinitrobenzene and chromium. Therefore, the MCE and screening decision for this PRS at this point of the process is essentially moot, and the reader is referred to the Sampling and Analysis Plan proposed. Again, LANL requires the clarification of the land use and risk assessment issues for this PRS addressed in our response to NMED Comment 17 above.

NMED comment 21.a. Section 5.2.7.2 The normalized concentrations of lead (0.145) and 1,3-dinitrobenzene (0.31) are greater than 0.1 in the MCE for noncarcinogenic effects (Table 5.2.7.1-1). LANL should carry forward these constituents, along with those that exceed SALs, into the Baseline Risk Assessment that is planned during the CMS/CMI process.

LANL response LANL will carry these constituents (lead and dinitrobenzene) forward into the Baseline Risk Assessment that is planned during the CMS/CMI process. Per discussion in a telecon with Kim Hill (EPA and HRMB) that occurred on September 9, 1997, note that this is contrary to current LANL programmatic guidance for MCEs.

This represents a programmatic issue, which may be addressed in future programmatic discussions.

NMED comment 21.b. Section 5.2.7.2 The normalized concentration of chromium is 0.55 and is the driver for the MCE for carcinogenic effects (Table 5.2.7.1-2). LANL should carry forward these constituents, along with those that exceed SALs, into the Baseline Risk Assessment that is planned during the CMS/CMI process.

LANL response LANL will carry chromium forward into the Baseline Risk Assessment that is planned during the CMS/CMI process. Per discussion in a telecon with Kim Hill (EPA and HRMB) that occurred on September 9, 1997, note that this is contrary to current LANL programmatic guidance for MCEs.

This represents a programmatic issue, which may be addressed in future programmatic discussions.

NMED comment 22.a. Section 5.2.9 Please clarify within the text of the RFI report, the intent or purpose of presenting Table 5.2.9-1.

LANL response At the end of the first paragraph of Section 5.2.9 LANL will insert the following text: "For each COPC identified during the screening assessment, Table 5.2.9-1 indicates whether the contaminant is present at levels less than SALs in the outermost laboratory samples on a bounding traverse at a specific distance downgradient from the TA-16-260 outfall. Contaminants present at levels less than SALs are bounded laterally relative to SALs."

NMED comment 22.b. Section 5.2.9 LANL should present the traverses relative to EPA Region 9 residential PRGs in addition to the industrial PRGs.

LANL response The traverses relative to SALs are equivalent to traverses relative to EPA Region 9 PRGs. LANL would like to clarify that the traverses shown in Figure 5.2.9-1 and the status of bounding outlined in Table 5.2.9-1 are presented relative to SALs. The text as written in not clear on this point. LANL will replace the sentence "These traverses are bounded relative to EPA Region 9 industrial PRGs" with "Although these traverses are not bounded relative to SALs (EPA Region 9 residential PRGs), they are bounded relative to EPA Region 9 PRGs for industrial soil." The industrial PRG bounding traverses are not shown.

NMED comment 22.c. Section 5.2.9 LANL should include lead, chromium and 1,3-dinitrobenzene in Table 5.2.9-1.

LANL response Below is an addition to Table 5.2.9-1 that includes lead, chromium and 1,3 dinitrobenzene"

ADDITION TO TABLE 5.2.9-1
STATUS OF LATERAL BOUNDING FOR PRS 16-021(c)

COPC	OUTFALL	100 FT	200 FT	300 FT	400 FT	500 FT	600 FT
lead	Yes	Yes	Yes	Yes	Yes	Yes	Yes
chromium	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1,3 DNB	Yes	Yes	Yes	Yes	Yes	Yes	Yes

NMED comment 23. Section 5.2.11.1 LANL should state that concentrations are "greater" not "larger".

LANL response In the last sentence of the first paragraph of Section 5.2.11-1 LANL will convert "greater" to "larger".

