



**Mariano Lake Mine
McKinley County, New Mexico**

**Interim Removal Action
Final Removal Site Evaluation
Report**

**Prepared for:
Chevron Environmental Management Company**

**Prepared by:
ARCADIS U.S., Inc.**



**Revision 1
March 5, 2013 Project
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Rev. 1

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Acronyms and Abbreviations

AOC	Administrative Order on Consent
ARCADIS	ARCADIS U.S., Inc
AUM	abandoned uranium mine
bgs	below ground surface
BIA	Bureau of Indian Affairs
CH	characterization
Chevron	Chevron U.S.A., Inc.
CEMC	Chevron Environmental Management Company
cpm	counts per minute
cy	cubic yard
DCRM	Dinétahdóó Cultural Resources Management
DGPS	Differential Global Positioning System
DRO	diesel range organics
F	Fahrenheit
FS	full suite
HASP	Health and Safety Plan
IRA	Interim Removal Action
µg/kg	micrograms per kilogram
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MLM	Mariano Lake Mine
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NNEPA	Navajo Nation Environmental Protection Agency
ORNL	Oak Ridge National Laboratory
PCB	polychlorinated biphenyl
pCi/g	pico-curies per gram
QAPP	Quality Assurance Project Plan
RSE	Removal Site Evaluation
Site	Mariano Lake Mine Site in McKinley County, New Mexico



Acronyms and Abbreviations

SOW	scope of work
SVOC	semi-volatile organic compound
TCP	traditional cultural place
TPH	total petroleum hydrocarbons
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound
WSW	Water supplywell



1. Introduction

The Mariano Lake Mine Site (Site) is an abandoned uranium mine located in McKinley County, New Mexico, that operated from 1977 to 1982. This Final Removal Site Evaluation (Report) describes the objectives, work performed, and results of a Removal Site Evaluation (RSE), which was performed by ARCADIS U.S., Inc. (ARCADIS) on behalf of Chevron Environmental Management Company (CEMC) as part of an Interim Removal Action (IRA). The Report also documents other work performed at the Site including background gamma scanning, a vegetation survey, fence repair and replacement, and chip sealing of roads. The activities described in this Report are consistent with the tasks outlined in the Scope of Work (SOW) in Attachment A of the Administrative Order on Consent (AOC) IRA for the Mariano Lake Mine Site between the U.S. Environmental Protection Agency (USEPA) and Chevron U.S.A., Inc. (Chevron), which was executed on July 28, 2011 (USEPA 2011).

1.1 Site Description and Background

The Site is located approximately 25 miles east of Gallup, New Mexico, in the southeast portion of the Navajo Nation (Figure 1-1). The geographic coordinates for the approximate center of the Site are latitude 35° 32' 49.82" north and longitude 108° 16' 45.60" west. The Site occupies approximately 31 acres in a rural area of northwestern New Mexico and includes two distinct separate areas, the eastern mine area (12.5 acres) and the western mine area (18.5 acres). Approximately six residences are located in the vicinity of the Site, the closest lying approximately 100 feet east of the eastern property boundary. In addition, two former water wells (WSW-1 and WSW-2) are located south of the Site (Figure 1-1). During operations, the Site consisted of a single mine shaft that was drilled to a depth of approximately 519 feet. The shaft was located in the eastern mine area. The western mine area was used as a dewatering pond. Also adjacent to the Site are various access/perimeter roads, a parking lot area, a bermed area, and washes.

The Site lies within the San Juan Hydrologic Basin, which has four major underlying aquifers and various smaller shallow alluvial aquifers. These major aquifers, in descending order, are the San Juan Unit, Dakota, Navajo, and Coconino aquifers. The Dakota aquifer provides domestic water to a majority of the drinking water wells in the southeastern portions of the Navajo Nation. Geologic materials in the unsaturated zone between ground surface and the top of the aquifer consist of Quaternary-age alluvium of varying depth and bedrock. Well WSW-1 was measured in April of 2012. Water level within WSW-1 was found to be 553.5 feet below ground surface (bgs).

The Site is located in the southeastern portion of the Colorado Plateau Physiographic Province. The plateau is characterized by large regions of folding with broad uplifts and basins. The Site is located at the juncture of several of these major structures: the San Juan Basin, the Zuni Uplift, and the Defiance Uplift. The native soils within the area of the Site generally consist of well-drained silty sands and inorganic silts and clays, characteristic of a semi-arid pinion-juniper region.

Potential evaporation in New Mexico is much greater than average precipitation in other climates. The annual net pan evaporation is approximately 54 inches. Wind speeds over the Site are usually moderate, although relatively strong winds often accompany occasional frontal activity during late winter and spring months. Based on data gathered from the Gallup Airport, winds predominate from the southwest and west. Daily extremes in temperature reach as high as 100° Fahrenheit (F) in summer and as low as -34 °F in winter. The average temperature in Gallup, near the Site, ranges between 29 °F in January and 68 °F in July. Gallup receives an average of 0.8 inch of precipitation in January and 2 inches in August, with a total annual average precipitation of 11 inches.

The Site is within the Navajo Nation, which covers more than 27,000 square miles in portions of Arizona, New Mexico, and Utah. Widespread uranium mining occurred on the Navajo Nation beginning in the early 1900s. Peak uranium mining activity occurred between the 1950s and 1980s in support of the U.S. Government's defense programs. Small amounts of land throughout the Navajo Nation were disturbed by surface and underground uranium mining. More than 1,200 mine features (e.g., portals, prospects, rim strips, pits, vertical shafts, or waste piles) associated with abandoned uranium mines (AUMs) have been identified. More than 600 AUM sites or related areas have been mapped throughout and within 1 mile of a residential property. A Navajo Nation uranium five-year plan was initiated in October 2007 regarding uranium impacts on the Navajo Nation properties, and a directive was issued to have federal agencies collaborate with the Navajo Nation to address the issue. Both USEPA and the Navajo Nation Environmental Protection Agency (NNEPA) were selected to lead the cleanup efforts (USEPA 2008, USEPA, 2011).

2. Initial Phases of Work

In accordance with the AOC SOW, the IRA for the Site includes four phases:

- Phase 1 – Cultural Resources Survey, Background Study, Gamma Scanning, and Signage

- Phase 2 – Fencing repair
- Phase 3 – RSE
- Phase 4 – Paving Roads and Applying Sealant to Road Shoulders and Parking Area

The IRA also includes additional limited gamma scanning of perimeter areas around homesteads.

The initial work at the Site was conducted independently of Phase 3 and included Phases 1, 2, and 4; the results of which are presented in this Report as individual documents (Appendices A, B, C, D, and E). For this reason, Phases 1, 2, and 4 are presented before Phase 3.

All phases of work were conducted under Work Plans approved by USEPA and NNEPA (ARCADIS 2011a, 2011b, 2011c, 2011d, 2011e, and 2012). Field work was also conducted under the guidance of the approved Health and Safety Plan (HASP) in accordance with the AOC SOW.

2.1 Phase 1 – Cultural Resources Survey, Background Study, Gamma Scanning, and Signage

2.1.1 Cultural Resources Survey

A Cultural Resources Inventory study was performed by Dinétahdó Cultural Resources Management (DCRM), which conducted a literature search, archaeological inventory, and ethnographic interviews (DCRM 2011). The literature search did not reveal any archaeological sites recorded within a 300-foot radius of the project area. Other archaeological sites in the vicinity are more than 1 mile from the project area.

DCRM also identified 15 isolated occurrences determined not to be part of archaeological sites; five traditional cultural places (TCPs), and one unmarked burial area. These features are located outside of the eastern and western mine areas, but are located within the project area. None of the features identified merit protection under the American Indian Religious Freedom Act or the Native American Graves Protection and Repatriation Act.

Two features were identified as archaeological sites that are greater than 50 years old, but less than 100 years old, and therefore may not be eligible for protection under the Archaeological Resource Protection Act. The cultural resource survey recommended that these areas be avoided during any site activities – this recommendation was adhered to during all subsequent phases of work. The cultural resource survey is included in Appendix A.

2.1.2 Background Study and Limited Gamma Scanning

Phase 1 included a background study, a limited gamma surface scan of portions of the Mariano Lake Mine (MLM) area, and the installation of warning signage on mine fences.

The objectives of the Phase 1 background study and gamma scan included:

- Characterization of background areas for metals and gamma concentrations at locations undisturbed by mine areas in order to provide a comparison to measurements taken at the Site and for future Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) reference areas.
- A confirmation of the extent of the estimated area with elevated gamma radiation that was previously surveyed by USEPA, including appropriate step-outs to ensure that all potentially elevated radiation areas were surveyed. The areas investigated include the eastern and western mine areas, perimeter roads, the parking area, the bermed area, and unnamed washes #1 and #2 (Figure 1-1).
- Use of gamma data to determine soil sample locations for the Phase 3 RSE.
- Collection of background gamma data to estimate site-specific background gamma values that was used to develop an investigation level to guide subsequent investigative work.

A background soil study was performed in an area undisturbed by uranium mining upwind of the Site. Two background areas were identified south of the Site, which are approximately 1,500 feet south of the mine footprint (Figure 1-1). The background areas were observed during a May 2011 Site walk to be undisturbed, and historical photographic documentation confirms that the areas were outside of the mine footprint and mining activities.

Surficial soils from the background areas were sampled from 0 to 6 inches from a total of 18 aliquots at each area in accordance with MARSSIM guidelines (USEPA 2000). Samples were homogenized and sent for laboratory analyses for stable metals (arsenic, molybdenum, selenium, vanadium, uranium, and mercury). Samples were also sealed and allowed to equilibrate and analyzed by gamma spectroscopy. Results included radium-226, thormium-232, and potassium-40. A gamma surface scan was also conducted at each background area to establish background gamma counts. Details of the background study are presented in Appendix B.

The gamma scan field event was performed from June 6 to June 9, 2011. The gamma scan produced a map of gamma count rate in the MLM area. In addition to the planned gamma scanning transects, three additional areas were scanned at the request of NNEPA and included a homesite north and midway between the western and eastern mine areas, a triangular area north of the bermed area formed by two parts of unnamed wash #1, and Old Gulf Mine Road from Bureau of Indian Affairs (BIA) 49 (the highway) to the eastern mine area. The gamma scan report is included in Appendix B.

2.1.3 Signage

Fifteen bilingual signs (English and Navajo) were placed on the fences around the eastern and western mine areas, approximately 5 feet above the ground, warning residents of the potential for radiation exposure. The signs were placed at the gates and various locations along the fence and are visible to individuals in vehicles or walking either off or on the perimeter roads. Photographs of the signage installations are included in Appendix B.

2.2 Phase 2 - Fencing, Soil Tackifier, and Vegetation Assessment

2.2.1 Fencing

Fencing and gate repair and replacement activities commenced on October 10, 2011 and were completed by October 31, 2011. ARCADIS provided health and safety and construction oversight of the fencing work activities performed by Merrill Fence Company (ARCADIS' subcontractor). Approximately 1,600 feet of damaged or non-existing fencing was replaced with 6-foot high, nine-gage, 2-inch mesh with a 1 and 5/8-inch schedule 40 steel top rail with three-strand barbed wire. Fencing repairs consisted of replacing 450 feet of barbed wire, 114 feet of fence sections, and 270 feet of top rail. Repairs were completed where barbed wire and/or top rail were

missing or where fence sections were in poor condition that sections could not be manually repaired.

Fence debris (poles, wire fencing, and concrete anchors) derived from fencing repair work remained within the eastern and western mine areas at the location where it was generated, while a fence sampling program was implemented, and surface wipe samples were submitted for laboratory analysis in the fall of 2011. Laboratory results were received and evaluated to determine the level of radioactivity which guides disposal options. The fence material was determined to be below regulatory concern for removable radiation, and could be disposed of at a Chevron-approved Waste Management facility in Rio Rancho, New Mexico. ARCADIS coordinated with Merrill Fence Company and Waste Management to coordinate the pickup of fence debris in April 2012.

2.2.2 Soil Tackifier

A soil tackifier was applied at the parking area immediately east of the eastern mine area. The parking area covers approximately 8 acres, which includes a portion of the road adjacent to the eastern mine area. It was assumed that trucks were parked in this area along with employee and other support vehicles during operation of the former mine. Results of the IRA Phase 1 gamma survey and previous gamma scanning by Ecology & Environment, Inc. suggest that the area of elevated gamma in the parking area is relatively small and potential exposure to humans is low for common scenarios (Ecology & Environment, Inc. 2010). Based on the gamma scan data, ARCADIS evaluated the need to fence the area and recommended use of a soil tackifier instead of a fence, which is documented in a September 14, 2011 Memorandum in Appendix C. The recommendation to apply a soil tackifier in place of the fence was approved by USEPA. On October 27, 2011, ARCADIS and an ARCADIS subcontractor spread a liquid soil tackifier on approximately 2 to 3 acres of the parking lot area. Information on the soil tackifier application is documented in a December 6, 2011 Memorandum that is also included in Appendix C.

2.2.3 Vegetation Assessment

ARCADIS conducted a vegetation assessment from August 30 to September 1, 2011. The objective of the assessment evaluation was to characterize the current (baseline) plant communities prior to any remedial activities to assist in the evaluation of potential restoration alternatives. Surface soil conditions were also evaluated for potential use in future Site reclamation activities.

Twenty-three sampling locations were randomly located throughout the MLM area. Each sampling location had X-shaped transects bisecting the location wherein 100 samples were collected along each arm of the X. Samples were analyzed for ground cover, species present, and height interval for each species.

The survey identified 70 plant species across the Site. In general, the eastern and western mine areas are dominated by herbaceous species and scattered low-lying shrub growth. Pinion-juniper woodlands surround the Site. Soils are characterized as consistent throughout the sampling regions and range from dark brown sand to sandy loam with a low organic content.

The vegetation assessment is included in Appendix D.

2.3 Phase 4 – Road Mitigation

The Phase 1 gamma scan confirmed elevated gamma counts along perimeter roads at the MLM. Phase 4 included chip-seal paving of perimeter roads and soil tackifier application to the road shoulders. Road mitigation work was completed on 5,736 linear feet of the perimeter roads surrounding the mine areas. Perimeter road surfaces were prepared for chip seal using standard construction equipment to level and fill depressions and smooth out the shoulders. The prepared road surfaces were coated with 625 gallons of tackifier, including the shoulders, to reduce erosion. Approximately 3,017 gallons of tackifier material was sprayed onto the perimeter road surfaces, followed by 2,900 gallons of heated emulsion, and 116 tons of aggregate was uniformly spread and rolled until a chip seal covered the perimeter road surfaces. After application of the chip seal, the perimeter road surfaces were swept, which completed the road mitigation work activities.

A detailed road mitigation summary memorandum is included in Appendix E.

3. Phase 3 Removal Site Evaluation

Phase 3 RSE work was completed in accordance with Section 5.3 of the AOC's SOW as described in the Phase 3 RSE Work Plan (ARCADIS 2012). The objectives of Phase 3 were to:

- Characterize soils to a sufficient depth to confirm the absence of impacts or until native soil or bedrock was reached.

- Collect and analyze soil samples from a minimum of eight locations, four from each of the eastern and western mine Site areas, for a full suite of constituents that targets locations of former mine operations.
- Sample and analyze groundwater samples from two existing groundwater wells (WSW-1 and WSW-2).
- Perform localized gamma surveys at various locations where the Phase 1 transect gamma survey indicated an isolated area with elevated gamma readings.

3.1 Sampling Events

Two sampling events were conducted to complete the Phase 3 RSE soil sampling: October 31, 2001 through November 4, 2011 (the fall 2011 event) and April 23, 2012 through April 27, 2012 (the spring 2012 event). During the initial fall 2011 event, poor weather conditions affected collection of all samples and the field event was approved by USEPA to be postponed until April 2012.

The fall 2011 event consisted of test-pit excavation at sampling locations using a backhoe. Test pits were excavated at predetermined intervals: 0 to 2 inches (in) below ground surface (bgs), 0 to 6 inches bgs, 18 to 24 inches bgs, and 36 to 48 inches bgs. A 30 second count rate was recorded, and if elevated field gamma count readings were encountered, excavations were continued at 6-inch intervals until gamma readings were less than two times the background and/or native materials were reached, which typically consisted of clay or bedrock (sandstone).

During the spring 2012 event, all samples were collected using the same sampling protocol detailed in the Phase 3 RSE Draft Work Plan, although subsurface sampling was completed with a direct-push drill rig rather than a backhoe. Direct-push drilling is an industry standard method that consists of using a small track-mounted drill rig to advance a 2-inch-diameter, hollow, continuous-core sampler to required depths. This method allows a core of a sample to be retrieved while leaving drive rods in the ground to maintain the integrity of the borehole. The core was logged and scanned by a field geologist using a pancake Geiger-Mueller (GM) detector. Down-hole gamma counts were recorded with a 1-inch by 1-inch gamma detector that was lowered within the direct-push drilling rods left in the ground. A 30 second count rate was measured at 6-inch intervals.

All sample locations were field located using a Trimble® GeoXH Differential Global Positioning System (DGPS). Field data was recorded on individual sampling sheets (Appendix F-1).

3.2 Analytical Methods and Quality Assurance

All sampling and analyses were completed according to the Work Plan and Work Plan Addendum, as well as the Approved Quality Assurance Project Plan (QAPP) (ARCADIS 2011c and ARCADIS 2012).

Overall, the laboratory and field quality control and quality assurance data were found to be acceptable in all sample delivery groups. Field soil sampling records are included in Appendix F-1; sample data packages and validation reports are included in Appendix F-3.

The fall 2011 event included sampling for radionuclides and metals (Characterization [CH] Samples), as well as a limited number of samples for an expanded (Full Suite [FS] Samples) analytes list:

- *Characterization Samples:* Radium-226 activity by USEPA Method 901.1; metals (arsenic, molybdenum, selenium, uranium, and vanadium) by USEPA Method 200.8; and mercury by USEPA Methods SW7470A, SW7471A, 6020A, and 245.1.
- *Full Suite Samples:* Radium-226 activity by USEPA Method 901.1; metals (arsenic, molybdenum, selenium, uranium, and vanadium) by USEPA Method 200.8; mercury by USEPA Methods SW7470A, SW7471A, 6020A, and 245.1; volatile organic compounds (VOCs) by USEPA Method 8260/8270; semi-volatile organic compounds (SVOCs) by USEPA Method SW8270; polychlorinated biphenyls (PCBs) by USEPA Methods SW8082 and 608; total petroleum hydrocarbons (TPH) by ALS Laboratory SOP 406 and SOP 425; and explosives (including perchlorate) by ALS Laboratory SOP 404 and SOP 448 and USEPA Methods SW8330 and SW8330B.

Samples of surface and subsurface soils were collected and analyzed in the following areas:

- Eastern and Western Mine Areas – Characterization Suite of Analytes and Full Suite of Analytes

- Perimeter Roads, Parking Area, and Washes – Characterization Suite of Analytes
- Step-outs from Perimeter Roads, Parking Area, and Washes – Characterization Suite of Analytes

Preliminary analysis of the fall 2011 data revealed that the following constituents were detected at the Site in concentrations that warranted further characterization: arsenic, molybdenum, selenium, uranium, vanadium, and radium-226. Other full suite analytes were not determined to necessitate additional analysis due to non-detect or low detectable values. The spring 2012 sampling event included the following analyses:

- Total metals using USEPA Methods 6020 and 200.1 for arsenic, molybdenum, selenium, uranium, and vanadium
- Radium-226 by surrogate using USEPA Method 901.1

All sample delivery groups were validated in accordance with the QAPP and Work Plan (ARCADIS 2011c). Data packages and data validation reports are included in Appendix F-3.

Some data packages from the fall 2011 data had Matrix Spike/Matrix Spike Duplicate (MS/MSD) sample results outside of the control limits for arsenic, uranium, and vanadium (Appendix F-3). These results were flagged “J” meaning the value is estimated.

Some radionuclide results included the following qualifiers:

- G – Sample density was different than the density of the laboratory control sample (LCS)
- LT- Results are lower than the requested minimum detectable concentration (MDC) but greater than the sample specific MDC.
- M3 – The requested detection limit was not met.
- SI – The associated reported values of Bi-214/Eu-152, Bi-214/Co-56, and/or Bi-214/Th-227 occur at similar emissions energies, resulting in the possibility of a

false-positive measurement. These results were given the validation flag of “JN” – the reported concentration is considered an estimate.

- NQ – There was net quantification of undefined peak energy, and therefore the possibility of a false-positive measurement exists. These results were given the validation flag of “J” – the reported concentration is considered an estimate.
- TI – The associated reported values did not meet abundance criterion and the analyte is tentatively identified at the reported concentration. These results were given the validation flag of “JN” – the reported concentration is considered an estimate.

Chloroform was detected in four of the rinsate blanks and in two trip blanks. Chloroform is a common laboratory contaminant and is not likely representative of Site conditions. Because of the relative rarity of chloroform in the natural environment, and the likely laboratory source, these results are also not indicative of a failure in field decontamination or in sample transport.

Methylene chloride was detected in four samples and in a trip blank. All methylene chloride detections were flagged with a laboratory qualifier “B” meaning that this compound was also detected in a laboratory method blank, indicating that detections are likely a result of laboratory contamination and not representative of Site conditions.

2-Butanone was detected in two samples: MLM-WFS-2 (36-48) and MLM-WFS-4 (18-24). 2-Butanone is chemically related to acetone – these chemicals are commonly used as laboratory solvents and likely are not representative of Site conditions, but rather are a laboratory contaminant.

Acetone was detected in two samples: MLM-WFS-2 (36-48) and MLM-WFS-4 (18-24). Acetone is chemically related to 2-butanone – these are commonly used as laboratory solvents and likely are not representative of Site conditions, but rather are a laboratory contaminant.

3.3 Deviations from the Work Plan

Field work was conducted in accordance with the Phase 3 RSE Work Plan; however, several site-specific conditions resulted in minor deviations from the Work Plan that was approved by USEPA:

1. Samples were taken at depths of 0 to 6, 18 to 24, and 38 to 48 inches bgs in the mine areas, and at 0 to 6, 18 to 24, and 36 to 48 inches bgs outside of the mine areas. During the fall 2011 sampling event, a sample at 18 to 24 inches bgs was taken only if gamma counts were observed to be greater than two times background. Boreholes were advanced until: native materials were encountered; field gamma measurements were less than 2-times background; the maximum extent of the back-hoe was reached; refusal due to bedrock; or USEPA approved the abandonment of a borehole (Table 3-1).
2. Opportunity samples were collected at several locations and/or in non-standard sample intervals. These samples were collected at the directive of USEPA and/or NNEPA. These samples were collected in accordance with procedures outlined in the approved Phase 3 RSE Work Plan.
3. During the fall 2011 sampling event, gamma counts near, but higher than two times background readings were observed in fissile clay soils in excavations. As a result, USEPA approved the termination of sampling at locations where native clay soils were encountered, regardless of gamma reading.
4. Poor weather conditions during the fall 2011 sampling event inhibited sample collection, and therefore the sampling event was postponed until the spring. ARCADIS demobilized from the Site on November 4, 2011 and returned to the Site to complete sampling on April 10, 2012. During the period between sampling events, sample results were presented in an interim memorandum, and a Work Plan Addendum was approved by USEPA for the second field mobilization (ARCADIS 2011e and ARCADIS 2012).
5. As of February 2013, site access agreements among BIA, USEPA/NNEPA, and property owners for the two existing groundwater wells have not been fully secured. Therefore, this component of the Work Plan has not been completed. It is anticipated that these access agreements may be secured at a later date, and groundwater sampling will be submitted subsequent to this Report.

An additional monitoring well was identified during site visits subsequent to the two sampling events. This well has been tentatively identified as WSW-3 and will be redeveloped and sampled along with WSW-1 and WSW-2 after access agreements are secured (Figure 1-1).

6. According to the USEPA and the NNEPA, surface water has been observed at a location adjacent to the eastern mine area, between the perimeter road and the eastern mine area fence (Figure 1-1). A surface water sample location (SW-01) was proposed; however, no water was observed in this area during either field sampling event. Therefore, no surface water sample was collected.

3.4 Sample Results

No significant detections of VOCs, SVOCs, PCBs, explosives and perchlorates, or TPH were identified at the Site; therefore, sample discussion and sample results included in Table 3-1 focus on stable metals results and radium-226 activity results. Table 3-1 provides a location-by-location summary of pertinent data collected at each sampling location and depth interval. It includes a description of the soil (color, grain size, textural properties, etc.), analytical sample results, field gamma scan results, and borehole abandonment details. A summary of all analytical constituents is included in Table 3-2.

Maps displaying the spatial distribution of field gamma counts, radium-226 activities, and uranium concentrations are included on Figures 3-1 to 3-15. Field gamma counts for both field events were averaged where multiple readings were taken and compared to site background; absolute field gamma count values can be found in Table 3-1. Figures 3-6 through 3-15 (radium-226 and uranium) present a comparison to the Phase 1 background study concentrations. The Phase 1 background study concentrations are as follows:

- Average radium-226 activity was 0.81 pico-curies per gram in soil (pCi/g).
- Average uranium concentration in background samples was 363 micrograms per kilogram ($\mu\text{g}/\text{kg}$).
- Background field gamma counts for the fall 2011 event averaged 9,461 cpm for surficial measurements and 12,359 cpm for subsurface measurements. Fall 2011 gamma counts were established using a Ludlum model 22-21 scaler/rate meter (serial #73685) coupled with a Ludlum model 44-10 2-inch by 2-inch diameter gamma sodium iodide gamma scintillator probe (serial #302622). The same instruments were used for all sampled areas during the fall 2001 event.

Background field gamma counts for the spring 2012 event averaged 432cpm for surficial measurements and 434 cpm for subsurface measurements as recorded

with a Ludlum model 22-21 scaler/rate meter (serial #73685) coupled with a Ludlum model 44-62 1-inch by ½-inch diameter sodium iodide gamma scintillator probe (serial #63744). The same instruments were used for all sampled areas during spring 2012 event.

Because different meters were used during each field event, field gamma scan data are compared to two different sets of background scan data. On Figures 3-1 to 3-5, symbols for sample locations have been normalized relative to the respective background concentrations. Absolute gamma count values are presented in table 3-1.

The following discusses the soil sample results for each of the areas identified in the AOC SOW.

3.4.1 Background Areas

Two background areas were used to establish background field gamma counts and to establish background concentrations for select metals (arsenic, molybdenum, radium-226, selenium, and uranium) (Figure 3-1). Metals values were established during the Phase 1 background study; detailed discussion of these values can be found in Appendix B. Field gamma count background values were established for both surface and subsurface soils at the time of each respective field event as count values are specific to the instruments deployed in the field (Figure 3-1).

During the spring 2012 event, all down hole gamma radiation detector measurements were made within the steel drilling rods left in the ground to maintain the integrity of the borehole during testing and sampling. A data correlation of the subsurface measurements was completed during the establishment of background conditions at background area 1. Boreholes were first measured without the steel drive rods, and then measured with the drive rods. It was observed that while there was an attenuation of gamma through the rods, the ratio of the count rates with the steel drive rods and those without the drive rods was constant over a range of values (a straight-line correlation). As a result, all subsequent subsurface field gamma measurements were made with the steel drive rods in the boreholes.

Background radium-226 values measured during the Phase 1 background study are anomalously low for the region. The average radium-226 concentration for background areas is 0.81 pCi/g with a standard deviation of 0.14 pCi/g. New Mexico soils average

approximately 1.55 pCi/g (ORNL 1981), which is nearly double the background value measured for the Site.

Similar to the radium-226 data, the background sample concentrations for uranium are low relative to other mines in the region, and low relative to average North American soil concentrations (900 to 900,000 µg/kg) (USEPA 1983). The average concentration for uranium in the background areas is 363 µg/kg (Appendix B). This background average may be biased low, because investigation of the SW846 3050b/SOP 806 Rev 15 method for the preparation and analyses of uranium in soils is not sufficiently aggressive to liberate uranium from silica matrices. In order to provide comparison to the uranium background, all samples collected during the Phase 3 RSE were prepared for analyses using the same preparation method as the background dataset (SW846 3050b/SOP 806 Rev 15). A detailed discussion of the uranium background analysis is included in Appendix B.

Other site background concentrations are as follows:

- Arsenic – 1,789 µg/kg
- Mercury – Non-detect (one sample had a low detection for mercury at 0.44 µg/kg; all other samples did not detect mercury)
- Molybdenum – 261 µg/kg
- Selenium – 262 µg/kg
- Vanadium – 10,872 µg/kg

Background areas were not sampled for VOCs, SVOCs, explosives, PCBs, or TPH.

3.4.2 Eastern Mine Area

Surficial field gamma counts in the eastern mine area ranged from less than two times background to more than four times background (Figure 3-1). The average surficial field gamma count was less than two times background for the fall 2011 sampling event. Though the average surficial field gamma count was more than four times background for the spring 2012 sampling event, only two locations, ECH-07 and EFS-03, had substantially elevated gamma (Figure 3-1). Field gamma counts at depth ranged from less than two times background to more than four times background

(Figures 3-2 to 3-4). The average subsurface field gamma reading was more than four times background.

The majority of gamma readings greater than two times background were measured in the southern and eastern portions of the eastern mine area. During excavation and drilling activities, brick-red, medium-grained sand was observed throughout this area and is associated with the elevated gamma readings (Appendix F-2, Photos 8 and 10). Gamma counts were highest near sample locations ECH-06, ECH-07, and ECH-08, likewise, this sandy soil was observed in all of these excavations (Table 3-1). Despite elevated gamma readings at the maximum depth of these sample locations, the radium-226 data was near two times background for the same locations, suggesting the native materials at depth had been reached (Figure 3-10).

