EMCSF
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Remedial Investigation/Feasibility Study

Preliminary Site Characterization Summary

Volume II

Sections 4.1-4.3

Prepared for:
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for the
Eastern Michaud Flats Site

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Section 4

Nature and Extent of Constituents of Potential Concern

This section of the Preliminary Site Characterization Summary (PSCS) provides an interpretation of data gathered to define the nature and extent of site-related constituents and potential pathways in the Eastern Michaud Flats (EMF) study area. Information presented here is derived primarily from the following sources:

- Results of sampling and analytical data gathered (per methodologies described in Section 2 of the PSCS) during the Phase I and Phase II Remedial Investigation (RI) field investigations
- Information obtained from previous investigations (presented in Section 1.3 and Appendix A) and from the EMF facilities

In addition, Section 3 of the PSCS, which described the regional and site physical characteristics of the EMF study area, provided the context for evaluating the nature and extent of site-related constituents in the area.

This section is organized into five subsections:

- Section 4.1 addresses the quality of the RI data collected, summarizing any nonconformance to the data quality objectives presented in the RI/FS Work Plan and the Sampling and Analysis Plan.
- Section 4.2 evaluates the potential sources of site-related constituents previously identified in Section 1, and examines the impacts to onsite soils.
- Section 4.3 describes the constituents of potential concern found in offsite soils, and relates them (as applicable) to EMF operations.
- Section 4.4 presents an interpretation of the nature and extent of constituents of potential concern in groundwater in the EMF study area, and relates them (as applicable) to EMF sources.
- Section 4.5 characterizes the types and distribution of constituents of potential concern in surface water and sediments of the Portneuf River and related springs. Section 4.5 also identifies those constituents introduced from EMF facilities operations.

The information presented in Section 4, in conjunction with that presented in Section 3, will be used in future work and reports to:

- Develop a baseline risk assessment
- Assess the fate and transport of constituents of potential concern
- Identify potential remedial action objectives

- Provide a technical foundation and serve as a source of information for feasibility studies of potential remedial action alternatives

The findings of the PSCS are summarized in Section 5.

4.1 REVIEW OF SITE CHARACTERIZATION DATA AND DATA QUALITY

Characterization of the nature and extent of constituents of potential concern in the EMF study area involved the collection of numerous samples of each media investigated. These samples were collected in accordance with the data quality objectives (DQOs) presented in the RI/FS Work Plan (Bechtel, 1992a) and the Sampling and Analysis Plan (SAP) (Bechtel, 1992b). Both the RI/FS Work Plan and the SAP were approved by the EPA.

Section 4.1 is provided as a preliminary description of the scope of data collected and data quality.

The objectives of this preliminary explanation of data quality are to:

- Identify analytical results that may not be representative of the sampled media (e.g., groundwater, soil, sediments, etc.).
- Identify any data limitations or qualifications used by the authors of the PSCS in reporting RI data or interpreting the nature and extent of constituents of potential concern.

The RI Report, to be completed after the PSCS is published, will include Appendix PARCC. Appendix PARCC will contain a detailed summary of the precision, accuracy, representativeness, completeness, and comparability of the data, including all quality control/quality assurance information. The appendix will also contain a summary of exceptions to the RI/FS Work Plan and SAP.

4.1.1 Deviation from SAP during Sample Labeling, Transport, and Analysis

As is true of any site investigation of this complexity, deviation from the SAP and RI/FS Work Plan occurred during data collection and laboratory analysis. Data sets with questions relating to sample container labels, chain of custody forms, holding times, laboratory procedures, and analytical technique have been flagged with a data qualifier on the Form 1s and in the electronic database. Use of these data was limited as appropriate for the data qualifier. Data validation guidelines published by the EPA (EPA, 1988a and 1988b) were followed in this process. Appendix J presents an explanation of the data validation qualification codes.

4.1.2 Deviations from the SAP during Sampling

Technical review of sampling procedures indicated that certain samples may not be entirely representative. On the basis of professional judgment, these data points have been used only for limited extent or with qualification. These samples consist of a set of groundwater samples collected several days after a group of new wells was installed in April and May 1992. Inadequate time had elapsed between well installation and well development and sampling to ensure that the grout used to

isolate the well screen from potential down-hole infiltration had set properly. Results for these samples were not relied upon to be representative of groundwater at the time of sampling because of the possible presence of grout in the sampling interval. Rather, results from subsequent samples collected from these wells have been used; these samples were collected in four or more separate quarterly events between the summer of 1992 and the late summer of 1993. The list of these wells and associated sample identification numbers is presented in Table 4.1-1.

4.1.3 Scope of Data and Quality of Data Management

The RI data consist of the results of analyses performed on samples taken at the EMF facilities. The table below shows the total number of samples taken, analytical results obtained, and the total volume of individual pieces of information contained in the database associated with the samples. The performance of data management during the RI has been assessed based on the total number of errors made in the processing of data as reflected in the primary deliverable, the database.

Data Volume

Total Number of Samples Taken	Total Number of Analytical Results	Total Number of Database Fields
2,176	*105,950*	*2,716,371*

While few samples taken have required the complete set of possible measurements, an average of nearly 50 results for each sample taken during the RI exists in the database.

Four different kinds of changes are routinely made after delivery of electronically formatted data to the EPA: completion of missing information, changes for consistency, correction of actual numbers reported (based on reanalysis or error correction not performed prior to delivery), and changes in data validation qualifiers initiated because of data-user questions (items that should have been caught prior to initial delivery). While changes made to fill in missing information or for consistency of information can be considered errors, they primarily impact ease of database use and do not impact the analytical data directly. However, numerical changes or data qualifier changes can impact the meaning and assessment of the data. Each of these changes has been documented with the data reports submitted to EPA for each sampling event.

To assess the performance of data management during the RI, the number of changes for consistency were examined and the number of numerical changes or data qualifier changes were examined as data management performance metrics. Additions to complete missing information are not considered valid performance indicators and were not examined because there are many other factors in addition to data management that need to be added to the database. The total number of rejected analyses and samples were also examined because a perception of the overall performance of a sampling program can be drawn from "rejects." This information is not a reflection on data management but can be construed as an indicator of laboratory performance. Also, there are other factors, such as matrix interference, that can cause a result to be rejected. Below are summary statistics on the performance indicators discussed above.

Data Management and Sampling/Analytical Performance

Post-Validation Corrections (Errors)			Total Other Changes		Total Rejected Results		Total Samples Requiring Recollection	
Qual Val	Concentrations	Percentage	Number of Consistency Changes	Percentage	Number	Percentage	Number of Total Rejected Samples	Percentage
1,428	*8*	*1.34*	*21,040*	*0.07*	*449*	*0.00004*	*27*	*0.0001*

To better understand these statistics, the error corrections, changes, and rejected results were plotted as a function of time either when the change was made or when the data were collected (sampling event completion). The number of rejected samples requiring collection occurred in one event and did not require this type of analysis. Figure 4.1-1 shows the cumulative "other" changes over the life of the RI plotted against when the changes were made. Figure 4.1-2 shows cumulative post-validation corrections (errors) and the associated error rates (by time and as a cumulative average) plotted as a function of the month when the data were collected. Figure 4.1-2 also shows cumulative rejected results. Figure 4.1-3 shows post-validation error corrections compared to the number of results they impact plotted as a function of when the data were collected.

Historical data are not included in the analysis. Only results obtained from samples collected during the RI are included.

Post-validation errors are those changes discovered after validation was completed. Since the purpose of data validation is to find and correct analytical errors, it is not a performance indicator of data management.

"Other" changes include changes to all other database fields.

4.1.4 Data Limitations and Uncertainties

This section describes analytical results that have either not been used in the PSCS or have been used with judgment. An explanation of the basis for this judgment is presented.

4.1.4.1 Mercury

The analysis of environmental samples for mercury has been affected by the continuing problem of blank contamination. All types of blanks have shown contamination with mercury, both laboratory and field blanks.

Preparation blank contamination has frequently caused most of results in a sample delivery group to be given "U" qualification during validation. Very often the preparation blank has been among the highest detects in the sample delivery group, which gives little confidence that any of the mercury reported at low-levels in such a group is actually present. Rather, the reported presence is likely a false positive.

Examination of the raw data for mercury analysis has revealed some discrepancies that show the random nature of low-level detects for mercury. For example, where the laboratory has run continuing calibration verification (CCV) and continuing calibration blank (CCB) together in the sequence CCV, CCB, CCV, CCB, one CCB will show contamination above the instrument detection limit (IDL) and the other will be a nondetect. Examination of the data shows that the detect in the CCB cannot be attributed to "carry over" from the previous analysis. Samples associated with a contaminated CCB that are less than five times the amount in that blank have been qualified "U" in accordance with the directions given in Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis (EPA, 1988a).

