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Demolition Documentation Report for the Bayo Canyon Wastewater Treatment Plant, Area of Concern 00-018(b)

Los Alamos
NATIONAL LABORATORY
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Prepared by the Environmental Programs Directorate

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EXECUTIVE SUMMARY

Area of Concern (AOC) 00-018(b), the Bayo Canyon Wastewater Treatment Plant (WWTP), is the former site of a municipal WWTP located near the confluence of Bayo and Pueblo Canyons within the Pueblo Canyon Aggregate Area at Technical Area 00. The Bayo Canyon WWTP was operated by the County of Los Alamos (the County) from 1963 to 2007. In October 2007, the Bayo Canyon WWTP was replaced by a newly constructed WWTP and taken offline. The County subsequently demolished the Bayo Canyon WWTP between October 2009 and February 2010.

The results of characterization sampling at AOC 00-018(b), conducted in 1996 and 2006, indicated low concentrations of chemicals of potential concern, consistent with the industrial use of the site over more than four decades. The nature and extent of contamination were defined, and the site was found to pose no potential unacceptable risk under residential, industrial, recreational, and construction worker scenarios.

The New Mexico Environment Department required that the U.S. Department of Energy and Los Alamos National Laboratory (the Laboratory) observe demolition activities at the Bayo Canyon WWTP to verify no contaminant migration or worker exposure occurred during demolition. The observation activities included providing on-call support to the County and its subcontractor during demolition of the WWTP, on-site observation of exposed areas beneath the structures, photographic documentation, and limited field screening.

This demolition documentation report describes the result of the Laboratory's oversight of the County's demolition of the Bayo Canyon WWTP. No indications of contamination or unusual site conditions were observed during the demolition of the Bayo WWTP. Where field-screening instruments were used to identify radioactivity or volatile organic compounds, no anomalous readings were obtained. Because no staining, odors, elevated field-screening results, or any other indication of contamination was observed, no fixed-laboratory analytical samples were collected. Based on the results of the characterization sampling conducted in 1996 and 2006 as well as the observations made during demolition of the Bayo WWTP, the Laboratory proposes that AOC 00-018(b) is appropriate for corrective actions complete without controls.

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Acronyms and Abbreviations

AOC	area of concern
BCH	benzene hexachloride
bgs	below ground surface
BV	background value
COPC	chemical of potential concern
DDD	dichlorodiphenyldichloroethane
DDE	dichlorophenyltrichloroethylene
DOE	Department of Energy (U.S.)
FV	fallout value
HI	hazard index
HRL	Health Research Laboratory
LANL	Los Alamos National Laboratory
NMED	New Mexico Environment Department
PCB	polychlorinated biphenyl
PID	photoionization detector
RCT	radiation control technician
RPF	Record Processing Facility
SHC	Southwest Hazard Control
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TA	technical area
The County	Los Alamos County
VOC	volatile organic compound
WWTP	wastewater treatment plant

1.0 INTRODUCTION

Los Alamos National Laboratory (LANL or the Laboratory) is a multidisciplinary research facility owned by the U.S. Department of Energy (DOE) and managed by the Los Alamos National Security, LLC. The Laboratory is located in north-central New Mexico approximately 60 mi northeast of Albuquerque and 20 mi northwest of Santa Fe. The Laboratory site covers 40 mi^2 of the Pajarito Plateau, which consists of a series of fingerlike mesas separated by deep canyons containing perennial and intermittent streams running from west to east. Mesa tops range in elevation from approximately 6200 to 7800 ft above sea level.

This demolition documentation report addresses structures at Area of Concern (AOC) 00-018(b), the Bayo Canyon Wastewater Treatment Plant (WWTP), a former municipal WWTP owned and operated by Los Alamos County (the County). The Bayo WWTP was demolished by the County between October 2009 and February 2010. The New Mexico Environment Department (NMED) required the Laboratory to observe the demolition of the Bayo WWTP to ensure no release of contamination occurred at AOC 00-018(b) beneath structures that predated potential Laboratory inputs. The observation activities were conducted in accordance with the Observation Plan for Demolition of the Bayo Wastewater Treatment Plant, Area of Concern 00-018(b), by Los Alamos County (LANL 2009, 105411); the NMED approval with modifications letter dated April 15, 2009 (NMED 2009, 105601); and the NMED clarification letter dated August 19, 2009 (NMED 2009, 108132).

Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to NMED in accordance with DOE policy.

1.1 General Site Information

AOC 00-018(b), the former Bayo WWTP, falls within the Pueblo Canyon Aggregate Area (Figure 1.1-1). The Pueblo Canyon Aggregate Area consists of solid waste management units (SWMUs) and AOCs that were formerly part of Operable Unit 1071 within Technical Area 00 (TA-00). All the SWMUs and AOCs within this aggregate are located on County or private property. The location of AOC 00-018(b) within Pueblo Canyon Aggregate Area is shown in Figure 1.1-2.

1.2 Demolition Documentation Report Objectives

The objectives of this demolition documentation report are to describe the activities that were conducted in support of the County's demolition of the Bayo Canyon WWTP, present the results of these activities, and propose further activities or corrective actions complete, as appropriate. Per the NMED approval with modifications letter, the report "shall include discussion of all field work conducted during ground-disturbing and demolition activities, provide summary tables of all field screening results and laboratory analytical results (if any) and provide labeled photographic logs of any observed media staining/field screening locations" (NMED 2009, 105601).

2.0 BACKGROUND

2.1 Site Description and Operational History

AOC 00-018(b), the former Bayo Canyon WWTP located at the intersection of Pueblo and Bayo Canyons, was operated by the County from 1963 to 2007. It began operating in 1963 and was upgraded in 1966 to handle wastes from the decommissioned Central WWTP, SWMU 00-019, which treated sanitary waste from residential sources as well as TA-01 (LANL 1997, 056614, p. 5). The Bayo

Canyon WWTP probably did not receive wastes from TA-01 because TA-01 was decommissioned at approximately the same time operations began at the Bayo Canyon WWTP (LANL 1997, 056614, p. 5). The Bayo Canyon WWTP received sanitary wastes from eastern Los Alamos businesses and residences until 1992 when it began to receive sanitary waste from northern and western Los Alamos residential areas after the original Pueblo Canyon WWTP [SWMU 00-018(a)] was decommissioned (LANL 1997, 056614, p. 5). Although no documentation has been found, it is possible the Bayo WWTP received sanitary waste from the TA-43 Health Research Laboratory (HRL) from 1963 to 1981. Beginning in December 1981, HRL wastes were routed to the Laboratory's WWTP at TA-03 (Emelity 1981, 008081). The Bayo WWTP was decommissioned in October 2007 when the newly constructed Los Alamos WWTP became operational.

2.2 Land Use

Although the construction worker standard was applicable during the demolition of the Bayo WWTP, the current and future use of AOC 00-018(b) is industrial because the County plans to move its composting activities to this site. The recreational standard is also applicable because there is no restriction to hiking or other recreational uses of the area.

2.3 Previous Site Investigations

The 1996 Resource Conservation and Recovery Act facility investigation focused on the oldest sludge beds at AOC 00-018(b) because they had the most potential to have been impacted by Laboratory activities. Because it was determined that no sludge-fill areas existed at the site, areas outside the oldest sludge beds were not investigated. Angled boreholes were drilled at two locations to investigate material within and beneath the old sludge drying beds (LANL 1997, 056614, p. 53). Five samples were collected from beneath the sludge beds and submitted to an off-site analytical laboratory. All samples were analyzed for metals, gamma spectroscopy analytes, tritium, polychlorinated biphenyls (PCBs), pesticides, semivolatile organic compounds (SVOCs), and volatile organic compounds (VOCs) (LANL 1997, 056614, pp. 57–58).