In general, field gamma readings were at or near two times background levels within 4 feet of the ground surface except in the southern and eastern portions of the eastern mine area

Radium-226 was observed at 13 sample locations at greater than two times background (Figure 3-6). Surficial values of radium-226 ranged from 0.99 pCi/g to 132 pCi/g. Subsurface values of radium-226 ranged from 0.91 pCi/g to 153 pCi/g at MLM-ECH-07 (18-24 inches) (Figure 3-7). Similar to the gamma results, the radium-226 values greater than two times background were observed primarily in the southern and eastern portions of the eastern mine area, coincident with the brick-red sand observed in excavations.

Elevated radium-226 values were observed as deep as 10 feet in the southeastern portion of the eastern mine area. Despite localized areas in the eastern mine area, (Figures 3-9 and 3-10), most elevated radium-226 values were at or near two times background levels within 4 feet of the ground surface.

Uranium concentrations were observed at 15 locations greater than two times background within the eastern mine area (Figures 3-10 to 3-15). Surface concentrations area ranged from a minimum of 490 µg/kg to a maximum of 210,000 µg/kg. The average uranium concentration was 16,991 µg/kg in surface soils. The highest concentrations of uranium were co-located with radium and gamma in the southern and eastern portions of the eastern mine area; however, concentrations of uranium in subsurface soils were higher than two times background in all 15 locations in the eastern mine area. The minimum concentration was 840 µg/kg and the

maximum value was 420,000 µg/kg. The average concentration of uranium in the subsurface soils was 47,390 µg/kg.

Intermittent water has been observed by NNEPA and local residents in a small depression adjacent to the southeastern fence line of the eastern mine area (Figure 1-1). A surface water sample was proposed for this area; however, no sample was collected – no water was observed by ARCADIS during either field event.

In the eastern mine area, arsenic concentrations in surface and subsurface samples ranged from 2,100 µg/kg to 9,300 µg/kg and averaged 5,706 µg/kg. Molybdenum concentrations in surface and subsurface samples ranged from 240 to 32,000 µg/kg and averaged 3,434 µg/kg. Selenium concentrations for surface and subsurface samples ranged from 270 µg/kg to 9,900 µg/kg and averaged 2,115 µg/kg. Vanadium concentrations in surface and subsurface samples ranged from 4,300 µg/kg to 56,000 µg/kg and averaged 19,343 µg/kg.

Perchlorate and diesel range organics (DRO) were detected at low values at sample locations ECH-01, EFS-02, and EFS-04. Perchlorate concentrations ranged from 0.15J to 0.73 µg/kg and DRO ranged from 1.8J µg/kg to 24 µg/kg.

3.4.3 Western Mine Area

Surficial field gamma counts in the western mine area ranged from less than two times background to more than four times background (Figure 3-1). Only one location, MLM-WFS-2 (0-6) was more than two times the background level. The average surficial field gamma count in the western mine area is less than two times background. Subsurface field gamma counts ranged from less than two times background to more than four times background (Figures 3-2 to 3-5). The average subsurface gamma count was more than two times background. In general, the southern half of the western mine area had higher field gamma readings than the northern half.

Radium-226 was detected at six surficial locations at values greater than two times background. Radium-226 concentrations ranged from 0.74 LT pCi/g to 5.16 G pCi/g (Figure 3-6). For subsurface sample locations, radium-226 was observed to be greater than two times background concentrations at eight locations and ranged from 0.37 pCi/g to 59.4 pCi/g (Figures 3-6 to 3-10). Radium concentrations were generally higher in the southern half of the western mine area. During drilling operations, a white, crust-like precipitate was observed in soils excavated in the southern portion of the western

mine area (WFS-4, WCH-5 sample locations, Table 3-1). At one location, the borehole was advanced through a black plastic liner material (WFS-1 sample location).

Uranium was detected greater than two times background concentrations at eight surficial locations. Surficial uranium concentrations ranged from 480 µg/kg to 7,900 µg/kg and averaged 1,562 µg/kg. Subsurface uranium concentrations ranged from 320 µg/kg to 480,000 µg/kg and averaged 27,737 µg/kg. Similar to the radium-226 values, the highest concentrations of uranium were in the southern half of the western mine area.

In the western mine area, arsenic concentrations in surface and subsurface samples ranged from 2,200 µg/kg to 69,000 µg/kg and averaged 5,706 µg/kg. Molybdenum concentrations in surface and subsurface samples ranged from 300 to 51,000 µg/kg and averaged 2,464 µg/kg. Selenium concentrations for surface and subsurface samples ranged from 260 µg/kg to 54,000 µg/kg and averaged 2,717 µg/kg. Vanadium concentrations in surface and subsurface samples ranged from 460 µg/kg to 360,000 µg/kg and averaged 20,750 µg/kg. The maximum values were from a single sample point – MLM-WFS-01 (36-48). The concentration of metals at this location is an order of magnitude higher than all other results and may represent an outlier.

DRO was detected at low values at two sample locations, WFS-4 and WFS-2. DRO, and ranged from 1.8 µg/kg to 6.3 µg/kg. Perchlorate was also detected in the same samples at low concentrations that ranged from 0.15 µg/kg to 0.54 µg/kg.

3.4.4 Mine Entrance Road and Perimeter Roads

Bedrock crops out at or near the surface along Old Gulf Mine Road, and is present within 18 inches of the ground surface at all road sample locations except for at sample location ROAD0.7.

Along perimeter roads, surficial field gamma counts ranged from less than two times background to more than four times background. Surficial and subsurface field gamma counts average more than two times background. Generally, field gamma counts were highest along the northern perimeter road. All of the elevated gamma readings were recorded along perimeter roads. None of the sample locations along Old Gulf Mine Road had field gamma readings more than two times background. All field gamma readings were at or lower than two times background below 4 feet bgs, elevated gamma was constrained to the upper 36 inches.

Radium-226 was detected at 14 surficial locations greater than two times background. Radium-226 concentrations ranged from 0.22 pCi/g to 68.3 pCi/g. For subsurface sample locations, radium-226 was detected at eight locations greater than two times background concentrations and ranged from 0.54 pCi/g to 68.3 pCi/g (Figures 3-6 to 3-10). Radium-226 values are generally less than two times background at depths greater than two feet. Radium concentrations were higher along the northern perimeter road as compared to the southern road.

Surficial uranium concentrations ranged from 200 µg/kg to 410,000 µg/kg and averaged 33,880 µg/kg. All surface uranium concentrations were greater than two times background concentrations. Subsurface uranium concentrations ranged from 380 µg/kg to 150,000 µg/kg and averaged 19,054 µg/kg. Uranium concentrations were higher along the northern perimeter road as compared to the southern roads.

Along perimeter roads, arsenic concentrations in surface and subsurface samples ranged from 1,200 µg/kg to 13,000 µg/kg and averaged 4,885 µg/kg. Molybdenum concentrations in surface and subsurface samples ranged from 240 to 14,000 µg/kg and averaged 2,725 µg/kg. Selenium concentrations for surface and subsurface samples ranged from 120 µg/kg to 19,000 µg/kg and averaged 2,983 µg/kg. Vanadium concentrations in surface and subsurface samples ranged from 3,700 µg/kg to 100,000 µg/kg and averaged 23,463 µg/kg.

3.4.5 Parking Lot Area

The parking lot area was sampled using the same sampling nomenclature as the step-out sample locations (Figures 3-1 to 3-15). Bedrock crops out along the northern portion of the parking lot area and therefore sample locations SOCH-18 and SOCH-19 were offset approximately 40 feet from their proposed location to locations where surficial soil was present.

Parking lot area surficial field gamma counts ranged from less than two times background to more than two times background (Figure 3-1). Subsurface field gamma counts ranged from less than two times background to more than two times background (Figures 3-1 to 3-5). Field gamma counts were generally low, and only four locations had field gamma counts greater than two times background readings for both surface and subsurface samples. A single location, SOCH-20, had field gamma down-hole readings greater than two times background to a depth of approximately 9.5 feet.

Surficial radium-226 concentrations ranged from 4.75 pCi/g to 49.9 pCi/g. All surficial sample locations had radium-226 concentrations greater than two times background. Subsurface concentrations ranged from 1.85 pCi/g to 15.6 pCi/g. SOCH-20 had subsurface radium-226 concentrations above two times background at all sample intervals with depth.

Surficial uranium concentrations ranged from 3,900 µg/kg to 40,000 µg/kg. All surficial sample locations had uranium concentrations greater than two times background. Subsurface uranium concentrations ranged from 840 µg/kg to 14,000 µg/kg.

In the parking lot area, arsenic concentrations in surface and subsurface samples ranged from 2,500 µg/kg to 11,000 µg/kg and averaged 6,837 µg/kg. Molybdenum concentrations in surface and subsurface samples ranged from 480 to 2,600 µg/kg and averaged 1,071 µg/kg. Selenium concentrations for surface and subsurface samples ranged from 500 µg/kg to 5,000 µg/kg and averaged 1,444 µg/kg. Vanadium concentrations in surface and subsurface samples ranged from 2,500 µg/kg to 39,000 µg/kg and averaged 17,968 µg/kg.

3.4.6 Bermed Area

Two sample locations, SOCH-1 and SOCH-23, were sampled to characterize the bermed area. These sample locations had an average surficial field gamma reading of less than two times background (Figure 3-1). Subsurface field gamma readings were less than two times background.

Radium-226 in surface and subsurface samples at sample location SOCH-1 were lower than two times the background level; the maximum concentration was 0.82 pCi/g (Figures 3-6 to 3-10). The surficial radium-226 concentration was higher than two times background at sample location SOCH-23 (4.1 pCi/g). Subsurface radium-226 concentration was below two times background at SOCH-23 (0.89 pCi/g at 2 feet bgs and 0.79 pCi/g at 4 feet bgs).

Uranium concentrations were also lower than two times background for sample location SOCH-1; the maximum uranium concentration was 330 µg/kg. Uranium was detected in the surface sample interval at SOCH-23 at a concentration greater than two times background (4,600 µg/kg). All other sample intervals were below two times background.

The maximum arsenic concentration detected at SOCH-1 was 2,600 µg/kg (at 4 feet bgs). SOCH-23 had a maximum arsenic concentration of 6,200 µg/kg detected in surface sample MLM-SOCH-23 (0-2). The maximum molybdenum concentration detected at SOCH-1 was 390 µg/kg. SOCH-23 had a maximum molybdenum concentration of 1,000 µg/kg detected in surface sample MLM-SOCH-23 (0-2). The maximum selenium concentration detected at SOCH-1 was 170 µg/kg. SOCH-23 had a maximum selenium concentration of 940 µg/kg detected in surface sample MLM-SOCH-23 (0-2). The maximum vanadium concentration detected at SOCH-1 was 7,700 µg/kg. SOCH-23 had a maximum vanadium concentration of 22,000 µg/kg detected in surface sample MLM-SOCH-23 (0-2).

3.4.7 Unnamed Washes

Two sample locations, PR-1 and PR-19, were located to characterize the unnamed washes that lie to the northwest and east of the Site during the fall 2011 sampling event (Figure 3-1). None of the samples at these locations were above two times background for any constituent. Bedrock crops out near sample location PR-19 and refusal was met by the backhoe at 1 foot bgs.

PR-1 had a field gamma average less than two times background, a maximum radium-226 concentration of 0.67LT pCi/g, and a maximum uranium concentration of 580 µg/kg. PR-19 had a field gamma average less than two times background, a maximum radium-226 concentration of 0.22U pCi/g (non-detect), and a maximum uranium concentration of 200 µg/kg. Field gamma counts and uranium and radium-226 concentrations were all less than two times background.

The maximum arsenic concentration detected at PR-1 was 2,800 µg/kg. PR-19 had a maximum arsenic concentration of 1,800 µg/kg. The maximum molybdenum concentration detected at PR-1 was 450 µg/kg. PR-19 had a maximum molybdenum concentration of 260 µg/kg. The maximum selenium concentration detected at PR-1 was 320 µg/kg. PR-19 had a maximum selenium concentration of 130 µg/kg. The maximum vanadium concentration detected at PR-1 was 8,200 µg/kg. PR-19 had a maximum vanadium concentration of 4,100 µg/kg.

3.4.8 Step-outs

Surficial field gamma readings for the step-out areas ranged from less than two times background to more than two times background (Figure 3-1). The average surficial field gamma reading was less than two times background only two locations, SOCH-25

and SOCH-26 had substantially elevated gamma (Figure 3-1). Subsurface field gamma readings ranged from 254 cpm to 25,766 cpm. The average subsurface field gamma reading was 16,440 cpm (less than two times background) for the fall 2011 field sampling event, and 411 cpm (less than two times background) for the spring 2012 sampling event.

Surficial radium-226 concentrations ranged from 0.66 pCi/g to 118 pCi/g. The highest radium-226 concentrations were detected southeast of the Site at locations SO-25 and SO-26 (Figure 3-5). Subsurface radium-226 concentrations ranged from 0.56 pCi/g to 15.6 pCi/g throughout all step-out locations.

Surficial uranium concentrations ranged from 320 µg/kg to 96,000 µg/kg. Similar to the radium-226 concentrations, the highest uranium concentrations were located southeast of the Site at SO-25 and SO-26 (Figure 3-11). Subsurface uranium concentrations ranged from 330 µg/kg to 31,000 µg/kg.

At step-out sample locations, arsenic concentrations in surface and subsurface samples ranged from 1,900 µg/kg to 12,000 µg/kg and averaged 5,516 µg/kg. Molybdenum concentrations in surface and subsurface samples ranged from 260 to 9,800 µg/kg and averaged 1,103 µg/kg. Selenium concentrations for surface and subsurface samples ranged from 140 µg/kg to 40,000 µg/kg and averaged 1,768 µg/kg. Vanadium concentrations in surface and subsurface samples ranged from 6,200 µg/kg to 150,000 µg/kg and averaged 19,401 µg/kg.

In general, constituent concentrations at step-out locations were below two times background concentrations (Figures 3-1 to 3-15). At step-out location SO-25, elevated field gamma counts were observed during the Phase 1 gamma transects and confirmed during the spring 2012 sampling event. Further, elevated field gamma readings were generally constrained to the first few inches of soil, meaning that this location is of limited extent both vertically and laterally.

During the spring 2012 sampling event, real-time gamma transects were completed at step-out sample locations SO-25 and SO-26 to determine the extent of surficial gamma in these areas. Figure 3-16 displays the surficial gamma in these locations. Near sample location SO-25, field gamma counts trend east-west, and are contained within the scan area. These traverses with the field gamma detector in the SO-25 area indicate that any materials with elevated gamma/radium-226 concentrations are localized within 100 feet of the sample location. Sample location SO-26 is characterized by significant debris and trash. Although radium-226 and field gamma

measurements in this area are significantly above background, the 3- to 4-foot sample interval at this location (as well as at the adjacent SO-15 location) is below two times background concentration for radium-226, indicating that this feature is shallow.

3.4.9 Homestead Gamma Scan

At the direction of NNEPA, limited surficial soil gamma scanning was performed around three homesteads after the completion of soil sampling during the spring 2012 field event. These homesteads are the future location of full- and part-time residences along Old Gulf Mine Road north of the mine area. The three homesteads include:

- Betsey George Homestead – Located east of Old Gulf Mine Road, this homestead is located open ground where bedrock crops out at the surface. There is little to no vegetation or soil development.
- Mary Lou Frame Homestead – This homestead is located west of Gulf Mine Road and north of the existing Dakai Hogan and property. Vegetation is sparse and consists primarily of pinion, forb, and grass, with sandy-silt loam soil.
- Thomas Dakai Property Location of New Hogan – This property is located west of Gulf Mine Road, southeast of and adjacent to the existing Dakai Hogan property. Vegetation consists of forb and fescue grasses, with sandy-silt loam soil.

All of the homestead areas were analyzed for field gamma counts with a Trimble® GeoXH DGPS coupled with a 2-inch by 2-inch Ludlum Model 44-10 gamma detector (serial068744).

Site background for the homesteads was recorded at background location 1 and yielded an average value of 9,524 cpm.

All homestead areas had gamma count values less than two times the background (Figure 3-16). All values were at or near background (Tables A and B of Appendix F-5). The average field gamma for all of the homesteads was 8,383 cpm (standard deviation = 1,360 cpm).

3.4.10 Field Gamma Scan and Analytical Correlation

This section evaluates the correlation between field gamma scan data in counts per minute with the radium-226 concentration in soils, as requested by USEPA. A review

of the 99 samples taken, 67 samples (approximately 70 percent) have radium-226 detected below 5 pCi/g. Only 22 samples (approximately 22 percent) are greater than 15 pCi/g and only four samples have radium-226 concentrations greater than 100 pCi/g.

A regression analysis was performed between the radium-226 analytical results and the field gamma scan data. Figure 3-17 shows the correlation using all values. The full range of values is dominated by outliers (values greater than 120 pCi/g). There is also a great deal of scatter in the dataset. Figure 3-18 compares the same data, but using only the radium-226 concentrations below 5 pCi/g. The correlation coefficient (R^2) using all data is 0.71 and 0.25 for data less than 5 pCi/g. The R^2 value for data greater than 5 pCi/g is 0.53 (Figure 3-19). The correlation coefficient for all data is interpreted to be a fair correlation, while the correlation for data less than 5 pCi/g is poor.

Figure 3-20 compares all surficial data collected from both the fall 2011 and spring 2012 sampling events. The fall 2011 sampling event has an R^2 value of 0.8; however, this trend is dominated by a few samples at high concentrations. Data less than 5 pCi/g yields an R^2 value of 0.21. The R^2 value for surficial samples during the spring 2012 sampling event is 0.63.

The radionuclides actinium-228 (Ac-228), thorium (Th-232), and potassium 40 (K-40) are naturally occurring. These isotopes or their progeny are gamma emitters and will contribute to the gamma meter count rate during field gamma scanning. The influence of Ac-228 and K-40 can be significant where radium-226 concentrations are less than 5 pCi/g. Due to the likely influence of Th-232 and K-40, the correlation of count rate to radium-226 concentration below 5 pCi/g does not appear to be useful. For concentrations greater than 5 pCi/g, the correlation of count rate to radium-226 may be more useful.

3.4.11 Site Summary and Soil Volumes

Overall, field gamma measurements, radium-226 concentrations, and uranium concentrations at greater than two times background are constrained to the eastern and western mine areas, the western portion of the parking lot area, and the northern perimeter roads. Throughout the Site, the majority of these constituent values that are above two times background are within the upper 4 feet of the ground surface, with the exception of the southern portion of the western mine area, the southern and eastern portions of the eastern mine area, and locally within the parking lot area.

Radium-226 results were used to estimate the volume of soils that are greater than the investigation level throughout the Site. The Investigation Level is defined in the AOC SOW as 1.24 pCi/g plus the site background, or 2.05 pCi/g ($1.24 + 0.81 = 2.05$ pCi/g). Table 3-3 provides an estimate of the volumes of soil by area. These volumes were estimated by interpolating the concentrations at each sample location that are above the Investigation Level. The volume was computed for each depth interval (0 to 1, 1 to 2, 2 to 4, 4 to 6, and 6 to 10-foot intervals) for each area. The total estimated volume for the Site is approximately 242,000 cubic yards (cy). The largest volume of soil lies within the western and eastern mine areas (75,000 cy and 107,000 cy, respectively). As previously stated, the estimated soil volumes are based on the radium-226 Investigation Level defined in the AOC SOW and are for informational purposes only. A removal action cleanup level has not been determined and soil volumes will change based on the final cleanup level.

3.5 Site Control

The AOC SOW requires that this Report propose post-removal site controls consistent with Section 300.415(l) of the National contingency Plan and Office of Solid Waste and Emergency Response Directive No. 9360.2-02 (USEPA 1990). The following post-removal site controls are recommended for the Site until final site controls have been established:

- Fenced mine areas (eastern and western mines) will remain locked.
- Signage, fencing, and gate accesses will be inspected monthly. All signage will be readable and secured to fencing. Fencing should be free of debris and breaches, and be in general good repair. Inspections will verify that locks are in place and that gates remain intact and functioning as designed.
- Perimeter roads will be inspected monthly. Chip-sealed roads will remain in good repair. Ruts, holes, and/or missing sections of chip seal will be noted.
- Soil tackifier areas will be inspected monthly. Soils will be inspected to verify that tackifier is in place and functioning as designed. Areas of high traffic or changes in land use in tackifier areas will be noted.

Small repairs to minor damages such as small potholes through the chip-seal that can be repaired by onsite field staff will be completed during inspections. Larger repairs or replacement of destroyed controls such as ruts within perimeter roads deeper than the chip-

seal that require the use of equipment will be conducted after approval from USEPA and NNEPA.

4. Recommendations

Considering the results of the RSE characterization, the following recommendations are offered:

- A risk assessment of the Site with site-specific exposure pathways and potential receptors should be conducted to determine site-specific cleanup levels.
- Using information from the RSE characterization and risk assessment, an Engineering Evaluation and Cost Analysis should be conducted to determine the appropriate remedial action.

5. References

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Tables

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Cornfield Sample

Sample Location: Corn-1 **Northing (ft):** 2588901
Sample Type: Cornfield Characterization **Easting (ft):** 1654701
Sample Date: 11/2/2011 **General Location:** Dehiya Residence
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SC-SM	Red-Brown, silty sand, medium to fine grained, moderately sorted, sub-rounded, moist at 2-inches	0	9922	MLM-CFCH-1 (0-2)	0-2	0.6 LT	1700	210	250	430	11000	
		6										
		12										
		18										
		24	11501									
		30										
		36										
		42										
		48	12706	MLM-CFCH-1 (36-48)	36-48	0.53 U,G	1900	190	280	380	11000	Less than 2x Background Hole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Eastern Mine Area

Sample Location: ECH-01 **Northing (ft):** 2590111
Sample Type: Mine Standard Characterization **Easting (ft):** 1655186
Sample Date: 11/3/2011 **General Location:** Eastern Mine Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SP-SM	Gray-brown silty sand, fine to medium grained, moderately sorted, some gravel, red-brick fragments throughout, Moist at 6-inches	0											
		6	15936	MLM-ECH-1 (0-6)	0-6	2.27 G	5600 J	700	550	2200	12000 J		
		12											
		18											
		24	24474	MLM-ECH-1 (18-24)	18-24	1.95 G	6200 J	640	400	3100	8300 J		
		30	96012										
		36											
		42	89648										
		48	62757	MLM-ECH-1 (36-48)	36-48	19.9	4000 J	9300	1500	23000	27000 J		
		54											
		60											
		66	45089	MLM-ECH-1 (60-66)	60-66	2.64 G	6400 J	870	660	5800	23000 J		
		72											
		78		MLM-ECH-1 (72-78)	72-78	2.76 G	6300 J	1000	610	3000	21000 J	Native Soil Encountered	
		42											Borehole Abandoned
48													

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: ECH-02 **Northing (ft):** 2590407
Sample Type: Mine Standard Characterization **Easting (ft):** 1655174
Sample Date: 11/3/2011 **General Location:** Eastern Mine Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SP-SM	Gray-brown silty sand, fine to medium grained, sub-rounded, moderately sorted, Moist at 6"	0											
		6	16316	MLM-ECH-2 (0-6)	0-6	2.92 G	6400 J	900	690	3100	12000 J		
		12											
		18											
		24	15515	MLM-ECH-2 (18-24)	18-24	1.4	8000 J	960	710	3800	12000 J		
		30											
		36											
		42											Less than 2x Background
		48	18440	MLM-ECH-2 (36-48)	36-48	4.14	9300 J	1800	940	6400	9300 J	Borehole Abandoned	

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: ECH-03 **Northing (ft):** 2590930
Sample Type: Mine Standard Characterization **Easting (ft):** 1655185
Sample Date: 4/26/2012 **General Location:** Mine Eastern Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SC-ML	Brown Silty Sand and Clayey Sand, medium to fine grained, moderately well sorted, Loose, Dry	0	430	MLM-ECH-03(0-6)	0-6	3.86	4800	820	760	3000	12000	
		6	500									
		12	424									
		18	434									
		24	360	MLM-ECH-03(18-24)	18-24	0.91	7600	1700	320	910	4300	
		30	348									
		36	346									
		42	338									Refusal at 3.5 feet
		48	308									bottom of borehole

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: ECH-04 **Northing (ft):** 2590682
Sample Type: Mine Standard Characterization **Easting (ft):** 1655035
Sample Date: 11/3/2011 **General Location:** Eastern Mine Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SP-SM, SP-SC	Grey-Brown silty sand, medium grained, sub-rounded, moderately sorted, trace gravel, clay from 24 - 36 inches, moist at 6-inches	0	17043	MLM-ECH-04 (0-2)	0-2	1.42	8200	1000	640	1600	13000 J		
		6											
		12											
		18											
		24	24541	MLM-ECH-04 (18-24)	18-24	2.29 G	7900	840	880	5400	14000 J		
		30											
		36											
		42											Native Soils Encountered
		48	34324	MLM-ECH-04 (36-48)	36-48	2.03	7200	1100	840	3500	7200 J	Borehole Abandoned	

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: ECH-05 **Northing (ft):** 2590558
Sample Type: Mine Standard Characterization **Easting (ft):** 1654870
Sample Date: 11/3/2011 **General Location:** Eastern Mine Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SP-SM, SP-SC	Gray-Brown silty sand, fine to medium grained, trace gravel, clay at 30 - 36 inches, moist	0											
		6	19365	MLM-ECH-5 (0-6)	0-6	3.58 G	6600 J	890	890	2600	20000 J		
		12											
		18											
		24	18187.5	MLM-ECH-5 (18-24)	18-24	1.68 G	6900 J	1000	640	2300	10000 J		
		30											
		36											
		42											less than 2x background
		48	19848.5	MLM-ECH-5 (36-48)	36-48	1.36 G	6100 J	530	970	840	23000 J	borehole abandoned	

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: ECH-06 **Northing (ft):** 2590853
Sample Type: Mine Standard Characterization **Easting (ft):** 1654717
Sample Date: 11/3/2011 **General Location:** Eastern Mine Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SP-SM	Red-Brown sand, fine to medium grained, sub-rounded, moderately sorted, trace gravel, dry	0											
		6	23292	MLM-ECH-6 (0-6)	0-6	2.25	5700	590	1000	2000	12000 J		
		12											
		18											
		24	84926.5	MLM-ECH-6 (18-24)	18-24	30	4900	8400	3400	81000	29000 J		
		30											
		36											
		42											
		48	196501	MLM-ECH-6 (36-48)	36-48	50	4600	9900	5200	100000	34000 J		
		54	218132	MLM-ECH-6 (48-54)	48-54	49.5	4200	8800	2500	67000	34000 J		
		60											
		66	239367	MLM-ECH-6 (60-66)	60-66	66.1	6200	11000	4600	110000	43000 J		
		72											
		78	100000	MLM-ECH-6 (72-78)	72-78	66.7	5900	9900	4600	120000	46000 J		
		84											
		90											
		96											
102	120000												
108													
114											Max depth of backhoe		
120	100000	MLM-ECH-6 (116-120)	116-120	2.26	4300	580	1600	5600	9200 J	borehole abandoned			

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
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J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
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**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: ECH-07 **Northing (ft):** 2590969
Sample Type: Mine Standard Characterization **Easting (ft):** 1654873
Sample Date: 4/26/2012 **General Location:** South of Parking Lot Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
		0	7594										
		6	20098	MLM-ECH-07(0-6)	0-6	132	7500	7800	9900	210000	56000		
		12	20498										
		18	18384										
		24	3540	MLM-ECH-07 (18-24)	18-24	153	6700	7700	2500	280000	32000		
		30	1470/1422										
		36	916										
		42	882										
		48	816	MLM-ECH-07 (36-48)	36-48	2	7100	720	1400	2400	18000		
		54	824										
SC-CH	Brown Sandy Clay and Clayey Sand, fine sand, moderately sorted, sub-rounded, minor silt, dry, tough	60	988										
		66	900										
		72	802										
		78	838										
		84	718	MLM-ECH-07(72-84)	72-84	1.87	3800	330	960	1100	8700		
		90	746										
		96	538										
		102	690										
		108	872										
		114	818										less than 2x background
		120	842										borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

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J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: ECH-08 **Northing (ft):** 2590801
Sample Type: Mine Standard Characterization **Easting (ft):** 1654832
Sample Date: 4/26/2012 **General Location:** Mine Eastern Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results						Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)	Vanadium (ug/kg)		
SM-CH, SP	Red-brown and Brown Fine silty sand, clayey, slightly blocky, Red-brown medium well sorted sand layer at 2.5-6 ft. Clay from 9.5 to 12	0	544	MLM-ECH-08(0-6)	0-6	3.1	5500	530	710	1800	14000		
		6	808										
		12	862										
		18	948										
		24	968/840	MLM-ECH-08(18-24)	18-24	2.69	6100	940	900	2600	12000		
		30	1394										
		36	3086										
		42	3556										
		48	4568	MLM-ECH-08(36-48)	36-48	25.8	4900	7700	3900	31000	29000		
		54	4562										
		60	4216										
		66	2064										
		72	1210	MLM-ECH-08(60-72)	60-72	8	5300	7000	2400	66000	25000		
		78	1080										
		84	938										
		90	966										
		96	982	MLM-ECH-08(84-96)	84-96	1.81	6400	710	610	1200	9600		
		102	826										
		108	832										
		114	868										
120	No Sample												
126	No Sample												
132	No Sample												
138	No Sample										less than 2x background		
144	386										borehole abandoned		

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

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U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: ECH-09 **Northing (ft):** 2590760
Sample Type: Mine Standard Characterization **Easting (ft):** 1654631
Sample Date: 4/25/2012 **General Location:** Mine Eastern Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
		0	488	MLM-ECH-09(0-6)	0-6	0.99	2200	250	270	490	8700		
		6	812										
		12	804										
		18	898										
		24	1222	MLM-ECH-09(18-24)	18-24	2.16	6300	830	760	1600	6900		
		30	1590										
		36	2510										
		42	3296										
		48	3422	MLM-ECH-09(36-48)	36-48	8.4	7700	2600	3000	33000	16000		
		54	4388										
		60	7392										
		66	9802										
		72	9776	MLM-ECH-09(60-72)	60-72	63.2	3300	5200	4200	70000	37000		
		78	9080										
		84	4692										
SC-CH	Brown Silty, sandy clay, blocky, hard, Red-brown 6-12-inch thick silty sand lenses throughout upper 6 ft, lower 6 ft - CH clay brown, blocky, Slightly Moist, hard, stiff . Grassy Plant matter at 10 ft.	90	3250/3308										
			96	2730									
			102	2750	MLM-ECH-09(90-102)	90-102	13.5	2900	7300	2800	250000	12000	
			108	2990									
			114	3284									
			120	2998									
			126	3216									
			132	2372									
			138	1192									
			144	932									
			150	884									
			156	868	MLM-ECH-09(144-156)	144-156	1.59	6600	4100	3500	4300	6300	
			162	908									
			168	968									
			174	920									less than 2x background
			180	742									borehole abandoned

Notes:
Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers
LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: ECH-10 **Northing (ft):** 2590343
Sample Type: Mine Standard Characterization **Easting (ft):** 1655026
Sample Date: 4/25/2012 **General Location:** Mine Eastern Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SC-CH, SP	Medium Brown Clay, sandy clay, blocky, dry, slightly Moist, Loose Dry Red, Red-brown medium well sorted sand at 48-72 inches, and 78-96 inches	0	488	MLM-ECH-10(0-6)	0-6	1.85	2500	300	320	1500	12000	Red-Brown Sand co-	
		6	640										
		12	778										
		18	988/990										
		24	1490	MLM-ECH-10(18-24)	18-24	1.48	5200	700	490	4700	5700		
		30	2406										
		36	4780										
		42	4760										
		48	1946	MLM-ECH-10(36-48)	36-48	39.6	5200	8800	6200	51000	43000		
		54	2636										
		60	4470										
		66	5164										
		72	5876										
		78	5724	MLM-ECH-10(66-78)	66-78	28	4900	3600	4800	68000	21000		
		84	4420										
		90	1968										
		96	1308										
		102	1056										
		108	850										
114	714										less than 2x background		
120	658	MLM-ECH-10(108-120)	108-120	2.15	5000	660	860	1500	19000		borehole abandoned		

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: ECH-11 **Northing (ft):** 2589922
Sample Type: Mine Standard Characterization **Easting (ft):** 1655270
Sample Date: 4/25/2012 **General Location:** Mine Eastern Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SC-CH	Medium Brown Clay, slightly sandy, blocky, slightly moist.	0	676	MLM-ECH-11(0-6)	0-6	4.22	4800	660	950	3700	13000	
		6	790									
		12	1192									
		18	1532									
		24	2410/2540	MLM-ECH-11(18-24)	18-24	12.9	5200	2200	2300	26000	18000	
		30	1058									
		36	854									
		42	806									
		48	722	MLM-ECH-11(36-48)	36-48	1.39	4600	490	530	1600	16000	
		54	702									less than 2x background
		60	698									borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet

in bgs: Inches Below ground Surface

CPM: Counts Per Minute

pCi/g: Pico-Curies per gram

ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC

U: result is less than the sample specific MDC or less than the associated total propagated uncertainty

J: The compound was positively identified, however the associated numerical value is an estimated concentration only.