NMED comment 24. Section 5.2.11.2.1 Adding the pond and dam to Figure 5.2.11.2.1-1 would aid in visualizing the proposed activities.

LANL response A modified version of Figure 5.2.11.2.1-1 is included as Attachment L. This modified figure schematically shows the locations of the pond and dam relative to the sampling localities.

NMED comment 25.a. Section 5.2.11.2.3 LANL must ensure that representative and confirmatory sampling for HE will occur. The HE screening kit has a detection limit of 100 ppm, whereas the SAL for HE is 15 ppm.

LANL response All locations where HE spot test results are negative are also being screened using the RDX D-Tech immunoassay kit, which has a detection limit of less-than 1 ppm. In addition, LANL has taken additional laboratory samples in the boreholes drilled thus far during the FY 1997 field campaign, to address concerns with the D-Tech immunoassay kits that were expressed in discussions with NMED.

NMED comment 25.b. Section 5.2.11.2.3 LANL should also consult NMED DOE OB in the re-siting of boreholes to the location of geophysical anomalies.

LANL response Thus far, LANL has discussed re-siting of boreholes with HRMB representatives. These discussions occurred in meetings on April 15, 1997 and October 9, 1997 and were subsequently communicated in writing to HRMB. In the future, LANL will consult with either NMED DOE OB or NMED HRMB prior to re-siting boreholes.

NMED comment 25.c. Section 5.2.11.2.3 LANL should also present the sampling locations, depths, etc. provided in the text (pages 67 and 68) as a table for clarification.

LANL response These sample locations, depths, etc. as outlined in this SAP are provided in Table 25.c.-1 (below). Note that these locations and sampling depths have been modified following discussions with HRMB during April and October of 1997. Note also that additional laboratory samples were taken in most of these boreholes.

Table 25.c.-1

Borehole	Location*	Proposed total depth	Screening depths*	Lab sample depths
1	75 ft -center	First clean screening interval	Every 5 ft.	1) 0-5 ft 2) total depth
2	75 ft - north	At least 70 ft	Every 5 ft.	1) 0-5 ft 2) total depth
3	75 ft - south	At least 70 ft	Every 5 ft.	1) 0-5 ft 2) total depth
4	100 ft -center	First clean screening interval	Every 5 ft.	1) 0-5 ft 2) total depth
5	320 ft -center	First clean screening interval	Every 5 ft.	1) 0-5 ft 2) total depth
6	320 ft -north	At least 5 ft deeper than hole 5	Every 5 ft.	1) 0-5 ft 2) total depth
7	320 ft - south	At least 5 ft deeper than hole 5	Every 5 ft.	1) 0-5 ft 2) total depth
8	450 ft - north central	First clean screening interval	Every 5 ft.	1) surface 2) 0-5 ft 3) total depth
9	450 ft - south central	First clean screening interval	Every 5 ft.	1) surface 2) 0-5 ft [illegible] total depth
10	450 ft - north	At least 70 ft	Every 5 ft.	1) 0-5 ft

				2) total depth
11	450 ft - south	At least 70 ft	Every 5 ft.	1) 0-5 ft 2) total depth
12 (optional)	75 ft -north contingent	At least 70 ft	Every 5 ft.	1) 0-5 ft 2) total depth
13 (optional)	75 ft - south contingent	At least 70 ft	Every 5 ft.	1) 0-5 ft 2) total depth

a. All locations are measured downgradient from the outfall. Locations will be biased based on geophysical investigations.
b. Additional screening samples will be located in fractured zones or wet areas.

NMED comment 25.d. Section 5.2.11.2.3 LANL should also provide well construction diagrams in RFI Workplans to obtain prior regulatory approval.

LANL response Well construction diagrams are included as part of Attachment J.

NMED comment 26.a. Section 5.2.11.2.5 After one year of quarterly sampling (for HE, VOCs, Inorganics and anions), LANL should evaluate the data obtained from the alluvial wells and discuss the results with the Administrative Authority to determine if continued sampling would enhance the investigation.