In 2006, additional investigation activities were conducted at AOC 00-018(b) (LANL 2008, 103243). The potential for off-site transport and releases from the active drying bed could not be determined from the historical data. Therefore, three locations were hand-augered downgradient of the drying beds towards Pueblo Canyon, and one angled borehole was drilled at location 00-25468 (Figure 2.3-1). The angled borehole was drilled 13 linear ft at 45 degrees (9.2 ft below ground surface [bgs]) to collect samples beneath the drying bed, which was active at the time of sampling, without damaging the liner. All the 2006 samples were analyzed for metals, anions, cyanide, nitrate, perchlorate, PCBs, pesticides, SVOCs, VOCs, and radionuclides by gamma spectroscopy (LANL 2008, 103243).

2.4 Summary of Data Evaluation

The chemicals of potential concern (COPCs) identified for AOC 00-018(b) as a result of the both the 1996 and 2006 investigations include the following (LANL 2008, 103243):

- Inorganic COPCs: antimony, copper, mercury, nitrate, perchlorate, selenium, silver, and zinc
- Radionuclide COPC: europium-152

- Organic COPCs: acetone; Aroclor-1242; Aroclor-1254; Aroclor-1260; delta-BHC (benzene hexachloride); gamma-chlordane; 4-chloroaniline; 4,4'-DDD (dichlorodiphenyldichloroethane); 4,4'-DDE (dichlorophenyltrichloroethylene); 1,4-dichlorobenzene; dieldrin; toluene; and 1,3-xylene+1,4-xylene

A summary of the1996 and 2006 investigation data from AOC 00-018(b) is included in Tables 2.4-1 through 2.4-3. The analytes and concentrations detected are consistent with the industrial use of the site.

Of the inorganic COPCs, only perchlorate and nitrate were detected in environmental media from the site. The other inorganic COPCs were either detected only in a sludge sample collected from a pipe in 1996 or were not detected but had detection limits in excess of the background values (BVs). Neither nitrate nor perchlorate has a BV, and therefore, both are retained as COPCs if they are detected. Perchlorate was detected at low concentrations (maximum of 0.00566 mg/kg) in three samples. All but two nitrate results were less than 5 mg/kg, which is within the expected range for naturally occurring nitrate.

Europium-152 was detected in one 1996 sample in the middle of a borehole. Because no BV or fallout value (FV) has been established for europium-152, it is retained as a COPC if it is detected. However, there is no known use of europium-152 at the Laboratory and, based on review of the data, it is likely that this detection is actually of bismuth-214. Bismuth-214, which decays with the same energy as europium-152 (1408 keV gamma), is part of the natural decay chain for uranium-234 and uranium-238. No uranium isotopes or any other radionuclides were detected above their respective BVs or FVs in samples from AOC 00-018(b).

Of the organic COPCs, only acetone; Aroclor-1242; Aroclor-1254; Aroclor-1260; 1,4-dichlorobenzene; toluene; and 1,3-xylene+1,4-xylene were detected in environmental media from the site. The remaining organic COPCs were detected only in the 1996 sludge sample. None are detected in more than four samples, and more than half were detected at less than the estimated quantitation limit.

AOC 00-018(b) was evaluated for potential risk using the residential, recreational, and construction worker scenarios. There is no potential unacceptable risk to human health under any of these scenarios, nor is there any potential unacceptable risk to the environment from this site (LANL 2008, 103243).

3.0 CURRENT SITE CONDITIONS

The average elevation of AOC 00-018(b) is approximately 6550 ft above mean sea level. The site is located on a gentle slope at the base of the east end of Kwage Mesa, just above the bottom of Pueblo Canyon. Most of the site was previously developed, with roads and buildings covering much of the area within the AOC boundary until the time of demolition. The structure floors, as well as much of the debris that resulted from the demolition of the Bayo WWTP, were buried on-site, covered with fill material, and regraded to match the surrounding natural grade. Currently, very little vegetation exists on the site, but the site was reseeded with a native seed mix during the week of March 15, 2010.

4.0 SCOPE OF OBSERVATION ACTIVITIES

NMED required that the Laboratory observe the demolition of Bayo Canyon WWTP to verify no migration of contaminants or risk of worker exposure occurred as a result of demolition of the WWTP. Per the approved observation plan (LANL 2009, 105411; NMED 2009, 105601), the Laboratory conducted photographic documentation, visual observations, and field screening of newly exposed site soils and other materials during the County's demolition activities. Per the NMED clarification letter (NMED 2009, 108132), visual and olfactory observations were used to determine the site areas that required field

screening. The following sections describe the Laboratory's observation activities. Figure 4.0-1 shows the observation point(s) for each structure.

4.1 Sludge Beds (Structure Groups A through C)

The clarification letter from NMED (2009, 108132) specifies that one location be observed in each sludge bed that may have received wastes from the HRL (i.e., any sludge drying beds used before 1981). The sludge beds did not have concrete bottoms, so observations were made in holes dug down to native soil using an excavator. Figure 4.0-1 shows the observation points for the sludge beds at the Bayo WWTP.

Structure Group A, three sludge beds located on the west side of the site, is the original sludge drying beds for the Bayo WWTP. Observations were conducted at one location in each of two sludge beds on October 8, 2009 (observation points A-2 and A-3). An observation was made in one of the sludge beds on November 16, 2009 (observation point A-1), after the location of an active effluent line in the immediate vicinity of that bed had been verified. Three newer sludge beds in the same area did not require observation because they were constructed after 1981, which postdates any potential Laboratory input to the Bayo WWTP (Emelity 1981, 008081).

Structure Group B consists of five sludge beds located next to and southwest of the three original sludge beds. Observations were conducted at one location in each of the five beds on October 7, 2009 (observation points B-1 through B-5). In addition, field screening was conducted for radioactivity (observation point B-1) and VOCs (observation points B-1 through B-4) to obtain baseline information for the Bayo WWTP.

Structure Group C consists of four sludge beds located across an access road from and southwest of the Structure Group B sludge beds. Observations were conducted at one location in each of the four beds on October 7, 2009. In addition, field screening was conducted for radioactivity (observation points C-1 and C-2) and VOCs (observation point C-4) to obtain baseline information for the Bayo WWTP. One additional sludge bed in the same location did not require observation because it was constructed after 1981, which postdates potential Laboratory input to the Bayo WWTP (Emelity 1981, 008081).

4.2 Secondary Clarifiers (Structures D and E)

The secondary clarifiers are located between the sludge beds and the trickling filters in the central portion of the plant. On October 7, 2009, NMED collected a sample of the standing water present in the western secondary clarifier (Structure D). Observation holes were punched through the base of the secondary clarifiers using a hydraulic hammer attachment on the excavator. Figure 4.0-1 shows the observation locations for the secondary clarifiers at the Bayo WWTP.

Structure D is the western secondary clarifier. Observations were made at two locations within the footprint of Structure D on October 20, 2009 (observation points D-1 and D-4).

Structure E is the eastern secondary clarifier. Observations were made at two locations within the footprint of Structure E on October 7, 2009 (observation points E-1 and E-2). In addition, field screening was conducted for radioactivity and VOCs (observation points E-1 and E-2) to obtain baseline information for the Bayo WWTP.

4.3 Trickling Filters (Structures F through H)

The clarification letter from NMED (2009, 108132) specifies that four locations (one in each quadrant) be observed in each trickling filter. Observation holes were punched through the base of the trickling filters

using a hydraulic hammer attachment on the excavator. Figure 4.0-1 shows the observation locations for the three trickling filters at the Bayo WWTP.

The original trickling filter was constructed in 1963 and had not been used as a trickling filter since 2001. It was empty at the time of demolition, with the exception of an accumulation of rainwater.

Two more trickling filters were constructed in 1966 to increase the capacity of the Bayo WWTP in anticipation of the Central WWTP (SWMU 00-019) being taken offline. The newer trickling filters operated until October 2007, when the Bayo WWTP was decommissioned. These trickling filters were full of cobbles at the time of the Bayo WWTP demolition. The cobbles had to be removed before holes could be punched in the floor to allow for observation.