G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Eastern Mine Full Suite

Sample Location: EFS-01 **Northing (ft):** 2590620
Sample Type: Mine Full Suite Characterization **Easting (ft):** 1655192
Sample Date: 11/3/2011 **General Location:** Eastern Mine Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 432
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SM-SC	Red-brown silty sand, fine to medium grained, sub-rounded, Moist at 6-inches	0											
		6	19365	MLM-EFS-1 (0-6)	0-6	15.2	4900 J	3400	2700	29000	26000 J		
		12											
		18											
		24	18187.5	MLM-EFS-1 (18-24)	18-24	26.3	5500 J	4200	3600	44000	30000 J		
		30										Refusal at 24 in bgs,	
		36		MLM-EFS-1 (24-36)	24-36	28.6	5000 J	5900	6000	72000	33000 J	36-48 in bgs sample collected from top of	
		42											
		48	19848.5	MLM-EFS-1 (36-48)	36-48							bedrock	

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: EFS-02 **Northing (ft):** 2590779
Sample Type: Mine Full Suite Characterization **Easting (ft):** 1655169
Sample Date: 11/3/2011 **General Location:** Eastern Mine Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results						Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)	Vanadium (ug/kg)		
SM-SC	Red-Brown, silty sand, fine grained, well sorted, root casts, moist at 6 inches	0											
		6	39839.5	MLM-EFS-2 (0-6)	0-6	15.2 G	3900 J	1600	2100	5200	19000 J		
		12											
		18											
		24	39842.5	MLM-EFS-2 (18-24)	18-24	1.38 G	9100 J	1800	820	23000	11000 J		
		30											
		36											
		42											
		48	42281.5	MLM-EFS-2 (36-48)	36-48	5.18	6200 J	2400	3400	15000	19000 J	Native Soil Encountered	
54	32371.5	MLM-EFS-2 (48-54)	48-54	2.7 G	6700 J	1400	1100	9200	19000 J	borehole abandoned			

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: EFS-03 **Northing (ft):** 2590916
Sample Type: Mine Standard Characterization **Easting (ft):** 1655019
Sample Date: 4/26/2012 **General Location:** Mine Eastern Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results						Comments
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)	Vanadium (ug/kg)	
CH	Brown, Silty Clay, Dry, Loose, Clay at 6-inches, blocky, stiff, hard.	0	5350	MLM-EFS-03(0-6)	0-6	33.8	4200	1400	3200	17000	22000	
		6	2366									
		12	1210	MLM-EFS-03(6-12)	6-12	3.81	7200	5300	1900	59000	26000	
		18	920									
		24	830/830	MLM-EFS-03(18-24)	18-24	3.16	7300	1100	1400	3300	19000	
		30	664									
		36	518									
		42	378									
		48	418	MLM-EFS-03(36-48)	36-48	2.23	4500	1900	920	1800	5200	
		54	418									less than 2x background
		60	376									borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet

in bgs: Inches Below ground Surface

CPM: Counts Per Minute

pCi/g: Pico-Curies per gram

ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC

U: result is less than the sample specific MDC or less than the associated total propagated uncertainty

J: The compound was positively identified, however the associated numerical value is an estimated concentration only.

G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: EFS-04 **Northing (ft):** 2590582
Sample Type: Mine Full Suite Characterization **Easting (ft):** 1654667
Sample Date: 11/3/2011 **General Location:** Eastern Mine Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SP-SM	Red-Brown sand, fine to medium grained, sub-rounded, moderately sorted, trace gravel, dry	0										
		6	70460.5	MLM-EFS-4 (0-6)	0-6	1.73	4600	500	970	3400	12000 J	
		12										
		18										
		24	129845.5	MLM-EFS-4 (18-24)	18-24	95	9300	32000	9300	420000	38000 J	
		30										
		36										
		42										
		48	52475	MLM-EFS-4 (36-48)	36-48	1.82 G	3100	6200	1700	75000	16000 J	
		54	43932		48-54							
		60										Native soils encountered
66	36702	MLM-EFS-4 (60-66)	116-120	2.16 G	4800	2100	1100	20000	14000 J	borehole abandoned		

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Perimeter Road Samples

Sample Location: PR-1 **Northing (ft):** 2587291
Sample Type: Perimeter Road Characterization **Easting (ft):** 1656198
Sample Date: 11/2/2011 **General Location:** Perimeter Roads
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SM	Tan Brown to medium-brown silty sand, fine grained, root casts, well sorted, sub-rounded, slightly moist	0	9977	MLM-PRCH-1 (0-2)	0-2	0.67 LT	2800	440	320	340	8200	
		6										
		12										
		18										
		24	11158									
		30										
		36										
		42										less than 2x background
		48	11055	MLM-PRCH-1 (36-48)	36-48	0.64 LT,JN	1600	450	120	580	5900	borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-2 **Northing (ft):** 2587406
Sample Type: Perimeter Road Samples **Easting (ft):** 1655603
Sample Date: 4/23/2012 **General Location:** Perimeter Road Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SC-ML	Road base gravel on top of Red Brown Silty Sand and Clayey Sand, Loose, Dry	0	2130	MLM-PRCH-02(0-2)	0-2	14.8	4800	4300	2700	39000	34000		
CH	Brown sandy clay, sand is fine grained, slightly blocky, tough, dry	6	3636										
		12	3880										
		18	2872/3028										
		24	4414	MLM-PRCH-02(18-24)	18-24	22.6	8100	5000	7200	45000	31000		
		30	3988										
		36	1128										
		42	888										
		48	686	MLM-PRCH-02(36-48)	36-48	1.08	3100	680	870	1900	13000		
		54	660										less than 2x background
		60	650										borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet

in bgs: Inches Below ground Surface

CPM: Counts Per Minute

pCi/g: Pico-Curies per gram

ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC

U: result is less than the sample specific MDC or less than the associated total propagated uncertainty

J: The compound was positively identified, however the associated numerical value is an estimated concentration only.

G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-3 **Northing (ft):** 2587424
Sample Type: Perimeter Road Characterizatio **Easting (ft):** 1654957
Sample Date: 11/2/2011 **General Location:** Perimeter Roads
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SM	Brown fine sand, silty, well sorted, dry, loose	0	11020	MLM-PRCH-3 (0-2)	0-2	1.17 G	3500	400	340	410	17000	
		6										
		12										
		18										
		24	11309		18-24							
		30										
		36										
		42										less than 2x background
		48	9927.5	MLM-PRCH-3 (36-48)	36-48	0.97 LT,G	4200	240	280	380	13000	borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-4 **Northing (ft):** 2587858
Sample Type: Perimeter Road Characterizatio **Easting (ft):** 1655603
Sample Date: 11/4/2011 **General Location:** Perimeter Roads
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SP	Reddish-brown silty sand, medium to fine grained, moderately well sorted, slightly moist, stiff clay at depth.	0	169511	MLM-PRCH-4 (0-2)	0-2	60.6 G	4000	8100	9900	60000 J	39000 J		
		6											
		12											
		18											
		24	111766.5	MLM-PRCH-4 (18-24)	18-24	57.7 G	4600	10000	12000	83000 J	40000 J		
		30											
		36											
		42											Native Soils Encountered
		48	49111.5	MLM-PRCH-4 (36-48)	36-48	4.17 G	3500 J	710	1500	7200	16000		borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-5 **Northing (ft):** 2588148
Sample Type: Perimeter Road Characterizatio **Easting (ft):** 1654931
Sample Date: 11/2/2011 **General Location:** Perimeter Roads
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SM-SC	Medium to Dark brown silty sand well sorted, fine grained, sub-rounded, dry	0	10492.5	MLM-PRCH-5 (0-2)	0-2	1.38	2900	460	320	1500	13000		
		6											
		12											
		18											
		24	13170		18-24								
		30											
		36											
		42											less than 2x background
		48	13690	MLM-PRCH-5 (36-48)	36-48	0.58 LT,JN	2900	280	300	640	12000		borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-6 **Northing (ft):** 2588446
Sample Type: Perimeter Road Samples **Easting (ft):** 1655611
Sample Date: 4/23/2012 **General Location:** Perimeter Road Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SC-ML	Road base gravel and asphalt first 2-in bgs, Red Brown Silty Sand and Clayey Sand, Loose, Dry	0	2292	MLM-PRCH-06(0-2)	0-2	58	4000	12000	9700	35000	54000	
		6	5390									
		12	2586									
		18	812/882									
		24	680	MLM-PRCH-06(18-24)	18-24	1.45	3800	570	720	1300	13000	
		30	572									
		36	576									
		42	504									Refusal at 4 ft
		48	436	MLM-PRCH-06(36-48)	36-48	0.67	7600	1700	420	7800	3700	borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-7 **Northing (ft):** 2588748
Sample Type: Perimeter Road Samples **Easting (ft):** 1655139
Sample Date: 4/24/2012 **General Location:** Perimeter Road Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SC-CH	Red-Brown Silty and Sandy Clay, Dry, Blocky, Stiff	0	1762	MLM-PRCH-07(0-2)	0-2	25.6	4100	4200	3300	22000	24000	
		6	2368									
		12	1128									
		18	718									
		24	690/626	MLM-PRCH-07(18-24)	18-24	1.4	2500	850	730	3100	13000	
		30	616									
		36	652									
		42	628									
		48	620	MLM-PRCH-07(36-48)	36-48	1.25	6400	460	430	520	14000	
		54	616									less than 2x background
		60	508									borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-8 **Northing (ft):** 2589353
Sample Type: Perimeter Road Characterizatio **Easting (ft):** 1655148
Sample Date: 11/4/2011 **General Location:** Perimeter Roads
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SP	Reddish-brown, silty sand, medium to fine grained, well sorted, loose, slightly moist, Native clay soils at 24 in bgs	0	94458	MLM-PRCH-8 (0-2)	0-2	36.6	6200	6700	6300	86000 J	33000 J		
		6											
		12											
		18											
		24	153457	MLM-PRCH-8 (18-24)	18-24	64	5900	14000	5800	97000 J	47000 J		
		30											
		36											
		42											Native soils encountered
		48	59171.5	MLM-PRCH-8 (36-48)	36-48	1.78 G	5200	470	470	2100 J	15000 J		borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-9 **Northing (ft):** 2589979
Sample Type: Perimeter Road Characterizatio **Easting (ft):** 1654688
Sample Date: 11/1/2011 **General Location:** Perimeter Roads
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SC-CH	Medium Brown, sandy clay, fine grained sand, blocky, slightly moist	0	13626.5	MLM-PRCH-9 (0-2)	0-2	2.07	6100	1000	490	3000	17000		
		6											
		12											
		18											
		24	15079		18-24								
		30											
		36											
		42											less than 2x background
		48	16734	MLM-PRCH-9 (36-48)	36-48	1.11 G	4400	430	430	670	11000	borehole abandoned	

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-10 **Northing (ft):** 2590116
Sample Type: Perimeter Road Samples **Easting (ft):** 1655371
Sample Date: 4/26/2012 **General Location:** Perimeter Road Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SC-CH	Red-Brown Silty Sand, fine grained, loose, dry, medium brown clay at 18-48 inches, stiff blocky, dry	0	1894	MLM-PRCH-10(0-2)	0-2	68.3	5500	13000	14000	35000	65000	
		6	4454									
		12	10296									
		18	6166									
		24	2318/2130	MLM-PRCH-10(18-24)	18-24	46.8	4800	8700	14000	48000	44000	
		30	1066									
		36	902									
		42	854									
		48	880	MLM-PRCH-10(36-48)	36-48	0.95	2600	300	440	850	7600	
		54	648									less than 2x background
		60	546									borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet

in bgs: Inches Below ground Surface

CPM: Counts Per Minute

pCi/g: Pico-Curies per gram

ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC

U: result is less than the sample specific MDC or less than the associated total propagated uncertainty

J: The compound was positively identified, however the associated numerical value is an estimated concentration only.

G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-11 **Northing (ft):** 2590695
Sample Type: Perimeter Road Characterizatio **Easting (ft):** 1654479
Sample Date: 11/2/2011 **General Location:** Perimeter Roads
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SC	Gray-brown, clayey sand, moderately sorted, sub-rounded, fine grained, dry	0	9977	MLM-PRCH-11 (0-2)	0-2	5.42	5000	990	1100	7700	16000		
		6											
		12											
		18											
		24	11158										
		30											
		36											
		42											less than 2x background
		48	11055	MLM-PRCH-11 (36-48)	36-48	1.76 G	6700	330	610	720	21000		borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-12 **Northing (ft):** 2590705
Sample Type: Perimeter Road Characterizatio **Easting (ft):** 1655363
Sample Date: 11/2/2011 **General Location:** Perimeter Roads
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SP	Red-brown silty sand, fine to medium grained, moderately sorted, moist	0	75245	MLM-PRCH-12 (0-2)	0-2	37.7	7600	9800	9700	410000 J	36000 J		
		6											
		12											
		18											
		24	130938.5	MLM-PRCH-12(18-24)	18-24	122 G	6500	12000	19000	150000 J	63000 J		
		30											
		36											
		42											Refusal at 42"
		48	91046.5	MLM-PRCH-12(36-48)	36-48	122 G	6500	12000	19000	150000 J	63000 J	borehole abandoned	

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-13 **Northing (ft):** 2590996
Sample Type: Perimeter Road Samples **Easting (ft):** 1654667
Sample Date: 4/26/2012 **General Location:** Perimeter Road Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
CH	Red-Brown, Fine Sandy Clay 0 - 12inches, Brown Clay, Stiff, Hard, Slightly Moist, 12-48 inches	0	3480	MLM-PRCH-13(0-2)	0-2	54.6	5100	9500	15000	82000	42000	
		6	6062									
		12	3160									
		18	1316									
		24	950/912	MLM-PRCH-13(18-24)	18-24	17.5	4400	5400	8500	84000	45000	
		30	832									
		36	738									
		42	668									
		48	760	MLM-PRCH-13(36-48)	36-48	1.49	5800	460	1400	1200	17000	
		54	730									less than 2x background
		60	776									borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet

in bgs: Inches Below ground Surface

CPM: Counts Per Minute

pCi/g: Pico-Curies per gram

ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC

U: result is less than the sample specific MDC or less than the associated total propagated uncertainty

J: The compound was positively identified, however the associated numerical value is an estimated concentration only.

G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-14 **Northing (ft):** 2591158
Sample Type: Perimeter Road Characterization **Easting (ft):** 1654928
Sample Date: 11/1/2011 **General Location:** Perimeter Roads
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
ML-SC	Medium Brown silty, clayey sand and sandy clay, fine grained, moderately sorted, at 18 in bgs becomes sandy clay (CH) blocky, hard, stiff, blocky, moist	0	53456	MLM-PRCH-14 (0-2)	0-2	30.1 G	5300	1600	3900	24000	40000		
		6											
		12											
		18											
		24											
		30											
		36	45762.5	MLM-PRCH-14 (18-36)	18-36	2.04 G	8200	2400	1400	44000	21000		
		42											
		48	29536.5	MLM-PRCH-14 (36-48)	36-48	4.42 G	5700	900	1200	4100	12000		Native soils encountered
		54	22140.5	MLM-PRCH-14 (48-54)	48-54	2.08 G	5700	670	690	1400	12000		borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-15 **Northing (ft):** 2591014
Sample Type: Perimeter Road Samples **Easting (ft):** 1655109
Sample Date: 4/26/2012 **General Location:** Perimeter Road Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
CH	Brown, Silty Clay, Dry, Loose, consistent. Clay at 6-inches, blocky, stiff, hard.	0	646	MLM-PRCH-15(0-2)	0-2	2.62	6300	1000	860	4200	27000	
		6	874									
		12	896									
		18	744	MLM-PRCH-15(18-24)	18-24	1.93	8200	1100	1000	1000	15000	
		24	770/812									
		30	868									
		36	826									
		42	520									
		48	430	MLM-PRCH-15(36-48)	36-48	1.56	12000	1500	570	800	5200	
		54	386									less than 2x background
		60	362									borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet

in bgs: Inches Below ground Surface

CPM: Counts Per Minute

pCi/g: Pico-Curies per gram

ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC

U: result is less than the sample specific MDC or less than the associated total propagated uncertainty

J: The compound was positively identified, however the associated numerical value is an estimated concentration only.

G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-16 **Northing (ft):** 2591143
Sample Type: Perimeter Road Characterization **Easting (ft):** 1655177
Sample Date: 11/1/2011 **General Location:** Perimeter Roads
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
ML-SM	Medium Grey Brown, Silty clayey sand, fine grained, moderately well sorted, dry, bedrock sandstone at 42 in bgs	0	31169.5	MLM-PRCH-16 (0-2)	0-2	26.5	5500	1400	4100	32000	31000		
		6											
		12											
		18											
		24											
		30											
		36	25435	MLM-PRCH-16 (18-36)	18-36	1.57 G	13000	3400	650	24000	8600		
		42											bedrock refusal at 42"
		48	21078.5	MLM-PRCH-16 (36-48)	36-48	1.68	4800	570	880	5000	5900		borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-17 **Northing (ft):** 2591053
Sample Type: Perimeter Road Characterizatio **Easting (ft):** 1655453
Sample Date: 11/4/2011 **General Location:** Perimeter Roads
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SP	Medium Grey Brown, gravel and sand, fine grained, poorly sorted, dry	0	14202.5	MLM-PRCH-17 (0-2)	0-2	3.47	2800	1000	650	12000 J	54000 J		
		6											
		12											bedrock refusal at 24 in
		18	13641	MLM-PRCH-17 (12-18)	12-18	1.02	5300	370	680	690 J	7200 J	borehole abandoned	

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet

in bgs: Inches Below ground Surface

CPM: Counts Per Minute

pCi/g: Pico-Curies per gram

ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC

U: result is less than the sample specific MDC or less than the associated total propagated uncertainty

J: The compound was positively identified, however the associated numerical value is an estimated concentration only.

G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-18 **Northing (ft):** 2591085
Sample Type: Perimeter Road Characterizatio **Easting (ft):** 1655855
Sample Date: 11/4/2011 **General Location:** Perimeter Roads
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SP	Medium Grey Brown, gravel and sand, fine grained, poorly sorted, dry	0	15176	MLM-PRCH-18 (0 - 2)	0-2	4.54	1200	320	380	8500 J	100000 J		
		6											
		12											bedrock refusal at 24 in
		18	10348	MLM-PRCH-18 (6-12)	6-12	0.78 LT,G	3500	320	570	480 J	11000 J	borehole abandoned	

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet

in bgs: Inches Below ground Surface

CPM: Counts Per Minute

pCi/g: Pico-Curies per gram

ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC

U: result is less than the sample specific MDC or less than the associated total propagated uncertainty

J: The compound was positively identified, however the associated numerical value is an estimated concentration only.

G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-19 **Northing (ft):** 2592462
Sample Type: Perimeter Road Characterizatio **Easting (ft):** 1654640
Sample Date: 11/2/2011 **General Location:** Perimeter Roads
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SP	Tan-brown sand, medium grained, well sorted, dry	0	8106	MLM-PRCH-19 (0-2)	0-2	0.22 U	1800	260	130	200	4100	
		6										Refusal at 12"
		12										borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: PR-20 **Northing (ft):** 2592245
Sample Type: Perimeter Road Samples **Easting (ft):** 1659100
Sample Date: 4/26/2012 **General Location:** Perimeter Road Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results						Comments
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)	Vanadium (ug/kg)	
SC-ML	Red-Brown Fine Sand and Silt, well sorted, dry, loose.	0		MLM-PRCH-20(0-2)	0-2	11.9	1600	350	1100	3000	26000	Surface Sample Location

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet

in bgs: Inches Below ground Surface

CPM: Counts Per Minute

pCi/g: Pico-Curies per gram

ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC

U: result is less than the sample specific MDC or less than the associated total propagated uncertainty

J: The compound was positively identified, however the associated numerical value is an estimated concentration only.

G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Old Gulf Mine Road Samples

Sample Location: ROAD0.3 **Northing (ft):** 2591447
Sample Type: Perimeter Road Characterization **Easting (ft):** 1658395
Sample Date: 11/4/2011 **General Location:** Perimeter Roads
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SP	Red-brown to tan sand. Medium grained, sub rounded, well sorted, dry, loose	0	10215	MLM-ROAD0.3 (0-2)	0-2	0.87 LT,G	2700	520	360	3800 J	13000 J	Refusal at 2"

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet

in bgs: Inches Below ground Surface

CPM: Counts Per Minute

pCi/g: Pico-Curies per gram

ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC

U: result is less than the sample specific MDC or less than the associated total propagated uncertainty

J: The compound was positively identified, however the associated numerical value is an estimated concentration only.

G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: ROAD0.7 **Northing (ft):** 2592646
Sample Type: Perimeter Road Characterizatio **Easting (ft):** 1659923
Sample Date: 11/4/2011 **General Location:** Perimeter Roads
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SP	Red-brown to tan sand. Medium grained, sub rounded, well sorted, dry, loose	0	9273	MLM-ROAD0.7 (0-2)	0-2	0.49 U,G	2500	250	240	1800 J	13000 J		
		6											
		12											
		18											
		24	9768.5	MLM-ROAD0.7 (18-24)	18-24	0.64 LT,G	3200	300	190	870 J	11000 J		
		30											Refusal at 36"
		36		MLM-ROAD0.7 (30-36)		0.54 LT,G,JN	4200	480	300	1100 J	13000 J		borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: ROAD1.0 **Northing (ft):** 2593605
Sample Type: Perimeter Road Characterizatio **Easting (ft):** 1661028
Sample Date: 11/4/2011 **General Location:** Perimeter Roads
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SP	Red-brown to tan sand. Medium grained, sub rounded, well sorted, dry, loose	0	10272.5	MLM-ROAD1.0 (0-2)	0-2	1.56	3100	370	280	1400 J	16000 J	Refusal at 10"
		6										
		10	10915	MLM-ROAD1.0 (6-10)	6-10	1.22 G	3100	520	220	2400 J	11000 J	borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Step Out Locations

Sample Location: SO-1 **Northing (ft):** 2587246
Sample Type: Mine Step Out Characterization **Easting (ft):** 1655766
Sample Date: 11/2/2011 **General Location:** Mine Western Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SM	Medium Brown silty sand, fine grained, well sorted, sub-rounded, dry	0	11706.5	MLM-SOCH-1 (0-2)	0-2	0.67 LT	2200	390	170	320	7700	
		6										
		12										
		18										
		24	13200		18-24							
		30										
		36										
		42										less than 2x background
		48	14377.5	MLM-SOCH-1 (36-48)	36-48	0.82 LT	2600	380	140	330	7200	borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: SO-9 **Northing (ft):** 2590106
Sample Type: Mine Step Out Characterization **Easting (ft):** 1655467
Sample Date: 11/1/2011 **General Location:** Mine Eastern Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
ML-SC	Medium Grey Brown, Silty clayey sand, fine grained, moderately well sorted, dry	0	10713.5	MLM-SOCH-9 (0-2)	0-2	1.31 G	2800	290	440	1100	8200	
		6										Refusal at 12"
		12	9164		10-12							borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: SO-10 **Northing (ft):** 2589926
Sample Type: Mine Step Out Characterization **Easting (ft):** 1655038
Sample Date: 11/1/2011 **General Location:** Mine Eastern Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SC-CH	Medium Brown, blocky, sandy clay, moist	0	13579.5	MLM-SOCH-10 (0-2)	0-2	1.08	3500	420	410	1000	13000		
		6											
		12											
		18											
		24	15081.5		18-24								
		30											
		36											
		42											less than 2x background
		48	17150	MLM-SOCH-10(36-48)	36-48	1.73 G	9900	1000	440	870	13000	borehole abandoned	

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: SO-11 **Northing (ft):** 2590717
Sample Type: Mine Step Out Characterization **Easting (ft):** 1655447
Sample Date: 11/1/2011 **General Location:** Mine Eastern Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
ML-SC	Medium Brown silty sand, fine grained, well sorted, sub-rounded, dry	0	10873.5	MLM-SOCH-11 (0-2)	0-2	0.68 LT,JN	2500	450	290	3100	6200	Refusal at 2"

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet

in bgs: Inches Below ground Surface

CPM: Counts Per Minute

pCi/g: Pico-Curies per gram

ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC

U: result is less than the sample specific MDC or less than the associated total propagated uncertainty

J: The compound was positively identified, however the associated numerical value is an estimated concentration only.

