Work Plan for Pilot Investigation of the Buckman Well Field Piezometers

Introduction	This work plan presents an alternate pilot sampling approach for the existing piezometers within the Buckman well field (BWF) (Figures 1 and 2). This work plan will be implemented as an interim step to the current requirement to implement the "Work Plan for Enhanced Groundwater Monitoring in the Buckman Well Field" (hereafter, Enhanced Monitoring Work Plan), as approved with modifications by the New Mexico Environment Department (NMED) in its letter dated September 1, 2010. Information gathered during this pilot investigation will be used to determine the appropriate subsequent actions within the BWF and specifically whether the NMED-approved scope of the Enhanced Monitoring Work Plan is still appropriate for implementation. The overall approach to the work proposed in this plan follows from the conceptual model presented in the Enhanced Monitoring Work Plan.
Objectives	The objectives for this work plan are (1) to assess the general representativeness of groundwater obtained from the piezometers without redevelopment or removal of downhole objects or obstacles; (2) if data are representative, to assess whether there is any indication of contamination from Los Alamos National Laboratory (the Laboratory) in groundwater obtained from the piezometers; and (3) to gather data to supplement existing information to assess whether the groundwater produced in the BWF has a recognizable component of water that originates from beneath the Pajarito Plateau. Presently, the Laboratory collects samples on a quarterly basis from supply wells Buckman 1 (B-1), B-6, and B-8. Although groundwater-quality data from these water-supply wells directly informs the quality of water delivered into the BWF treatment and distribution system, discrete-horizon data can inform whether a distinct water quality is present within the zone sampled by each piezometer.
Proposed Scope	The following scope of work is proposed: The Laboratory will collect samples using a nondedicated Bennet pump from piezometers SF-2b, SF-3a, and SF-4a, which are all near or within the zone screened by nearby water-supply wells B-1 and B-8 (Figure 3). Sampling will also be conducted in piezometer SF-4c, which is in a shallow groundwater zone that shows water-level responses consistent with changes in stage in the Rio Grande. Field parameters, including dissolved oxygen, specific conductance, temperature, pH, and turbidity, will be collected using flow-through cells. The field parameter data will be used to determine if stability in parameters is achieved a maximum of 3 casing volumes of water is removed for each piezometer. Two rounds of samples are scheduled to be collected approximately 3 mo apart from each of the piezometers listed above and analyzed as described in Table 1. Samples SF-2b, SF-3a, and SF-4a will also be analyzed for stable isotopes of oxygen and deuterium and delta C-13 to assist in addressing the objective of assessing potential mixing of waters within the BWF. The data from these two rounds of sampling will be evaluated along with existing analytical data and other information to address the objectives of this work plan. The results will be presented in a report that will also include recommendations for future monitoring within the BWF and the potential actions with respect to use of the piezometers as monitoring points.
Schedule	The target schedule for starting the initial sampling round in the piezometers is September 2011. This schedule is proposed under the assumption that the Laboratory is able to obtain approval for a notice of intent to discharge that allows direct and well-managed land application of purge water without the need for storage. The second round of sampling will be conducted in January 2012. The report will be submitted to NMED by May 15, 2012.