Structure F, the original trickling filter for the Bayo WWTP, is the northeastern trickling filter of the three at the Bayo WWTP. Observations were conducted at four points within the footprint of Structure F on October 7, 2009 (observation points F-1 through F-4). In addition, field screening was conducted for VOCs to obtain baseline information for the Bayo WWTP.

Structure G, constructed in 1966, is the central trickling filter at the Bayo WWTP. Observations were made at four points within the footprint of Structure G on December 2, 2009 (observation points G-1 through G-4).

Structure H, constructed in 1966, is the southwestern trickling filter of the three at the Bayo WWTP. Observations were made at four points within the footprint of Structure H on December 7, 2009 (observation points H-1 through H-4).

On October 9, 2009, wipe samples were taken of the cobbles in the two newer trickling filters to determine if they could be removed from the site for use elsewhere. The wipe samples were analyzed for PCBs and metals. In addition, a radiation control technician (RCT) took direct readings and wipe samples of the cobbles for alpha and beta/gamma radiation. A total of 11 samples were collected for radiation screening: 5 from Structure G and 6 from Structure H.

During the demolition of the Bayo WWTP, residual mercury was discovered in the seals of the two newer trickling filters (Structures G and H). The County contracted to Southwest Hazard Control (SHC) to recover the mercury from the seals.

4.4 Primary Clarifiers (Structures I and J)

The primary clarifiers are located north of the trickling filters. Observation holes were punched through the base of the primary clarifiers using a hydraulic hammer attachment on the excavator. Figure 4.0-1 shows the observation locations for the primary clarifiers at the Bayo WWTP.

Structure I is the western primary clarifier. Observations were made at two points within the footprint of Structure I on November 16, 2009 (observation points I-1 and I-2).

Structure J is the eastern primary clarifier. Observations were made at two points within the footprint of Structure J on November 16, 2009 (observation points J-1 and J-2).

4.5 Digesters (Structures K and L)

The primary and secondary digesters were the last two structures to be demolished at the Bayo WWTP. Between early December 2009 and mid-January 2010, the demolition of the digesters was on hold while

the County identified a disposal option for the sludge that was still contained within them. Figure 4.0-1 shows the observation locations for the primary and secondary digesters at the Bayo WWTP.

Structure K, the secondary digester, was located on the north side of the site. Observations were made at two points within the footprint of Structure K on January 15, 2010 (observation points K-1 and K-2).

Structure L, the primary digester, was located on the north side of the site, east of the primary digester. Observations were made at two points within the footprint of Structure L on January 21, 2010 (observation points L-1 and L-2).

4.6 Deviations from the Demolition Observation Plan

Most of the deviations from the demolition observation plan were positive because more observations and measurements were made than were required. In addition to the observations points required for the trickling filters and sludge beds (NMED 2009, 108132), observations were made in the footprints of the primary and secondary clarifiers (eight additional points) and the primary and secondary digesters (four additional points). Also, although not required unless olfactory and/or visual observations indicated unexpected conditions (NMED 2009, 108132), field screening was conducted at several points within the sludge beds, secondary clarifiers, and trickling filters. This field screening was done to document baseline conditions for the Bayo WWTP in the event that unexpected conditions were encountered at subsequent observations points. Lastly, wipe samples were collected from trickling filter rock in Structures G and H and analyzed for metals, PCBs, and gross alpha and beta to determine if the rocks could be reused at another location.

Based on the information available at the time the observation plan (LANL 2009, 105411) was written, the Laboratory proposed providing full-time RCT support during groundbreaking activities at the Bayo WWTP. However, during a June 19, 2009, site visit with NMED, County, and Laboratory personnel, the County indicated it intended to leave most of the subsurface structures in place and cover them with fill material, thus minimizing the opportunity to perform observation at the site. The County's demolition contractor had been instructed to punch drain holes in the remaining structure floors to minimize ponding of rainwater once the structures had been buried. NMED provided guidance regarding the number of observations required using the drain holes in the remaining structure floors (NMED 2009, 105601), and work was conducted at AOC 00-018(b) following that guidance.

The County anticipated the demolition activities would take up to 30 d. However, the County's contractor was conducting work at more than one site and was not at the Bayo WWTP every day. Therefore, the demolition of the Bayo WWTP took place from October 6, 2009, to February 12, 2010, a total of 129 d. Because groundbreaking activities were conducted only sporadically throughout the 129-d duration of the Bayo WWTP demolition, Laboratory personnel were on-site regularly to check the progress of the demolition, conduct visual and olfactory observations as observation points became available, and produce the photodocumentation required by NMED. However, it was not practical to keep Laboratory personnel on-site full time for the duration of the project.

Finally, because the NMED approval with modifications letter (NMED 2009, 105601) required VOC screening as well as radiation screening only in the event that olfactory and visual observations indicated the presence of contamination, the observations were conducted by Laboratory industrial hygienists with RCT support as needed.

5.0 RESULTS OF OBSERVATION ACTIVITIES

The observations conducted from October 2009 to February 2010 in support of the County's demolition of the WWTP included visual and olfactory observations made in holes punched within the bottom of structures as well as general site observations, photodocumentation, and field screening. Table 5.0-1 summarizes the results of the visual and olfactory observations as well as the results of screening with field instrumentation. Appendix A provides the photographs taken to document the demolition activities conducted by Los Alamos County and the observation field notes for the demolition activities. Appendix B presents the results for the trickling filter rock wipe sample and radiation screening results. The following sections describe the results of each of these activities for the structures at the Bayo WWTP.

5.1 Sludge Beds (Structure Groups A through C)

Table 5.0-1 summarizes the results of the observations for the sludge beds at the Bayo WWTP. No staining, discoloration, or odors were observed in the footprints of any of the sludge beds. In several of the holes dug in the footprints of the sludge beds for the purpose of observation, standing water from recent rainfall was observed. However, no unusual odors, sheen, or staining were noted at the observation locations where standing water occurred.

Although no unusual visual or olfactory conditions were noted, field screening was conducted for radioactivity and VOCs at selected locations to obtain baseline information for the Bayo WWTP. The results of the field screening are also presented in Table 5.0-1. Field screening did not indicate the presence of contamination in the area of the sludge beds.

5.2 Secondary Clarifiers (Structures D and E)

Table 5.0-1 summarizes the results of the observations for the secondary clarifiers at the Bayo WWTP. No staining, discoloration, or odors were observed in the footprints of the secondary clarifiers. Although no unusual visual or olfactory conditions were noted, field screening was conducted for radioactivity and VOCs at selected locations to obtain baseline information for the Bayo WWTP. The results of the field screening are also presented in Table 5.0-1. Field screening did not indicate the presence of contamination in the area of the secondary clarifiers.

5.3 Trickling Filters (Structures F through H)

Table 5.0-1 summarizes the results of the observations for the trickling filters at the Bayo WWTP. No staining, discoloration, or odors were observed in the footprints of the trickling filters. Although no unusual visual or olfactory conditions were noted, field screening was conducted for radioactivity and VOCs at selected locations to obtain baseline information for the Bayo WWTP. The results of the field screening are also presented in Table 5.0-1. Field screening did not indicate the presence of contamination in the area of the trickling filters.

The data for the wipe samples collected from the trickling filter cobbles in Structures G and H on October 9, 2009, are presented in Appendix B. Aroclor-1260 was detected in one of the 11 wipe samples at a concentration below the detection limit (0.16 µg/wipe versus 0.5 µg/wipe). Nine of the 11 samples were analyzed for arsenic, barium, cadmium, chromium, iron, lead, selenium, and silver. Barium, chromium, and iron were detected in all nine samples in small amounts, with iron detected at the highest concentrations (up to 1280 µg/wipe). Lead and silver were each detected in one sample in trace amounts (less than 3 µg/wipe). Two of the 11 wipe samples were analyzed for mercury, but it was not detected. All of these metals are naturally occurring and would be expected to be detected in low concentrations on

the wipes. Because the data are presented in units of µg/wipe, no background comparisons are applicable.