LANL response After one year of quarterly sampling (for HE, VOCs, Inorganics and anions), LANL will evaluate the data obtained from the alluvial wells and discuss the results with the Administrative Authority to determine if continued sampling would enhance the investigation. LANL anticipates that the alluvial wells will be completed and developed by December 1997, thus these discussions will be tentatively scheduled for December 1998.

NMED comment 26.b. Section 5.2.11.2.3 Please clarify which of the 2 well/borehole locations are accessible and tentatively accessible and discuss what will occur if a borehole is found to be completely inaccessible.

LANL response The westernmost alluvial well location and the fourth-from-the-west (see Figure 5.2.11.2.1-2) near MDA-P are easily accessible. The other three are potentially less accessible. LANL currently anticipates being able to access all five locations using available drilling technology. If a borehole location is completely inaccessible LANL will consult with NMED DOE OB and /or NMED HRMB about alternative borehole locations.

NMED comment 27. Appendix A. *Analytical Suites: See Comment 7.*

LANL response Attachment G provides a compilation of all analytical data, including non-detectable concentrations. This attachment will be included as part of Appendix A

NMED comment 28. Appendix B. Table B-1 A crosswalk between request number and PRS/sample location would be extremely useful.

LANL response A crosswalk between request numbers and PRS/sample locations is provided as Attachment M.

Provision of this information is a programmatic issue, which may be addressed in future programmatic discussions.

NMED comment 29 Appendix C, Section 1 LANL should perform or otherwise include a comparison of water balances for each of the potentially affected springs and seeps included in Table C-1.

LANL response Per discussion in a telecon with Kim Hill (EPA and HRMB) that occurred on September 9, 1997 note that the cation summation sum balance that is requested is available in Table C-

NMED comment 30.a. Appendix C, Section 2. LANL should clearly indicate the names and locations of all background springs (p. C-2, first paragraph) and provide a summary of the background water chemistry data.

LANL response LANL will replace the following sentence: "Two springs, Burning Ground and SWSC Line, appear to issue from Tshirege Subunit 3, and one spring, Martin Spring, appears to issue from Tshirege Subunit 4" with the following text "Three springs and two seeps have been identified at TA-16. Burning Ground spring, SWSC Line spring, and Martin spring all appear to issue from near the Tshirege Subunit 3/4 contact. The former two issue from the south wall of Canon de Valle northeast of TA-16-260. Martin spring discharges roughly 3000 ft southeast of TA-16-260. Two intermittent seeps, Peter Seep and Fishladder Seep, represent the alluvial discharge of water in Canon de Valle west of the intersection of PRS 16-021(c) with Canon de Valle and of water in a tributary to Canon de Valle downgradient from the TA-16-340 outfall, respectively." Current elevation data suggests that all three springs issue from very near the unit 3/4 contact.

The background water chemistry data is included as Attachment N.

NMED comment 30.b. Appendix C, Section 2. Figure C-1 should be revised to clearly indicate the sampling locations more so than NPDES outfalls.

LANL response A revised version of Figure C-1 is included as Attachment O. NPDES outfall designations have been removed and sampling locations have been more clearly delineated.

NMED comment 30.c. Appendix C, Section 2. LANL should include tritium and oxygen-18 in Table C-2.

LANL response Table 30.c.-1 (below) presents the requested information for tritium and oxygen isotopes. Note that the analytical precision of the stable isotope analyses (in per mil), rather than a detection limit, is an appropriate measure of the analytical sensitivity of this technique.

TABLE 30.c.-1
METHODS OF CHEMICAL ANALYSIS AND DETECTION LIMITS FOR WATER SAMPLES

ANALYTE	METHOD	DETECTION LIMIT
Tritium	scintillation counting	0.1 Tritium units (est.)
Oxygen isotopes	stable isotope mass spectrometer	analytical precision of .1 per mil

NMED comment 31.a. Appendix C, Section 3.0 LANL should provide a tabulation of the SALs and background concentrations for those analytes presented in paragraph 3, page C—6, Table C-3 and paragraph 3, page C-13.