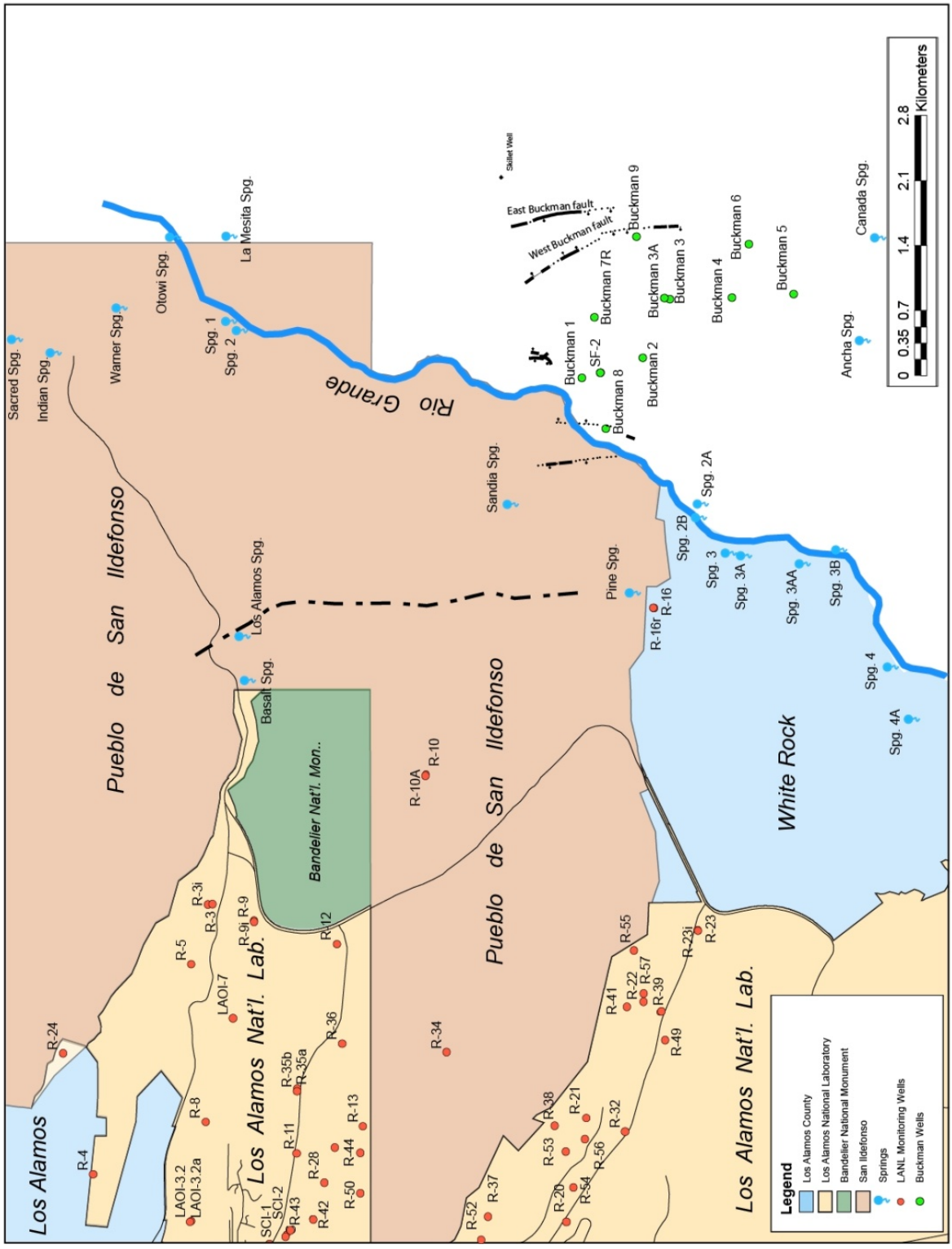
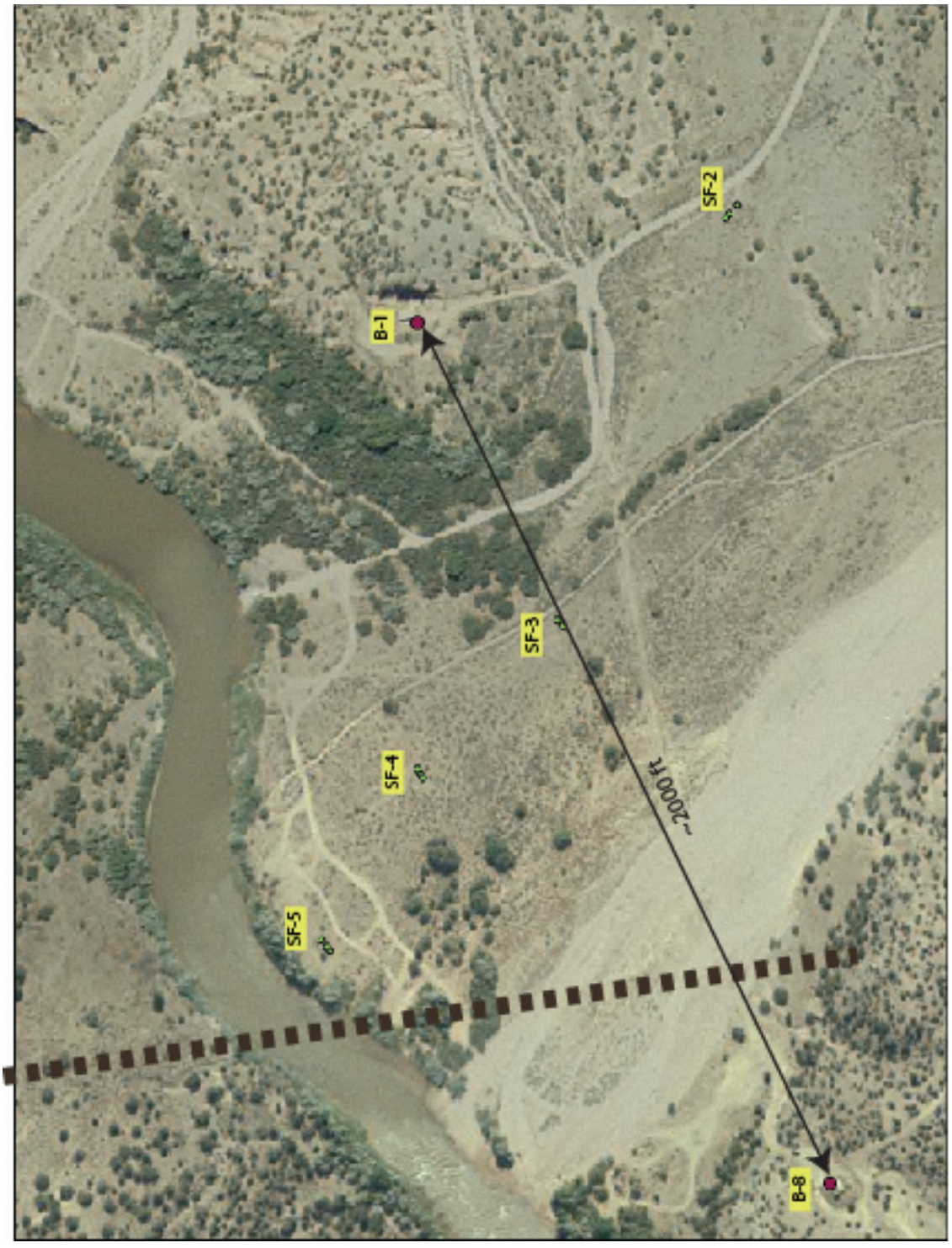