All 11 samples were direct-surveyed and wipe-sampled for radioactivity. All results were less than the minimum detectable activity. The County did not reuse the cobbles off-site; they were buried in the subsurface at AOC 00-018(b).

Recovery of elemental mercury from the seals of the two newer trickling filters (Structures G and H) took place on December 2 and 3, 2009, and is discussed in a report prepared by SHC for the County (SHC 2010, 109000). Although no longer used for this purpose, in the past mercury was commonly used to seal and lubricate the hubs of trickling filters. Residual mercury was found to be present in the seals of Structures G and H during demolition. A total of 133.5 lb of mercury was recovered from the trickling filters (SHC 2010, 109000). Photographs of the mercury recovery activities are included in Appendix A.

5.4 Primary Clarifiers (Structures I and J)

Table 5.0-1 summarizes the results of the observations for the primary clarifiers at the Bayo WWTP. No staining, discoloration, or odors were observed in the footprints of the primary clarifiers.

5.5 Digesters (Structures K and L)

Table 5.0-1 summarizes the results of the observations for the primary and secondary digesters at the Bayo WWTP. No staining, discoloration, or odors were observed in the footprints of the digesters.

6.0 CONCLUSIONS AND RECOMMENDATIONS

No indication of contamination or unusual site conditions was observed during the demolition of the Bayo WWTP. Where field-screening instruments were used to identify radioactivity or VOCs, no anomalous readings were obtained. Because no staining, odors, elevated field-screening results, or any other indication of contamination was observed, no fixed-laboratory analytical samples were collected.

Based on the results of characterization sampling conducted at AOC 00-018(b) in 1996 and 2006, the nature and extent of contamination have been defined, and the site was shown to pose no potential unacceptable risk under residential, industrial, recreational, and construction worker scenarios (LANL 2008, 103243). The types and concentrations of contaminants detected are consistent with the use of the site as a municipal WWTP.

Based on the results of the characterization sampling as well as the observations made during demolition of the Bayo WWTP, the Laboratory proposes that AOC 00-018(b) is appropriate for corrective actions complete without controls.

7.0 REFERENCES AND MAP DATA SOURCES

7.1 References

The following list includes all documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ER ID. This information is also included in text citations. ER IDs are assigned by the Environmental Programs Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

Emelity, L.A., December 15, 1981. "Monthly Major Achievements Report, Group H-7)," Los Alamos National Laboratory memorandum to G.L. Voelz (Health Division Leader) from L.A. Emelity (H-7), Los Alamos, New Mexico. (Emelity 1981, 008081)

LANL (Los Alamos National Laboratory), September 1997. "RFI Report for PRSs 0-018(a,b), Wastewater Treatment Plants," Los Alamos National Laboratory document LA-UR-97-3319, Los Alamos, New Mexico. (LANL 1997, 056614)

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LANL (Los Alamos National Laboratory), July 2008. "Investigation Report for Pueblo Canyon Aggregate Area, Revision 1," Los Alamos National Laboratory document LA-UR-08-4765, Los Alamos, New Mexico. (LANL 2008, 103243)

LANL (Los Alamos National Laboratory), April 2009. "Observation Plan for the Demolition of the Bayo Canyon Wastewater Treatment Plan, Area of Concern 00-018(b), by Los Alamos County," Los Alamos National Laboratory document LA-UR-09-1814, Los Alamos, New Mexico. (LANL 2009, 105411)

NMED (New Mexico Environment Department), April 15, 2009. "Approval with Modifications, Observation Plan for Demolition of the Bayo Canyon Wastewater Treatment Plant, Area of Concern 00-018(b), by Los Alamos County," New Mexico Environment Department letter to D. Gregory (DOE-LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2009, 105601)

NMED (New Mexico Environment Department), August 19, 2009. "Clarification Concerning Approval with Modifications; Observation Plan for Demolition of the Bayo Canyon Wastewater Treatment Plant, Area of Concern 00-018(b), by Los Alamos County," New Mexico Environment Department letter to D. Gregory (DOE-LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2009, 108132)

SHC (Southwest Hazard Control, Inc.), February 9, 2010. "Remediation and Disposal Report," prepared for County of Los Alamos Department of Public Utilities under SHC Job #H9162, Tucson, Arizona. (SHC 2010, 109000)

7.2 Map Data Sources

Boundary - Los Alamos National Laboratory. Technical Area Boundaries; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; September 2007; as published 04 December 2008.

Edge of dirt road or path. Orthophotography, 2008 Los Alamos National Laboratory Aerial Photography, Site Planning and Project Initiation Group, February 2009.

Edge of ground-level concrete structure. Orthophotography, 2008 Los Alamos National Laboratory Aerial Photography, Site Planning and Project Initiation Group, February 2009.

Fences. [1] Bayo Canyon Sewage Disposal Plant Expansion – FY 1966, Disposal Plant, Plot Plan and Hydraulic Profile; Drawing LA-IA-15, sheet 15; April 1966. [2] Orthophotography, 2008 Los Alamos National Laboratory Aerial Photography, Site Planning and Project Initiation Group, February 2009.

Former structures or buildings. [1] Bayo Canyon Sewage Disposal Plant Expansion – FY1966, Disposal Plant, Plot Plan and Hydraulic Profile; Drawing LA-IA-15, sheet 15; April 1966. [2] Orthophotography, 2008 Los Alamos National Laboratory Aerial Photography, Site Planning and Project Initiation Group, February 2009. [3] Former Structures of the Los Alamos Site; Los Alamos National Laboratory, Waste and Environmental Services Division, EP2008-0441; 1:2,500 Scale Data; 08 August 2008.

Hypsography, Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program; 1991.

Primary Electric Grid; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.

Sampling locations. Markup of base map BCWWTP10-01-1; Becky Coel-Roback, Los Alamos National Laboratory, Corrective Action Programs; 16 March 2010.