LANL response Per discussion in a telecon with Kim Hill (EPA and HRMB) that occurred on September 9, 1997 LANL will provide this information on those analytes in paragraph 4 on page C-6. The analytes discussed in this paragraph are barium, manganese and RDX. These data are provided in Attachment P.

NMED comment 31.b. Appendix C, Section 3.0 LANL should define the acronym "NQ" in paragraph 3, page C-13.

LANL response NQ is nitroguanadine, a liquid HE used occasionally at TA-16.

References

Blake, W.D., F. Goff, A.I. Adams, and D. Counce, May 1995. "Environmental Geochemistry for Surface and Subsurface Waters in the Pajarito Plateau and Outlying Areas, New Mexico," Los Alamos National Laboratory Report LA-12912-MS, UC 903, Los Alamos, New Mexico. (Blake et al. 1995, 1355)

TABLE 5.1.6-2

PRS 16-003(k) SOIL CONCENTRATIONS FOR SEMIVOLATILE ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT[a]

SAMPLE ID	DEPTH (ft)	BENZOIC ACID (mg/kg)	DIETHYLPHTHALATE (mg/kg)	FLUORANTHENE (mg/kg)	2-METHYLNAPHTHALENE (mg/kg)	PYRENE (mg/kg)
SAL	N/A[b]	100 000	52 000	2 600	NC[c]	2 000
EQL	N/A	3.3	0.33	0.33	0.33	0.33
0316-95-0049	0–1	3.8 (U)[d]	0.08 (J)[e]	0.38 (U)	0.38 (U)	0.38 (U)
0316-95-0051	1–2	7.4 (U)	0.74 (U)	0.74 (U)	0.26 (J)	0.74 (U)
0316-95-0052	2.5–3.5	3.7 (U)	0.48	0.37 (U)	0.37 (U)	0.37 (U)
0316-95-0053	1.5–2.3	0.056 (J)	0.35 (U)	0.35 (U)	0.35 (U)	0.35 (U)
0316-95-0056	5–6	3.8 (U)	0.099 (J)	0.046 (J)	0.38 (U)	0.04 (J)

[a] Analytes greater than ECLs enclosed in double lines.
[b] N/A = Not applicable.
[c] NC = Not calculated.
[d] U = The analyte was not positively identified in the sample and the associated valued is the sample specific EQL/EDL.
[e] J = The analyte was positively identified and the associated numerical value is more uncertain than would normally be expected for that analyte.

TABLE 5.1.6-3

PRS 16-003(k) SOIL CONCENTRATIONS FOR VOLATILE ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	METHYLENE CHLORIDE (mg/kg)
SAL	N/A[a]	11
EQL	N/A	0.05
0316-95-0049	0–1	0.003 (J)[b]
0316-95-0050	3.5–4.5	0.004 (J)

[a] N/A = Not applicable.
[b] J = The analyte was positively identified and the associated numerical value is more uncertain than would normally be expected for that analyte.

5.1.7 Human Health

5.1.7.1 Screening Assessment

No constituents were detected at levels greater than SALs at PRS 16-003(k). COPCs are identified when the maximum detected concentrations in soil are greater than the carcinogenic soil SAL, or when the noncarcinogenic concentration normalized to SAL is greater than 0.1.

Inorganic constituents detected at this PRS are summarized in Table 5.1.7-1. Inorganic COPCs identified include barium and copper. These constituents will be evaluated during the VCA activities proposed for this PRS as described in Section 5.1.10.