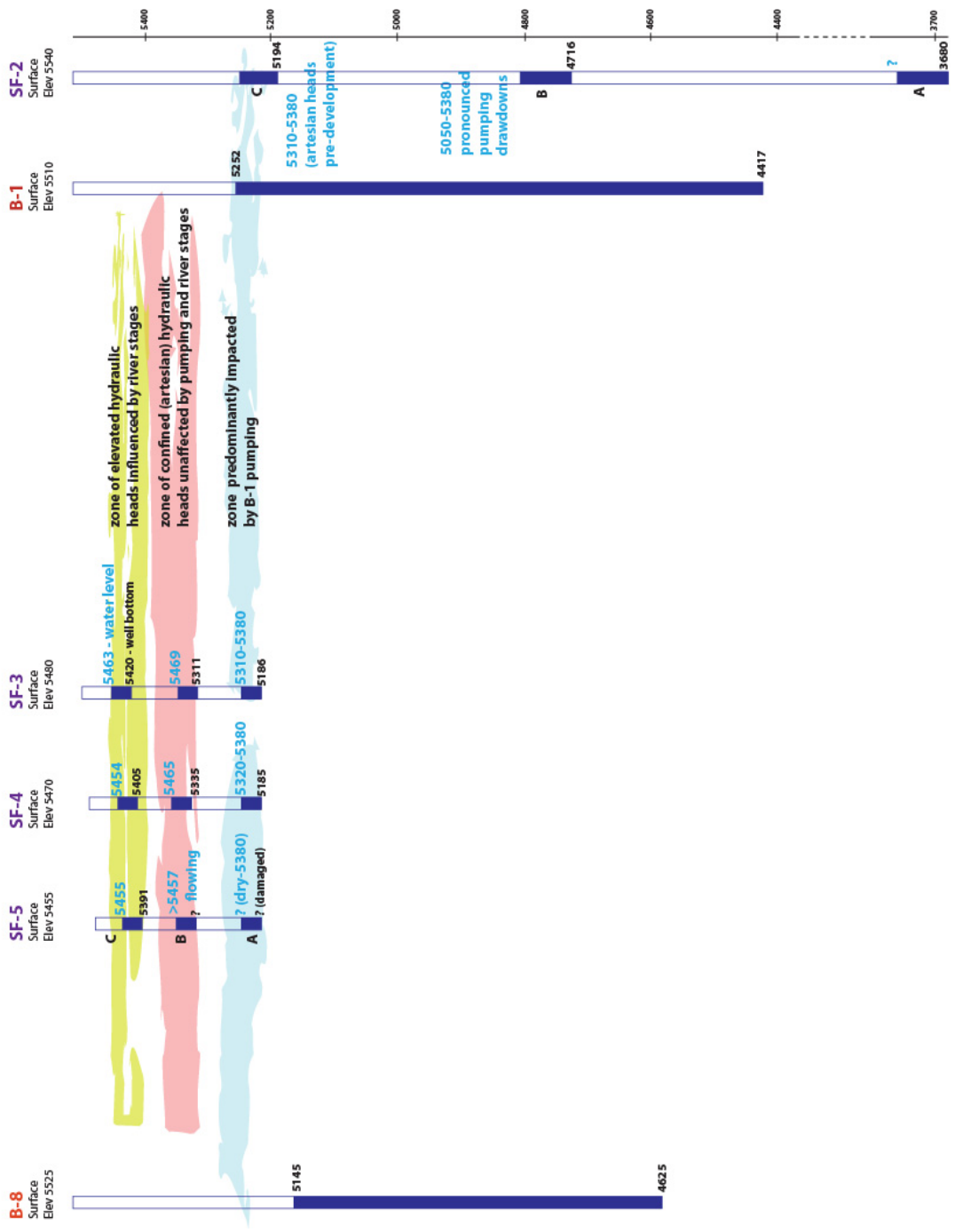