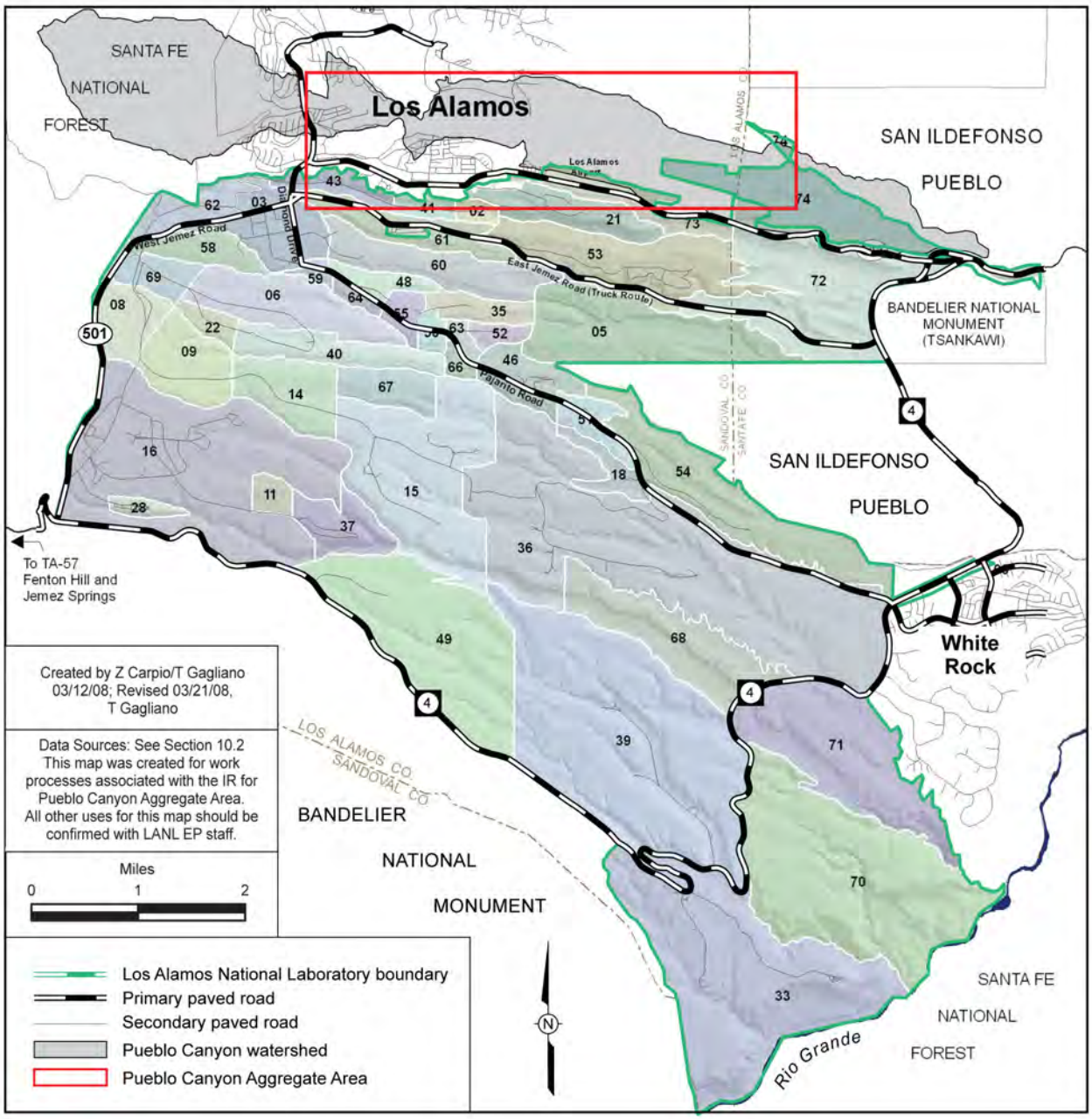


Figure 1.1-1 Pueblo Canyon Aggregate Area

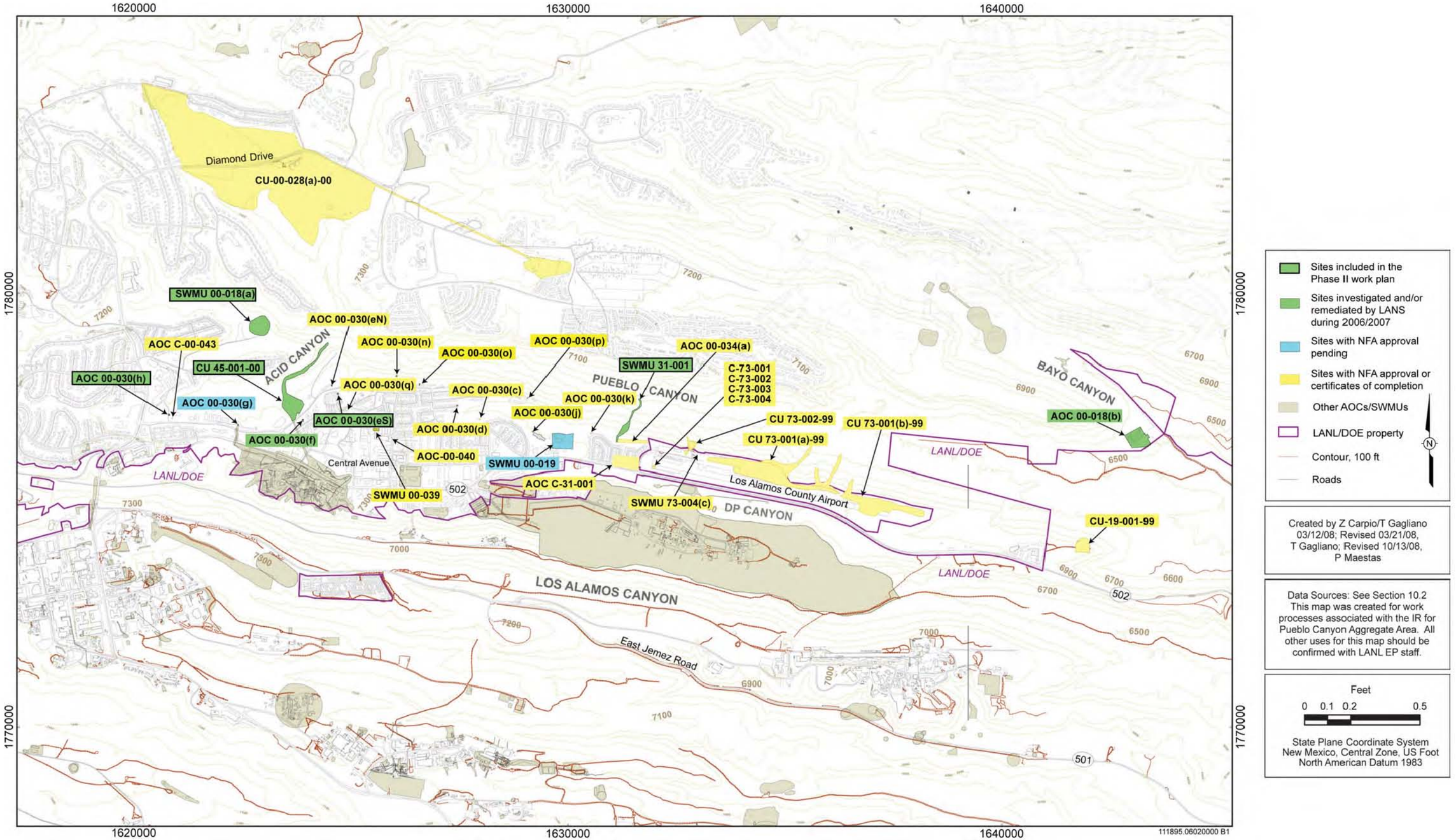


Figure 1.1-2 Location and status of SWMUs and AOCs within the Pueblo Canyon Aggregate Area