TABLE 5.1.7-1

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 16-003(k)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Barium	2 030	5 300	0.38
Cobalt	38.5	4 600	0.008
Copper	317	2 800	0.11
Lead	17	400	0.043
Nickel	103	1 500	0.069
Silver	3.7	383	0.009
Zinc	200	23 000	0.008
HMX	3.84	3 300	0.001
TNB	0.272	3.3	0.08
Benzoic acid	0.056	100 000	0.0000005
Diethylphthalate	0.48	52 000	0.000009
Fluoranthene	0.046	2 600	0.00002
Pyrene	0.04	2 000	0.00002

Carcinogenic contaminants greater than LANL background UTLs were submitted for an MCE for carcinogenic effects. The sum of the maxima for the carcinogenic group is 0.61, which is below the target value of 1. This result indicates a low potential for adverse effects due to exposure to carcinogens (Table 5.1.7-2).

TABLE 5.1.7-2

MCE FOR CARCINOGENIC EFFECTS AT PRS 16-003(k)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Chromium	116	210	0.55
TNT	0.911	15	0.06
Methylene chloride	0.004	11	0.004
Total			0.61

Only a single radionuclide, uranium, was found at PRS 16-003(k), so no MCE was performed for this constituent.

5.1.7.2 Risk Assessment

No risk assessment was performed at this PRS.

5.1.8 Preliminary Ecological Assessment

In accordance with conversations between LANL ER Project personnel, DOE/Los Alamos Area Office (LAAO), and the regulators, discussion of ecological risk assessment methodology will be deferred until the Ecological Exposure Unit (Ecozone) methodology that is being developed by LANL in conjunction with EPA Region 6 and the NMED has been approved by the regulators.

5.1.9 Extent of Contamination

Although inorganic constituents were identified above UTL values at this PRS, and organic constituents were measured above EQL values, only two risk-based COPCs were identified in Subsection 5.1.7.1 above, barium and copper. As described in Subsection 5.1.4, the sampling activities were biased toward areas where residual contamination was expected (highly [illegible] sumps and leak points in the troughs).

Although the extent of contamination cannot be defined with certainty based on the data from these sampling locations, additional sampling for this PRS is not proposed at this time. Rather, full characterization of the extent of contamination at this PRS will be performed during the CMS activities that are described below.

5.1.10 Conclusions and Recommendations

PRS 16-003(k) is recommended for VCA associated with CMS/CMI at PRS 16-021(c) (see Subsection 5.2). No large-scale release of constituents to the environment has occurred at PRS 16-003(k) at four locations, two sumps, and two drain line leak points, identified as high probability locations for such a release. No constituents were found above SALs and MCE calculations indicate low probability of impact to receptors due to multiple constituent effects. Full characterization of potential releases within this unit has not occurred because characterization of active sumps, drain lines, and troughs is logistically difficult. The vitrified-clay pipe and troughs can now be characterized because they are currently scheduled to be abandoned as active units during fall 1996. The most cost-effective time to complete such characterization is during VCA accompanying CMI at PRS 16-021(c), when heavy equipment will be deployed. LANL proposes that: 1) the drain lines and troughs be removed as a VCA, 2) soil beneath these structures be further characterized at that time, 3) if characterization data indicate that constituents are present at levels that represent a risk to human health and the environment, the soils be removed and treated concurrently with soils undergoing remediation at PRS 16-021(c), and 4) characterization adequate to support NFA beneath the active sumps occur at that time. Such characterization beneath the sumps will be accomplished using heavy equipment. Characterization via angled drilling is not allowed at TA-16 and characterization using vertical boreholes is not fully effective. A VCA plan describing these activities in detail will be provided along with the CMS report.

5.2 PRS 16-021(c)

PRS 16-021(c) is the outfall area for HE machining building TA-16-260. The outfall receives HE wastewater discharge from the 13 HE sumps that constitute PRS 16-003(k), described in Subsection 5.1 of this report. The outfall is currently active, but is currently scheduled to be deactivated during fall 1996. The outfall is permitted as EPA 05A056. Because the extent of HE contamination is not defined with certainty, the PRS is recommended for Phase II sampling to support the CMS/CMI process. The level of contamination and the presence of HE constituents in surface waters and groundwater, suggest that the CMS/CMI process is appropriate for PRS 16-021(c).