G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: SO-12 **Northing (ft):** 2590297
Sample Type: Mine Step Out Characterization **Easting (ft):** 1654734
Sample Date: 11/1/2011 **General Location:** Mine Eastern Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
ML-SM	Grey-brown, fine sand and silt, dry	0	14301	MLM-SOCH-12 (0-2)	0-2	1.54	2800	390	370	1400	14000		
		6											
		12											
		18											
		24	18459.5			18-24							
		30											
		36											
		42											less than 2x background
		48	19675	MLM-SOCH-12(36-48)	36-48	1.44 G	5700	410	510	980	13000		borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: SO-13 **Northing (ft):** 2590685
Sample Type: Mine Step Out Characterization **Easting (ft):** 1654337
Sample Date: 11/1/2011 **General Location:** Mine Eastern Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
ML-SM	Grey-brown, fine sand and silt, dry	0	14810	MLM-SOCH-13 (0-2)	0-2	2.08 G	8300	530	650	880	21000	
		6										
		12										
		18										
		24	17840		18-24							
		30										
		36										
		42										
		48	21380	MLM-SOCH-13(36-48)	36-48	1.54 G	7900	440	980	1100	17000	less than 2x background borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results

Sample SO-14 was not collected

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: SO-15 **Northing (ft):** 2591760
Sample Type: Mine Step Out Characterization **Easting (ft):** 1654447
Sample Date: 11/2/2011 **General Location:** Mine Eastern Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SM	Brown-Red brown fine sand and silt moderately sorted, sub-rounded, Clay at 38 inches - slightly moist	0	31112.5	MLM-SOCH-15 (0-2)	0-2	13.7	5700	2000	2200	9000	22000		
		6											
SM-SC		12	25140.5	MLM-SOCH-15 (18-36)	18-36	3.96 G	8800	1300	890	20000	19000		
		18											
		24											
		30											
		36											
		42											
		SC-CH	48	25765.5	MLM-SOCH-15 (36-48)	36-48	1.45 G	3200	300	420	1600	9100	

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: SO-16 **Northing (ft):** 2591737
Sample Type: Mine Step Out Characterization **Easting (ft):** 1654656
Sample Date: 11/2/2011 **General Location:** Mine Eastern Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
ML-SM	Brown-Grey, Fine Sand and Silt, sub-rounded, well sorted, moist deeper than 2 inches	0	25257	MLM-SOCH-16 (0-2)	0-2	15.7	6800	2600	2500	83000	37000		
		6											
		12											
		18											
		24	18257			18-24							
		30											
		36											
		42											less than 2x background
		48	20621.5	MLM-SOCH-16(36-48)	36-48	2.49 G	8600	1500	850	17000	16000	borehole abandoned	

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: SO-17 **Northing (ft):** 2591456
Sample Type: Mine Step Out Characterization **Easting (ft):** 1654737
Sample Date: 11/2/2011 **General Location:** Mine Eastern Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
ML-SC	Brown-Grey, Fine Sand and Silt, sub-rounded, well sorted, moist deeper than 2 inches	0	18396	MLM-SOCH-17 (0-2)	0-2	8 G	6400	660	1400 EJ	5000	21000		
		6											
		12											
		18											
		24	18964.5			18-24							
		30											
		36											
		42											less than 2x background
		48	19030.5	MLM-SOCH-17 (36-48)	36-48	1.85 G	5900	560	710	1900	17000	borehole abandoned	

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: SO-18 **Northing (ft):** 2591424
Sample Type: Mine Step Out Characterization **Easting (ft):** 1654960
Sample Date: 4/25/2012 **General Location:** Mine Eastern Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results						Comments
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)	Vanadium (ug/kg)	
SM	Red-Brown Silty Fine Sand, well sorted, dry, loose.	0	8645	MLM-SOCH-18(0-2)	0-2	4.75	4100	600	950	8200	14000	Offset approximately 40 ft south and sampled sediment near interface with bedrock. Actual SO-18 is located on bedrock, GAMMA is 2x2 reading

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: SO-20 **Northing (ft):** 2591249
Sample Type: Mine Step Out Characterization **Easting (ft):** 1654815
Sample Date: 4/25/2012 **General Location:** Mine Eastern Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SC-CH	Brown Silty, Sandy clay, fine sand, sl. Blocky, sl. Moist, stiff, hard, consistent throughout borehole	0	692	MLM-SOCH-20(0-2)	0-2	10.9	6800	860	1700	7700	21000		
		6	688										
		12	756										
		18	818										
		24	796	MLM-SOCH-20(18-24)	18-24	2.86	7500	900	950	3300	17000		
		30	838/638										
		36	900										
		42	916										
		48	1058	MLM-SOCH-20(36-48)	36-45	2.03	9300	780	1200	1700	8800		
		54	830										
		60	776										
		66	808/788										
		72	764										
		78	758										
		84	704										
		90	768										
96	816												
102	820												
108	894										Refusal at 9.5 ft		
		114	834	LM-SOCH-20(102-114)	102-114	2.29	9000	580	760	1100	10000	borehole abandoned	

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: SO-21 **Northing (ft):** 2591624
Sample Type: Mine Step Out Characterization **Easting (ft):** 1654788
Sample Date: 4/25/2012 **General Location:** Mine Eastern Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SM	Brown medium to fine silty sand and Sandy Clay from 0-18", Silty Sand 18-36, fine grained, well sorted, loose, dry	0	420	MLM-SOCH-21(0-2)	0-2	8.7	5600	750	1500	3900	21000	
		6	680									
		12	692									
		18	670									
		24	718/678	MLM-SOCH-21(18-24)	18-24	2.29	7500	480	500	840	8200	
		30	582									
		36	572									Refusal at 36 in bgs
		42	556									bottom of borehole

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: SO-22 **Northing (ft):** 2591276
Sample Type: Mine Step Out Characterization **Easting (ft):** 1655061
Sample Date: 4/25/2012 **General Location:** Mine Eastern Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
ML-CH	Brown, Silty sand and silty clay, loose, dry, sl moist, clay at 24 inches, blocky, hard, stiff	0	1438	MLM-SOCH-22(0-2)	0-2	49.9	7100	1700	5000	40000	39000	
		6	1478									
		9	960									
		12	764									
		18	694	MLM-SOCH-22(6-18)	6-18	15.6	8500	1100	850	14000	20000	
		24	736/734	MLM-SOCH-22(18-24)	18-24	3.98	11000	990	590	8400	21000	
		30	736									Refusal at 36 inches
		36	576									borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet

in bgs: Inches Below ground Surface

CPM: Counts Per Minute

pCi/g: Pico-Curies per gram

ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC

U: result is less than the sample specific MDC or less than the associated total propagated uncertainty

J: The compound was positively identified, however the associated numerical value is an estimated concentration only.

G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: SO-23 **Northing (ft):** 2587490
Sample Type: Mine Step Out Characterization **Easting (ft):** 1655823
Sample Date: 4/23/2012 **General Location:** Bermed Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
ML-SL	Tan-brown Fine Sand and Silt, Well Sorted, Consistent, Dry, Loose	0	1050	MLM-SOCH-23(0-2)	0-2	4.1	6200	1000	940	4600	22000	
		6	576									
		12	590									
		18	624									
		24	508	MLM-SOCH-23(18-24)	18-24	0.89	3500	530	390	510	9800	
		30	538/582									
		36	618									
		42	636									
		48	470	MLM-SOCH-23(36-48)	36-48	0.79	2800	500	480	450	8700	
				54	518							
		60	438								borehole abandoned	

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results

Sample SO-24 not collected

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: SO-25 **Northing (ft):** 2591103
Sample Type: Mine Step Out Characterization **Easting (ft):** 1654140
Sample Date: 4/26/2012 **General Location:** Mine Eastern Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
CH-ML	Brown Clayey and fine sandy silt, loose, dry, Clay at 6", slightly moist, blocky, hard, stiff.	0	3842	MLM-SOCH-25(0-6)	0-6	111	4300	3000	40000	81000	150000		
		3	4094										
		6	1980										
		12	1182										
		18	1118	MLM-SOCH-25(18-24)	18-24	2.87	7600	1300	5400	15000	24000		
		24	880/912										
		30	956										
		36	1044										
		42	1008										
		48	950	MLM-SOCH-25(36-48)	36-48	3.6	4900	500	1300	2000	12000		
		54	942										less than 2x background
		60	812										borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: SO-26 **Northing (ft):** 2591640
Sample Type: Mine Step Out Characterization **Easting (ft):** 1654504
Sample Date: 4/26/2012 **General Location:** Mine Eastern Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SC-CH	Brown Clayey and fine sandy silt, loose, dry, Clay at 12 inches, slightly moist, blocky, hard, stiff.	0	4426	MLM-SOCH-26(0-2)	0-2	118	5600	9800	3800	96000	54000	
		6	2812									
		12	1012									
		18	790									
		24	720	MLM-SOCH-26(18-24)	18-24	4.98	7300	3200	1100	31000	23000	
		30	722/722									
		36	614									
		42	664									
		48	676	MLM-SOCH-26(36-48)	36-48	1.05	7200	890	520	800	16000	
		54	782									less than 2x background
		60	718									borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Western Mine Area

Sample Location: WCH-01 **Northing (ft):** 2587115
Sample Type: Mine Standard Characterization **Easting (ft):** 1655493
Sample Date: 11/4/2011 **General Location:** Mine Western Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SP	Brown fine to medium poorly graded sand, trace gravel, trace silt, moist at 6 inches	0	13854	MLM-WCH-1 (0-6)	0-6	2.68 G	3400 J	560	690	1600	16000		
		6											
		12											
		18											
		24	16134.5	MLM-WCH-1 (18-24)	18-24	1.13	4000 J	460	330	410	16000		
		30											
		36											
		42											less than 2x background
		48	17349	MLM-WCH-1 (36-48)	36-48	0.63 LT	2600 J	330	290	320	12000		borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

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U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: WCH-02 **Northing (ft):** 2587559
Sample Type: Mine Standard Characterization **Easting (ft):** 1655479
Sample Date: 4/24/2012 **General Location:** Mine Western Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SC-ML	Brown Clayey and fine sandy silt, loose, dry, Clay at 12 inches, slightly moist, blocky, hard, stiff.	0	482	MLM-WCH-02(0-6)	0-6	3.41	3300	640	840	1800	12000		
		6	482										
		12	428										
		18	438										
		24	490	MLM-WCH-02(18-24)	18-24	1.31	2300	390	360	1800	9300		
		30	498/460										
		36	460										
		42	484										
		48	572	MLM-WCH-02(36-48)	36-48	0.55	2900	330	300	420	12000		
		54	508										less than 2x background
		60	580										borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: WCH-03 **Northing (ft):** 2587873
Sample Type: Mine Standard Characterization **Easting (ft):** 1655344
Sample Date: 4/24/2012 **General Location:** Mine Western Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SC-CH	Silty Clay/Sandy Clay, Dry, Blocky, Stiff, Consistent	0	420	MLM-WCH-03(0-6)	0-6	1.05	2200	330	390	480	9100	
		6	422									
		12	724									
		18	756									
		24	560/606	MLM-WCH-03(18-24)	18-24	1.02	5100	440	550	820	13000	
		30	556									
		36	472									
		42	524									
		48	538	MLM-WCH-03(36-48)	36-48	0.72	3300	330	290	420	6900	
		54	542									less than 2x background
60	556									borehole abandoned		

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: WCH-04 **Northing (ft):** 2588373
Sample Type: Mine Standard Characterization **Easting (ft):** 1655467
Sample Date: 4/24/2012 **General Location:** Mine Western Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SM-ML	Light Brown Silty Sand and Clayey Sand, Dry, loose, Evaporitic Crust at 18 and 25 inches	0	518	MLM-WCH-04(0-6)	0-6	1.04	2900	360	340	490	12000		
		6	512										
		12	772										
		18	632										
		24	468	MLM-WCH-04(18-24)	18-24	2.06	6500	2000	770	2500	2200		
		30	464										
		36	438										
		42	384										
		48	340	MLM-WCH-04(36-48)	36-48	0.56	7200	580	470	320	8800		
		54	348										less than 2x background
		60											borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
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**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: WCH-05 **Northing (ft):** 2588379
Sample Type: Mine Standard Characterization **Easting (ft):** 1655189
Sample Date: 11/4/2011 **General Location:** Mine Western Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results						Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)	Vanadium (ug/kg)		
SP-SC	Gray-brown sand, fine to medium grained some gravel, some clay, White clayey material in test pit	0											
		6	12883	MLM-WCH-5 (0-6)	0-6	5.16 G	4000 J	500	470	1800	13000		
		12											
		18											
		24	17366	MLM-WCH-5 (18-24)	18-24	2.37 G	6500 J	1100	510	4300	7800		
		30											
		36											
		42											
		48	40414	MLM-WCH-5 (36-48)	36-48	19.4 G	4600 J	3000	3200	31000	19000		
		54	37912.5	MLM-WCH-5 (48-54)	48-54	4.4 G	3000 J	620	850	7300	660		
		60											
		66											
		72											Native soils encountered
78	41492	MLM-WCH-5 (72-78)	72-78	4.25 G	2200 J	660	940	4700	460	borehole abandoned			

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

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J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: WCH-06 **Northing (ft):** 2587885
Sample Type: Mine Standard Characterization **Easting (ft):** 1655154
Sample Date: 4/24/2012 **General Location:** Mine Western Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SP-SC	Tan Brown Fine sand and clay, sl moist, red-brown sand layers at 66-78 and 54-66 inches, sandstone bedrock from 78 in bgs	0	380	MLM-WCH-06(0-6)	0-6	0.85	2300	340	360	480	9600	
		6	490									
		12	566									
		18	570									
		24	514/508	MLM-WCH-06(18-24)	18-24	0.89	5300	620	370	1800	4800	
		30	520									
		36	988	MLM-WCH-06(24-36)	24-36	4.61	8700	990	690	3500	9100	
		42	836									
		48	1664									
		54	5382									
		60	6832/5472									
		66	1452	MLM-WCH-06(54-66)	54-66	59.4	3700	3000	3600	89000	26000	
		72	626									Refusal at 78 in bgs
78		MLM-WCH-06(66-78)	66-78	3.43	4000	830	260	1600	2700	borehole abandoned		

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: WCH-07 **Northing (ft):** 2587579
Sample Type: Mine Standard Characterization **Easting (ft):** 1655154
Sample Date: 4/24/2012 **General Location:** Mine Western Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SL-SC	Sandy Clay, Sl. Moist, Stiff, blocky, Medium Brown to Brown-Red fine Sand layers a 36 inches	0	556	MLM-WCH-07(0-6)	0-6	1.56	2900	400	580	920	12000	
		6	842									
		12	2558									
		18	5650									
		24	4090/4196	MLM-WCH-07(18-24)	18-24	46.9	4900	9000	12000	57000	43000	
		30	4054									
		36	5392									
		42	4838									
		48	1862	MLM-WCH-07(36-48)	36-48	35.7	5100	8900	16000	65000	55000	
		54	1350									
		60	974	MLM-WCH-07(48-60)	48-60	23.2	4200	2100	2600	26000	18000	
		66	774									
		72	674									Refusal at 78 in bgs
78	468	MLM-WCH-07(66-78)	66-78	0.37	2500	500	290	960	2700	borehole abandoned		

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
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J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: WCH-08 **Northing (ft):** 2587276
Sample Type: Mine Standard Characterization **Easting (ft):** 1655358
Sample Date: 4/24/2012 **General Location:** Mine Western Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results						Comments
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)	Vanadium (ug/kg)	
SC-CH	Brown Silty Sand and Sandy Clay, Sl. Moist, Blocky, Clayey	0	340	MLM-WCH-08(0-6)	0-6	1.78	3600	520	490	1300	13000	
		6	574/514									
		12	712									
		18	572									Refusal at 24 in bgs
		24	428	MLM-WCH-08(18-24)	18-24	1.51	2500	580	340	1600	9800	borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: WCH-09 **Northing (ft):** 2588118
Sample Type: Mine Standard Characterization **Easting (ft):** 1655330
Sample Date: 4/24/2012 **General Location:** Mine Western Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SC-CH	Tan-Brown Clay, Blocky, Stiff, Dry, Slightly Sandy	0	380	MLM-WCH-09(0-6)	0-6	1.59	4000	370	530	770	12000	
		6	550									
		12	676									
		18	1026									
		24	1140/1154	MLM-WCH-09(18-24)	18-24	4	2500	400	1000	3700	1700	
		30	1140	MLM-WCH-09(24-30)	24-30	1.85	2500	300	490	680	3500	
		36	464									
		42	492									Refusal at 48 in bgs
		48	378	MLM-WCH-09(36-48)	36-48	1.09	7300	1000	560	750	4200	borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Western Mine - Full Suite Samples

Sample Location: WFS-01 **Northing (ft):** 2587290
Sample Type: Mine Standard Characterization **Easting (ft):** 1655160
Sample Date: 4/24/2012 **General Location:** Mine Western Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SC-ML	Sandy Clay, slightly moist, blocky, stiff, loose sand at 28 inches, evaporation liner at 36"	0	538	MLM-WFS-01(0-6)	0-6	1.89	2600	440	530	1700	11000		
		6	500										
		12	832										
		18	1244										
		24	2238	MLM-WFS-01(18-24)	18-24	12.5	3300	2800	3500	22000	17000		
		30	1678										
		36	1794										
		42	1998										
		48	2184	MLM-WFS-01(36-48)	36-48	10.4	69000	51000	54000	480000	360000		
		54	2378										Refusal at 60 in bgs
		60	1418										borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: WFS-02 **Northing (ft):** 2587557
Sample Type: Mine Full Suite Characterization **Easting (ft):** 1655331
Sample Date: 11/4/2011 **General Location:** Mine Western Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SP-SM	Red-brown, silty sand, fine to medium grained, moderately sorted, sub-rounded, moist	0	75293.5	MLM-WFS-2 (0-6)	0-6	4.65 G	3400 J	1300	1100	7900	17000		
		6											
		12											
		18											
		24	71864.5	MLM-WFS-2 (18-24)	18-24	21.7 G	5700 J	4500	4100	47000	32000		
		30											
		36											
		42											native soils encountered
		48	35020	MLM-WFS-2 (36-48)	36-48	1.33 G	3800 J	910	530	14000	17000		borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: WFS-03 **Northing (ft):** 2588157
Sample Type: Mine Standard Characterization **Easting (ft):** 1655490
Sample Date: 4/24/2012 **General Location:** Mine Western Area
Collection Method: Dual Tube Direct Push Probe **Background Gamma Surface (cpm):** 432
Driller: WDC Exploration, Inc. **Background Gamma Depth (cpm):** 434

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments	
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)
SC-ML	Brown silty fine sand and silt, clayey sand and silt at 0 - 18 inches, Dry, loose	0	402	MLM-WFS-03(0-6)	0-6	0.95	2700	320	320	490	11000	
		6	460									
		12	616									
		18	668									
		24	564	MLM-WFS-03(18-24)	18-24	1.43	4000	630	360	540	9000	
		30	540									
		36	460/434									
		42	410									
		48	350	MLM-WFS-03(36-48)	36-48	0.93	10000	760	300	320	6200	
		54	312									
60	404										borehole abandoned	

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

**Table 3-1
Mariano Lake Mine, McKinley County, NM
Surface and Subsurface Soil Sample Locations and Results**

Sample Location: WFS-04 **Northing (ft):** 2588154
Sample Type: Mine Full Suite Characterization **Easting (ft):** 1655172
Sample Date: 11/4/2011 **General Location:** Mine Western Area
Collection Method: Back-hoe test pit **Background Gamma Surface (cpm):** 9461
Driller: Blue Collar Excavation **Background Gamma Depth (cpm):** 12359

USCS	Sediment Description	Gamma Depth (in bgs)	Gamma (cpm)	Sample ID	Sample Interval (in bgs)	Sample Results					Comments		
						Radium226 (pCi/g)	Arsenic (ug/kg)	Molybdenum (ug/kg)	Selenium (ug/kg)	Uranium (ug/kg)		Vanadium (ug/kg)	
SP-GP	Brown silty sand and gravel, moderately fine to medium sand, gravel with some red-brick soil/clay, dry	0	15082	MLM-WFS-4 (0-6)	0-6	0.74 LT	2700 J	320	350	580	11000		
		6											
		12											
		18	25332	MLM-WFS-4 (18-24)	18-24	43.2	4600 J	4200	3800	18000	32000		
		24											
		30											
		36											
		42											refusal at 42 in bgs
		48	47109.5	MLM-WFS-4 (36-48)	36-48	16.5	4500 J	3300	4000	27000	21000		borehole abandoned

Notes:

Coordinate Datum: New Mexico State Plane West (NAD1983) US Feet
in bgs: Inches Below ground Surface
CPM: Counts Per Minute
pCi/g: Pico-Curies per gram
ug/kg: milligrams per kilogram

Data Qualifiers

LT: result is less than requested Minimum Detectable Concentration (MDC), greater than sample specified MDC
U: result is less than the sample specific MDC or less than the associated total propagated uncertainty
J: The compound was positively identified, however the associated numerical value is an estimated concentration only.
G: Sample density differs by more than 15% of the LCS density

Table 3-2
Mariano Lake Mine, McKinley County, NM
Summary of Analytical Laboratory Data

Parameter	Count	Number of Detects	Average Conc.	Units	Maximum Conc.	Location of Maximum Concentration	
						Sample ID	Area
RADIONUCLIDES							
Ac-228	230	117	0.8	pCi/g	3.47	MLM-WCH-5 (48-54)	Western Mine Area
Ag-110m	230	0	<0.101	pCi/g	NA	--	--
Al-26	228	11	0.1	pCi/g	0.17	MLM-PRCH-02 (18-24)	Perimeter Road Samples
Am-241	230	3	1.0	pCi/g	5.6	MLM-WCH-5 (72-78)	Western Mine Area
Be-7	230	0	<1.32	pCi/g	NA	--	--
Bi-212	230	13	1.7	pCi/g	4.6	MLM-WCH-09 (18-24)	Western Mine Area
Bi-214	230	222	9.0	pCi/g	109	MLM-ECH-07 (18-24)	Eastern Mine Area
Ce-139	230	0	<0.088	pCi/g	NA	--	--
Ce-144	230	0	<0.54	pCi/g	NA	--	--
Co-56	230	59	0.9	pCi/g	14	MLM-PRCH-12 (18-24)	Perimeter Road Samples
Co-57	230	0	<0.07	pCi/g	NA	--	--
Co-58	230	0	<0.128	pCi/g	NA	--	--
Co-60	230	0	<0.106	pCi/g	NA	--	--
Cr-51	230	0	<1.9	pCi/g	NA	--	--
Cs-134	230	1	0.2	pCi/g	1.8	MLM-ECH-07 (0-6)	Eastern Mine Area
Cs-137	230	9	0.1	pCi/g	0.52	MLM-SOCH-12 (0-2)	Step-Out
Eu-152	230	38	1.2	pCi/g	11.7	MLM-PRCH-12 (18-24)	Perimeter Road Samples
Eu-154	230	0	<0.6	pCi/g	NA	--	--
Eu-155	230	1	0.3	pCi/g	0.76	MLM-ECH-10 (36-48)	Eastern Mine Area
Fe-59	230	1	0.4	pCi/g	0.79	MLM-WCH-06 (54-66)	Western Mine Area
I-131	230	1	2.9	pCi/g	7.3	MLM-PRCH-4 (0-2)	Perimeter Road Samples
K-40	230	230	12.5	pCi/g	26.3	MLM-ECH-09 (60-72)	Eastern Mine Area
Mn-54	230	2	0.1	pCi/g	0.23	MLM-PRCH-12 (18-24)	Perimeter Road Samples
Na-22	230	2	0.1	pCi/g	0.23	MLM-SOCH-20 (0-2)	Step-Out
Nb-94	230	5	0.1	pCi/g	0.49	MLM-PRCH-12 (18-24)	Perimeter Road Samples
Nb-95	230	3	0.2	pCi/g	0.77	MLM-PRCH-12 (18-24)	Perimeter Road Samples
Pa-234m	230	13	22.7	pCi/g	185	MLM-EFS-04 (18-24)	Eastern Mine Area
Pb-212	230	205	0.9	pCi/g	4.32	MLM-WCH-5 (72-78)	Western Mine Area
Pb-214	230	227	10.0	pCi/g	124	MLM-ECH-07 (18-24)	Eastern Mine Area
Ra-226	230	227	12.5	pCi/g	153	MLM-ECH-07 (18-24)	Eastern Mine Area
Ru-106	230	0	<1.05	pCi/g	NA	--	--
Sb-124	230	1	0.2	pCi/g	0.38	MLM-ECH-06 (60-66)	Eastern Mine Area
Sb-125	230	0	<0.25	pCi/g	NA	--	--
Sc-46	230	1	0.2	pCi/g	0.4	MLM-ECH-06 (60-66)	Eastern Mine Area
Th-227	230	22	1.3	pCi/g	6.6	MLM-ECH-07 (0-6)	Eastern Mine Area
Th-234	230	69	7.6	pCi/g	112	MLM-EFS-04 (18-24)	Eastern Mine Area
Tl-208	230	130	0.3	pCi/g	1.29	MLM-WCH-5 (72-78)	Western Mine Area
U-235	230	22	0.8	pCi/g	5.6	MLM-PRCH-12 (0-2)	Perimeter Road Samples
Zn-65	230	0	<0.26	pCi/g	NA	--	--
METALS AND PERCHLORATE							
ARSENIC	230	230	5341	µg/kg	69000	MLM-WFS-01 (36-48)	Western Mine Area
MOLYBDENUM	230	230	2441	µg/kg	51000	MLM-WFS-01 (36-48)	Western Mine Area
SELENIUM	230	230	2335	µg/kg	54000	MLM-WFS-01 (36-48)	Western Mine Area

Table 3-2
Mariano Lake Mine, McKinley County, NM
Summary of Analytical Laboratory Data

Parameter	Count	Number of Detects	Average Conc.	Units	Maximum Conc.	Location of Maximum Concentration	
						Sample ID	Area
URANIUM	230	230	24329	µg/kg	480000	MLM-WFS-01 (36-48)	Western Mine Area
VANADIUM	230	230	20493	µg/kg	360000	MLM-WFS-01 (36-48)	Western Mine Area
PERCHLORATE	19	3	0.33	µg/kg	0.73	MLM-EFS-2 (48-54)	Eastern Mine Area
MERCURY	126	2	0.03	mg/kg	0.06	MLM-EFS-1 (18-24)	Eastern Mine Area
ORGANICS							
1,1,1,2-TETRACHLOROETHANE	19	0	<5.2	mg/kg	NA	--	--
1,1,1-TRICHLOROETHANE	19	0	<5.2	mg/kg	NA	--	--
1,1,2,2-TETRACHLOROETHANE	19	0	<5.2	mg/kg	NA	--	--
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	19	0	<5.2	mg/kg	NA	--	--
1,1,2-TRICHLOROETHANE	19	0	<5.2	mg/kg	NA	--	--
1,1-DICHLOROETHANE	19	0	<5.2	mg/kg	NA	--	--
1,1-DICHLOROETHENE	19	0	<5.2	mg/kg	NA	--	--
1,1-DICHLOROPROPENE	19	0	<5.2	mg/kg	NA	--	--
1,2,3-TRICHLOROBENZENE	19	0	<5.2	mg/kg	NA	--	--
1,2,3-TRICHLOROPROPANE	19	0	<5.2	mg/kg	NA	--	--
1,2,4-TRICHLOROBENZENE*	38	0	<5.2	mg/kg	NA	--	--
1,2,4-TRIMETHYLBENZENE	19	0	<5.2	mg/kg	NA	--	--
1,2-DIBROMO-3-CHLOROPROPANE	19	0	<10	mg/kg	NA	--	--
1,2-DIBROMOETHANE	19	0	<5.2	mg/kg	NA	--	--
1,2-DICHLOROBENZENE*	38	0	<5.2	mg/kg	NA	--	--
1,2-DICHLOROETHANE	19	0	<5.2	mg/kg	NA	--	--
1,2-DICHLOROPROPANE	19	0	<5.2	mg/kg	NA	--	--
1,3,5-TRIMETHYLBENZENE	19	0	<5.2	mg/kg	NA	--	--
1,3,5-TRINITROBENZENE	19	0	<0.1	mg/kg	NA	--	--
1,3-DICHLOROBENZENE*	38	0	<5.2	mg/kg	NA	--	--
1,3-DICHLOROPROPANE	19	0	<5.2	mg/kg	NA	--	--
1,3-DINITROBENZENE	19	0	<0.1	mg/kg	NA	--	--
1,4-DICHLOROBENZENE*	38	0	<5.2	mg/kg	NA	--	--
1-CHLOROHEXANE	19	0	<5.2	mg/kg	NA	--	--
1-METHYLNAPHTHALENE	19	0	<260	mg/kg	NA	--	--
2,2-DICHLOROPROPANE	19	0	<5.2	mg/kg	NA	--	--
2,3,4,6-TETRACHLOROPHENOL	19	0	<260	mg/kg	NA	--	--
2,4,5-TRICHLOROPHENOL	19	0	<260	mg/kg	NA	--	--
2,4,6-TRICHLOROPHENOL	19	0	<260	mg/kg	NA	--	--
2,4,6-TRINITROTOLUENE	19	0	<0.1	mg/kg	NA	--	--
2,4-DICHLOROPHENOL	19	0	<260	mg/kg	NA	--	--
2,4-DIMETHYLPHENOL	19	0	<260	mg/kg	NA	--	--
2,4-DINITROPHENOL	19	0	<520	mg/kg	NA	--	--
2,4-DINITROTOLUENE*	38	0	<0.1	mg/kg	NA	--	--
2,6-DINITROTOLUENE*	38	0	<0.1	mg/kg	NA	--	--
2-AMINO-4,6-DNT	19	0	<0.1	mg/kg	NA	--	--
2-BUTANONE	19	0	<21	mg/kg	NA	--	--
2-CHLORONAPHTHALENE	19	0	<260	mg/kg	NA	--	--

Table 3-2
Mariano Lake Mine, McKinley County, NM
Summary of Analytical Laboratory Data