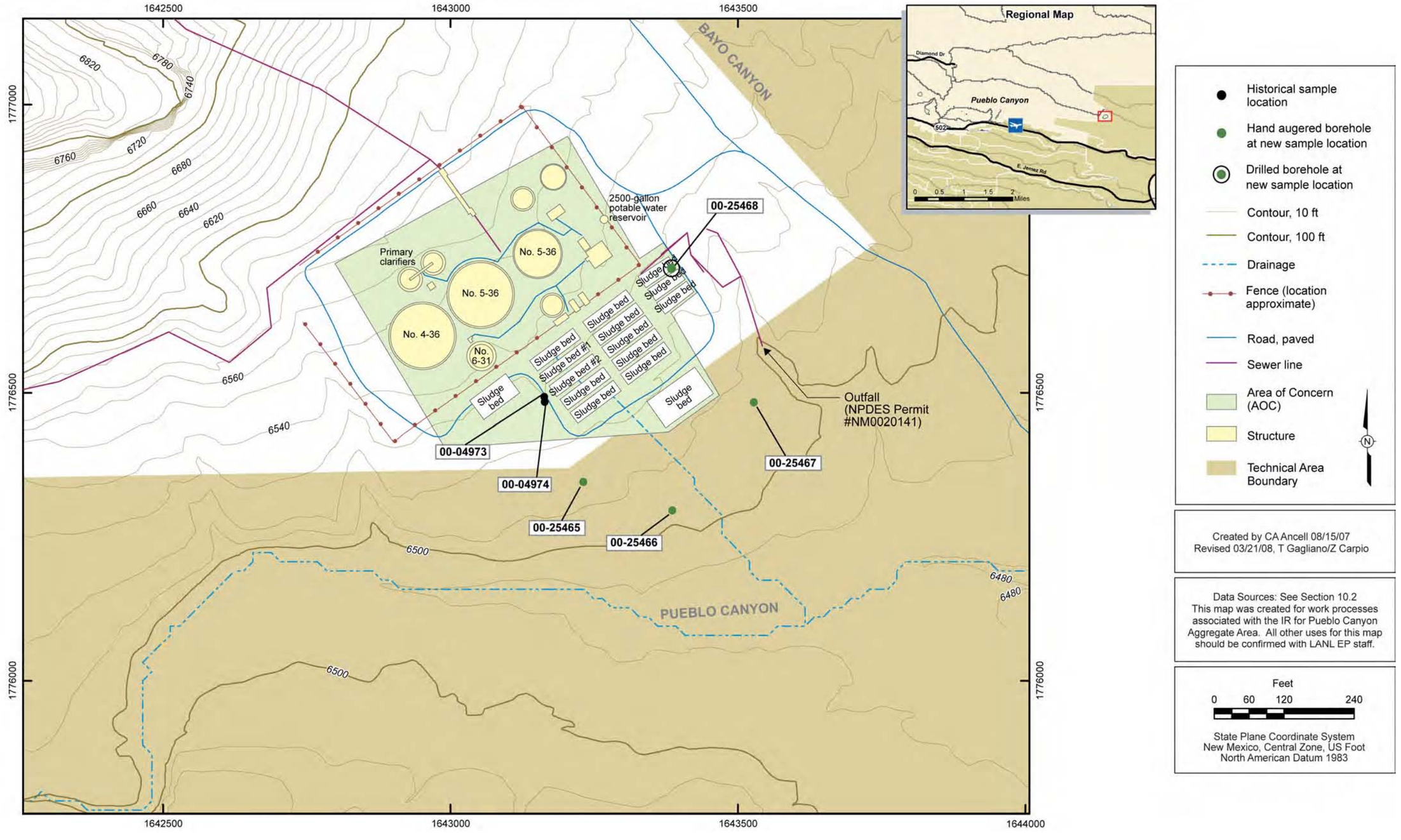


Figure 2.3-1 Site layout and sampling locations at AOC 00-018(b)

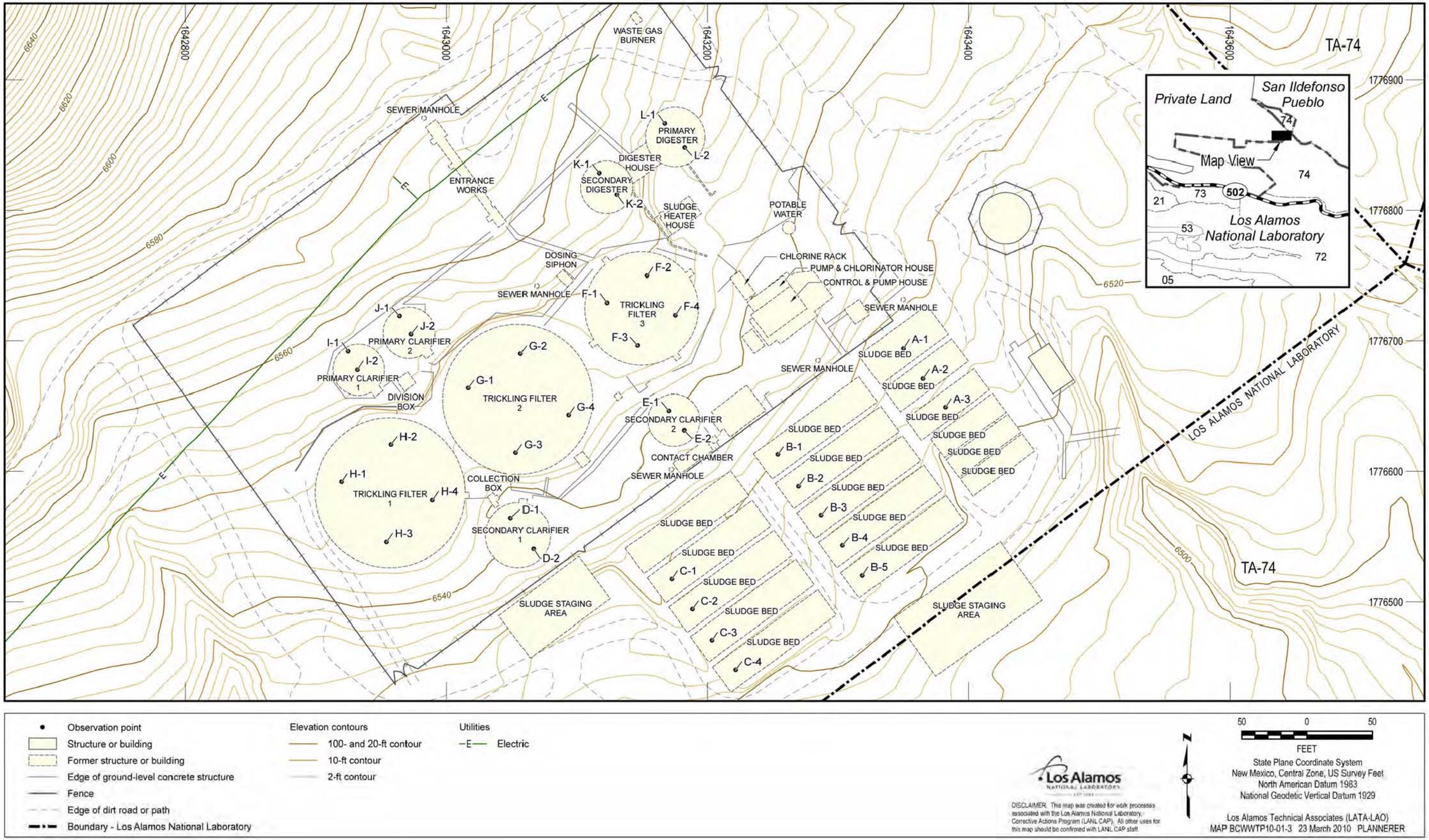


Figure 4.0-1 Bayo WWTP structures and observation points

Table 2.4-1
Summary of Inorganic Chemicals above BVs at AOC 00-018(b)

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Cadmium	Copper	Iron	Mercury	Nitrate	Perchlorate	Selenium	Silver	Zinc
Soil/Fill BV[a]				**0.83**	**0.4**	**14.7**	**21500**	**0.1**	**na**[b]	**na**	**1.52**	**1**	**48.8**
0100-96-0561	00-04973	33.00–35.50	Soil	12 (UJ)[c]	0.62 (U)[d]	—[e]	—	0.12 (U)	—	—	—	2.5 (U)	—
0100-96-0563	00-04973	54.50–56.50	Soil	13 (UJ)	0.66 (U)	—	—	0.13 (U)	—	—	—	2.6 (U)	—
0100-96-0564	00-04974	16.00–17.00	Soil	11 (UJ)	0.57 (U)	—	—	0.11 (U)	—	—	—	2.3 (U)	—
0100-96-0565	00-04974	31.50–32.60	Soil	13 (UJ)	0.64 (U)	—	—	0.13 (U)	—	—	—	2.6 (U)	—
0100-96-0566	00-04974	51.50–52.50	Soil	11 (UJ)	0.56 (U)	—	—	0.11 (U)	—	—	—	2.2 (U)	—
RE00-06-66946	00-25465	0.00–0.50	Soil	—	0.576 (U)	—	—	—	1.14 (J)	—	1.73 (U)	—	—
RE00-06-66947	00-25465	1.00–1.50	Soil	—	0.507 (U)	—	—	—	0.86 (J)	—	—	—	—
RE00-06-66948	00-25465	10.00–10.50	Soil	—	0.542 (U)	—	—	—	1.24	0.00566	1.63 (U)	—	—
RE00-06-66951	00-25466	0.00–0.50	Soil	—	0.532 (U)	—	—	—	—	—	1.6 (U)	—	—
RE00-06-66952	00-25466	1.00–1.50	Soil	—	0.534 (U)	—	—	—	—	—	1.6 (U)	—	—
RE00-06-66953	00-25466	10.00–10.50	Soil	—	0.494 (U)	—	—	—	—	0.00455	—	—	—
RE00-06-66956	00-25467	0.00–0.50	Soil	—	0.572 (U)	—	—	—	3.31	—	1.72 (U)	—	—
RE00-06-66957	00-25467	1.00–1.50	Soil	—	0.542 (U)	—	—	—	3.97	—	1.63 (U)	—	—
RE00-06-66958	00-25467	10.00–10.50	Soil	—	0.511 (U)	—	—	—	2.2	0.00211	1.53 (U)	—	—
RE00-06-66964	00-25468	6.40–6.70	Fill	—	0.545 (U)	—	—	—	43.1	—	1.64 (U)	—	—
RE00-06-66965	00-25468	8.50–8.80	Fill	—	0.559 (U)	—	—	—	84.6	—	1.68 (U)	—	—
0100-96-0572	n/a[f]	0.00–0.00	n/a	—	—	55.3	21700	0.492	—	—	—	8.96	113

Notes: Units are mg/kg.