5.2.1 History

PRS 16-021(c) is discussed in work plan, Subsection 5.2 (LANL 1993, 1094). PRS 16-021(c) has received HE wastewater since construction of TA-16-260 in 1951. As described in Subsection 5.1, TA-16-260 is an industrial-scale HE machining building. HE in the drainage

TABLE 5.2.6-3

PRS 16-021(c) SOIL CONCENTRATIONS FOR VOLATILE ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT[a]

SAMPLE ID	DEPTH (ft)	Acetone (mg/kg)	1,2-dichlorobenzene (mg/kg)	p-isopropyltoluene (mg/kg)	sec-butylbenzene (mg/kg)	1,1,1-trichloroethane (mg/kg)	1,2,4-trimethylbenzene (mg/kg)
SAL	N/A[b]	2.000	2.300	NC[c]	NC	3.000	8
EQL	N/A	0.2	0.05	0.05	0.05	0.05	0.05
0316-95-0044	1-1.5	0.06 (J)[d]	0.007 (UJ)[e]	0.022 (J)	0.007 (UJ)	0.007 (UJ)	0.007 (UJ)
0316-95-0015	1.5-1.9	0.016 (J)	0.007 (UJ)	0.051 (J)	0.007 (UJ)	0.007 (UJ)	0.052 (J)
0316-95-0016	1.7-2.2	0.031 (UJ)	0.005 (J)	0.008 (UJ)	0.008 (UJ)	0.014 (J)	0.008 (J)
0316-95-2015	1-1.5	0.014 (J)	0.007 (U)	0.007 (U)	0.007 (U)	0.007 (U)	0.007 (U)

[a] Analytes with double lines are greater than EQLs
[b] N/A = Not applicable
[c] NC = Not calculated
[d] J = Analyte possibly present [illegible]
[e] U = Analyte not possibly present [illegible] sample specific EQL/EDL

TCLP organic results showed no constituents above analytical detection limits.

5.2.7 Human Health Assessment

5.2.7.1 Screening Assessment

The noncarcinogens barium, HMX, TNB, and anthracene were found at levels greater than SALs (Table 5.2.5-1, 5-2.6-1 and 5.2.6-2). The carcinogens DNT, RDX, TNT, and bis(2-ethylhexyl)phthalate were also found at levels greater than SALs (Table 5.2.6-1, 5.2.6-2). All of these constituents will be carried through the RFI/CMS process as COPCs. No radionuclides were found at levels greater than SALs.

MCEs were performed for both carcinogens and non-carcinogens that were not already identified as COPCs.

Noncarcinogenic contaminants detected other than the COPCs mentioned above are summarized in Table 5.2.7.1-1. Additional inorganic COPCs identified (those where the noncarcinogenic concentration normalized to SAL is greater than 0.1) include lead, vanadium, and 1,3-dinitrobenzene.

Carcinogenic contaminants with levels greater than LANL background UTLs but below SAL were submitted for an MCE for carcinogenic effects. The sum of the maxima for the carcinogenic group is 0.13, well below the target value of 1. This indicates a low potential for adverse effects due to exposure to carcinogens other than those already identified as COPCs because these carcinogens are at levels above SALs (Table 5.2.7.1-2).

Only a single radionuclide, uranium, was identified at levels above background, so no MCE was performed for the radionuclides.