The laboratory also reported the presence of mercury at low levels in some field blanks. This was sporadic and not attributable to a particular source. The mercury data for liquid matrices were validated against rinsate blanks using the "five times" rule.

The CLP SOW for Inorganics Analysis (EPA, 1989) directs a laboratory to carry out quarterly IDL determinations. The variation in the reported IDLs obtained from these determinations gives a variation in the concentration of mercury reported as a detect, or nondetect.

Taken together, the effect of laboratory and field blank contamination, and changing IDLs is to give results that provide inconclusive evidence for the presence or absence of mercury at low levels (on the order of 0.0006 mg/l) in water samples. However, this level is comparable to the Contract Required Detection Limit (CRDL) of 0.0005 mg/l established in the EPA-approved SAP (Bechtel, 1992b). Thus, the reported detection of mercury at these low levels is believed to be an artifact of both

the analytical equipment used at the offsite laboratory and laboratory method blank contamination, and not an indication of the presence of mercury in the actual environmental samples.

4.1.4.2 Radiological Constituents

An uncertainty in the reported values for analytical accuracy of radiological parameters was noted. Further evaluation is ongoing, and the issue will be resolved prior to completion of the RI Report. Until completion of this evaluation, the analytical results noted below have been used with qualification in the PSCS.

It was noted that the radiological laboratory reported the analytical accuracy for some parameters at the one-sigma (or one standard deviation) level. The SAP specifies reporting at the two-sigma (two standard deviation) level. This problem was discovered during validation of the polonium-210 analyses, and the laboratory was instructed to change its reporting protocol. However, full review has not been completed of all of the radiological analyses (both those reported before the identification of this problem and those provided thereafter) to identify records that should be corrected to the two-sigma value.

To illustrate this point, if the reported activity of a radiological parameter is 10 pCi/g and the one-sigma accuracy is ± 3 pCi/g, the two-sigma accuracy is ± 6 pCi/g.

The significance of this issue is generally limited to two situations:

- Where radiological parameter activities have been reported by the laboratory at levels near the method detection limit
- When it is necessary to compare two or more radiological parameters

In the first situation, use of the analytical accuracy provides an indication of the confidence that can be placed on the reported activity. If, for example, the method detection limit for the parameter is 5 pCi/g and the activity reported by the laboratory is 10 ± 3 pCi/g, it is likely that the parameter is present in the sample. If, on the other hand, the accuracy is misreported as the one-sigma level, there is a degree of uncertainty whether the parameter is present above the detection limit because the lower range of the activity using the two-sigma level is less than the detection limit.

Comparison of certain radiological constituents can provide an indication of whether one of the isotopes has been enriched relative to the others or relative to naturally occurring levels. As noted in Section 4.3, examination of offsite soils indicates the presence of both inorganic and radiological constituents which have accumulated on the soil surface due, most likely, to wind dispersal of stockpiled ore. The concentrations and relative proportions of inorganic constituents (including total phosphorus and fluoride) and isotopes (uranium-238) in the soil samples are characteristic of phosphate ore. The activity of polonium-210 (which is a daughter

in the uranium-238 decay chain) is generally comparable with the activity of uranium-238 (i.e., the ranges of their upper and lower reported values overlap). This would be expected because these isotopes should be present in secular equilibrium in the absence of enrichment from other sources.

In some cases, the range between the upper and lower reported values for polonium-210 exceeds the range in uranium-238 activities, suggesting that polonium-210 has been enriched (perhaps from emissions from the FMC calciner). However, such potential enrichment cannot be concluded to have occurred until it is certain that uranium-238 and polonium-210 ranges have both been compared at their two-sigma levels. Further evaluation of raw data and instrument records provided by the radiological laboratory is needed to determine if one-sigma accuracy levels are present in the database.

The activities of non-isotope-specific radiological parameters (gross alpha and gross beta) can also be compared with isotopic activities to determine whether there are additional alpha-emitting or beta-emitting isotopes that cannot be accounted for by the gross alpha or beta activities. As noted in Sections 4.2 and 4.4, the gross beta activity of several samples exceeds the activity reported for potassium-40 (or in some cases the activity estimated for potassium-40 based on the reported concentration of potassium using the natural secular equilibrium ratio of potassium-40 and potassium). Until uncertainty in the analytical accuracy for the gross beta and potassium-40 analyses is resolved, it is premature to conclude that an additional beta-emitting isotope was present in the sample.

Also as noted in Sections 4.2 and 4.4, in some samples, the activity of potassium-40 reported by the laboratory is much lower than the activity calculated using the potassium concentration reported for the sample. This suggests that the laboratory may have under-reported the potassium-40 activities in these samples.

4.1.4.3 Fluoride Results

During the 1990 FMC Facility Assessment, a number of soil samples were collected and analyzed for soluble fluoride. These results are included in the discussion of constituents detected in soils in Section 4.2.3. The test method employed for this analysis utilizes a distilled water extraction procedure. Subsequently, soil samples collected during the RI were analyzed for total fluoride, which utilizes a nitric acid digestion as an extraction method.

Obviously, the two analysis methods are not directly comparable. To provide a basis for comparison, five soil samples and two sediment samples were subjected to analysis by both methods during the RI. The results of these analyses are presented in Table 4.1-2. As can be seen, the soluble results are generally less than 5 percent of the total value. Since the representative values for total fluoride are 559 mg/kg (subsurface soils) and 656 mg/kg (surface soils), it appears that a soil sample

containing soluble fluoride results above 28 to 38 mg/kg could be considered to have above-representative levels.

4.2 POTENTIAL SOURCES AND ONSITE SOILS

Section 4.2 details the results of the investigation of potential sources and onsite soil quality. These investigations were begun in Phase I of the RI in 1992 and continued in Phase II in 1993. Data from investigations at FMC in 1990 were also used in the evaluations. Samples were, by intent, collected in areas of known or suspected impact associated with past facility activities. As such, the sampling program was biased toward identification of impact. The purpose was twofold:

- To examine the nature of constituents present in feedstocks, byproducts, and wastes from the industrial processes, and identify any distinctive patterns in the levels of these constituents that would allow these materials to be readily differentiated from each other.
- To determine if units used to store, transport, or dispose of these materials have impacted soils within their vicinity, and, if so, to identify the vertical and horizontal extent of this impact. The suite of characteristic constituents identified in the first step was used as a tool in evaluating sampling results; this suite of constituents also allows source areas to be identified in cases where multiple sources were possible.

The major conclusions of the investigation of potential sources and onsite soils are as follows:

- The principle feed stock at the EMF facilities is phosphate rock mined from the Phosphoria Formation. This shale contains apatite, a mineral containing calcium, phosphate, and fluoride. The ore also contains trace levels of arsenic, cadmium, chromium (total), vanadium, uranium-238 (and related decay isotopic products), zinc, and other elements. The processing operations at the EMF facilities separate these components into various products, byproducts, and wastes.
- A suite of characteristic constituents has been identified by concentration for major feed stocks, byproducts, and waste materials. The constituents found in the solid fraction of these materials at both FMC and Simplot are cadmium, chromium (total), fluoride, total phosphorus, vanadium, and zinc. Unless at least four of these constituents are present in elevated concentrations above representative levels in a soil or sediment sample, it is unlikely that the soil or sediment has been impacted by the EMF facilities.
- Specific feed stocks, byproducts, and wastes can be distinguished by characteristic levels of additional constituents. At FMC these include: precipitator slurry and phossy waste solids, containing characteristic levels of cadmium, lead, potassium, silver, and zinc; ferrophos, containing characteristic levels of chromium (total), iron, and vanadium; and calciner pond sediments, containing characteristic levels of fluoride, potassium, and

Overview of Potential Sources and Onsite Soils (Section 4.2)

Characterization of Representative Soil *(Section 4.2.1):*

Two sets of chemical constituent representative levels were identified, one set for subsurface soils and another for surface soils (shown in Table 4.2.1-1).

Characterization of Potential Sources and Onsite Soils:

Simplot *(Section 4.2.2)*	FMC *(Section 4.2.3)*

- Characteristic constituents are identified for phosphate ore, major waste types, and byproduct materials: cadmium, chromium (total), fluoride, total phosphorus, vanadium, and zinc.
- Additional constituents can be associated with specific solid wastes and byproducts at the two facilities. These constituents are identified in Section 4.2.2.1 for Simplot, and Section 4.2.3.1 for FMC.

Conclusions *(Section 4.2.4):*

In areas with no sustained artificial hydraulic head:

- Widespread use of byproducts for fill and grading has introduced constituents to depths as great as 30 feet.
- Native soils beneath fill material show little to no migration of site-related trace metals where this soil is a silt or clay. Migration of fluoride, total phosphorus, and sulfate has occurred to greater depths.