Parameter	Count	Number of Detects	Average Conc.	Units	Maximum Conc.	Location of Maximum Concentration	
						Sample ID	Area
2-CHLOROPHENOL	19	0	<260	mg/kg	NA	--	--
2-CHLOROTOLUENE	19	0	<5.2	mg/kg	NA	--	--
2-HEXANONE	19	0	<21	mg/kg	NA	--	--
2-METHYLNAPHTHALENE	19	0	<260	mg/kg	NA	--	--
2-METHYLPHENOL	19	0	<260	mg/kg	NA	--	--
2-NITROANILINE	19	0	<520	mg/kg	NA	--	--
2-NITROPHENOL	19	0	<260	mg/kg	NA	--	--
2-NITROTOLUENE	19	0	<0.1	mg/kg	NA	--	--
3,3'-DICHLOROBENZIDINE	19	0	<260	mg/kg	NA	--	--
3,5-DINITROANILINE	19	0	<0.1	mg/kg	NA	--	--
3+4-METHYLPHENOL	19	0	<260	mg/kg	NA	--	--
3-NITROANILINE	19	0	<520	mg/kg	NA	--	--
3-NITROTOLUENE	19	0	<0.1	mg/kg	NA	--	--
4,6-DINITRO-2-METHYLPHENOL	19	0	<520	mg/kg	NA	--	--
4-AMINO-2,6-DNT	19	0	<0.1	mg/kg	NA	--	--
4-BROMOPHENYL PHENYL ETHER	19	0	<260	mg/kg	NA	--	--
4-CHLORO-3-METHYLPHENOL	19	0	<260	mg/kg	NA	--	--
4-CHLOROANILINE	19	0	<260	mg/kg	NA	--	--
4-CHLOROPHENYL PHENYL ETHER	19	0	<260	mg/kg	NA	--	--
4-CHLOROTOLUENE	19	0	<5.2	mg/kg	NA	--	--
4-METHYL-2-PENTANONE	19	0	<21	mg/kg	NA	--	--
4-NITROANILINE	19	0	<520	mg/kg	NA	--	--
4-NITROPHENOL	19	0	<520	mg/kg	NA	--	--
4-NITROTOLUENE	19	0	<0.1	mg/kg	NA	--	--
ACENAPHTHENE	19	0	<260	mg/kg	NA	--	--
ACENAPHTHYLENE	19	0	<260	mg/kg	NA	--	--
ACETONE	19	0	<21	mg/kg	NA	--	--
ANILINE	19	0	<260	mg/kg	NA	--	--
ANTHRACENE	19	0	<260	mg/kg	NA	--	--
AROCLOR-1016	19	0	<34	mg/kg	NA	--	--
AROCLOR-1221	19	0	<68	mg/kg	NA	--	--
AROCLOR-1232	19	0	<34	mg/kg	NA	--	--
AROCLOR-1242	19	0	<34	mg/kg	NA	--	--
AROCLOR-1248	19	0	<34	mg/kg	NA	--	--
AROCLOR-1254	19	0	<34	mg/kg	NA	--	--
AROCLOR-1260	19	0	<34	mg/kg	NA	--	--
AZOBENZENE	19	0	<260	mg/kg	NA	--	--
BENZENE	19	0	<5.2	mg/kg	NA	--	--
BENZO(A)ANTHRACENE	19	0	<260	mg/kg	NA	--	--
BENZO(A)PYRENE	19	0	<260	mg/kg	NA	--	--
BENZO(B)FLUORANTHENE	19	0	<260	mg/kg	NA	--	--
BENZO(G,H,I)PERYLENE	19	0	<260	mg/kg	NA	--	--
BENZO(K)FLUORANTHENE	19	0	<260	mg/kg	NA	--	--
BENZOIC ACID	19	0	<1300	mg/kg	NA	--	--

Table 3-2
Mariano Lake Mine, McKinley County, NM
Summary of Analytical Laboratory Data

Parameter	Count	Number of Detects	Average Conc.	Units	Maximum Conc.	Location of Maximum Concentration	
						Sample ID	Area
BENZYL ALCOHOL	19	0	<260	mg/kg	NA	--	--
BIS(2-CHLOROETHOXY)METHANE	19	0	<260	mg/kg	NA	--	--
BIS(2-CHLOROETHYL)ETHER	19	0	<260	mg/kg	NA	--	--
BIS(2-CHLOROISOPROPYL)ETHER	19	0	<260	mg/kg	NA	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	19	0	<260	mg/kg	NA	--	--
BROMOBENZENE	19	0	<5.2	mg/kg	NA	--	--
BROMOCHLOROMETHANE	19	0	<5.2	mg/kg	NA	--	--
BROMODICHLOROMETHANE	19	0	<5.2	mg/kg	NA	--	--
BROMOFORM	19	0	<5.2	mg/kg	NA	--	--
BROMOMETHANE	19	0	<5.2	mg/kg	NA	--	--
BUTYL BENZYL PHTHALATE	19	0	<260	mg/kg	NA	--	--
CARBAZOLE	19	0	<260	mg/kg	NA	--	--
CARBON DISULFIDE	19	0	<5.2	mg/kg	NA	--	--
CARBON TETRACHLORIDE	19	0	<5.2	mg/kg	NA	--	--
CHLOROBENZENE	19	0	<5.2	mg/kg	NA	--	--
CHLOROETHANE	19	0	<5.2	mg/kg	NA	--	--
CHLOROFORM	19	0	<5.2	mg/kg	NA	--	--
CHLOROMETHANE	19	0	<5.2	mg/kg	NA	--	--
CHRYSENE	19	0	<260	mg/kg	NA	--	--
CIS-1,2-DICHLOROETHENE	19	0	<5.2	mg/kg	NA	--	--
CIS-1,3-DICHLOROPROPENE	19	0	<5.2	mg/kg	NA	--	--
DIBENZO(A,H)ANTHRACENE	19	0	<260	mg/kg	NA	--	--
DIBENZOFURAN	19	0	<260	mg/kg	NA	--	--
DIBROMOCHLOROMETHANE	19	0	<5.2	mg/kg	NA	--	--
DIBROMOMETHANE	19	0	<5.2	mg/kg	NA	--	--
DICHLORODIFLUOROMETHANE	19	0	<5.2	mg/kg	NA	--	--
Diesel Range Organics	19	5	5.8	mg/kg	24	MLM-EFS-1 (24-36)	Eastern Mine Area
DIETHYL PHTHALATE	19	0	<260	mg/kg	NA	--	--
DIMETHYL PHTHALATE	19	0	<260	mg/kg	NA	--	--
DI-N-BUTYL PHTHALATE	19	0	<260	mg/kg	NA	--	--
DI-N-OCTYL PHTHALATE	19	0	<260	mg/kg	NA	--	--
ETHYLBENZENE	19	0	<5.2	mg/kg	NA	--	--
FLUORANTHENE	19	0	<260	mg/kg	NA	--	--
FLUORENE	19	0	<260	mg/kg	NA	--	--
GASOLINE RANGE ORGANICS	19	0	<0.46	mg/kg	NA	--	--
HEXACHLOROBENZENE	19	0	<260	mg/kg	NA	--	--
HEXACHLOROBUTADIENE*	38	0	<5.2	mg/kg	NA	--	--
HEXACHLOROCYCLOPENTADIENE	19	0	<260	mg/kg	NA	--	--
HEXACHLOROETHANE	19	0	<260	mg/kg	NA	--	--
HMX	19	0	<0.1	mg/kg	NA	--	--
INDENO(1,2,3-CD)PYRENE	19	0	<260	mg/kg	NA	--	--
IODOMETHANE	19	0	<5.2	mg/kg	NA	--	--
ISOPHORONE	19	0	<260	mg/kg	NA	--	--
ISOPROPYLBENZENE	19	0	<5.2	mg/kg	NA	--	--

Table 3-2
Mariano Lake Mine, McKinley County, NM
Summary of Analytical Laboratory Data

Parameter	Count	Number of Detects	Average Conc.	Units	Maximum Conc.	Location of Maximum Concentration	
						Sample ID	Area
M+P-XYLENE	19	0	<5.2	mg/kg	NA	--	--
METHYL TERTIARY BUTYL ETHER	19	0	<5.2	mg/kg	NA	--	--
METHYLENE CHLORIDE	19	0	<5.2	mg/kg	NA	--	--
NAPHTHALENE*	38	0	<5.2	mg/kg	NA	--	--
N-BUTYLBENZENE	19	0	<5.2	mg/kg	NA	--	--
NITROBENZENE*	38	0	<0.1	mg/kg	NA	--	--
NITROGLYCERIN	19	0	<0.4	mg/kg	NA	--	--
N-NITROSODIMETHYLAMINE	19	0	<260	mg/kg	NA	--	--
N-NITroso-DI-N-PROPYLAMINE	19	0	<260	mg/kg	NA	--	--
N-NITROSODIPHENYLAMINE	19	0	<260	mg/kg	NA	--	--
N-PROPYLBENZENE	19	0	<5.2	mg/kg	NA	--	--
O-XYLENE	19	0	<5.2	mg/kg	NA	--	--
PENTACHLOROPHENOL	19	0	<520	mg/kg	NA	--	--
PETN	19	0	<0.4	mg/kg	NA	--	--
PHENANTHRENE	19	0	<260	mg/kg	NA	--	--
PHENOL	19	0	<260	mg/kg	NA	--	--
P-ISOPROPYLTOLUENE	19	0	<5.2	mg/kg	NA	--	--
PYRENE	19	0	<260	mg/kg	NA	--	--
PYRIDINE	19	0	<260	mg/kg	NA	--	--
RDX	19	0	<0.1	mg/kg	NA	--	--
SEC-BUTYLBENZENE	19	0	<5.2	mg/kg	NA	--	--
STYRENE	19	0	<5.2	mg/kg	NA	--	--
TERT-BUTYLBENZENE	19	0	<5.2	mg/kg	NA	--	--
TETRACHLOROETHENE	19	0	<5.2	mg/kg	NA	--	--
TETRYL	19	0	<0.1	mg/kg	NA	--	--
TOLUENE	19	0	<5.2	mg/kg	NA	--	--
TRANS-1,2-DICHLOROETHENE	19	0	<5.2	mg/kg	NA	--	--
TRANS-1,3-DICHLOROPROPENE	19	0	<5.2	mg/kg	NA	--	--
TRICHLOROETHENE	19	0	<5.2	mg/kg	NA	--	--
TRICHLOROFLUOROMETHANE	19	0	<5.2	mg/kg	NA	--	--
VINYL ACETATE	19	0	<21	mg/kg	NA	--	--
VINYL CHLORIDE	19	0	<5.2	mg/kg	NA	--	--

Notes:

*Analyzed by two methods

-Averages calculated using 1/2 the practical reporting limit in place of non-detects. For parameters with no detections, the average is shown as less than the minimum practical reporting limit.

pCi/g = pico-curies per gram

µg/kg = micrograms per kilogram

mg/kg = milligrams per kilogram

NA = not applicable

-Detection is defined as a value above the practical reporting limit.

Table 3-3
Mariano Lake Mine, McKinley County, NM
Estimated Soil Volumes Greater Than the Investigation Level

Site Area	0-1 ft Depth	1-2 ft Depth	2-4 ft Depth	4-6 ft Depth	6-10 ft Depth	Total
Eastern Mine Area	21000	15000	34000	20000	17000	107000
Western Mine Area	14000	15000	29000	17000	--	75000
Parking Lot Area	7300	1500	15000	670	1600	26070
Step Out Locations	9000	6500	6100	--	--	21600
Bermed Area	1300	--	--	--	--	1300
Perimeter Roads/Mine Entrance Roads	3700	3600	3600	--	--	10900
Total by depth	56300	41600	87700	37670	18600	242000

Notes:

All values are in cubic yards

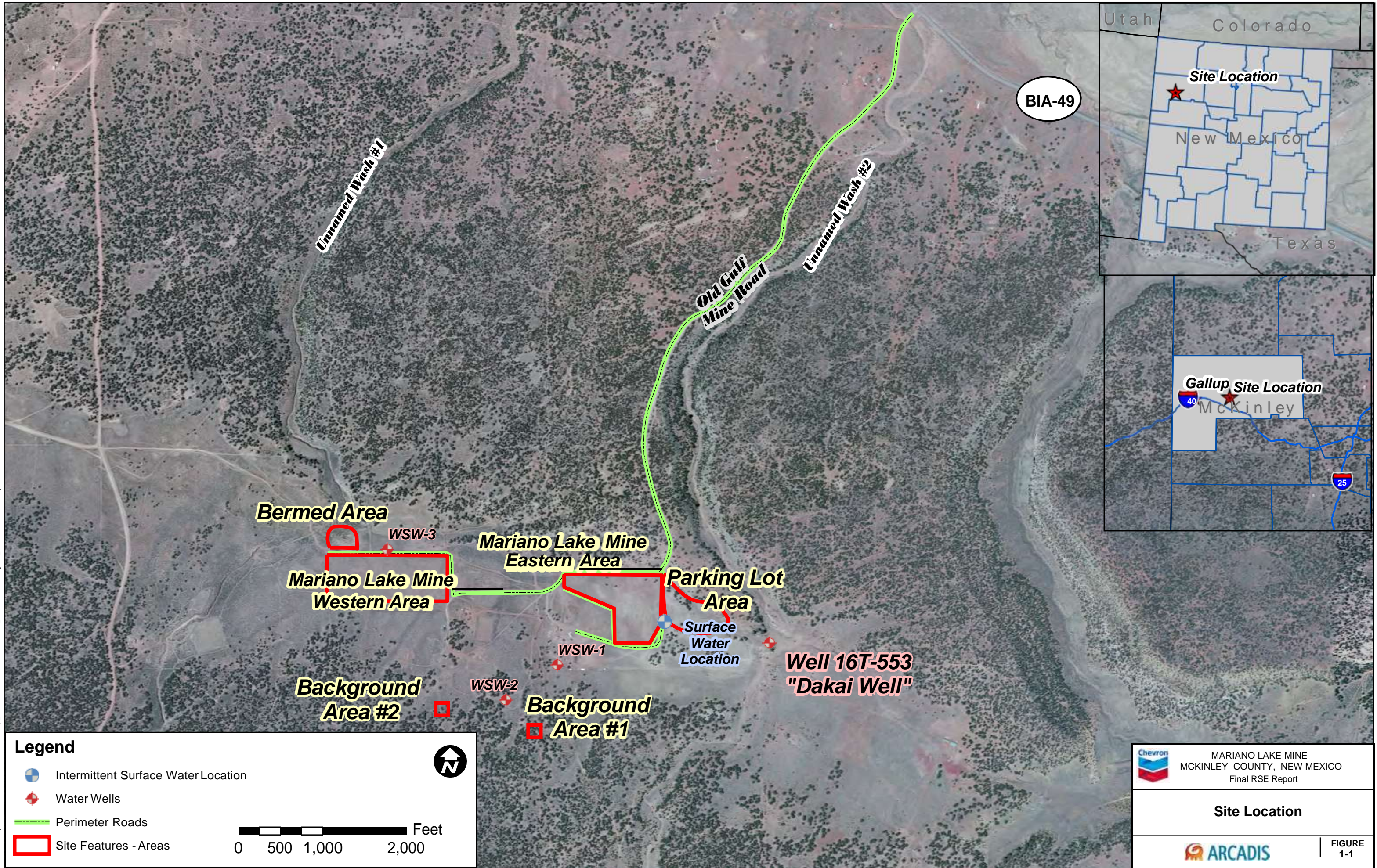
Soil bulking has not been taken into account

Investigation Level = 1.24 pCi/g plus the site background of 0.81 pCi/g, or 2.05 pCi/g



Figures

Date: 3/6/2013
Path: D:\A\Project\CEMC_Mariano Lake\GIS\Map_MXD\RSRSE COMPLETION REPORT_FINAL FIGURES\Figure1_Site Locations and Sample Locations.mxd



Legend

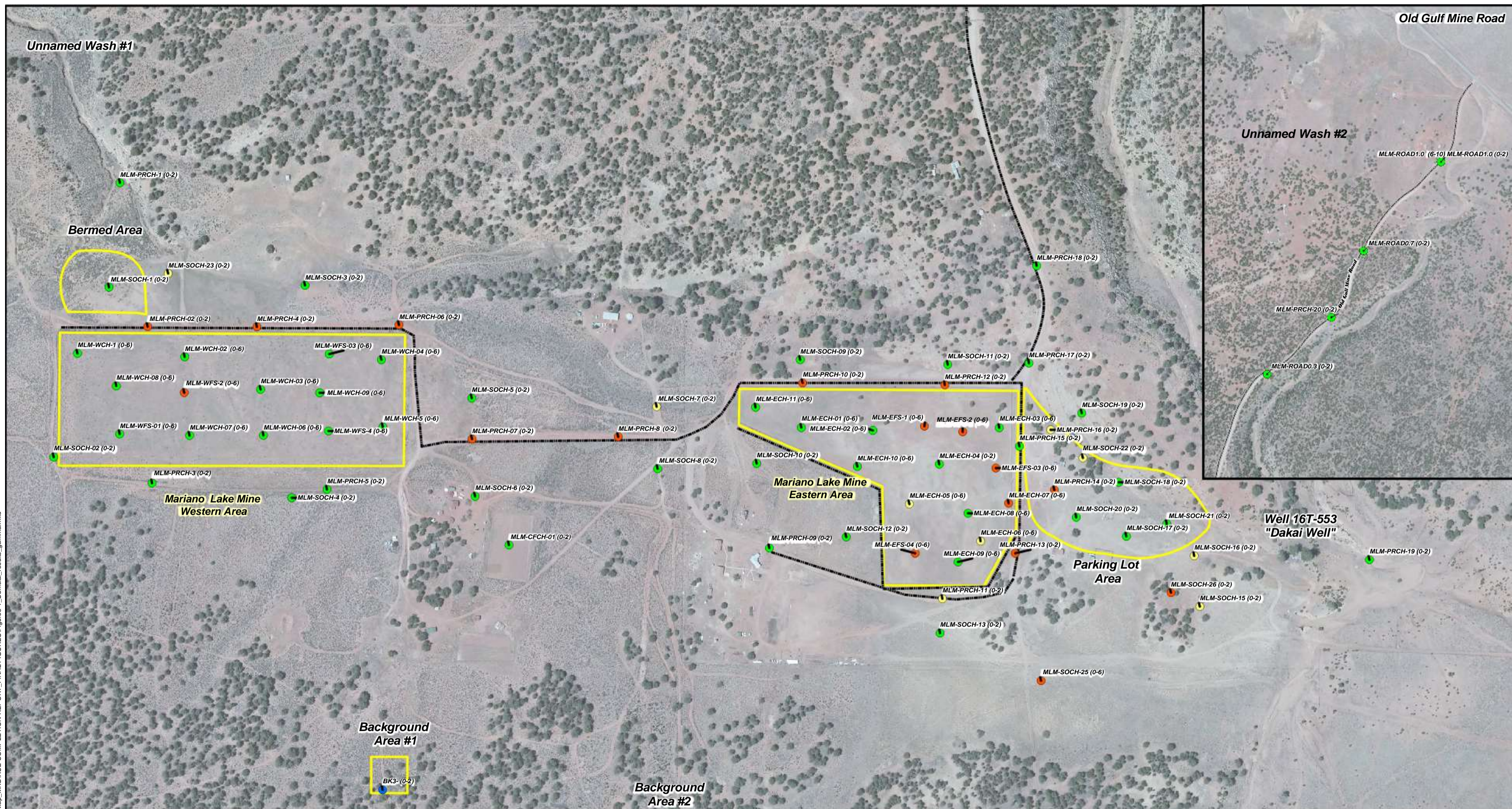
- Intermittent Surface Water Location
- Water Wells
- Perimeter Roads
- Site Features - Areas

MARIANO LAKE MINE
MCKINLEY COUNTY, NEW MEXICO
Final RSE Report

Site Location

| **FIGURE 1-1**

Date: 3/6/2013 Author: jgilbert Path: D:\A\Project\CEMC\Mariano Lake\GIS\GIS\Map_MXD\DIRSE_COMPLETION_REPORT_FINAL\FIGURES\Figure3-1_Surficial_results_gamma.mxd



Legend

Sample Locations - Field Gamma Counts

- No Surficial Gamma Collected
- Less than 2x Background
- 2x - 4x Background
- Greater than 4x Background

Old Gulf Mine Road (dashed line)

Perimeter Roads (dotted line)

Site Features - Areas (yellow outline)

cpm = Counts Per Minute
 pCi/g = Pico-Curies Per Gram
 µg/mg = Micrograms Per Milligram
 in bgs = Inches Below Ground Surface

0 500 1,000 Feet

Site Background Concentrations

Analyte	Site Background
Field Gamma - Fall 2011	9461 cpm
Field Gamma - Spring 2012	432 cpm
RADIUM-226	0.81 pCi/g
URANIUM	363 µg/mg

Symbol Legend

Mariano Lake Sequential Sample Mine Number
MLM-ECH-03 (0-6)
 Site Area Abbreviation Sample Depth (in bgs) and Analytical Suite

● Sample Location

Chevron

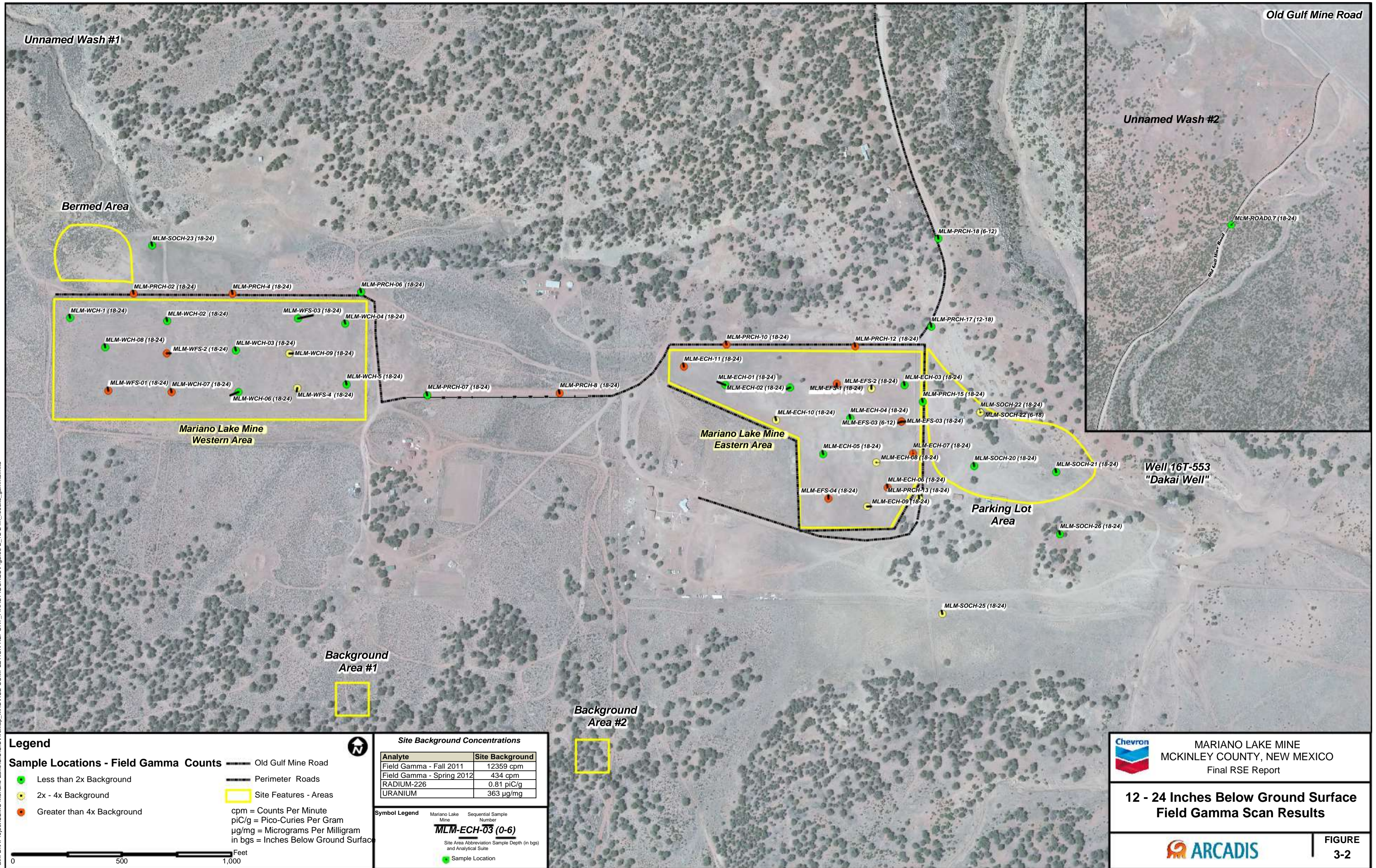
MARIANO LAKE MINE
 MCKINLEY COUNTY, NEW MEXICO
 Final RSE Report

**Surficial
 Field Gamma Scan Results**

ARCADIS

FIGURE 3-1

Date: 3/6/2013 Author: jgilbert Path: D:\A\Project\CEMC\Mariano Lake\GIS\Map_MXD\RSE COMPLETION REPORT_FINAL FIGURES\Figure3-2_12-24in_results_gamma.mxd



Legend

Sample Locations - Field Gamma Counts

- Less than 2x Background
- 2x - 4x Background
- Greater than 4x Background

Old Gulf Mine Road
 Perimeter Roads
 Site Features - Areas

cpm = Counts Per Minute
 pCi/g = Pico-Curies Per Gram
 µg/mg = Micrograms Per Milligram
 in bgs = Inches Below Ground Surface

0 500 1,000 Feet

Site Background Concentrations

Analyte	Site Background
Field Gamma - Fall 2011	12359 cpm
Field Gamma - Spring 2012	434 cpm
RADIUM-226	0.81 pCi/g
URANIUM	363 µg/mg

Symbol Legend

Mariano Lake Mine Sequential Sample Number

MLM-ECH-03 (0-6)

Site Area Abbreviation Sample Depth (in bgs) and Analytical Suite

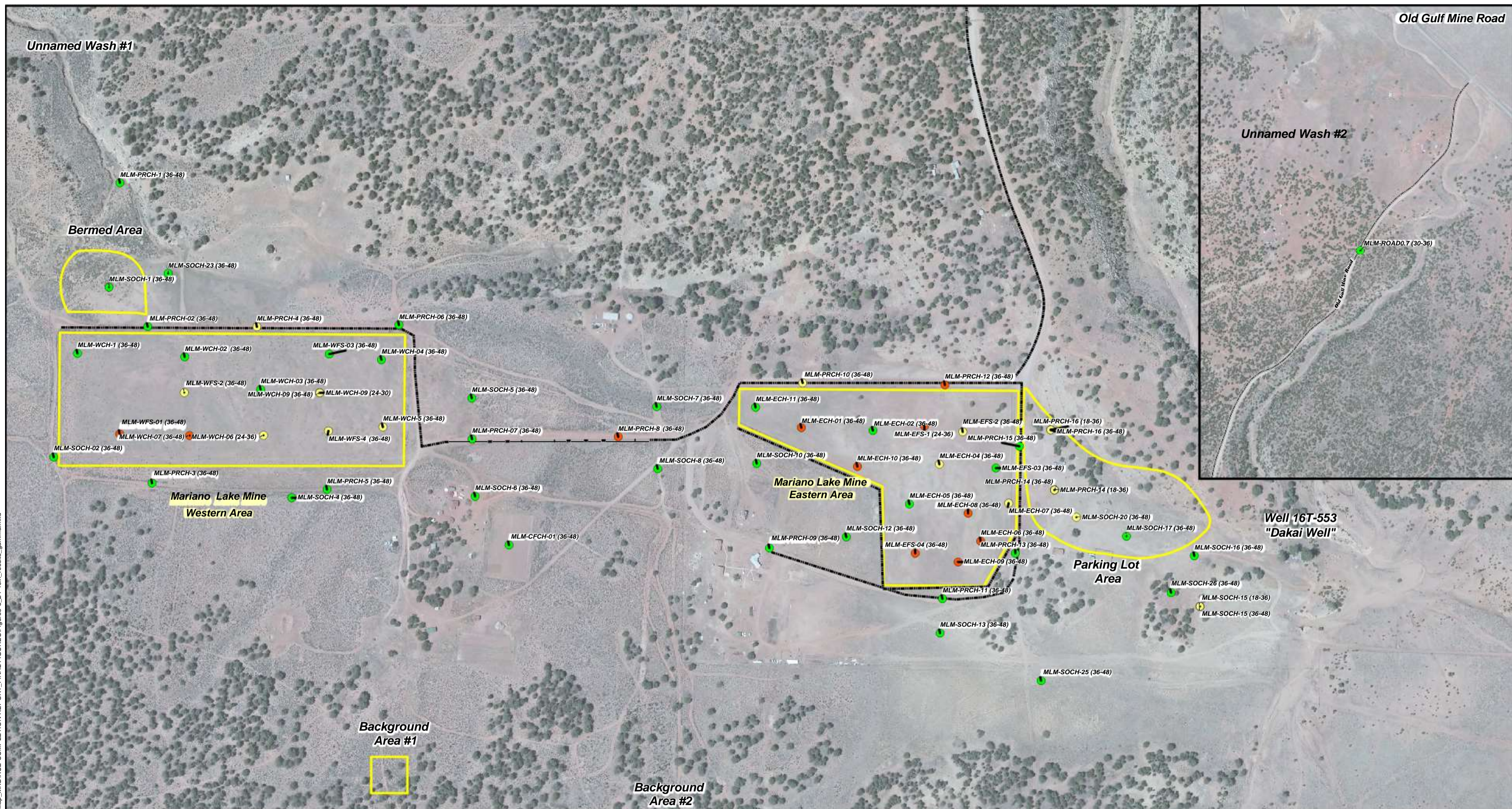
● Sample Location

Chevron MARIANO LAKE MINE
MCKINLEY COUNTY, NEW MEXICO
Final RSE Report

**12 - 24 Inches Below Ground Surface
Field Gamma Scan Results**

ARCADIS FIGURE 3-2

Date: 3/6/2013 Author: jgilbert Path: D:\V\Project\CEMC_Mariano Lake\GIS\GIS\Map_MXD\DIRSE_COMPLETION_REPORT_FINAL_FIGURES\Figures-3_24-48in_results_gamma.mxd



Legend

Sample Locations - Field Gamma Counts

- Less than 2x Background
- 2x - 4x Background
- Greater than 4x Background

Old Gulf Mine Road (dashed line)

Perimeter Roads (dotted line)

Site Features - Areas (yellow outline)

cpm = Counts Per Minute
 piC/g = Pico-Curies Per Gram
 µg/mg = Micrograms Per Milligram
 in bgs = Inches Below Ground Surface

0 500 1,000 Feet

Site Background Concentrations

Analyte	Site Background
Field Gamma - Fall 2011	12359 cpm
Field Gamma - Spring 2012	434 cpm
RADIUM-226	0.81 piC/g
URANIUM	363 µg/mg