TABLE 5.2.7.1-1

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 16-021(c)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Copper	40.5	2 800	0.014
Lead	107	400	0.23
Nickel	37.3	1 500	0.025
Silver	4.1	383	0.011
Vanadium	55.7	540	0.10
Zinc	152	23 000	0.0066
1,3-Dinitrobenzene	2.04	6.5	0.31
Nitrobenzene	1.2	33	0.036
3-Nitrotoluene	2.12	650	0.0033
Benzoic acid	0.43	100 000	0.000004
Di-n-butylphthalate	0.054	6 500	0.000008
Pyrene	0.071	2 000	0.00004
Acetone	0.067	2 000	0.00003
1,2 Dichlorobenzene	0.01	2 300	0.000004
1,2,4-Trimethylbenzene	0.052	8	0.0065
1,1,1-Trichloroethane	0.065	3 000	0.00002

TABLE 5.2.7.1-2

MCE FOR CARCINOGENIC EFFECTS AT PRS 16-021(c)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Chromium	26.8	210	0.13
2,4,6-Trichlorophenol	0.048	40	0.0012
Total			0.13

5.2.7.2 Risk Assessment

No human health risk assessment was performed at this PRS. A human health risk assessment is not needed to define the decision. A CMS/CMI will be required. The constituents RDX, HMX, and TNT are present at levels several orders of magnitude greater than SALs over much of the area of PRS 16-021(c). A human health risk assessment under either a residential or industrial scenario would yield carcinogenic and systemic risks far greater than the EPA's target range of 10^{-4} to 10^{-6} for carcinogens and a hazard index of 1 for systemic toxicants. In addition, the distribution of contaminant concentrations is so non-normal that a realistic 95 UCL on the mean, as prescribed in Risk Assessment Guidance for Superfund (RAGS) (EPA 1989, 0305) guidance, cannot legitimately be calculated. Using maximum concentrations in lieu of 95 UCLs, as is done for background constituents with non-normal or non-log normal distributions, suggests that risks are on the order of 10^{-2} and 10^{-3} for RDX and TNT and a hazard index greater than 1 for HMX under an industrial scenario. In addition, the high levels of HE in the soil (greater than 5 wt %) suggest that the soils pose an acute (explosive) hazard not just a chronic hazard to receptors.

A more detailed baseline risk assessment, which includes Phase II information on surface and groundwaters, will be completed as part of the CMS/CMI process.

5.2.8 Preliminary Ecological Assessment

In accordance with conversations between LANL ER Project personnel, DOE/LAAO, and the regulators, discussion of ecological risk assessment methodology will be deferred until the Ecological Exposure Unit (Ecozone) methodology that is being developed by LANL in conjunction with EPA Region 6 and the NMED has been approved by the regulators.

PRS 16-021(c) is known to have impacted ecological receptors. Dead trees are present in the drainage that are almost certainly due to impacts of COPCs from the outfall.

5.2.9 Extent of Contamination

The extent of contamination is not fully characterized for PRS 16-021(c) in either the lateral or vertical directions. None of the COPCs were bounded in the vertical direction. Table 5.2.9-1 and Fig. 5.2.9-1 indicate the status of lateral bounding relative to SALs for COPCs identified as part of the screening assessment.

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March 26, 1998

Mr. Theodore Taylor, Project Manager
Los Alamos Area Office
Department of Energy
528 35th Street
Los Alamos, New Mexico 87544

Mr. John Browne, Director
Los Alamos National Laboratory
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Los Alamos, New Mexico 87545

RE: Approval
16-003(k) and 16-021(c) RCRA Facility Investigation Report
Los Alamos National Laboratory
NM0890010515

Dear Mr. Taylor and Mr. Browne:

The RCRA Permits Management Program (RPMP) of the New Mexico Environment Department has reviewed and approves the 16-003(k) and 16-021(c) RCRA Facility Investigation (RFI) Report (LA-UR-86-502 dated September 1996). The approved document includes the RFI Report, Response to Supplemental Information (EM/ER:97-476 dated November 14, 1997), and the Response to Conditional Approval (EM/ER:98-056 dated February 26, 1998).

Should you have any questions regarding this letter, please contact me or Mr. John Kieling, RPMP's LANL Facility Manager, at (505) 827-1558.

Sincerely,

Robert S. ("Stu") Dinwiddie, PhD, Manager
RCRA Permits Management Program
Hazardous and Radioactive Materials Bureau

RSD:kth

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