In areas of sustained hydraulic head:

- Trace metals (including arsenic) have been generally precipitated or attenuated in the first 10 to 30 feet of the subsurface soil beneath sources if this soil is clay or silt.
- Several metals in oxyanionic dissolved states suspected to migrate (selenium and vanadium) are also in the silt and clay layers beneath source areas.
- Several trace metals (arsenic, selenium, copper, zinc, and vanadium) have migrated through the soils and are present in groundwater.
- Calcium, potassium, and sodium, and, to a lesser extent, lithium and magnesium, are not completely attenuated by subsurface soils.
- Fluoride, total phosphorus, and sulfate are more mobile through the soil column.

4.2.1 Characterization of Representative Soil Chemistry in the EMF Study Area

Soil constituent levels (i.e., representative levels) were defined above which soil may be identified as impacted by EMF facilities operations. This section describes the procedures used to characterize representative concentrations for the constituents of potential concern in surface and subsurface soil and the results of this evaluation. This information was also presented to the EPA in preliminary format as a separate report in October 1993 (J.R. Simplot Company and FMC Corporation, 1993).

The characterization of representative levels was complicated by the fact that the geologic history of the Pocatello area has created a variety of soil types throughout the EMF study area. The diversity of naturally occurring minerals in these soils has contributed to a range of concentrations of chemical elements within these soils, including those elements associated with the ore-processing operations at the EMF facilities.

In addition, the surface soils in the Pocatello area have been enriched with a number of constituents (e.g., phosphorus, lead) from a variety of historic land use practices unrelated to the EMF facilities, such as irrigation, application of soil amendments during agricultural use, and vehicle exhaust, as well as through natural soil development processes. Some of these chemical constituents are the same as those associated with EMF facilities operations. Consequently, it is important that this enrichment of surface soils be understood and factored into the characterization of representative surface levels.

Two sets of chemical constituent representative levels have been identified: one set for subsurface soils and another for surface soils (defined as the upper 2-inch horizon). These levels are presented in Table 4.2.1-1. The analyses through which these levels were identified are described in Section 4.2.1.1 (subsurface soils) and Section 4.2.1.2 (surface soils). The surface soil levels are comparable with levels identified in other studies in the greater Pocatello area.

The concentrations of constituents detected in soil samples collected in boring 101 were used as an initial indication of representative subsurface soil quality; boring 101 is upgradient from potential constituent sources. The data from these samples were found to be comparable with an additional 100 subsurface soil samples collected at other locations, and the pooled data set was used to describe representative subsurface soil characteristics.

Data reported by the U.S. Geological Survey (USGS) on the characteristics of surface soils in areas of Bannock, Power, and Bingham counties believed to be beyond the potential impact of airborne releases from the EMF facilities were compared with data from 27 surface soil samples collected in predominant upwind locations within the EMF study area. This comparison found that the data sets were similar, and the

assessment and its preliminary results was presented to the EPA in Pocatello, Idaho, on March 29, 1993.

The absence of data on total fluoride and phosphorus in subsurface samples from boring 101 made it necessary to conduct the evaluation in two phases. The first phase consisted of identifying onsite and offsite subsurface samples with cadmium, lead, vanadium, and zinc concentrations that were no higher than the highest concentrations found in samples from boring 101 for the same metals. This allowed a large set of additional samples to be identified that contained comparable levels of both these constituents and that also provided data on total fluoride and phosphorus. The second phase consisted of identifying onsite and offsite subsurface samples with fluoride and total phosphorus concentrations that were no higher than the highest concentrations of fluoride and phosphorus found in the samples identified in the first phase. The highest total phosphorus value identified was 788 mg/kg, and the highest fluoride value was 540 mg/kg. These values provided an initial indication of total fluoride and phosphorus in representative subsurface soils.

The rationale for selecting cadmium, lead, vanadium, and zinc as indicator chemicals for the Phase I characterization follows.

Cadmium is concentrated in several of the byproduct streams in the EMF facilities area. The samples from boring 101 have a concentration of 0.6 U (i.e., not detected at the 0.6 mg/kg level). Samples with detected levels of cadmium greater than 0.6 mg/kg were eliminated from further consideration in the representative analysis.

Lead is not generally associated with the facilities' byproducts or wastes, although it can be present at above-representative levels in association with non-EMF facilities-related anthropogenic activities. For this analysis, the lead value in the boring 101 samples (7.8 mg/kg) was chosen. This criterion eliminated several offsite soils that might otherwise have been chosen.

Vanadium is present in the ores processed at the facilities and is further concentrated in several facility byproduct streams. It is also more mobile than lead and cadmium. The vanadium concentrations found in the representative boring are generally lower than those found in the offsite subsurface soil samples. The highest value for vanadium in the samples from boring 101 (26 mg/kg) was used for the selection process.

Zinc is present in the ores and is further concentrated in several facility byproduct streams. The zinc values found in the representative boring samples are lower than the levels generally found in the subsurface offsite soil samples. The highest value for zinc in the boring 101 samples (48.2 mg/kg) was used in the selection process.

characterized. Finally, conservative assumptions were used in selecting the larger set of soil samples in the expanded characterization effort. These included the use of the detection level for cadmium, and the use of the highest concentrations of lead, vanadium, and zinc detected in the boring 101 samples.

4.2.1.2 Derivation of Surface Soil Representative Characteristics

The derivation of surface soil representative characteristics would be relatively straightforward if the constituents associated with the airborne releases were substantially different from those associated with typical anthropogenic sources unrelated to the EMF facilities. However, this is not the case at the EMF facilities. The potential facilities-related constituents are identical to those associated with a variety of common land use activities (e.g., agricultural use of soils, impact from vehicular exhaust). Differentiating between these is further compounded where the constituents are present at low concentrations and where there are no obvious features (such as soil color or texture) from which the source can be estimated.

The selection of representative concentrations for such surface soils must take vertical heterogeneity into account. Both natural and anthropogenic processes can enrich the upper soil layer in metals and other constituents. Chemical reactions in the root zone, plant uptake, application of fertilizer and other soil amendments, and the affinity of metals for the soil's organic fraction all can act to enrich the upper soil layer in metals relative to lower soil horizons.

In this analysis, consideration was given to constituents that might be associated with airborne releases from the EMF facilities. A preliminary worst-case release scenario was used to identify these constituents; this scenario is used in the Air Pathways Monitoring Program Plan for the EMF facilities area (submitted to the EPA in September 1993) to identify constituents to be chemically analyzed from particulate filters. Greater detail on this approach is provided in Appendix A of the Air Pathways Monitoring Program Plan. This analysis indicated that the following constituents could be present on particulate filters in concentrations above conservative screening criteria proposed by the EPA: arsenic, cadmium, chromium (total), fluoride (total), nickel, total phosphorus, and vanadium.

Approach. The characterization of surface soil representative quality involved three steps. The first was an examination of analytical results of the surface soil samples collected during Phase I of the EMF study area investigation to determine if patterns exist in the distribution of constituent concentrations. The second was to identify the range of constituents in soils from locations in the greater Pocatello area that could not be impacted by EMF facilities-related releases. Identification of information available in reports published by government agencies was included in this step. In the third step, the information from steps one and two was analyzed to

likely EMF facilities impact described above, while sectors 1 through 4 encompass the area remaining beyond sector 5.

As shown in Figure 4.2.1-6, an elevated level of lead was detected in a single sample near the eastern perimeter of the site. The reason for the presence of this level is not known; however, the area is near the old state bridge on the Portneuf River. The bridge is a popular target practice site; lead could have come from bullets. The U. S. Army Air Corps operated a target range within the EMF study area during World War II; however, the exact location of the firing range has not been identified. It may have been located where the elevated levels of lead were observed. Figure 4.2.1-7 displays lead isopleths with the highest single concentration of lead removed from the set of plotted values, indicating that the single elevated level is anomalous, and that lead concentrations in surface soils are more accurately represented by Figure 4.2.1-7.

A preliminary comparison level was developed for each chemical by averaging the concentrations in surface soils in sectors 1 through 4. The distributions of concentrations of certain elements thought to be associated with EMF facilities operations in surface soil in sector 5 are statistically distinct from the distributions in sectors 1 through 4. Comparison of the concentrations in sector 5 with sectors 1 through 4 indicates that plant operations have had the greatest impact on sector 5. This can be seen in the values for arsenic (up to 18.4 mg/kg), cadmium (up to 163 mg/kg), fluoride (up to 27,200 mg/kg), total phosphorus (up to 84,900 mg/kg), vanadium (up to 730 mg/kg), and zinc (up to 1,540 mg/kg).