[a] BVs are from LANL (1998, 059730).

[b] na = Not available.

[c] UJ = The analyte was not positively identified in the sample, and the associated value is an estimate of the sample-specific detection or quantitation limit.

[d] U = The analyte was analyzed for but not detected; however, the detection limit exceeds the BV.

[e] — = If analyzed, sample result is less than BV. If no BV is available, analyte was not detected.

[f] n/a = Not applicable (dried sludge).

Table 2.4-2
Summary of Radionuclide Detected or Detected above BV/FV at AOC 00-018(b)

Sample ID	Location ID	Depth (ft bgs)	Media	Europium-152
Soil BV/FV				**na***
0100-96-0561	00-04973	33.00–35.50	Soil	0.451

Note: Units are pCi/g.

*na = Not available.

Table 2.4-3
Summary of Organic Chemicals Detected at AOC 00-018(b)

Sample ID	Location ID	Depth (ft bgs)	Media	Acetone	Aroclor-1242	Aroclor-1254	Aroclor-1260	BHC[delta-]	Chlordane[gamma-]	Chloroaniline[4-]
RE00-06-66951	00-25466	0.00–0.50	Soil	—[a]	—	—	0.002 (J)[b]	—	—	—
RE00-06-66956	00-25467	0.00–0.50	Soil	—	—	—	0.0039 (J)	—	—	—
RE00-06-66952	00-25466	1.00–1.50	Soil	—	—	—	—	—	—	—
RE00-06-66957	00-25467	1.00–1.50	Soil	—	—	—	0.0035 (J)	—	—	—
RE00-06-66958	00-25467	10.00–10.50	Soil	—	0.013	0.0085	0.0029 (J)	—	—	—
0100-96-0564	00-04974	16.00–17.00	Soil	0.055	—	—	—	—	—	—
0100-96-0565	00-04974	31.50–32.60	Soil	0.091	—	—	—	—	—	—
0100-96-0561	00-04973	33.00–35.50	Soil	0.12	—	—	—	—	—	—
RE00-06-66964	00-25468	6.40–6.70	Fill	0.0147	—	—	—	—	—	—
RE00-06-66965	00-25468	8.50–8.80	Fill	—	—	0.0015 (J)	—	—	—	—
0100-96-0572	n/a[c]	0.00–0.00	n/a	—	—	—	—	0.00992	0.042	0.48 (J)

Table 2.4-3 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	DDD[4,4'-]	DDE[4,4'-]	Dichlorobenzene[1,4-]	Dieldrin	Toluene	Xylene[1,3-] +Xylene[1,4-]
RE00-06-66951	00-25466	0.00–0.50	Soil	—	—	—	—	0.0215	—
RE00-06-66956	00-25467	0.00–0.50	Soil	—	—	0.000396 (J)	—	—	—
RE00-06-66952	00-25466	1.00–1.50	Soil	—	—	—	—	—	—
RE00-06-66957	00-25467	1.00–1.50	Soil	—	—	—	—	—	—
RE00-06-66958	00-25467	10.00–10.50	Soil	—	—	—	—	—	—
0100-96-0564	00-04974	16.00–17.00	Soil	—	—	—	—	—	—
0100-96-0565	00-04974	31.50–32.60	Soil	—	—	—	—	—	—
0100-96-0561	00-04973	33.00–35.50	Soil	—	—	—	—	—	—
RE00-06-66964	00-25468	6.40–6.70	Fill	—	—	—	—	0.00101 (J)	0.000361 (J)
RE00-06-66965	00-25468	8.50–8.80	Fill	—	—	—	—	—	—
0100-96-0572	n/a	0.00–0.00	n/a	0.0142	0.00848	0.000501 (J)	0.0116	—	—

Notes: Units are mg/kg.

[a] — = If analyzed, sample result is not detected.

[b] J = The analyte was positively identified, and the associated numerical value is estimated to be more uncertain than would normally be expected for that analysis.

[c] n/a = Not applicable (dried sludge).

Table 5.0-1
Summary of Bayo WWTP Observation Results

Location	Visual Observation	Olfactory Observation	Date	Time	Photo Taken	Comments
A-1	No discoloration	None detected	11/16/2009	1:30:00 PM	Yes	None
A-2	No discoloration	None detected	10/8/2009	10:25:00 AM	Yes	None
A-3	No discoloration	None detected	10/8/2009	10:35:00 AM	Yes	None
B-1	No discoloration	None detected	10/7/2009	3:10:00 PM	Yes	Standing water present RCT screened negative PID* reading 0.0
B-2	No discoloration	None detected	10/7/2009	3:35:00 PM	Yes	PID reading 0.0
B-3	No discoloration	None detected	10/7/2009	3:42:00 PM	Yes	PID reading 0.0
B-4	No discoloration	None detected	10/7/2009	4:05:00 PM	Yes	PID reading 0.0
B-5	No discoloration	None detected	10/7/2009	4:10:00 PM	Yes	Standing water present
C-1	No discoloration	None detected	10/7/2009	2:30:00 PM	Yes	RCT screened negative
C-2	No discoloration	None detected	10/7/2009	2:40:00 PM	Yes	RCT screened negative
C-3	No discoloration	None detected	10/7/2009	3:20:00 PM	Yes	None
C-4	No discoloration	None detected	10/7/2009	4:15:00 PM	Yes	PID reading 0.0
D-1	No discoloration	None detected	10/20/2009	1:30:00 PM	Yes	None
D-2	No discoloration	None detected	10/20/2009	1:35:00 PM	Yes	None
E-1	No discoloration	None detected	10/7/2009	2:00:00 PM	Yes	RCT screened negative PID Reading 0.4
E-2	No discoloration	None detected	10/7/2009	2:10:00 PM	Yes	RCT screened negative PID reading 0.4
F-1	No discoloration	None detected	10/7/2009	2:00:00 PM	Yes	PID reading 0.0
F-2	No discoloration	None detected	10/7/2009	2:05:00 PM	Yes	PID reading 0.0
F-3	No discoloration	None detected	10/7/2009	2:08:00 PM	Yes	PID reading 0.0
F-4	No discoloration	None detected	10/7/2009	2:12:00 PM	Yes	PID reading 0.0
G-1	No discoloration	None detected	12/2/2009	12:20:00 PM	Yes	None
G-2	No discoloration	None detected	12/2/2009	12:23:00 PM	Yes	None
G-3	No discoloration	None detected	12/2/2009	12:27:00 PM	Yes	None
G-4	No discoloration	None detected	12/2/2009	12:30:00 PM	Yes	None
H-1	No discoloration	None detected	12/7/2009	10:08:00 AM	Yes	None
H-2	No discoloration	None detected	12/7/2009	10:12:00 AM	Yes	None
H-3	No discoloration	None detected	12/7/2009	10:14:00 AM	Yes	None
H-4	No discoloration	None detected	12/7/2009	10:17:00 AM	Yes	None
I-1	No discoloration	None detected	11/16/2009	1:40:00 PM	Yes	None
I-2	No discoloration	None detected	11/16/2009	1:40:00 PM	Yes	None
J-1	No discoloration	None detected	11/16/2009	1:40:00 PM	Yes	None
J-2	No discoloration	None detected	11/16/2009	1:40:00 PM	Yes	None
K-1	No discoloration	None detected	1/15/2010	10:30:00 AM	Yes	None
K-2	No discoloration	None detected	1/15/2010	10:30:00 AM	Yes	None
L-1	No discoloration	None detected	1/21/2010	9:00:00 AM	Yes	None
L-2	No discoloration	None detected	1/21/2010	9:05:00 AM	Yes	None

*PID = Photoionization detector.