Symbol Legend

Mariano Lake Sequential Sample Mine Number

MLM-ECH-03 (0-6)

Site Area Abbreviation Sample Depth (in bgs) and Analytical Suite

● Sample Location

Chevron

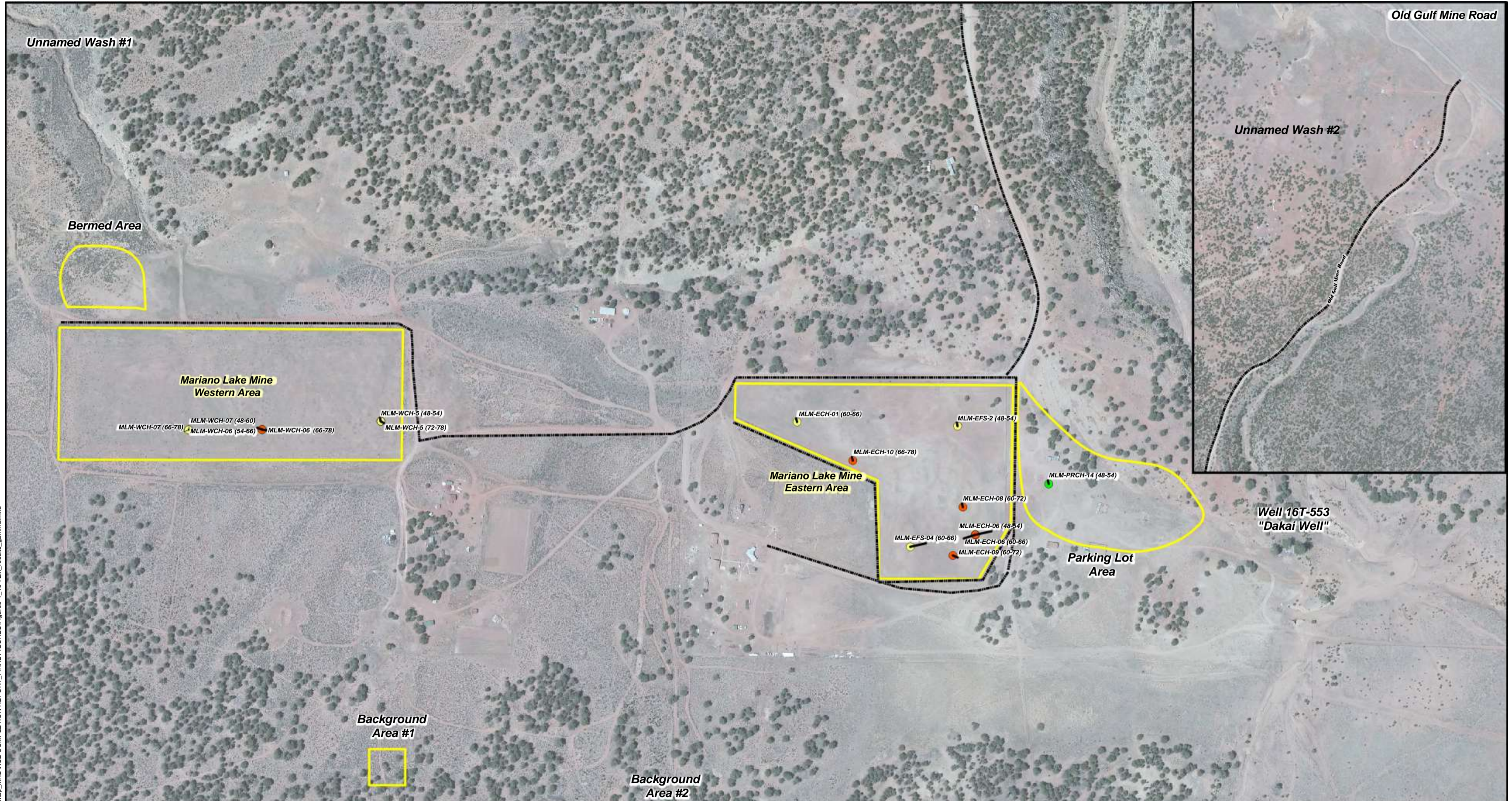
MARIANO LAKE MINE
 MCKINLEY COUNTY, NEW MEXICO
 Final RSE Report

**24 - 48 Inches Below Ground Surface
 Field Gamma Scan Results**

ARCADIS

FIGURE 3-3

Date: 3/6/2013 Author: jgilbert Path: D:\Projects\CEMC_Mariano Lake\GIS\Map_MXD\DIRSE COMPLETION REPORT_FINAL FIGURES\Figures4_48-72in_results_gamma.mxd



Legend

Sample Locations - Field Gamma Counts

- Less than 2x Background
- 2x - 4x Background
- Greater than 4x Background

Old Gulf Mine Road (dashed line)

Perimeter Roads (solid line)

Site Features - Areas (yellow outline)

cpm = Counts Per Minute
 pCi/g = Pico-Curies Per Gram
 µg/mg = Micrograms Per Milligram
 in bgs = Inches Below Ground Surface

Scale: 0, 500, 1,000 Feet

Site Background Concentrations

Analyte	Site Background
Field Gamma - Fall 2011	12359 cpm
Field Gamma - Spring 2012	434 cpm
RADIUM-226	0.81 pCi/g
URANIUM	363 µg/mg

Symbol Legend

Mariano Lake Sequential Sample Number

MLM-ECH-03 (0-6)

Site Area Abbreviation Sample Depth (in bgs) and Analytical Suite

● Sample Location

Chevron

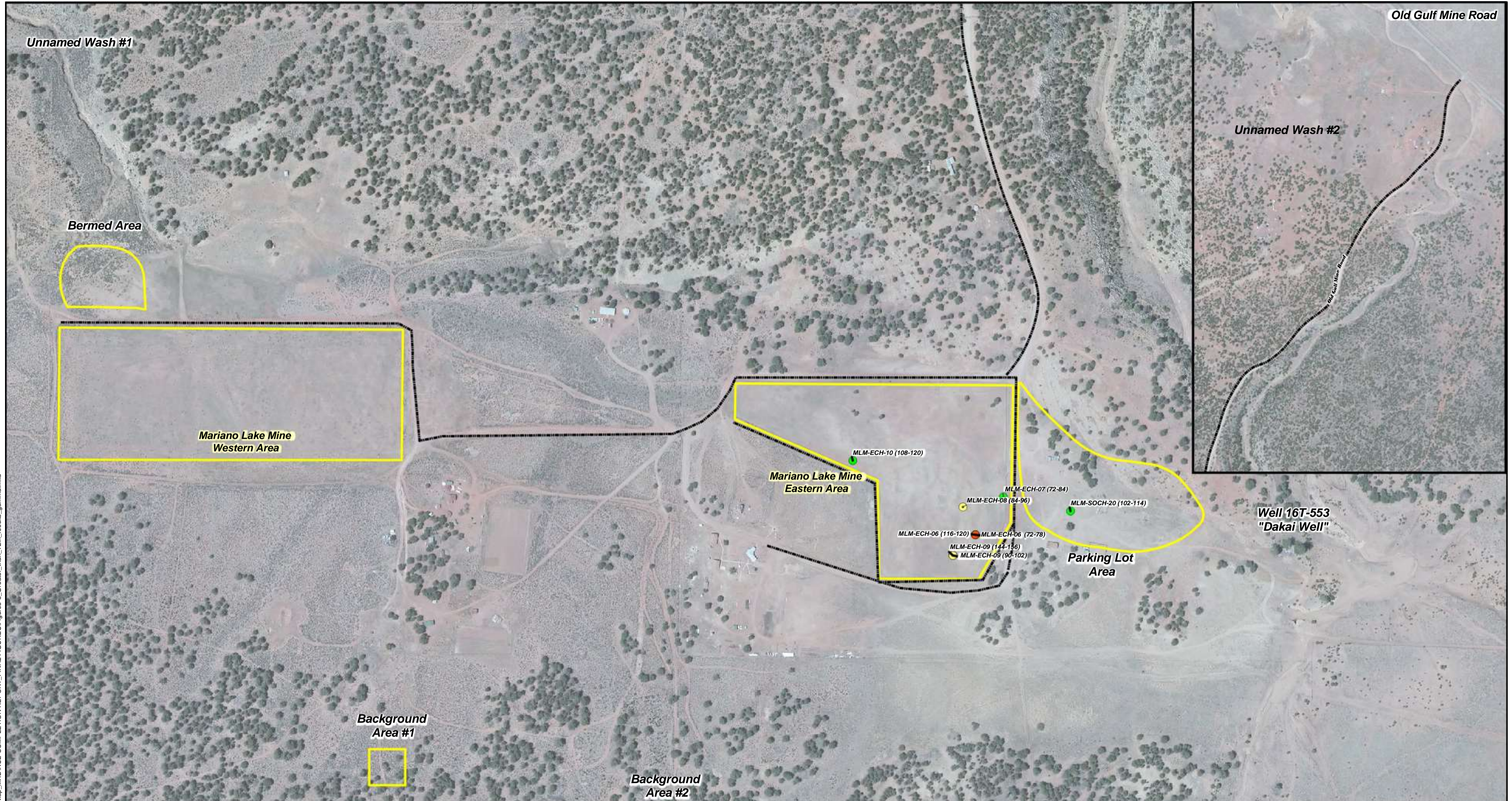
MARIANO LAKE MINE
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**48 - 72 Inches Below Ground Surface
 Field Gamma Scan Results**

ARCADIS

FIGURE 3-4

Date: 3/6/2013 Author: jgilbert Path: D:\A\Project\CEMC\Mariano Lake\GIS\Map\COMPLETION REPORT_FINAL FIGURES\Figures-5_Greater_than_72in_results_gamma.mxd



Legend

Sample Locations - Field Gamma Counts

- Less than 2x Background
- 2x - 4x Background
- Greater than 4x Background

Old Gulf Mine Road
 Perimeter Roads
 Site Features - Areas

cpm = Counts Per Minute
 pCi/g = Pico-Curies Per Gram
 µg/mg = Micrograms Per Milligram
 in bgs = Inches Below Ground Surface

0 500 1,000 Feet

Site Background Concentrations

Analyte	Site Background
Field Gamma - Fall 2011	12359 cpm
Field Gamma - Spring 2012	217 cpm
RADIUM-226	0.81 pCi/g
URANIUM	363 µg/mg

Symbol Legend

Mariano Lake Mine Sequential Sample Number

MLM-ECH-03 (0-6)

Site Area Abbreviation Sample Depth (in bgs) and Analytical State

● Sample Location

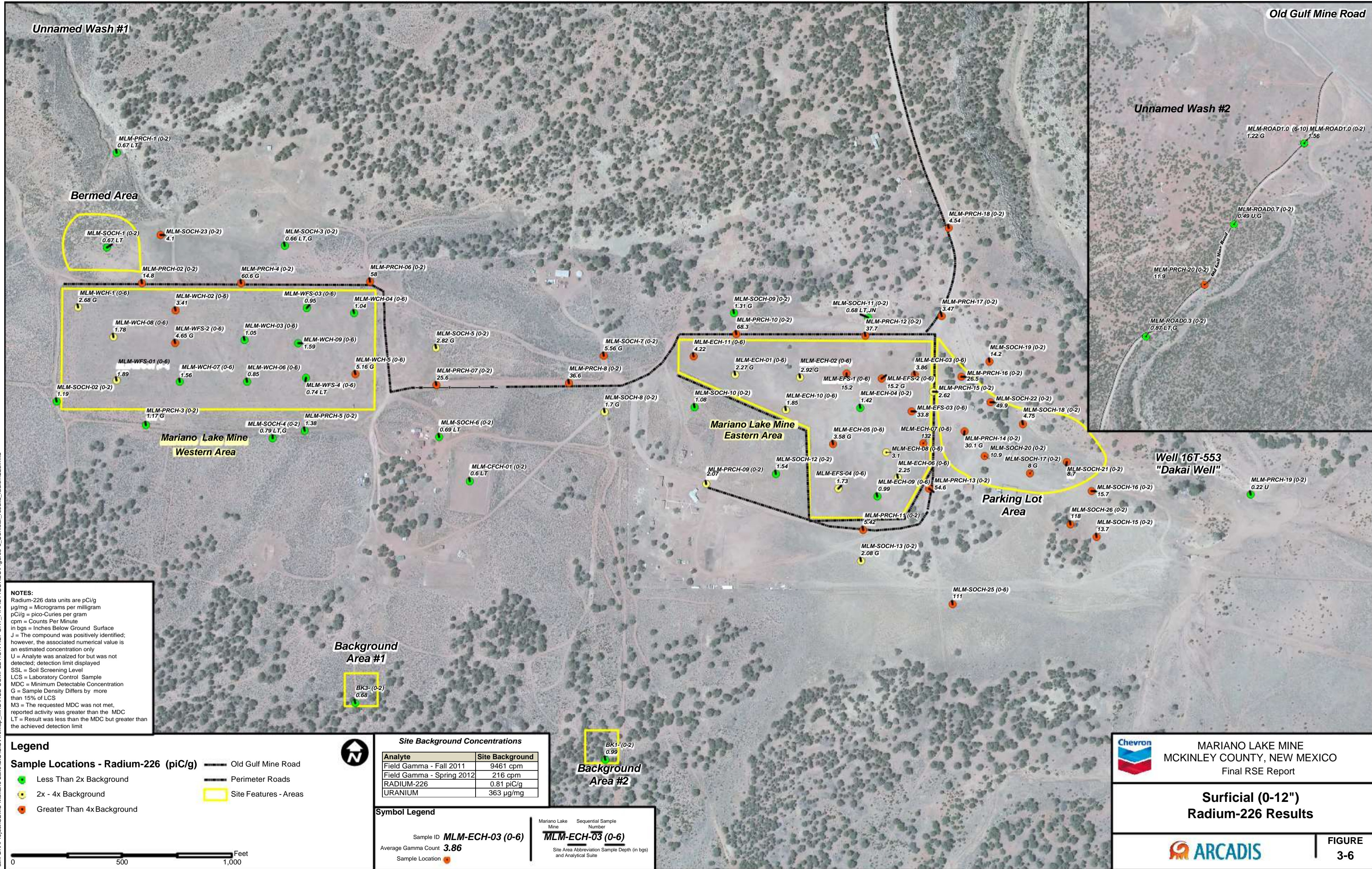
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 MCKINLEY COUNTY, NEW MEXICO
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**Greater Than 72 Inches
 Below Ground Surface
 Field Gamma Scan Results**

ARCADIS

FIGURE
3-5

Date: 3/6/2013 Author: jgilbert Path: D:\AP\Project\CEMC Mariano Lake\GIS\GIS\Map_MXD\ORISE COMPLETION REPORT_FINAL FIGURES\Figures-c_Surficial_results_radium226.mxd



NOTES:
 Radium-226 data units are pCi/g
 µg/mg = Micrograms per milligram
 pCi/g = pico-Curies per gram
 cpm = Counts Per Minute
 in bgs = inches Below Ground Surface
 J = The compound was positively identified; however, the associated numerical value is an estimated concentration only
 U = Analyte was analyzed for but was not detected; detection limit displayed
 SSL = Soil Screening Level
 LCS = Laboratory Control Sample
 MDC = Minimum Detectable Concentration
 G = Sample Density Differs by more than 15% of LCS
 M3 = The requested MDC was not met, reported activity was greater than the MDC
 LT = Result was less than the MDC but greater than the achieved detection limit

Legend
Sample Locations - Radium-226 (pCi/g)
 ● Less Than 2x Background
 ● 2x - 4x Background
 ● Greater Than 4x Background
 — Old Gulf Mine Road
 — Perimeter Roads
 □ Site Features - Areas



Background Area #1
 BK3- (0-2)
 0.68

Background Area #2
 BK1- (0-2)
 0.99

Site Background Concentrations

Analyte	Site Background
Field Gamma - Fall 2011	9461 cpm
Field Gamma - Spring 2012	216 cpm
RADIUM-226	0.81 pCi/g
URANIUM	363 µg/mg

Symbol Legend

Sample ID	Mariano Lake Mine	Sequential Sample Number
MLM-ECH-03 (0-6)	MLM-ECH-03	0-6

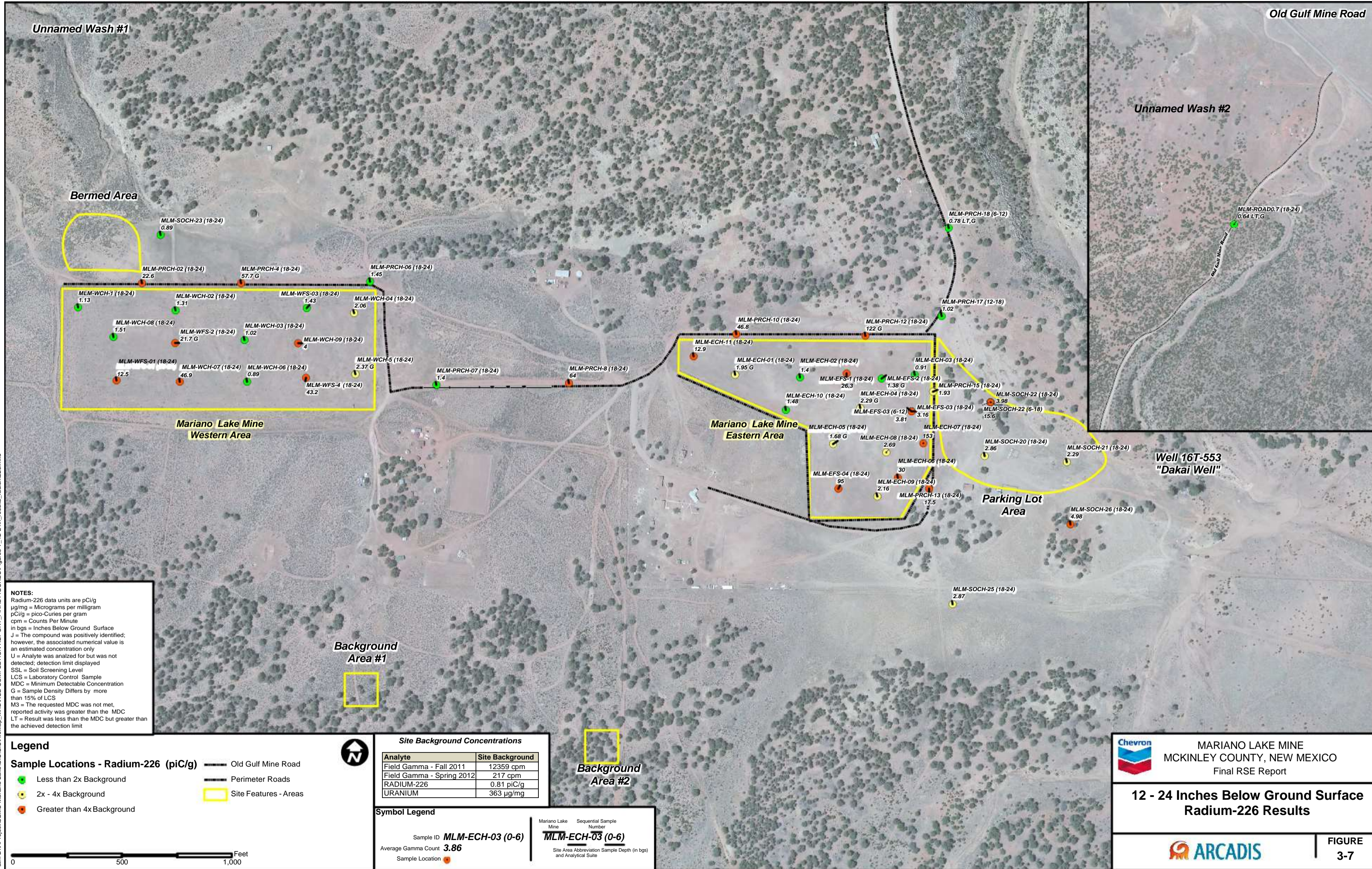
Average Gamma Count **3.86**
 Sample Location

Chevron
 MARIANO LAKE MINE
 MCKINLEY COUNTY, NEW MEXICO
 Final RSE Report

**Surficial (0-12")
 Radium-226 Results**

ARCADIS | **FIGURE 3-6**

Date: 3/6/2013 Author: jglibert Path: D:\AP\Project\CEMC_Mariano Lake\GIS\GIS\Map_MXD\BASE COMPLETION REPORT_FINAL FIGURES\Figures7_12_24in_results_rad226.mxd



NOTES:
 Radium-226 data units are pCi/g
 µg/mg = Micrograms per milligram
 pCi/g = pico-Curies per gram
 cpm = Counts Per Minute
 in bgs = inches Below Ground Surface
 J = The compound was positively identified; however, the associated numerical value is an estimated concentration only
 U = Analyte was analyzed for but was not detected; detection limit displayed
 SSL = Soil Screening Level
 LCS = Laboratory Control Sample
 MDC = Minimum Detectable Concentration
 G = Sample Density Differs by more than 15% of LCS
 M3 = The requested MDC was not met, reported activity was greater than the MDC
 LT = Result was less than the MDC but greater than the achieved detection limit

Legend

Sample Locations - Radium-226 (pCi/g)

- Less than 2x Background
- 2x - 4x Background
- Greater than 4x Background

- Old Gulf Mine Road
- Perimeter Roads
- Site Features - Areas

Background Area #1

Background Area #2

Site Background Concentrations

Analyte	Site Background
Field Gamma - Fall 2011	12359 cpm
Field Gamma - Spring 2012	217 cpm
RADIUM-226	0.81 pCi/g
URANIUM	363 µg/mg

Symbol Legend

Sample ID	Mariano Lake Mine	Sequential Sample Number
MLM-ECH-03 (0-6)	MLM-ECH-03	0-6

Average Gamma Count **3.86**

Sample Location

Chevron

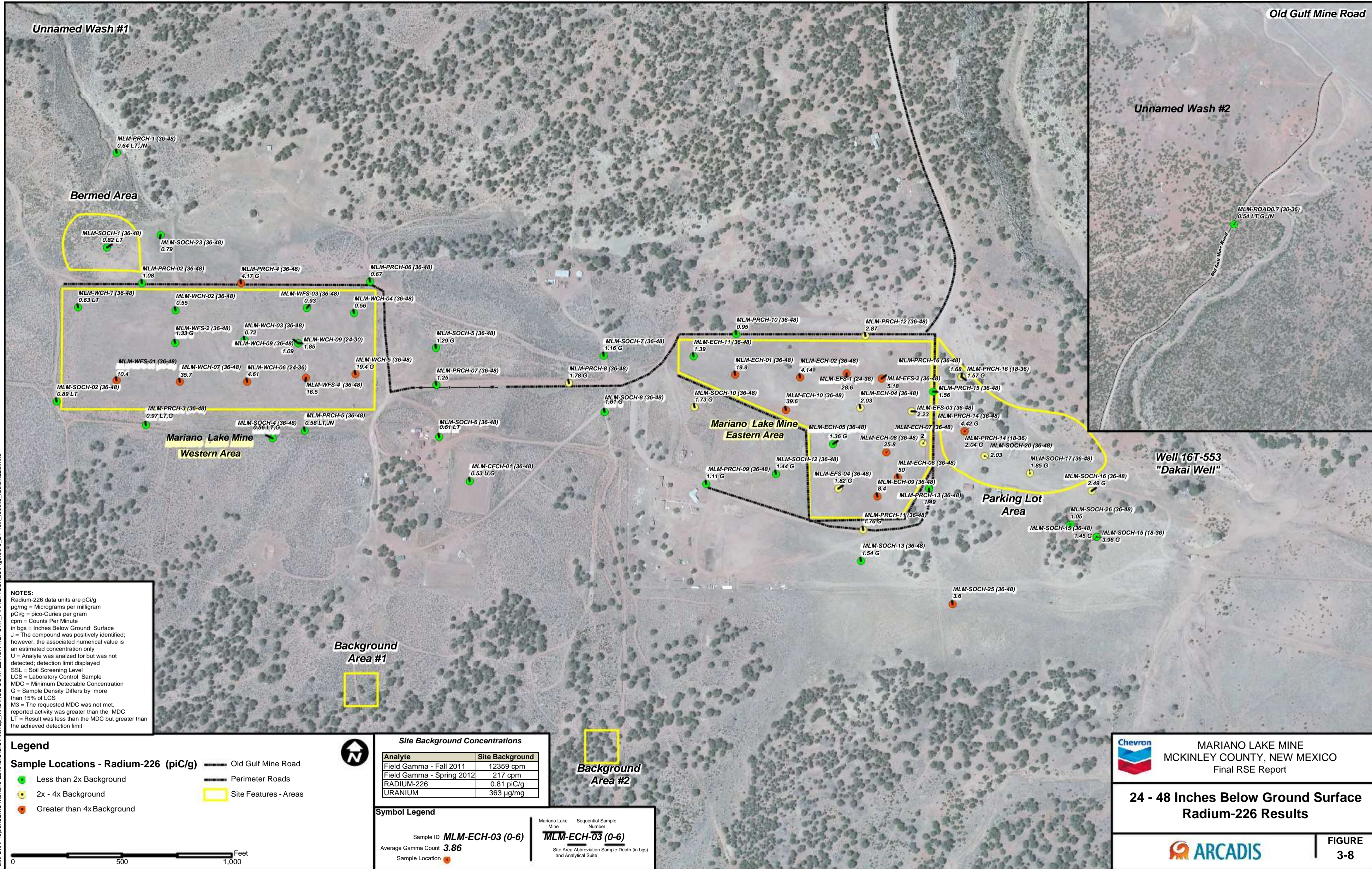
MARIANO LAKE MINE
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12 - 24 Inches Below Ground Surface Radium-226 Results

ARCADIS

FIGURE 3-7

Date: 3/6/2013 Author: jglbert Path: D:\A\Project\CEMC\Mariano Lake\GIS\Map_MXD\DIRSE COMPLETION REPORT_FINAL FIGURES\Figure 3-8_24-48in_results_radium226.mxd



NOTES:
 Radium-226 data units are pCi/g
 µg/mg = Micrograms per milligram
 pCi/g = pico-Curies per gram
 cpm = Counts Per Minute
 in bgs = inches Below Ground Surface
 J = The compound was positively identified; however, the associated numerical value is an estimated concentration only
 U = Analyte was analyzed for but was not detected; detection limit displayed
 SSL = Soil Screening Level
 LCS = Laboratory Control Sample
 MDC = Minimum Detectable Concentration
 G = Sample Density Differs by more than 15% of LCS
 M3 = The requested MDC was not met, reported activity was greater than the MDC
 LT = Result was less than the MDC but greater than the achieved detection limit

Legend

Sample Locations - Radium-226 (pCi/g)

- Less than 2x Background
- 2x - 4x Background
- Greater than 4x Background

- Old Gulf Mine Road
- Perimeter Roads
- Site Features - Areas

Site Background Concentrations

Analyte	Site Background
Field Gamma - Fall 2011	12359 cpm
Field Gamma - Spring 2012	217 cpm
RADIUM-226	0.81 pCi/g
URANIUM	363 µg/mg

Symbol Legend

Mariano Lake Mine Sequential Sample Number

Sample ID **MLM-ECH-03 (0-6)** **MLM-ECH-03 (0-6)**

Average Gamma Count **3.86**

Sample Location

Site Area Abbreviation Sample Depth (in bgs) and Analytical Suite

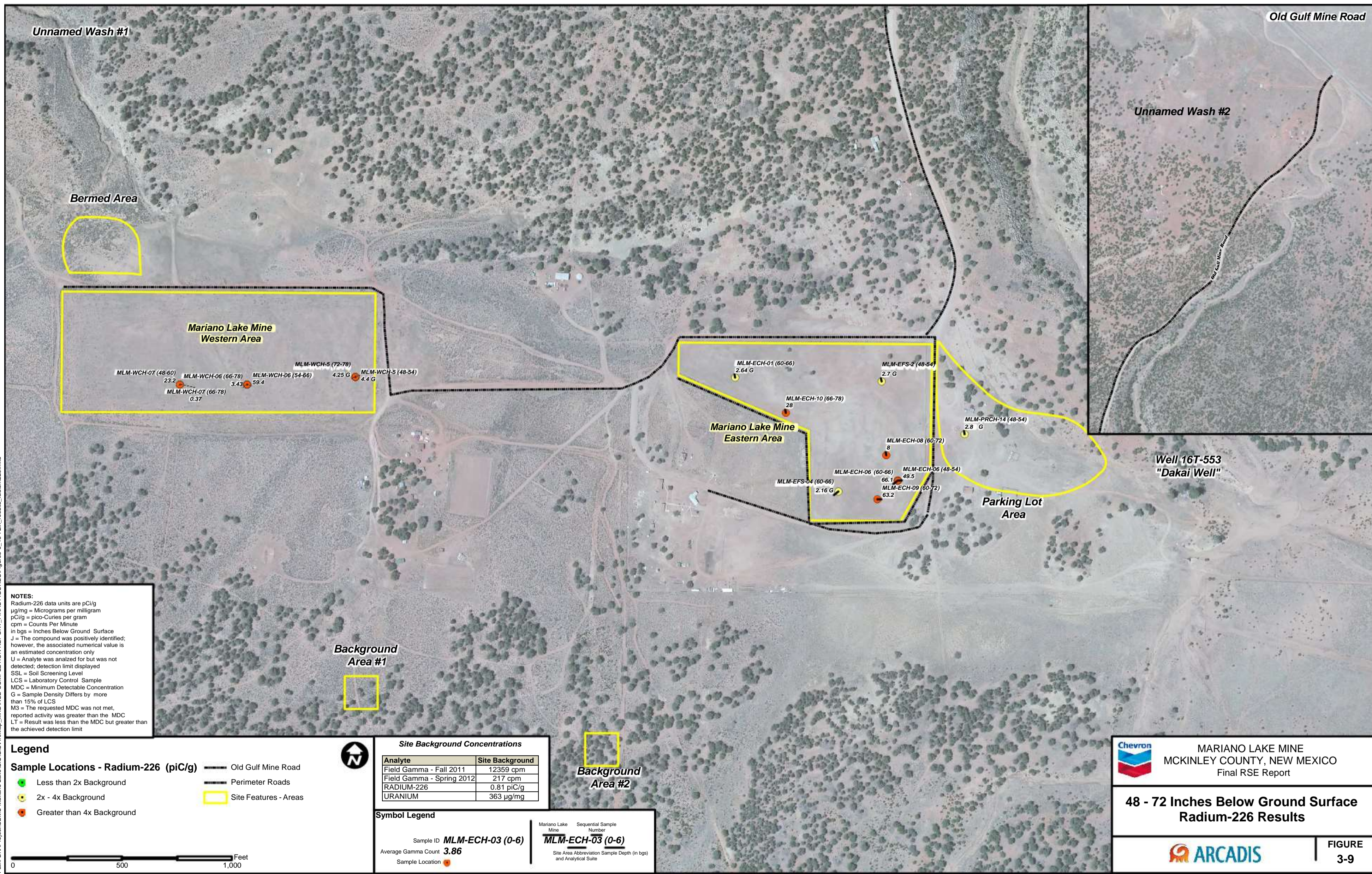
Chevron

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**24 - 48 Inches Below Ground Surface
 Radium-226 Results**