Constituent Concentrations in Upwind Locations. Offsite surface soil results were compared against wind direction using data from Simplot meteorological site 1 to identify zones of least probable impact from airborne releases. The prevailing wind directions at the site are from the southwest and southeast, as shown in Figure 3.5-2. Sampling locations along each radial transect in the southeastern, southern, and southwestern areas are directly downwind from the facilities approximately 4 percent of the year. The highest windspeeds during this interval are approximately 10 knots, whereas the highest sustained wind velocities (approximately 21 knots) recorded in the meteorological data originate from the southwest and southeast. Also, a hill southeast of the EMF facilities acts as a barrier to airborne particles potentially released from operational areas.

The concentration patterns for arsenic, cadmium, chromium, fluoride, lead, total phosphorus, vanadium, and zinc in the surface samples from all of the southwestern, southern, and southeastern transects sampled in Phase I were examined to identify samples that appeared not to be affected by emissions from the facilities (i.e., concentrations along the transect that are approximately constant with the distance from the facilities). This examination identified 22 samples that indicate representative surface soil levels. The samples were combined with the

A statistical analysis was made to assess the significance of the difference between the EMF and USGS means. The analysis was based on the assumption that the 95th percentile concentration approximately defines the upper 90-percent confidence limit and that the difference between two means is insignificant if the higher mean falls between the lower mean and its 95th percentile concentration.

The geometric means of arsenic, boron, chromium, copper, lead, lithium, and zinc in the USGS samples are encompassed by the corresponding 95th percentile concentrations in the EMF samples, indicating that there is no significant difference between the EMF and USGS means for those elements. However, the means for mercury, selenium, and vanadium do not fall within the 95th percentile of either mean, suggesting that the means differ significantly. With vanadium, the EMF mean is less than the USGS mean. However, with mercury and selenium, the EMF means were higher than the USGS means. (EMF mean for mercury was 0.10 versus the USGS mean of 0.02 mg/kg, and EMF mean for selenium was 0.61 versus the USGS mean of 0.1 mg/kg.)

While this finding suggests enrichment, comparison of the geometric means of mercury in the EMF surface samples and in the EMF subsurface samples, classified earlier as being representative of subsurface representative levels, indicates otherwise. The geometric mean concentration of mercury in the EMF surface samples is similar to the subsurface samples classified earlier as indicating subsurface representative levels (0.1 mg/kg). The geometric mean concentration of selenium in the EMF surface samples is very similar to the geometric mean concentration of that metal in the subsurface representative samples (0.61 vs 1.0 mg/kg).

In summary, representative levels have been identified for both subsurface and surface soils. The surface soil levels are generally comparable to, or less than, levels identified by the USGS for soils well beyond the potential area of influence from the EMF facilities, where comparisons can be made. The levels, presented in Table 4.2.1-1, are conservative, due to the constraints used in the evaluation process.

assessment and its preliminary results was presented to the EPA in Pocatello, Idaho, on March 29, 1993.

The absence of data on total fluoride and phosphorus in subsurface samples from boring 101 made it necessary to conduct the evaluation in two phases. The first phase consisted of identifying onsite and offsite subsurface samples with cadmium, lead, vanadium, and zinc concentrations that were no higher than the highest concentrations found in samples from boring 101 for the same metals. This allowed a large set of additional samples to be identified that contained comparable levels of both these constituents and that also provided data on total fluoride and phosphorus. The second phase consisted of identifying onsite and offsite subsurface samples with fluoride and total phosphorus concentrations that were no higher than the highest concentrations of fluoride and phosphorus found in the samples identified in the first phase. The highest total phosphorus value identified was 788 mg/kg, and the highest fluoride value was 540 mg/kg. These values provided an initial indication of total fluoride and phosphorus in representative subsurface soils.

The rationale for selecting cadmium, lead, vanadium, and zinc as indicator chemicals for the Phase I characterization follows.

Cadmium is concentrated in several of the byproduct streams in the EMF facilities area. The samples from boring 101 have a concentration of 0.6 U (i.e., not detected at the 0.6 mg/kg level). Samples with detected levels of cadmium greater than 0.6 mg/kg were eliminated from further consideration in the representative analysis.

Lead is not generally associated with the facilities' byproducts or wastes, although it can be present at above-representative levels in association with non-EMF facilities-related anthropogenic activities. For this analysis, the lead value in the boring 101 samples (7.8 mg/kg) was chosen. This criterion eliminated several offsite soils that might otherwise have been chosen.

Vanadium is present in the ores processed at the facilities and is further concentrated in several facility byproduct streams. It is also more mobile than lead and cadmium. The vanadium concentrations found in the representative boring are generally lower than those found in the offsite subsurface soil samples. The highest value for vanadium in the samples from boring 101 (26 mg/kg) was used for the selection process.

Zinc is present in the ores and is further concentrated in several facility byproduct streams. The zinc values found in the representative boring samples are lower than the levels generally found in the subsurface offsite soil samples. The highest value for zinc in the boring 101 samples (48.2 mg/kg) was used in the selection process.

The first phase of the selection process produced four onsite and six offsite samples; the second phase of the selection process produced 23 onsite and 67 offsite samples, for a total of 100 samples. Chemical concentrations in these samples were considered representative of subsurface representative levels. Samples obtained under or near former or currently operating units that at one time either had, or may still have, a hydraulic head (e.g., the gypsum stacks, cooling pond, calciner ponds, and phossy water ponds) were excluded from consideration even after examination of the data indicated that constituent levels were comparable to the levels from the samples obtained from boring 101 in 1990.

Results. Table 4.2.1-3 displays the arithmetic mean, standard deviation, and the mean plus two standard deviations for each of the analytes in the subsurface samples from boring 101 and the subsurface samples identified by the two-step process described above. In the calculation of these statistics, the reported detection limit was used whenever the concentration of a chemical was reported as being less than its detection limit.

For normally distributed data, the interval around the arithmetic mean defined by the mean plus or minus two standard deviations approximates the 95-percent confidence limits of the mean. The similarity of the arithmetic and geometric means of the element concentrations in the subsurface soils suggests that the data are normally distributed. With normally distributed data, a rapid method for determining whether or not the difference between two means is significant entails determining if the confidence limits overlap. When they overlap, the difference is insignificant. When they do not overlap, the difference is significant.

The method was used to compare the mean concentrations of elements found in subsurface samples from boring 101 and from samples identified through the two-step process described above. The difference in the means was found to be insignificant. No standard deviation could be calculated for cadmium and silver in the samples from boring 101. The means were very similar (0.6 versus 0.5 for cadmium and 0.8 versus 1.0 for silver) and judged to be insignificantly different. This comparison shows that the characterization of subsurface soil representative conditions can be based on a larger data set than the one used in the original characterization effort.

This characterization of soil representative values is conservative for several reasons. First, the textures of the original samples obtained from boring 101 are composed of silt- and sand-sized particles. Soils with these textures are not naturally enriched in minerals to the extent that soils with clay textures are enriched. Thus, the constituent levels identified from these samples are lower than those obtained from representative location soils containing a significant amount of clay-sized particles. Second, the large number of samples (100) used in the analysis provides a high level of confidence that representative conditions have been well-

characterized. Finally, conservative assumptions were used in selecting the larger set of soil samples in the expanded characterization effort. These included the use of the detection level for cadmium, and the use of the highest concentrations of lead, vanadium, and zinc detected in the boring 101 samples.

4.2.1.2 Derivation of Surface Soil Representative Characteristics

The derivation of surface soil representative characteristics would be relatively straightforward if the constituents associated with the airborne releases were substantially different from those associated with typical anthropogenic sources unrelated to the EMF facilities. However, this is not the case at the EMF facilities. The potential facilities-related constituents are identical to those associated with a variety of common land use activities (e.g., agricultural use of soils, impact from vehicular exhaust). Differentiating between these is further compounded where the constituents are present at low concentrations and where there are no obvious features (such as soil color or texture) from which the source can be estimated.

The selection of representative concentrations for such surface soils must take vertical heterogeneity into account. Both natural and anthropogenic processes can enrich the upper soil layer in metals and other constituents. Chemical reactions in the root zone, plant uptake, application of fertilizer and other soil amendments, and the affinity of metals for the soil's organic fraction all can act to enrich the upper soil layer in metals relative to lower soil horizons.

In this analysis, consideration was given to constituents that might be associated with airborne releases from the EMF facilities. A preliminary worst-case release scenario was used to identify these constituents; this scenario is used in the Air Pathways Monitoring Program Plan for the EMF facilities area (submitted to the EPA in September 1993) to identify constituents to be chemically analyzed from particulate filters. Greater detail on this approach is provided in Appendix A of the Air Pathways Monitoring Program Plan. This analysis indicated that the following constituents could be present on particulate filters in concentrations above conservative screening criteria proposed by the EPA: arsenic, cadmium, chromium (total), fluoride (total), nickel, total phosphorus, and vanadium.