Figure 1 General location of BWF



Note: The dashed line shows the location of a potential fault zone.

Figure 2 Location of Buckman piezometers SF-2, SF-3, SF-4, and SF-5 and water supply wells B-1 and B-8



Note: The observed water levels (approximate) are provided in blue.

Figure 3 Conceptual hydrogeologic cross-section showing the depths of piezometer and water-supply well screens

Table 1
Analyte Suites for Select Buckman Well Field Piezometers

Analytes	Analytical Method	Analytical Method Description
Metals		
Target analyte list metals + U (total)	EPA:200.7/6010 and EPA: 200.8/6020	Inductively Coupled Plasma Atomic Emission Spectrometry and Inductively Coupled Plasma Mass Spectrometry
Mercury	EPA 245.2	Cold Vapor Atomic Absorption
General Inorganics		
Total Dissolved Solids	EPA:160.1	Gravimetric
Anions: Cl, F, SO_4, Br	EPA:300.0	Ion Chromatography
Alkalinity	EPA:310.1	Titrimetric
Hardness	SM:A2340B	Titrimetric
Ammonia	EPA:350.1	Colorimetric
Nitrate/Nitrite	EPA:353.2	Automated Flow Injection
Perchlorate	SW846 EPA 6850	High Performance Liquid Chromatography Electrospray Ionization Mass Spectrometry
Radionuclides		
Americium-241	HASL-300	Chemical Separation Alpha Spectroscopy
Isotopic Plutonium	HASL-300	Chemical Separation Alpha Spectroscopy
Isotopic Uranium	HASL-300	Chemical Separation Alpha Spectroscopy
Cesium-137	EPA:901.1	Gamma Spectroscopy
Radium-226	EPA:903.1	Radon Emanation
Radium-228	EPA:904.4	Radiochemical
Stronium-90	EPA:905.0	Gas Flow Proportional Counting
Tritium	Low Level H-3	Electrolytic Enrichment