ARCADIS

FIGURE 3-8



Date: 3/6/2013 Author: jgilbert
 Path: D:\AP\Project\CEMC_Mariano Lake\GIS\GIS\Map_MXD\DIRSE_COMPLETION_REPORT_FINAL FIGURES\Figures-9_48-72in_results_rad226.mxd

NOTES:
 Radium-226 data units are pCi/g
 µg/mg = Micrograms per milligram
 pCi/g = pico-Curies per gram
 cpm = Counts Per Minute
 in bgs = Inches Below Ground Surface
 J = The compound was positively identified; however, the associated numerical value is an estimated concentration only
 U = Analyte was analyzed for but was not detected; detection limit displayed
 SSL = Soil Screening Level
 LCS = Laboratory Control Sample
 MDC = Minimum Detectable Concentration
 G = Sample Density Differs by more than 15% of LCS
 M3 = The requested MDC was not met, reported activity was greater than the MDC
 LT = Result was less than the MDC but greater than the achieved detection limit

- Legend**
- Sample Locations - Radium-226 (pCi/g)
 - Green circle: Less than 2x Background
 - Yellow circle: 2x - 4x Background
 - Red circle: Greater than 4x Background
 - Old Gulf Mine Road (dashed line)
 - Perimeter Roads (dotted line)
 - Site Features - Areas (yellow outline)



Background Area #1

Background Area #2

Site Background Concentrations

Analyte	Site Background
Field Gamma - Fall 2011	12359 cpm
Field Gamma - Spring 2012	217 cpm
RADIUM-226	0.81 pCi/g
URANIUM	363 µg/mg

Symbol Legend

Sample ID	Mariano Lake Mine	Sequential Sample Number
MLM-ECH-03 (0-6)	MLM-ECH-03	0-6

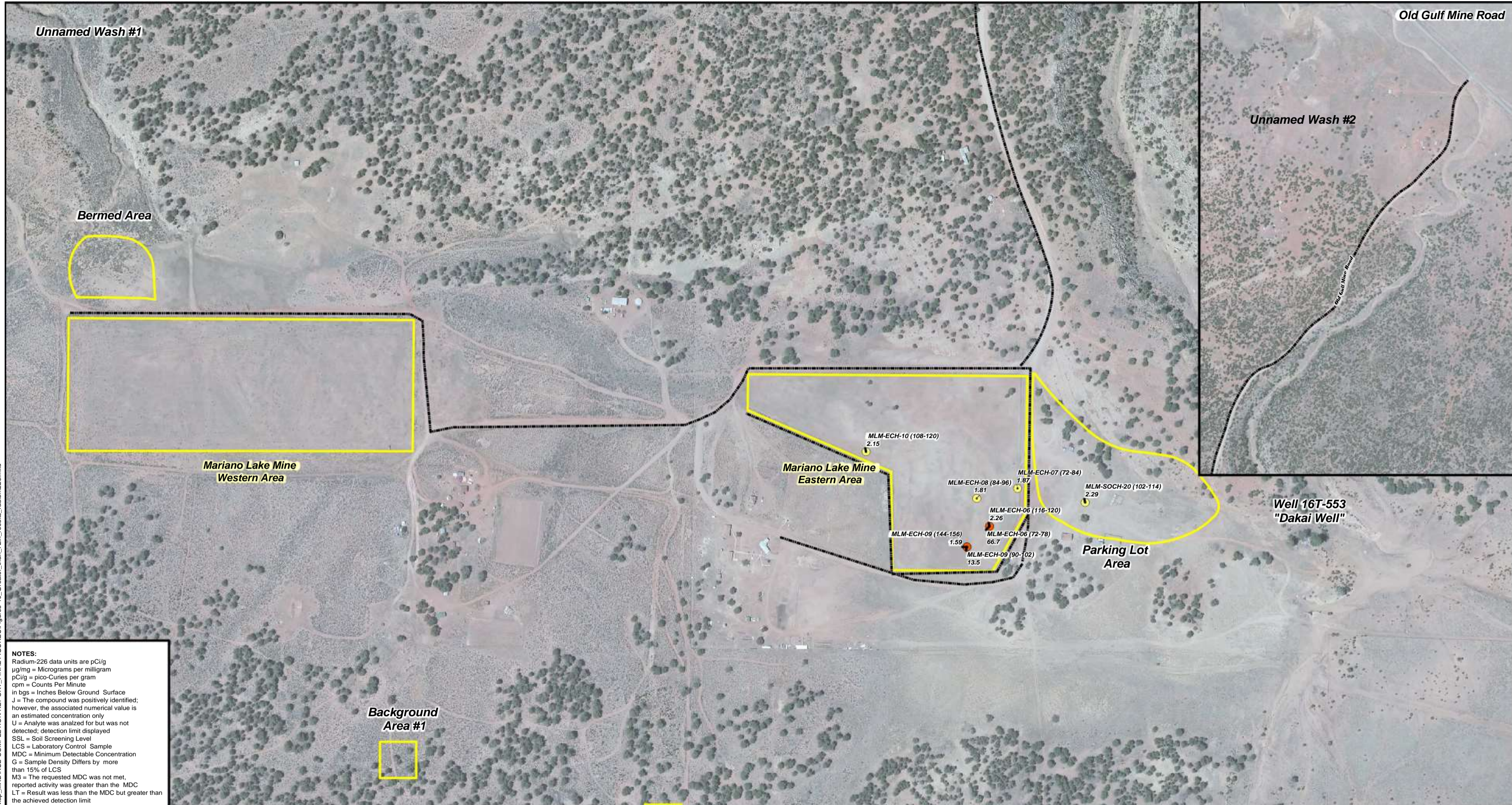
Average Gamma Count **3.86**

Sample Location (red circle)

Chevron
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**48 - 72 Inches Below Ground Surface
 Radium-226 Results**

ARCADIS | **FIGURE 3-9**



NOTES:
 Radium-226 data units are pCi/g
 µg/mg = Micrograms per milligram
 pCi/g = pico-Curies per gram
 cpm = Counts Per Minute
 in bgs = Inches Below Ground Surface
 J = The compound was positively identified; however, the associated numerical value is an estimated concentration only
 U = Analyte was analyzed for but was not detected; detection limit displayed
 SSL = Soil Screening Level
 LCS = Laboratory Control Sample
 MDC = Minimum Detectable Concentration
 G = Sample Density Differs by more than 15% of LCS
 MS = The requested MDC was not met, reported activity was greater than the MDC
 LT = Result was less than the MDC but greater than the achieved detection limit

- Legend**
- Sample Locations - Radium-226 (pCi/g)**
- Less than 2x Background
 - 2x - 4x Background
 - Greater than 4x Background
- Old Gulf Mine Road
 - Perimeter Roads
 - Site Features - Areas

Site Background Concentrations

Analyte	Site Background
Field Gamma - Fall 2011	12359 cpm
Field Gamma - Spring 2012	217 cpm
RADIUM-226	0.81 pCi/g
URANIUM	363 µg/mg

Symbol Legend

Sample ID	Mariano Lake Mine	Sequential Sample Number
MLM-ECH-03 (0-6)	MLM-ECH-03	0-6

Average Gamma Count **3.86**

Sample Location

Chevron

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 MCKINLEY COUNTY, NEW MEXICO
 Final RSE Report

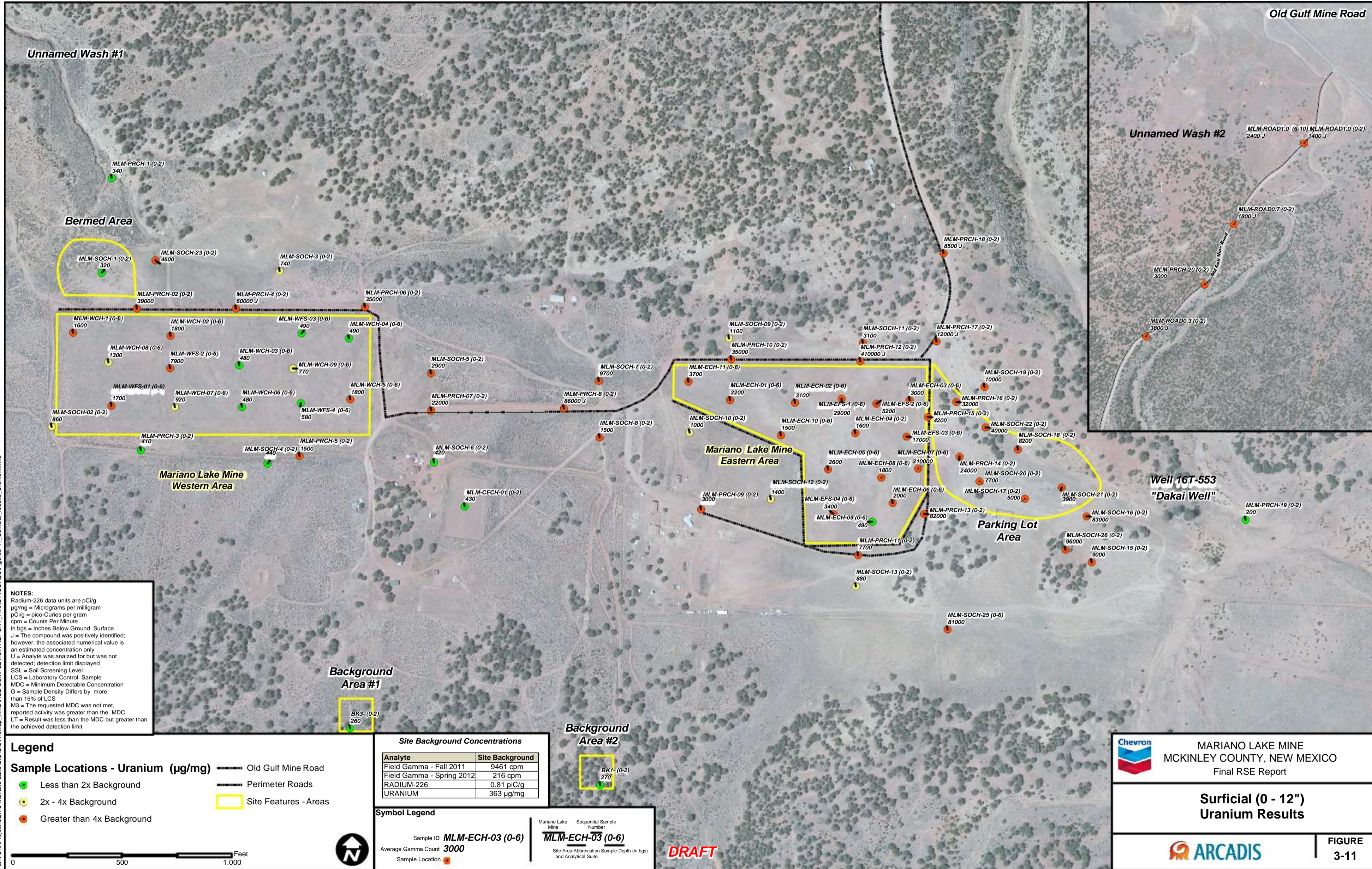
Greater Than 72 Inches Below Ground Surface Radium-226 Results

ARCADIS

FIGURE 3-10

Date: 3/6/2013 Author: jgilbert Path: D:\A\Project\CEMC_Mariano Lake\GIS\Map\COMPLETION REPORT_FINAL FIGURE\Figure3-10_Greater_than_72in_results_radium226.mxd

Date: 3/6/2013 Author: jgilbert Path: D:\AP\Project\CEMC_Mariano Lake\GIS\Map_MXD\DIRSE_COMPLETION_REPORT_FINAL_FIGURES\Figure3-11_Surficial_results_Uranium.mxd



NOTES:
 Radium-226 data units are pCi/g
 µg/mg = Micrograms per milligram
 pCi/g = pico-Curies per gram
 cpm = Counts Per Minute
 in bgs = Inches Below Ground Surface
 J = The compound was positively identified; however, the associated numerical value is an estimated concentration only
 U = Analyte was analyzed for but was not detected; detection limit displayed
 SSL = Soil Screening Level
 LCS = Laboratory Control Sample
 MDC = Minimum Detectable Concentration
 G = Sample Density Differs by more than 15% of LCS
 MS = The requested MDC was not met, reported activity was greater than the MDC
 LT = Result was less than the MDC but greater than the achieved detection limit

Legend

Sample Locations - Uranium (µg/mg)

- Less than 2x Background
- 2x - 4x Background
- Greater than 4x Background
- Old Gulf Mine Road
- Perimeter Roads
- Site Features - Areas

Background Area #1

BK3- (0-2)
260

Background Area #2

BK1- (0-2)
270

Site Background Concentrations

Analyte	Site Background
Field Gamma - Fall 2011	9461 cpm
Field Gamma - Spring 2012	216 cpm
RADIUM-226	0.81 pCi/g
URANIUM	363 µg/mg

Symbol Legend

Mariano Lake Mine Sequential Sample Number

Sample ID **MLM-ECH-03 (0-6)**
Average Gamma Count **3000**

Sample Location

Mariano Lake Mine Sequential Sample Number **MLM-ECH-03 (0-6)**
Site Area Abbreviation Sample Depth (in bgs) and Analytical Suite

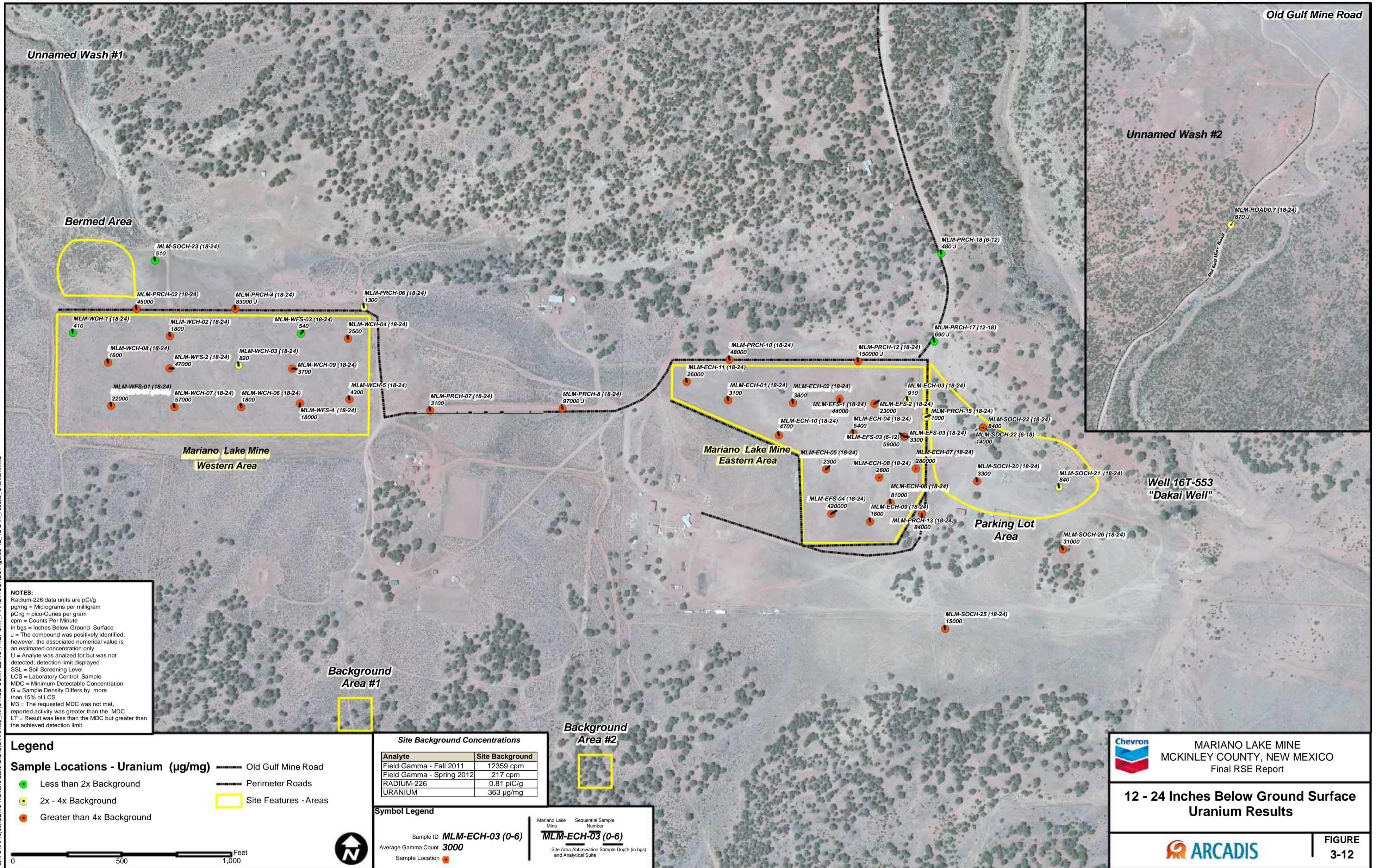
DRAFT

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Surficial (0 - 12") Uranium Results

ARCADIS FIGURE 3-11

Date: 3/6/2013 Author: jgilbert Path: D:\A\Project\CEMC_Mariano Lake\GIS\GIS\Map_MXD\ORISE COMPLETION REPORT_FINAL FIGURES\Figure3-12_12-24in_results_Uranium.mxd



NOTES:
 Radium-226 data units are pCi/g
 µg/mg = Micrograms per milligram
 pCi/g = pico-Curies per gram
 cpm = Counts Per Minute
 in bgs = inches Below Ground Surface
 J = The compound was positively identified; however, the associated numerical value is an estimated concentration only
 U = Analyte was analyzed for but was not detected; detection limit displayed
 SSL = Soil Screening Level
 LCS = Laboratory Control Sample
 MDC = Minimum Detectable Concentration
 G = Sample Density Differs by more than 15% of LCS
 M3 = The requested MDC was not met, reported activity was greater than the MDC
 LT = Result was less than the MDC but greater than the achieved detection limit

- Legend**
- Sample Locations - Uranium (µg/mg)**
- Less than 2x Background
 - 2x - 4x Background
 - Greater than 4x Background
 - Old Gulf Mine Road
 - Perimeter Roads
 - Site Features - Areas

Site Background Concentrations

Analyte	Site Background
Field Gamma - Fall 2011	12359 cpm
Field Gamma - Spring 2012	217 cpm
RADIUM-226	0.81 pCi/g
URANIUM	363 µg/mg

Symbol Legend

Mariano Lake Mine Sequential Sample Number

Sample ID **MLM-ECH-03 (0-6)**
 Average Gamma Count **3000**

Sample Location

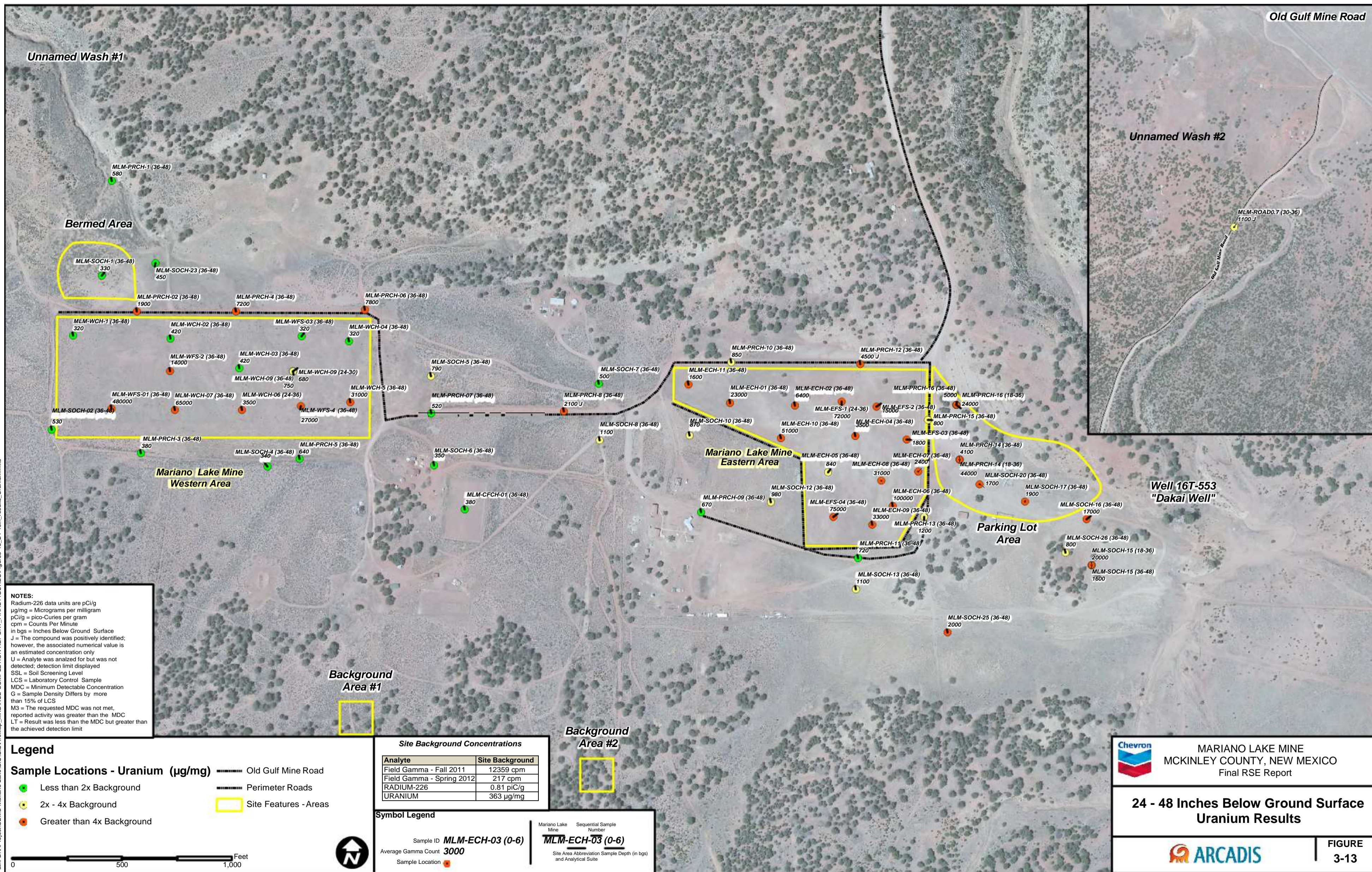
MLM-ECH-03 (0-6)
 Site Area Abbreviation Sample Depth (in bgs) and Analytical Suite

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12 - 24 Inches Below Ground Surface Uranium Results

ARCADIS FIGURE 3-12

Date: 3/6/2013 Author: jgilbert Path: D:\A\Project\CEMC_Mariano Lake\GIS\Map_MXD\ORISE COMPLETION REPORT_FINAL FIGURES\Figure3-13_24-48in_results_Uranium.mxd



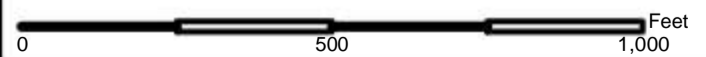
NOTES:
 Radium-226 data units are pCi/g
 µg/mg = Micrograms per milligram
 pCi/g = pico-Curies per gram
 cpm = Counts Per Minute
 in bgs = inches Below Ground Surface
 J = The compound was positively identified; however, the associated numerical value is an estimated concentration only
 U = Analyte was analyzed for but was not detected; detection limit displayed
 SSL = Soil Screening Level
 LCS = Laboratory Control Sample
 MDC = Minimum Detectable Concentration
 G = Sample Density Differs by more than 15% of LCS
 M3 = The requested MDC was not met, reported activity was greater than the MDC
 LT = Result was less than the MDC but greater than the achieved detection limit

Legend

Sample Locations - Uranium (µg/mg)

- Less than 2x Background
- 2x - 4x Background
- Greater than 4x Background

Old Gulf Mine Road
 Perimeter Roads
 Site Features - Areas



Background Area #1

Background Area #2

Site Background Concentrations

Analyte	Site Background
Field Gamma - Fall 2011	12359 cpm
Field Gamma - Spring 2012	217 cpm
RADIUM-226	0.81 pCi/g
URANIUM	363 µg/mg

Symbol Legend

Mariano Lake Mine Sequential Sample Number

Sample ID **MLM-ECH-03 (0-6)**
 Average Gamma Count **3000**

Sample Location ●

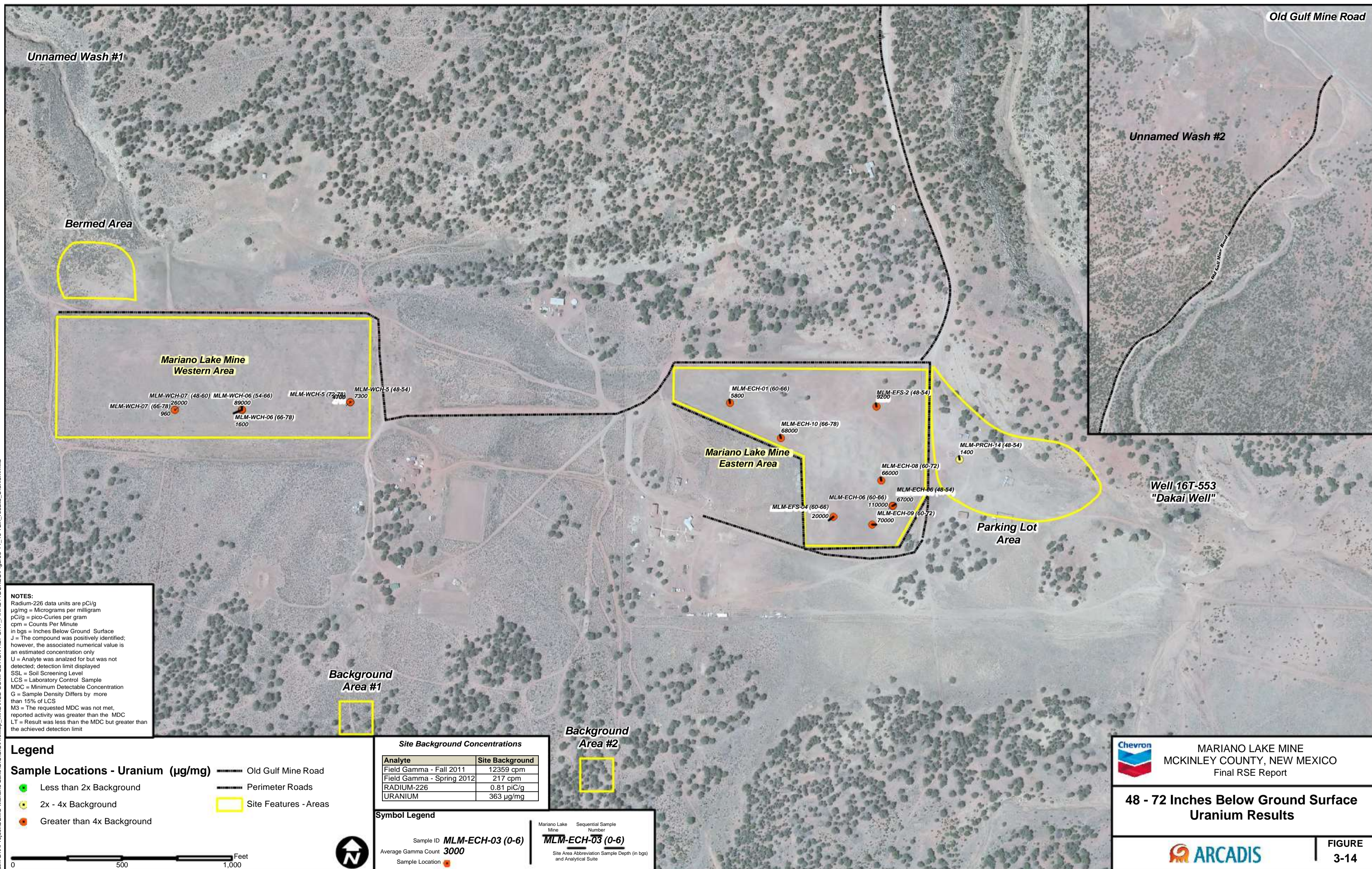
MLM-ECH-03 (0-6)
 Site Area Abbreviation Sample Depth (in bgs) and Analytical Suite