Approach. The characterization of surface soil representative quality involved three steps. The first was an examination of analytical results of the surface soil samples collected during Phase I of the EMF study area investigation to determine if patterns exist in the distribution of constituent concentrations. The second was to identify the range of constituents in soils from locations in the greater Pocatello area that could not be impacted by EMF facilities-related releases. Identification of information available in reports published by government agencies was included in this step. In the third step, the information from steps one and two was analyzed to

determine the divergence of EMF site-specific results from surface soils that are clearly unaffected by the EMF facilities.

General Patterns in Constituent Concentrations. The analytical results for all offsite surface soil samples collected during the Phase I investigation of the EMF study area were first examined to see if patterns of constituent concentrations were evident. If distinct patterns were present, it might have been possible to delineate areas of EMF facilities impact from areas of other anthropogenic impact.

A total of 108 offsite surface soil samples were collected during Phase I from the zero to 2-inch depth interval. Offsite soil samples were collected between the facilities' boundaries and at a distance up to 3 miles along radial transects that originated at the northern intersection of the facility boundary between the FMC and Simplot facilities. Samples were collected up to 3 miles from the facilities along some radial transects during the Phase II sampling campaign to evaluate potential trends observed in the results from the Phase I samples.

An initial examination of the data indicated that surface soils in an area directly north of the facilities, within a mile of the fenceline, were enriched in certain metal concentrations relative to other offsite soils. Thus, it appeared that a zone of deposition potentially associated with windblown ore might be present. These patterns are illustrated in Figures 4.2.1-2 through 4.2.1-10, which present isopleths of offsite surface soil concentrations for arsenic, cadmium, total chromium, fluoride, lead, total phosphorus, vanadium, and zinc, respectively.

The data were gridded for the isopleth plots using the minimum curvature method. The method first calculates initial values of the grid elements based on the data. Any grid element with data present within a grid cell centered about it will have its value fixed during the computation, thus honoring the data. The method then applies an equation repeatedly to the surface, with each application counted as one iteration. The equation attempts to smooth the gridded surface. Each grid element is recalculated until successive changes in its value are less than the minimum absolute error, or the maximum number of iterations has been reached. This process is begun on a coarse grid and repeated for finer and finer grid spacings until the actual grid spacing has been reached. Since the minimum curvature method projects trends, results will be more unpredictable in areas of missing data. The number of grid elements on each side of the graph is 81, which is the maximum number allowed by the program. This number allows for smoother isopleths and increased unpredictability along the borders of the graph.

On the basis of this general pattern, the area beyond the facilities' fenceline was divided into five sectors, as shown in Figure 4.2.1-11. Sector 5 (encompassing an area up to approximately 1 mile north of the facilities' fenceline) encloses the area of

likely EMF facilities impact described above, while sectors 1 through 4 encompass the area remaining beyond sector 5.

As shown in Figure 4.2.1-6, an elevated level of lead was detected in a single sample near the eastern perimeter of the site. The reason for the presence of this level is not known; however, the area is near the old state bridge on the Portneuf River. The bridge is a popular target practice site; lead could have come from bullets. The U. S. Army Air Corps operated a target range within the EMF study area during World War II; however, the exact location of the firing range has not been identified. It may have been located where the elevated levels of lead were observed. Figure 4.2.1-7 displays lead isopleths with the highest single concentration of lead removed from the set of plotted values, indicating that the single elevated level is anomalous, and that lead concentrations in surface soils are more accurately represented by Figure 4.2.1-7.

A preliminary comparison level was developed for each chemical by averaging the concentrations in surface soils in sectors 1 through 4. The distributions of concentrations of certain elements thought to be associated with EMF facilities operations in surface soil in sector 5 are statistically distinct from the distributions in sectors 1 through 4. Comparison of the concentrations in sector 5 with sectors 1 through 4 indicates that plant operations have had the greatest impact on sector 5. This can be seen in the values for arsenic (up to 18.4 mg/kg), cadmium (up to 163 mg/kg), fluoride (up to 27,200 mg/kg), total phosphorus (up to 84,900 mg/kg), vanadium (up to 730 mg/kg), and zinc (up to 1,540 mg/kg).

Constituent Concentrations in Upwind Locations. Offsite surface soil results were compared against wind direction using data from Simplot meteorological site 1 to identify zones of least probable impact from airborne releases. The prevailing wind directions at the site are from the southwest and southeast, as shown in Figure 3.5-2. Sampling locations along each radial transect in the southeastern, southern, and southwestern areas are directly downwind from the facilities approximately 4 percent of the year. The highest windspeeds during this interval are approximately 10 knots, whereas the highest sustained wind velocities (approximately 21 knots) recorded in the meteorological data originate from the southwest and southeast. Also, a hill southeast of the EMF facilities acts as a barrier to airborne particles potentially released from operational areas.

The concentration patterns for arsenic, cadmium, chromium, fluoride, lead, total phosphorus, vanadium, and zinc in the surface samples from all of the southwestern, southern, and southeastern transects sampled in Phase I were examined to identify samples that appeared not to be affected by emissions from the facilities (i.e., concentrations along the transect that are approximately constant with the distance from the facilities). This examination identified 22 samples that indicate representative surface soil levels. The samples were combined with the

five representative surface samples collected near the City of Pocatello in Phase II, bringing the total number of possible representative surface samples to 27. Figure 4.2.1-12 identifies the points at which the 22 surface samples were collected during Phase I. The surface soil sampling locations near the City of Pocatello are shown in Figure 4.2.1-13. The minimum distance between the sampling locations in Figure 4.2.1-13 and the EMF study area is 5.75 miles.

Comparisons with Published Information. The concentrations of the elements found in the 27 representative surface samples were compared with published concentrations of the same elements in samples obtained from areas unlikely to have been affected by the EMF facilities and are, therefore, representative. Representative concentrations of elements in soil were obtained from a report by the USGS on the composition of surface soils in Bannock, Bingham, and Power counties. The representative data in the USGS report were from an unpublished study conducted in 1975 (Severson, 1979). Only the geometric means, 95th percentile concentrations, and ranges were reported by USGS. The locations of Bannock, Bingham, and Power counties are shown in Figure 4.2.1-14.

The soil samples described by USGS were obtained from a depth of approximately 8 inches, and none of the samples was obtained within a distance of less than 5 miles of the EMF study area. Information on sample collection and analytical techniques was not available in the USGS report. Part of the EMF study area is in Power County and part is in Bannock County. Bingham County is adjacent to Power County. The USGS soil samples were analyzed for 11 elements, 10 of which are elements that were also found in the 27 representative surface soil samples.

The samples described in the USGS report were not analyzed for cadmium, fluoride, or total phosphorus, all of which are elements associated with EMF facilities operations. Government and university sources (i.e., USDA, Idaho State University, County Extension Agents, etc.) were requested to provide data on these and other constituents in soils from the region, but the agencies and researchers contacted did not have such information.

Results. Table 4.2.1-4 presents the geometric means and geometric 95th percentile concentrations for elements detected in the USGS surface samples and the EMF representative surface samples. These two statistics are presented because they were the only statistics presented in the USGS report.

The geometric mean concentrations for arsenic, boron, chromium, copper, lead, lithium, vanadium, and zinc in the possible EMF representative surface samples are lower than the geometric means of the same elements in the USGS samples. Two of the elements (mercury and selenium) were more concentrated in the EMF samples than in the USGS samples; however, these elements were not identified in the analysis that identified potential airborne releases from the EMF facilities.

A statistical analysis was made to assess the significance of the difference between the EMF and USGS means. The analysis was based on the assumption that the 95th percentile concentration approximately defines the upper 90-percent confidence limit and that the difference between two means is insignificant if the higher mean falls between the lower mean and its 95th percentile concentration.

The geometric means of arsenic, boron, chromium, copper, lead, lithium, and zinc in the USGS samples are encompassed by the corresponding 95th percentile concentrations in the EMF samples, indicating that there is no significant difference between the EMF and USGS means for those elements. However, the means for mercury, selenium, and vanadium do not fall within the 95th percentile of either mean, suggesting that the means differ significantly. With vanadium, the EMF mean is less than the USGS mean. However, with mercury and selenium, the EMF means were higher than the USGS means. (EMF mean for mercury was 0.10 versus the USGS mean of 0.02 mg/kg, and EMF mean for selenium was 0.61 versus the USGS mean of 0.1 mg/kg.)

While this finding suggests enrichment, comparison of the geometric means of mercury in the EMF surface samples and in the EMF subsurface samples, classified earlier as being representative of subsurface representative levels, indicates otherwise. The geometric mean concentration of mercury in the EMF surface samples is similar to the subsurface samples classified earlier as indicating subsurface representative levels (0.1 mg/kg). The geometric mean concentration of selenium in the EMF surface samples is very similar to the geometric mean concentration of that metal in the subsurface representative samples (0.61 vs 1.0 mg/kg).