Appendix A

Chronological Photographic Log of
Bayo Wastewater Treatment Plant Demolition

October 7, 2009

Site visit 1 pm. Nine observations made in the sludge beds (Structure Groups B and C), two in a secondary clarifier (Structure E), and four in a trickling filter (Structure F). No odors or discoloration. Negative field-screening results. Photos taken.



Observation point B-1



Observation point B-2



Observation point B-3



Observation point B-4



Observation point B-5



Observation point C-1



Observation point C-2



Observation point C-3



Observation point C-4



Observation point E-1



Observation point E-2



Structure F, observation points F-1 through F-4

October 8, 2009

Site visit. Two observations made in sludge beds (Structure Group A). No odors or discoloration. Photos taken.



Observation point A-2



Observation point A-3

October 9, 2009

Site visit 9:30 am. General observations. No concerns noted.

October 14, 2009

Site visit. Demolition of secondary clarifier (Structure E) in progress. Unit previously observed. No concerns noted. Photos taken.







October 15, 2009

Site visit. Observed demolition of chlorine contact chamber. Photos taken.







October 19, 2009

Crew finished demolition of chlorine contact chamber and will move to secondary clarifier (Structure D). Crew reported no unusual observations. Observation did not show any signs of discoloration or other indicators of concern. Photos taken.









October 20, 2009

Crew finished demolishing secondary clarifier (Structure D). Visual observation (observation points D-1 and D-2) did not show any signs of discoloration or concerns. Photos taken.









October 22, 2009

Work crew punched holes below the trickling filter (Structure G). No unusual observations or concerns. Visual observation showed no sign of discoloration. No abnormal olfactory observations. Photos taken.









October 26, 2009

Excavator moved to the sludge beds; now in the process of pulling up concrete walls. Work is being done on the southernmost beds, which were previously cleared. No further excavation points within the fence area exposed, so no field observation were made. Photos taken.





November 2, 2009

Material pulled up from the sludge beds was not to be buried there per instruction of Andrew Alarid (Los Alamos County project manager). That area is intended for composting. A pit will be dug between the former clarifiers; material will be buried in that location. Demolition has begun on clarifier (Structure E). Tomorrow morning the County's hazardous materials contractor will determine how best to manage the mercury from the two towers above trickling filters (Structures G and H). Operator made an observation of a light-colored material located at the northernmost corner drying bed. He was not concerned but had not noticed the material before. Upon closer inspection, the material turned out to be a dried cluster of snail shells (first photo). No other unusual visual or olfactory observations. Photos taken.











November 5, 2009

Work was being done on the secondary clarifier (Structure E). A pit has been dug and contains debris; it is located below where secondary clarifier (Structure D) had previously been. We did not get a chance to talk to the operator who was busy working on the clarifier. We will return tomorrow. No unusual visual or olfactory observations. Photos taken.





November 12, 2009

Rock removal from trickling filters (Structures G and H). Operator is removing steel from primary clarifiers I and J and will punch holes in it later today. He dug a hole next to the primary clarifiers to be used to bury materials previously buried in a hole near the secondary clarifiers, which are to be dug up. No unusual visual or olfactory observations. Photos taken.








November 16, 2009

Rock removal from the trickling filters (Structures G and H) continues. One observation made while the operator was removing material from a sludge bed (observation point A-1). Holes punched in the primary clarifiers. Four observation points made in primary clarifiers (Structures I and J); 12 remain. No unusual visual or olfactory observations. Photos taken.















November 20, 2009

Rock from trickling filter (Structure G) has been completely removed. Work has started to remove the rock from trickling filter (Structure H). There is no work today. No unusual visual or olfactory observations. Photos taken.





November 24, 2009

The primary clarifiers were collapsed in and buried. Rock removal from trickling filter (Structure H) is approximately 25% complete. The rock is being piled near the site entrance. The steps and sidewalk near the digester have been cut and removed. Mercury remains in the towers and is scheduled to be removed 12/2/2009. No unusual visual or olfactory observations. Photos taken.











November 30, 2009

Rock continues to be removed from trickling filter (Structure H). The structure next to the digester (the sludge heater house) was taken down and the surrounding area was being cleaned up. No unusual visual or olfactory observations. Photos taken.











December 2, 2009

Southwest Hazard Control (Tucson, AZ) removing mercury from the towers in trickling filters (Structures G and H). Over 120 lb was removed from the tower of trickling filter ((Structure G). Holes were punched in the floor of trickling filter (Structure G), and we made four more observation points. No unusual visual or olfactory observations. Photos taken.








December 7, 2009

Mercury has been removed from trickling filter (Structure H). Holes were punched in the floor and four more observation points were made. There were no unusual visual or olfactory observations. Photos taken.













December 14, 2009

A pit will be dug and the remaining rock from the west trickling filter will be buried in it. Concrete material buried near the drying beds will be dug up and reburied within the fence area. There will be a meeting later today to discuss methods of demolishing the digesters and waste management. No unusual visual or olfactory observations.

December 21, 2009

Buried material continues to be removed from the drying bed area and transported to the pit within the fence line. We were unable to speak with the operator regarding the schedule of the digester demolition. No unusual observations. Photos taken.





January 6, 2010

The lid of the secondary digester was removed. Operator said they plan on excavating the solids in the tank tomorrow and transferring them to Pojoaque for disposal. Approximately 10 ft of sludge at the bottom of the tank needs to be removed before the crew can begin the demolition of the tank. No unusual visual or olfactory observations. Photos taken.











January 11, 2010

Work began on the primary digester. Operator is in the process of removing the sludge from the bottom of the tank. Tomorrow he plans to remove the concrete located at the top of the digester. Sludge from the secondary digester has been removed; the plan is to collapse the tank and bury the rubble. No unusual visual or olfactory observations. Photos taken.









January 13, 2010

The concrete top of the primary digester has been taken down. All sludge has been removed from it. The operator is working on removing remaining sludge in the secondary digester. No one will be working tomorrow (1/14/2010), but work will resume on Friday and Saturday. No unusual visual or olfactory observations. Photos taken.







January 15, 2010

Two more observation points were made. K-1 and K-2 were located at the secondary digester. No unusual visual or olfactory observations. Operator is continuing to demolish the digesters. We are hoping to make our remaining observations on Tuesday, 1/16/2010. Photos taken.







January 20, 2010

Operator has completed the demolition of the secondary digester and the digester house connecting the two digesters. He is continuing to work on the primary digester. No unusual observations. Photos taken.









January 21, 2010

Demolition of the primary digester is being completed and should be finished by the end of the day. Remaining two observation points were made (L-1 and L-2). No evidence of discoloration. No unusual olfactory observations. No other unusual visual observations. Photos taken.











February 9, 2010

Approximately 90% of the site has been brought to grade-level. All that remains is a small debris fill to be covered and leveled. The rock pile has been moved or buried. No other concerns. Photos taken.








February 9, 2010, continued







February 17, 2010

Entire site has been brought to grade-level. This observation verifies completion of the site activity. No unusual observations. No employees at were work site at the time of the inspection. Heavy equipment remains on site. Photos taken.








Appendix B

Trickling Filter Rock Wipe Sample
and Radiation-Screening Results
(on CD included with this document)