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24 - 48 Inches Below Ground Surface Uranium Results

FIGURE 3-13

Date: 3/6/2013 Author: jgilbert Path: D:\A\Project\CEMC_Mariano Lake\GIS\Map_MXD\ORSE COMPLETION REPORT_FINAL FIGURE\Figure3-14_48-72in_results_Uranium.mxd



NOTES:
 Radium-226 data units are pCi/g
 µg/mg = Micrograms per milligram
 pCi/g = pico-Curies per gram
 cpm = Counts Per Minute
 in bgs = Inches Below Ground Surface
 J = The compound was positively identified; however, the associated numerical value is an estimated concentration only
 U = Analyte was analyzed for but was not detected; detection limit displayed
 SSL = Soil Screening Level
 LCS = Laboratory Control Sample
 MDC = Minimum Detectable Concentration
 G = Sample Density Differs by more than 15% of LCS
 M3 = The requested MDC was not met, reported activity was greater than the MDC
 LT = Result was less than the MDC but greater than the achieved detection limit

Legend

Sample Locations - Uranium (µg/mg)

- Less than 2x Background
- 2x - 4x Background
- Greater than 4x Background

Old Gulf Mine Road
 Perimeter Roads
 Site Features - Areas

0 500 1,000 Feet

Site Background Concentrations

Analyte	Site Background
Field Gamma - Fall 2011	12359 cpm
Field Gamma - Spring 2012	217 cpm
RADIUM-226	0.81 pCi/g
URANIUM	363 µg/mg

Symbol Legend

Mariano Lake Mine Sequential Sample Number

Sample ID **MLM-ECH-03 (0-6)** Average Gamma Count **3000**

Sample Location ●

Mariano Lake Mine Sequential Sample Number **MLM-ECH-03 (0-6)**

Site Area Abbreviation Sample Depth (in bgs) and Analytical Suite

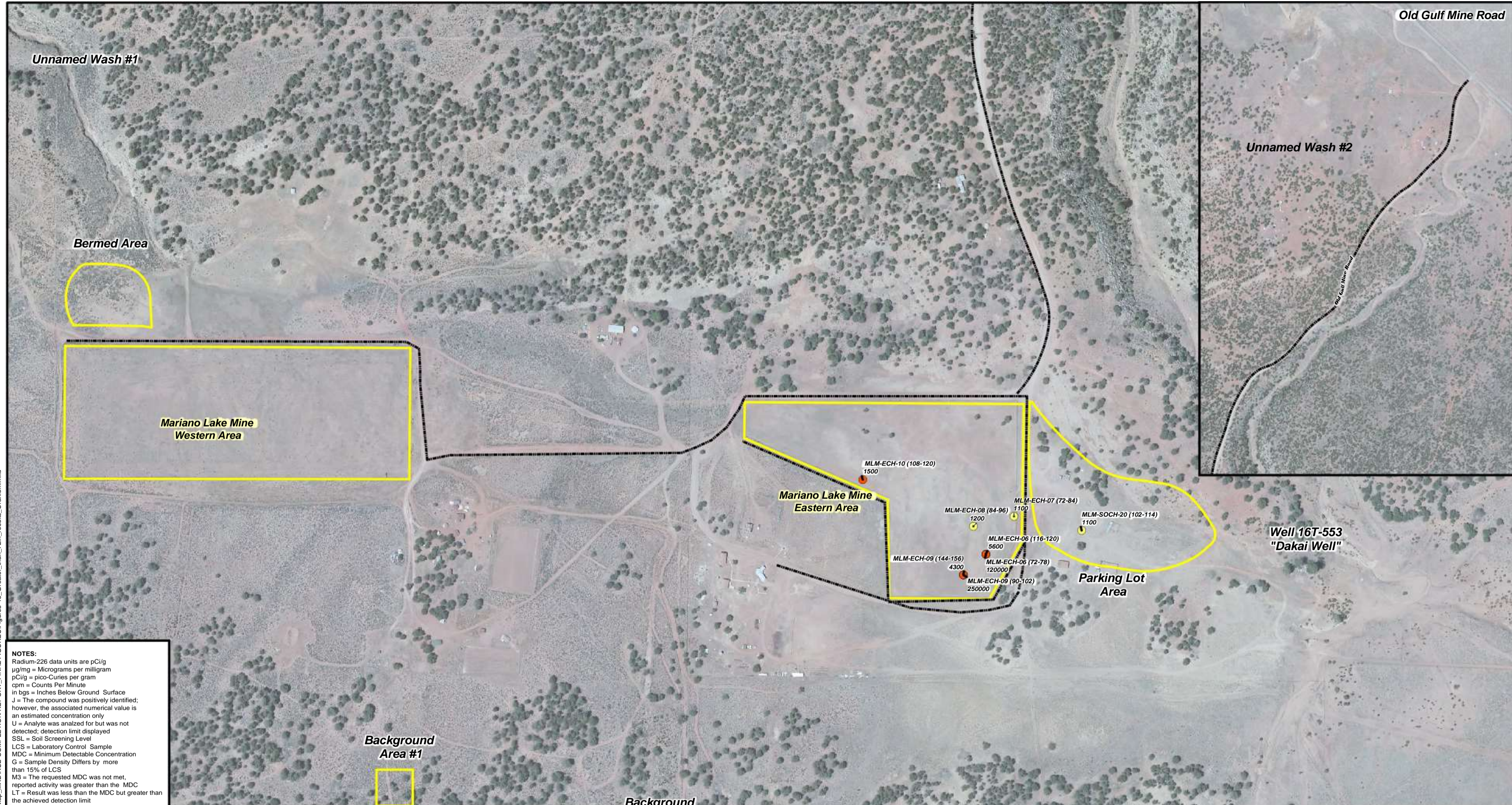
MARIANO LAKE MINE
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48 - 72 Inches Below Ground Surface Uranium Results

ARCADIS

FIGURE 3-14

Date: 3/6/2013 Author: jgilbert Path: D:\A\Project\CEMC_Mariano Lake\GIS\Map_MXD\DIRSE_COMPLETION_REPORT_FINAL_FIGURE3-15_Greater_than_72in_results_Uranium.mxd



NOTES:
 Radium-226 data units are pCi/g
 µg/mg = Micrograms per milligram
 pCi/g = pico-Curies per gram
 cpm = Counts Per Minute
 in bgs = Inches Below Ground Surface
 J = The compound was positively identified; however, the associated numerical value is an estimated concentration only
 U = Analyte was analyzed for but was not detected; detection limit displayed
 SSL = Soil Screening Level
 LCS = Laboratory Control Sample
 MDC = Minimum Detectable Concentration
 G = Sample Density Differs by more than 15% of LCS
 MS = The requested MDC was not met, reported activity was greater than the MDC
 LT = Result was less than the MDC but greater than the achieved detection limit

Legend

Sample Locations - Uranium (µg/mg)

- Less than 2x Background
- 2x - 4x Background
- Greater than 4x Background

Old Gulf Mine Road
 Perimeter Roads
 Site Features - Areas

0 500 1,000 Feet

Site Background Concentrations

Analyte	Site Background
Field Gamma - Fall 2011	12359 cpm
Field Gamma - Spring 2012	217 cpm
RADIUM-226	0.81 pCi/g
URANIUM	363 µg/mg

Symbol Legend

Sample ID **MLM-ECH-03 (0-6)**
 Average Gamma Count **3000**
 Sample Location ●

Mariano Lake Sequential Sample Number
MLM-ECH-03 (0-6)
 Site Area Abbreviation Sample Depth (in bgs) and Analytical Suite

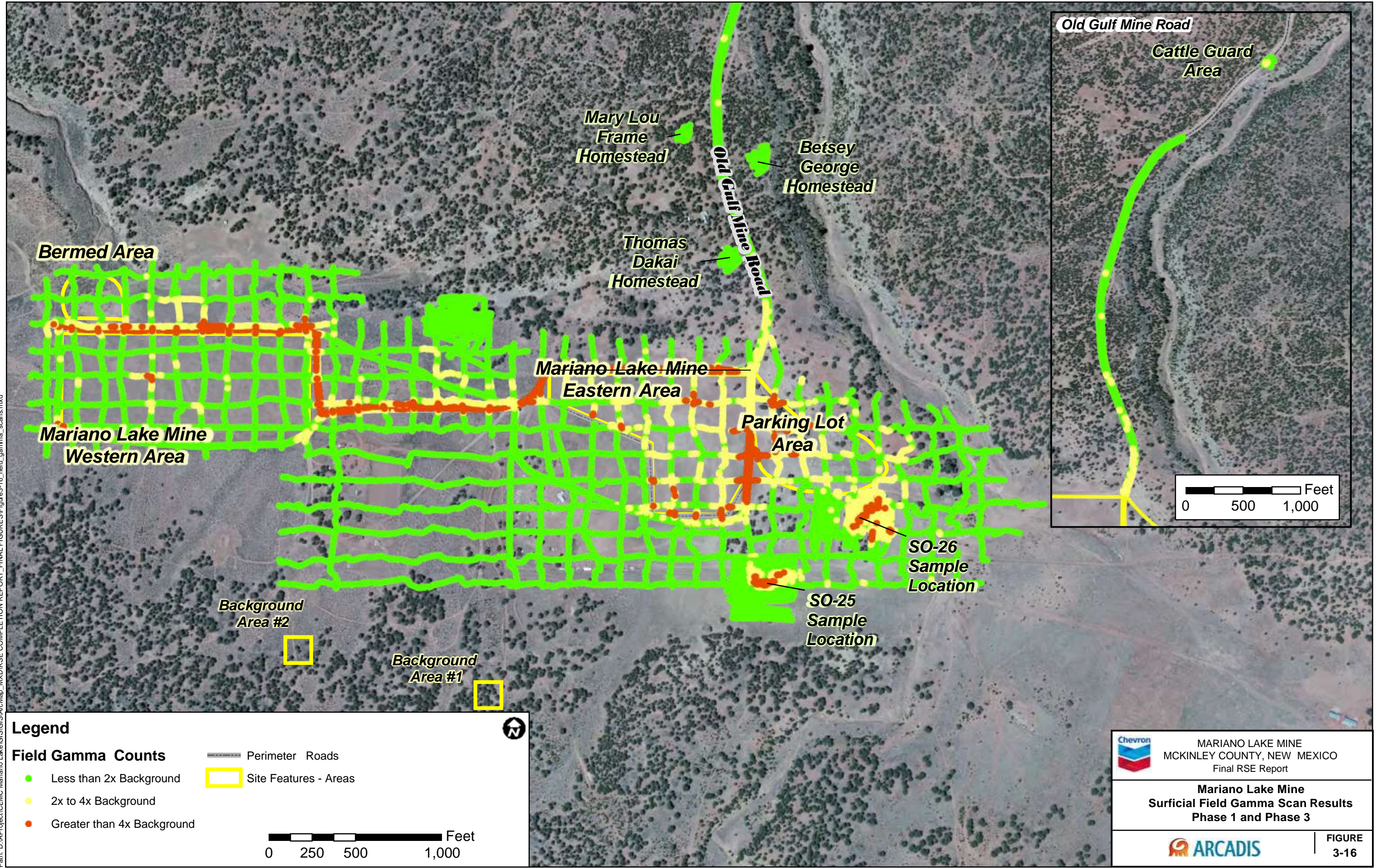
MARIANO LAKE MINE
 MCKINLEY COUNTY, NEW MEXICO
 Final RSE Report

Greater Than 72 Inches Below Ground Surface Uranium Results

ARCADIS

FIGURE 3-15

Date: 3/6/2013 Author: jgilbert
Path: D:\AProject\CEMC_Mariano Lake\GIS\GISMap_MXD\DIRSE COMPLETION REPORT_FINAL FIGURES\Figure3-16_field_gamma_scans.mxd



Legend

Field Gamma Counts

- Less than 2x Background
- 2x to 4x Background
- Greater than 4x Background

- Perimeter Roads
- Site Features - Areas

0 250 500 1,000 Feet

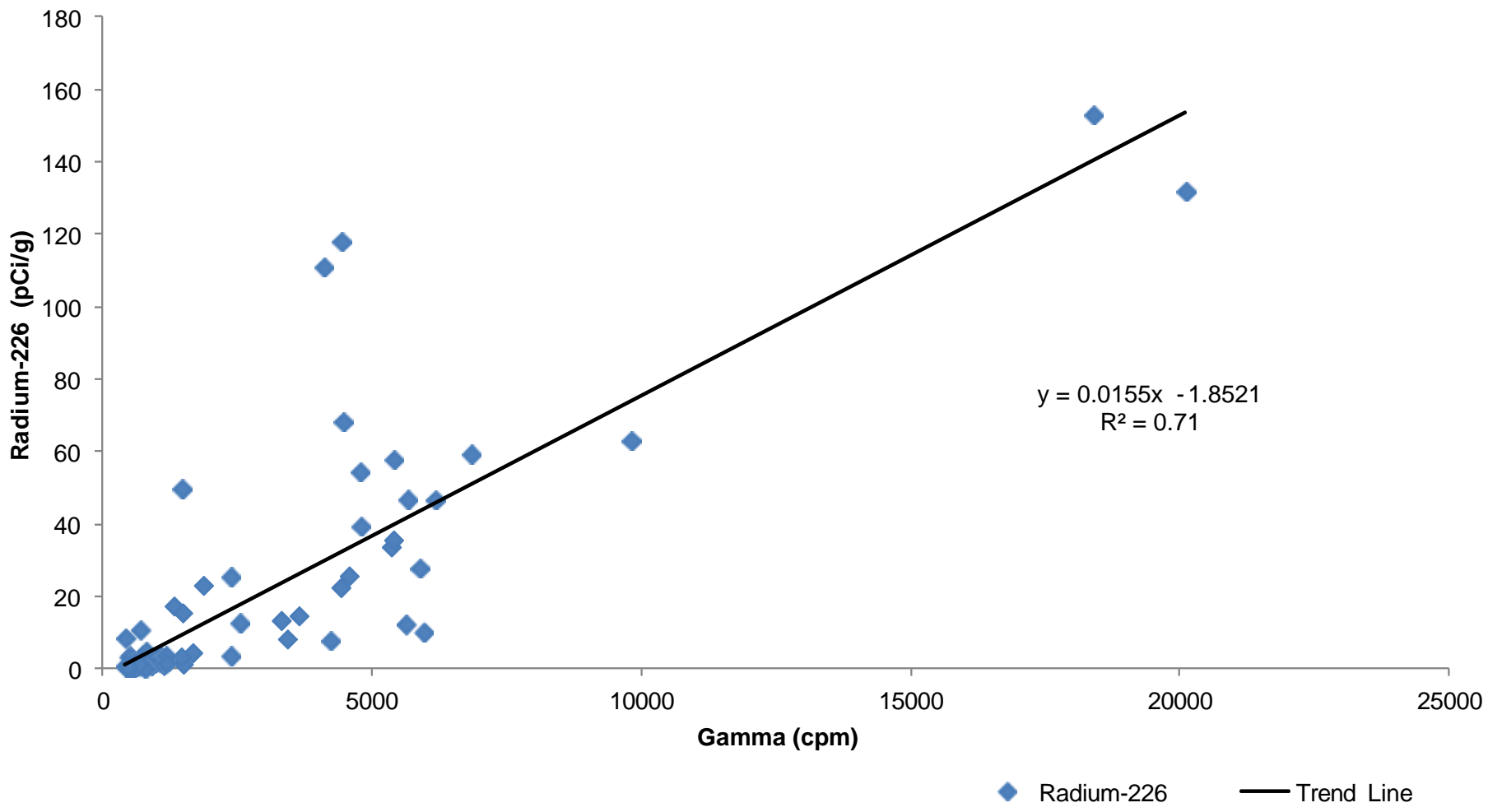
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Final RSE Report

Mariano Lake Mine
Surficial Field Gamma Scan Results
Phase 1 and Phase 3



 **ARCADIS**

FIGURE 3-16

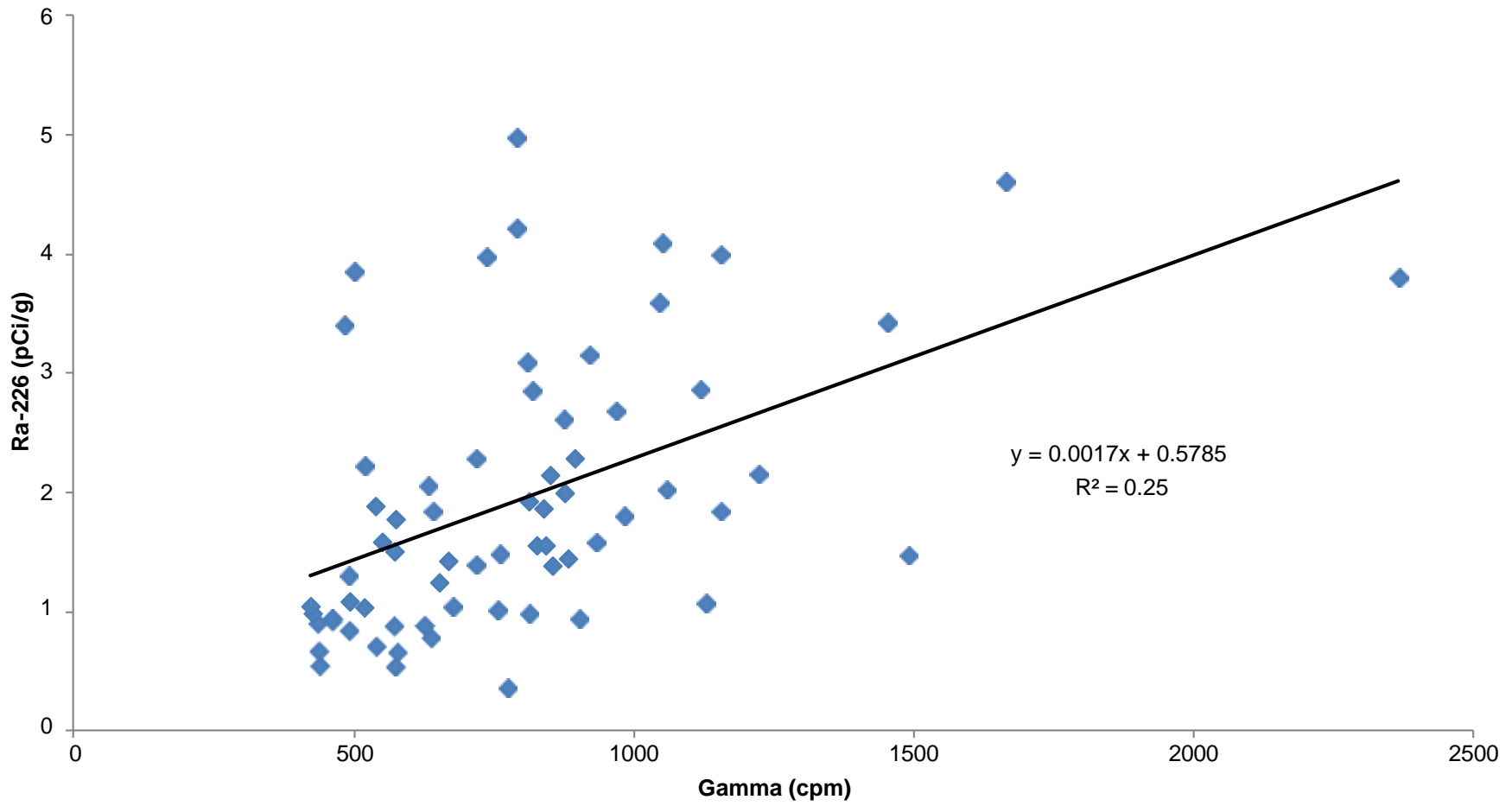
Date: 3/6/2013 Author: jghbrt
Path: D:\Project\CEMC_Mariano_Lake\GIS\Map\Map_MXD\RDSE_COMPLETION_REPORT_FINAL FIGURES\Figures-17_Correlation Between Radium-226 and Gamma Counts (All Values).mxd



Notes:
pCi/g = Pico Curies per Gram
cpm = Counts Per Minute
 R^2 = Correlation Coefficient



	MARIANO LAKE MINE MCKINLEY COUNTY, NEW MEXICO Final RSE Report
	Correlation Between Radium-226 and Gamma Counts (All Values)
	FIGURE 3-17

Date: 3/6/2013 Author: Gilbert
Path: D:\Project\CIMC Mariano Lake\GIS\ArcMap...MXD\ISE COMPLETION REPORT_FINAL FIGURES\Figure 18_Correlation Between Radium-226 and Gamma Counts (under 5).mxd

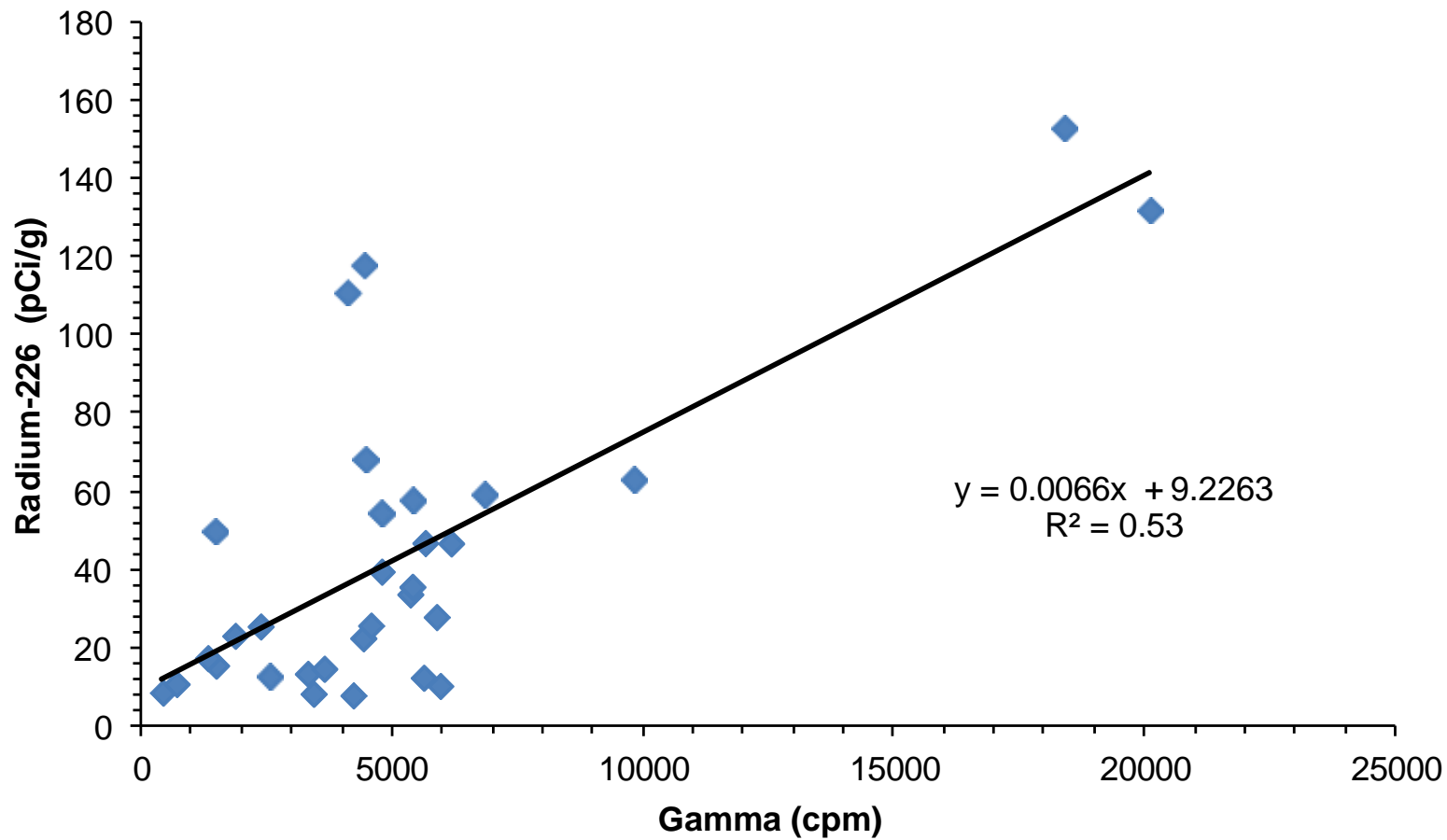


◆ Radium-226 — Trend Line

Notes:
pCi/g = Pico Curies per Gram
cpm = Counts Per Minute
 R^2 = Correlation Coefficient

	MARIANO LAKE MINE MCKINLEY COUNTY, NEW MEXICO Final RSE Report
	Correlation Between Radium-226 and Gamma Counts (Radium Concentrations Below 5 pCi/g)
	FIGURE 3-18

Date: 3/6/2013 Author: jfbert
Path: D:\Project\CEM\ Mariano Lake\GIS\svcs\Map_M\DIRSE COMPLETION REPORT_FINAL FIGURES\Figures-18_Correlation Between Radium-226 and Gamma Counts (over 5).mxd



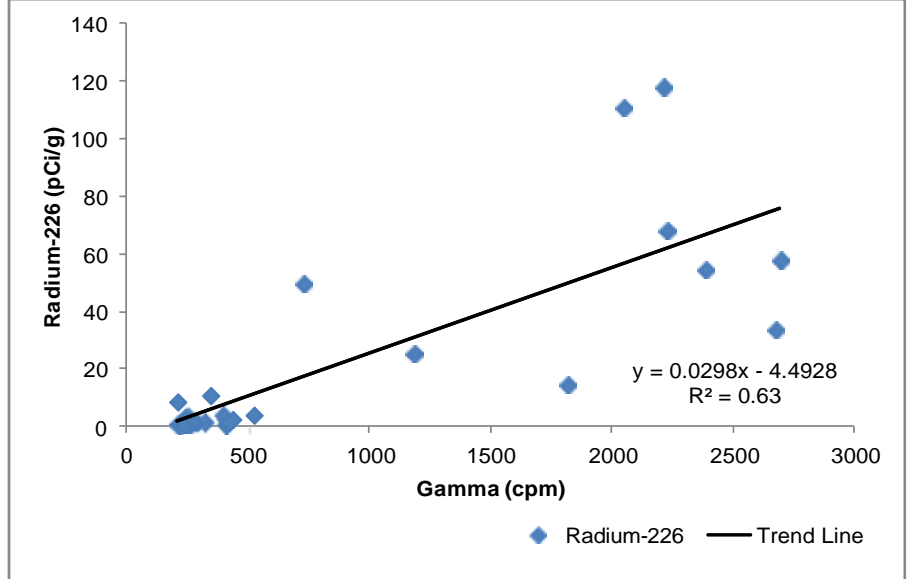
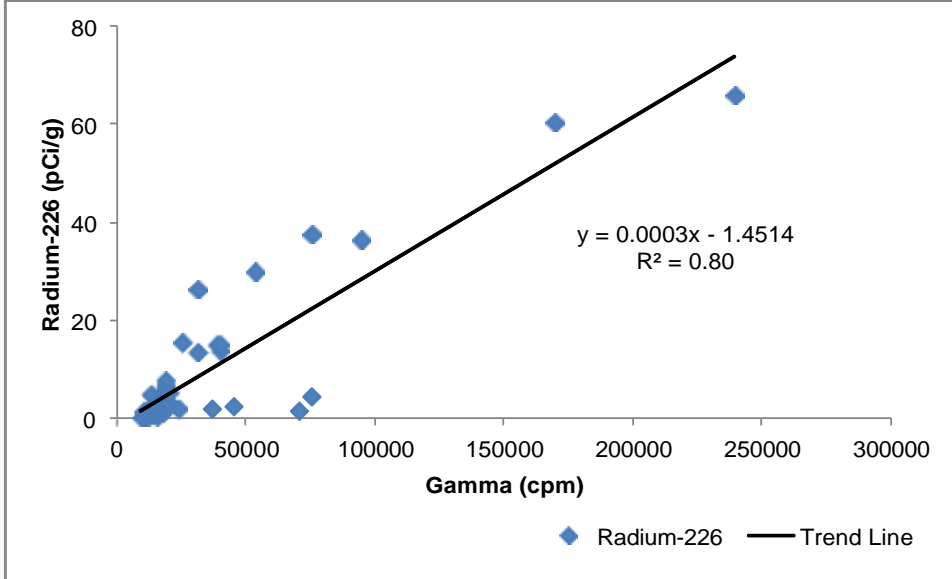
◆ Radium-226 — Trend Line

Notes:
pCi/g = Pico Curies per Gram
cpm = Counts Per Minute
 R^2 = Correlation Coefficient

	MARIANO LAKE MINE MCKINLEY COUNTY, NEW MEXICO Final RSE Report
	Correlation Between Radium-226 and Gamma Counts (Radium Concentrations Above 5 pCi/g)
	FIGURE 3-19

Fall 2011 Sampling Event

Spring 2012 Sampling Event



Notes:
pCi/g = Pico Curies per Gram
cpm = Counts Per Minute
 R^2 = Correlation Coefficient

	MARIANO LAKE MINE MCKINLEY COUNTY, NEW MEXICO Final RSE Report
	<p align="center">Correlation Between Radium-226 and Gamma Counts All Surficial (0-2, 0-6 inch depth)</p>
	FIGURE 3-20

Date: 3/6/2013 Author: jgb/ert Path: D:\Projects\CENIC\Mariano Lake\GIS\GIS\Map_MXD\RSE COMPLETION REPORT_FINAL FIGURES\Figure 20_surficial_radium_226_gamma_correlation.mxd