In summary, representative levels have been identified for both subsurface and surface soils. The surface soil levels are generally comparable to, or less than, levels identified by the USGS for soils well beyond the potential area of influence from the EMF facilities, where comparisons can be made. The levels, presented in Table 4.2.1-1, are conservative, due to the constraints used in the evaluation process.

4.2.2 Characterization of Potential Sources and Onsite Soils at Simplot

This section is organized into three major subsections. Section 4.2.2.1 describes the chemical composition of potential sources that are part of the industrial operations at Simplot. Sections 4.2.2.2 and 4.2.2.3 describe the chemical composition of onsite soils at the facility. Since the onsite soils at Simplot were sampled to assess the presence of constituents associated with the various potential sources, the areas were preferentially selected for soil sampling if there was a potential for impact by present or prior plant operations.

The onsite soil areas at Simplot included:

- Those active or formerly active areas not subject to a sustained hydraulic head except from natural precipitation (no sustained downward gradient or head due to aqueous discharge from plant operations) (Section 4.2.2.2).
- Those active or formerly active areas subject to a sustained hydraulic head from facility activities (i.e., subject to a sustained downward gradient or "head" due to aqueous discharges from plant operations) (Section 4.2.2.3).

The rationale for this subdivision follows from the conceptual model which postulates that site-related constituents can migrate into the subsurface soils only if there is a transport mechanism. This transport mechanism can be furnished by natural precipitation or by site-related activities. In the Pocatello area, evaporation far exceeds precipitation. The annual mean precipitation at the Pocatello Municipal Airport is approximately 11 inches per year, with the greatest amount occurring from March through May. Annual mean evaporation is greatest in the summer, totaling 29.76 inches for the 3-month period from June through August. The annual mean evaporation at the Pocatello airport is 61.14 inches (Bechtel, 1992). Consequently, areas that are only exposed to natural precipitation have low infiltration rates (i.e., low transport potential).

Aqueous discharges from plant operations can increase infiltration above that caused by natural precipitation. This in turn increases the potential for downward migration of constituents through the unsaturated zone. Downward migration may be enhanced by a higher flux of water through site-impacted soil or, depending on the source of the aqueous discharge, by the pH of the water. The extent of enrichment due to facility activities was evaluated by comparing the data with the representative concentrations of constituents in soils found in the Pocatello area. Parameters with values exceeding these concentrations are considered "parameters of interest" for that particular area.

The overall conclusions reached in this section are consistent with the conceptual model. First, in the absence of a driving hydraulic head, there is little to no migration of site-related constituents. Second, in the presence of a driving hydraulic

head, trace metals are generally attenuated by the naturally occurring soils, but oxyanions, anions, and alkali and alkaline earth metals are not.

4.2.2.1 Potential Sources

The Simplot plant produces phosphoric acid from phosphate ore using a wet (aqueous) process. The Gay, Conda, and Smoky Canyon mines formerly provided phosphate ore to the plant by railcar, but, as of September 1991, the Simplot plant began receiving phosphate ore solely from the Smoky Canyon mine through a slurry pipeline. The phosphate ore is beneficiated (physically washed) at the Smoky Canyon phosphate mining/processing plant before it is transported through the buried slurry pipeline to the Simplot facility. The mining/processing plant crushes and washes the ore and fines. Coarse materials generated from the crushing process are then separated in sequence by classifiers and a hydroclone system. The beneficiation process yields a 31-percent phosphorus pentoxide (P_2O_5) equivalent concentrate suitable for production of phosphoric acid.

The phosphate ore, a primary ingredient in the production of phosphoric acid at the Simplot facility, is the material from which many of the trace elements found in Simplot wastes originate. Consequently, a composite sample of the ore slurry was collected and the solid portion of the sample was analyzed for inorganics and radioactivity. Other process streams were also sampled (the discharge water to the water treatment ponds, the water in the former east overflow pond, and the gypsum slurry discharged to the gypsum stacks). Sediment samples were also collected from the former east overflow pond and dewatering pit.

Five Simplot source areas/materials were examined during Phases I and II to ascertain the chemical composition of their matrices. The following general conclusions were reached:

- Phosphate ore, gypsum slurry, former east overflow pond wastewater and sediments, wastewater treatment pond wastewater, and sediments from the unlined ditch to wastewater treatment pond, and at times wastewater, contain significantly higher concentrations of various trace metals and other constituents than do native soils and waters.
- The appearance of six characteristic constituents in all of the solid materials enables the source material to be identified as EMF-related when mixed with native soils or sediments. These are cadmium, chromium, fluoride, total phosphorus, vanadium, and zinc. [Note: When they occur as a group, they are underlined in the following text.]
- In addition to the six characteristic constituents, several of the above potential sources have unique concentrations of other constituents that allow for their identification, provided they are mixed in a matrix (soil or

sediment) in sufficient quantity (e.g., calcium and sulfate for the gypsum slurry).

- To a lesser extent than the solid matrices, the wastewaters associated with the gypsum slurry and the former east overflow pond also have enriched concentrations of various constituents that can be used to identify them as sources that contributed to releases to groundwater and surface water.

Ore Slurry. A time-composite sample of the ore slurry was collected and analyzed for the parameters listed in Table 2.1-4. This list is the same as that used for other potential source samples and was derived from known ore characteristics. Two methods of sample preparation were used. The first was digestion using nitric acid (the EPA-recommended method); the second consisted of hydrofluoric and perchloric acid digestion of a dried sample of the slurry. The first method does not result in the total breakdown of the ore matrix; the second method, which is much more aggressive, does. The second method is used by Simplot to assay ore. For this report, the second method samples were used to compare soil samples that might contain ore since the soil samples were analyzed with the nitric acid digestion.

The results of both digestion methods are contained in Table 4.2.2-1. An examination of the data indicates a typical characteristic pattern of elements contained in the ore. Key elements of the ore are the major constituents of the phosphate mineral apatite: calcium (29 to 30 percent), fluoride (3.3 to 3.6 percent), and total phosphorus (7.4 to 13.6 percent). Other ore constituents present that are above representative levels for soil and, hence, may be used for identifying potential site impacts include cadmium (109 to 111 mg/kg), chromium (404 to 476 mg/kg), copper (75.5 to 76.5 mg/kg), nickel (94.1 to 100 mg/kg), selenium (11.5 to 28.3 mg/kg), sodium (3,490 to 3,670 mg/kg), vanadium (701 to 732 mg/kg), and zinc (1,130 to 1,140 mg/kg).

Gypsum Slurry. Gypsum slurry is the primary byproduct at the Simplot facility. It is discharged to the gypsum stacks. Two time-composite samples of gypsum slurry were collected and analyzed for the parameters listed in Table 4.2.2-1. The first sample was analyzed as a slurry. The second sample was filtered and the filtrate analyzed to provide an estimate of the dissolved constituents available for potential migration.

The results of the gypsum slurry analyses indicate that the principal constituents are calcium (233,000 to 243,000 mg/kg), fluoride (6,900 to 7,650 mg/kg), total phosphorus (9,450 to 6,560 mg/kg), and sulfate (540,000 to 601,000 mg/kg). Cadmium (34.8 to 37.1 mg/kg), chromium (110 to 228 mg/kg), copper (38.6 to 43.1 mg/kg), nickel (25.5 to 42.3 mg/kg), selenium (15.6 to 23 mg/kg), sodium 2,090 to 2,400 mg/kg), vanadium (190 to 262 mg/kg), and zinc (211 to 227 mg/kg) are also found at above-representative soil levels. The presence of sulfate at the levels shown is due to the addition of sulfuric acid to the ore to extract/replace the phosphate. Hence, the

presence of sulfate in a soil sample at above-representative levels (generally less than 20 mg/kg) is an indication of Simplot facility impact.

Since the pH of the slurry is under 2, solids in it are likely to remain solid. Constituents available for migration would be found in the supernatant. Analysis of the supernatant indicates that it has been enriched by a number of constituents (Table 4.2.2-1). These include ammonia (318 mg/l), arsenic (0.205 mg/l), cadmium (2.4 mg/l), calcium (1,400 mg/l), chloride (162 mg/l), chromium (5.31 mg/l), fluoride (8,480 mg/l), lithium (0.354 mg/l), manganese (1.48 mg/l), nickel (1.68 mg/l), total phosphorus (2,460 mg/l), potassium (176 mg/l), sodium (768 mg/l), sulfate (4,480 mg/l), vanadium (3.81 mg/l), and zinc (12.6 mg/ l). Radionuclide activities were also enriched. Gross alpha was 644 ± 46.3 pCi/l; gross beta was 619 ± 31.1; radium-226 was 190 ± 4.26 pCi/l; and radium-228 was 1.9 ± 0.8 pCi/l. [Note the presence of the characteristic constituents (underlined).]

Former East Overflow Pond. The former east overflow pond was an unlined surface impoundment approximately 0.8 acre in size located near the northwestern corner of the lower gypsum stack (see Figure 1.2-1). It was taken out of service in August 1993 when it was replaced with a new lined impoundment (called the Reclaim Water Pond #1) located nearby. It received surface water runoff as well as excess process water from the plant water reclaim system if there was a power failure or in the event of other plant upsets, which occurred sporadically during normal plant operations. Reclaimed system water included gypsum filter wash water, scrubber water, and cooling tower water. Water collected in this pond was pumped back to the reclaim water system or the gypsum decant pond for later reuse.

One time-composite water sample was collected from the pond and analyzed for the constituents in Table 4.2.2-2 (see sample collection methodology in Section 2.4). The data from these analyses are summarized in Table 4.2.2-3. Also, one sludge sample was collected from the pond and analyzed for gross alpha, gross beta, and the inorganic parameters in Table 2.1-2.

Analysis of chemical data from the sludge sample showed concentrations of cadmium (21.9 mg/kg), chromium (204 mg/kg), copper (77.6 mg/kg), fluoride (52,200 mg/kg), nickel (41.2 mg/kg), total phosphorus (6,160 mg/kg), vanadium (362 mg/kg), and zinc (298 mg/kg) above representative soil levels. Analysis of the pond wastewater indicated that arsenic (0.13 mg/l), cadmium (1.14 mg/l), chromium (1.18 mg/l), fluoride (6,380 mg/l), total phosphorus (563 mg/l), sulfate (746 mg/l), vanadium (3.39 mg/l), and zinc (6.01 mg/l), among others, were above representative levels found in groundwater and surface water. [Note the presence of the characteristic constituents (underlined) in the sludge sample.]

Wastewater Treatment Ponds. A series of three lined ponds, north of the plant between U.S. Highway 30 and the Portneuf River, is used to treat noncontact cooling water, including boiler and cooling tower blowdown, compressor coolant water,

demineralizer regeneration water, laboratory wastes, (i.e., acids, ammonia, and sodium hydroxide), and stormwater (Figure 1.2-1). Analytical parameters for which wastewater samples were analyzed are presented in Table 2.1-4. The analytical results for water from the Simplot water treatment ponds are summarized in Table 4.2.2-4. The highest concentrations of site-related parameters were found in the holding pond. These included arsenic (0.04J mg/l), cadmium (0.54J mg/l), chromium (0.42J mg/l), copper (0.15 mg/l), fluoride (26.6 mg/l) nickel (0.28 mg/l), total phosphorus (1,320 mg/l), sulfate (2,590 mg/l), vanadium (1.67 mg/l), and zinc (5.19 mg/l). Concentrations of the same parameters in the samples for the other two ponds were lower, as expected, due to pH adjustment of the holding pond water.

Unlined Ditch to Water Treatment Ponds. The unlined ditch connects the facility drainage system to the water treatment ponds. It accepts the noncontact water from the facility drainage system through a pipe beneath U.S. Highway 30 as well as laboratory wastewaters and water from the former east overflow pond and its replacement. The water flows from the plant through the pipe and into the unlined ditch, eventually discharging to the water treatment ponds.

Sediment samples were collected at six locations along the ditch as shown in Figure 2.1-4. The samples were analyzed for gross alpha and gross beta, and the inorganic parameters listed in Table 2.1-2. The soil chemistry data from analyses of these samples are summarized in Table 4.2.2-5. Analysis of these data shows that a number of constituents were detected at levels above those expected for native soils. These included cadmium (14.1 to 108 mg/kg), chromium (363 to 2,350 mg/kg), copper (34.2 to 79.3 mg/kg), fluoride (1,230 to 25,900 mg/kg), mercury (<0.41 to 10.3 mg/kg), nickel (20.2 to 122 mg/kg), total phosphorus (17,900 to 123,000 mg/kg), selenium (4.2 to 61.2 mg/kg), silver (<0.83 to 33.7 mg/kg), vanadium (202 to 960 mg/kg), and zinc (231 to 1,400 mg/kg). [Note the presence of the characteristic constituents (underlined).]

Phase II Results for Unlined Ditch to Water Treatment Pond. An additional six sediment samples were collected during Phase II to verify the presence of mercury in the ditch. Their locations are shown in Figure 2.1-4. Mercury concentrations were found to be lower than those detected in the Phase I samples (range of 0.46 to 4.9 mg/kg). Results are provided in Table 4.2.2-6.

Summary. In general, the industrial activities related to handling phosphate ore concentrate or disperse ore-related constituents in relatively unique ways. However, there is a set of six parameters, any four of which will be present at above representative soil levels in any ore-related byproduct or waste material solid. These six parameters are total phosphorus, fluoride, cadmium, chromium, vanadium, and zinc.

There are other trace metals, cations, and anions that allow source materials to be identified. However, these six parameters are characteristic of all Simplot-related

solid byproducts and wastes. The following list presents distinguishing characteristics for ore and gypsum. The constituents highlighted by bold print are the most distinguishing characteristics. With the exception of the one ore sample, all values were obtained using standard EPA methods, which do not guarantee a total digestion of the sample. The values are estimates because they are not based on a statistically significant number of samples. Figures 4.2.2-1 through 4.2.2-3 present the characteristics in graphic form.

- Ore:
  - **Greater than 70,000 mg/kg total phosphorus**
  - **Greater than 400 mg/kg chromium, vanadium, and zinc**
  - Greater than 200,000 mg/kg calcium
  - Greater than 20,000 mg/kg fluoride
  - Greater than 200 pCi/g gross alpha
- Gypsum slurry solids:
  - **Greater than 500,000 mg/kg sulfate**
  - **Greater than 200,000 mg/kg calcium**
  - **Greater than 5,000 mg/kg total phosphorus and fluoride**
  - Greater than 100 mg/kg chromium, vanadium, and zinc
  - Less than 1 mg/kg arsenic
  - Greater than 200 pCi/g gross alpha
  - Greater than 30 pCi/g uranium-238

4.2.2.2 Onsite Soils – Areas Without Sustained Hydraulic Head

This section discusses the results of the RI Phase I and Phase II onsite soils investigation for areas without a sustained hydraulic head. Products from the Simplot plant are loaded onto trucks or railcars in loadout areas. These areas are not subject to sustained hydraulic head. All loadout areas are currently paved and during normal operations, some spillage can occur. Simplot produces two liquid products—phosphoric acid and sulfuric acid—and three solid products—ammonium phosphate, ammonium sulfate, and triple superphosphate. The results from sampling in these loadout areas for these five products are described below. In addition, the other areas discussed below that are not subject to sustained infiltration are the phosphoric acid tank containment area, sulfuric acid plants, plant roads, bone yard, water reclaim area, former ore pile area, and former pillow tank area.

Triple Superphosphate Plant Area. Triple superphosphate is a solid fertilizer product currently produced by a patented process. The production and railcar-loading areas are located directly to the west of the former east overflow pond. They are asphalt-paved areas. To investigate the potential effects of plant operations on soils within the triple super phosphate area, four borings, S050B, S051B, S052B, and S053B, were located as shown in Figure 2.1-3. At each boring location, samples were collected from the surface and at a depth of approximately 2 to 2.5 feet bgs; they were then analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2.

Boring S050B contains gravel fill at the surface and tan silt at the 2-foot depth. Both soils are probably disturbed (graded and/or fill) and not representative of natural soils. A number of constituents tested for were found at concentrations above those for representative soils in the surficial horizon (Table 4.2.2-7). These included barium (210 mg/kg), boron (19.2 mg/kg), cadmium (1.8 mg/kg) , calcium (79,800 mg/kg), chromium (115 mg/kg), copper (350 mg/kg), fluoride (73,000 mg/kg), nickel (93.9 mg/kg), total phosphorus (2,130 mg/kg), vanadium (102 mg/kg), and zinc (291 mg/kg). Both gross alpha and gross beta activities were also above the representative levels (49.1 ± 25.8 pCi/g and 34 ± 15.14 pCi/g, respectively). In the 2-foot horizon, cadmium (9.9 mg/kg), calcium (82,100 mg/kg), manganese (729 mg/kg), nickel (45.6 mg/kg), total phosphorus (54,700 mg/kg), and zinc (187J mg/kg) were above representative levels. The mix and difference in concentrations between the two horizons indicate mechanical deposition rather than leaching. Gross alpha and gross beta values were within representative levels in the 2-foot horizon soils. The pH values were normal in the surficial sample (8.62) but showed some evidence of site impact in the 2-foot sample (6.52).

Boring S051B contains silt at the surface and brown sandy silt at the 2-foot depth. Both soil samples are probably disturbed (graded and/or fill) and not representative of natural soils. As with boring S050B, a number of constituents were detected at concentrations above those for representative soils. These included boron (60 mg/kg), cadmium (7.7 mg/kg) , calcium (208,000 mg/kg), chromium (254 mg/kg), copper (44.2 mg/kg), fluoride (14,500 mg/kg), nickel (35.5 mg/kg), total phosphorus (5,140 mg/kg), vanadium (238 mg/kg), and zinc (143 mg/kg). Both gross alpha and gross beta activities were also above the representative levels (136 ± 35.6 pCi/g and 57.7J ± 12.12 pCi/g, respectively). In the 2-foot horizon, cadmium (4.9 mg/kg), chromium (51.6 mg/kg), copper (53.2 mg/kg), fluoride (2,300 mg/kg), nickel (23.5 mg/kg), total phosphorus (10,100 mg/kg), vanadium (54.5 mg/kg), and zinc (141J mg/kg) were above representative levels. Gross beta activities were within representative ranges, and gross alpha activities were slightly above representative ranges (27.2 ± 17.02 pCi/g). The pH values in both horizons in S051B were within the normal range (9.64 and 7.95, respectively). The high calcium values in the surficial horizon combined with the relatively low total phosphorus concentration indicate the presence of gypsum.

Boring S052B contained silt with fine gravel at the surface, and brown silt at the 2-foot depth. Both soil samples are probably disturbed (graded and/or fill) and not representative of natural soils. The elevated levels of calcium (160,000 mg/kg and 111,000 mg/kg, respectively) in these samples indicate a high percentage of gypsum. Other constituents that were detected at concentrations above the representative range included barium (713 mg/kg at 2 feet), boron (41.9 mg/kg at 0.5 feet), cadmium (6.1 and 30.4 mg/kg, respectively), chromium (196J and 103J mg/kg, respectively), copper (28.1J and 16.8J mg/kg, respectively), fluoride (11,600 and 4,800 mg/kg, respectively), mercury (0.81J and 2.1J mg/kg, respectively), nickel (31.2J and 19.4J mg/kg, respectively), total phosphorus (8,950 and 7,040 mg/kg, respectively), vanadium (183 and 154 mg/kg, respectively), and zinc (219 mg/kg at 0.5 feet). Both gross alpha and gross beta activities were also above the representative levels (133 ± 31.4 pCi/g and 52.3J ± 11.44 pCi/g at the 0.5-foot horizon and 49.1 ± 20.6 gross alpha at the 2-foot horizon).

Boring S053B contains silt with gravel at the surface and silty clay with gravel at the 2-foot depth. The 0.5-foot soil horizon contained a number of constituents that were above representative levels. This sample, however, was somewhat different from those found in the other boreholes as evidenced by the concentrations of arsenic (55J mg/kg), lead (2,370 mg/kg), and zinc (9,730 mg/kg). Other constituents that were above representative levels included boron (43.3 mg/kg), cadmium (14.1 mg/kg), calcium (137,000 mg/kg), chromium (199J mg/kg), copper (36.8J mg/kg), fluoride (10,600 mg/kg), mercury (1.9 mg/kg), nickel (39.1J mg/kg), total phosphorus (3150 mg/kg), and vanadium (207 mg/kg). Gross alpha and gross beta activities were also above representative levels in the 0.5-foot sample (107J ± 29.6 pCi/g and 54.6J ± 11.7 pCi/g, respectively). There was a steep decline in the concentrations of most of these constituents in the 2-foot sample, with only arsenic (12.8J mg/kg), calcium (106,000 mg/kg), mercury (0.67 mg/kg), and total phosphorus (1,260 mg/kg) remaining above representative levels. This type of steep gradient pattern is indicative of mechanically placed fill. This is especially true when the 2-foot soil is a clay and would be expected to show higher concentrations in a downward migration scenario due to its higher adsorption capabilities.

In summary, the Phase I investigation of the superphosphate area consisted of four soil borings that were drilled and sampled at the surface and approximately the 2-foot depth. Soil chemistry results met the objective of this sample program in this area, which was to determine the presence or absence of facility-related constituents in the near-surface soil horizons. All samples collected from the four borings are some type of facility-impacted soil or fill material. To further define the vertical extent of constituents in this area, an additional boring was drilled as part of the Phase II field investigation.

Phase II Results for Triple Superphosphate Plant Area. The Phase II field investigation consisted of drilling boring S098B, located as shown in Figure 2.1-3, between borings S051B and S052B, in the area of highest concentrations of

constituents detected in the Phase I investigation. Samples were collected from the surface and the 2.5-, 5-, 7.5-, and 10-foot depths; they were then analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2. The surficial sample was also tested for PCBs. Boring S098B was advanced through asphalt and approximately 3.5 feet of fill. Silt (loess) was encountered at 3.5 feet bgs and extended to 10.5 feet bgs. The boring was advanced to a total depth of 11 feet bgs in gravelly sand. Groundwater was not encountered in this boring.

As would be expected, the surface sample (fill) contained the highest concentrations of site-related constituents (Table 4.2.2-7). Concentrations of barium (2020J mg/kg), boron (31.4 mg/kg), cadmium (26 mg/kg), chromium (159 mg/kg), copper (22.1 mg/kg), fluoride (7,820 mg/kg), mercury (1 mg/kg), nickel (37.6 mg/kg), total phosphorus (44,800 mg/kg), vanadium (274 mg/kg), and zinc (440 mg/kg). At no time did gross alpha and gross beta activities exceed representative levels in this borehole, which demonstrates the variability of the distribution of constituents in the area. Most of the concentrations of constituents found at above representative levels in the surficial sample fall to levels below the representative range in the 2-foot horizon. However, they are present once again in the 5-foot sample at levels above representative but below what they were in the surficial sample. By the 10-foot horizon only mercury (0.35 mg/kg) and total phosphorus (7,000 mg/kg) are above representative levels. The pH readings in this borehole indicate a site impact in the surficial soil (5.43), but in general are within expected limits for the remaining samples (7.22 to 7.65). No PCBs were detected in the surficial sample (detection limit of 0.2 mg/kg).

Summary. Soil samples taken in the vicinity of the triple superphosphate plant area indicate that there is a shallow fill (0 to 3.5 feet) that contains site-related constituents at above-representative levels. Concentrations of most site-related constituents decrease to below-representative levels in soil samples collected below the 5-foot depth. The 5-foot sample is the shallowest non-fill sample collected. There is still some evidence of impact at the 10-foot horizon by phosphates and sulfates; however, site-related metals are retained in the soil interval between the 5- and 7.5-foot samples, and other site-related constituents (e.g., fluoride) have not affected soils at this depth. There does not appear, therefore, to be migration to depth of site-related constituents in the triple superphosphate plant area.

Former Phosphoric Acid Loading Area/Railcar Cleaning Area. The railcar cleaning area is located directly south of the main office building. This area is also a former phosphoric acid loading area. To investigate the railcar cleaning area, two borings were planned as part of the Phase I field investigation, extending to a depth of 10 feet bgs or 5 feet below fill. One soil sample of black railroad fill was collected from boring S056 at depth of 0.5-foot bgs, but refusal at 2 feet bgs during the drilling of this boring, as well as refusal in other locations, prevented completion of the Phase I investigation. The soil chemistry data from this sample are summarized in Table 4.2.2-8.

An examination of the results of the analysis of the 0.5-foot soil (fill) sample taken at S056B indicates a number of constituents were above representative levels. These included cadmium (55.6 mg/kg), chromium (306 mg/kg), copper (20.5J mg/kg), fluoride (10,000 mg/kg), nickel (35.1 mg/kg), total phosphorus (45,400 mg/kg), vanadium (408J mg/kg), and zinc (485 mg/kg). Gross alpha and gross beta activities were also above representative levels (86.7 ± 26.8 pCi/g and 55.1 ± 14.52 pCi/g, respectively).

As part of the Phase II field investigation, an additional boring was planned to investigate the potential vertical extent of constituents at this area.

Phase II Results for Railcar Cleaning Area. The Phase II field investigation consisted of boring S103B, located as shown in Figure 2.1-3. The boring, planned to a depth of 10 feet or 5 feet below fill, met refusal on three separate attempts. As a result, samples were collected from the surface and the 2-, 5-, and 7-foot depths; they were then analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2. Boring S103B contained fill (including concrete aggregate) throughout its depth, and groundwater was not encountered. Analysis of the data from soil samples collected from these borings indicates increasing concentrations of site-related constituents with depth (Table 4.2.2-8). These included the following (values are for surficial and 7-foot horizons and are not necessarily the maximum) arsenic (3.7 to 25.9 mg/kg), barium (638 to 828 mg/kg), boron (15.8 to 63.8 mg/kg), cadmium (11.3 to 61.2 mg/kg), chromium (69.8 to 636 mg/kg), copper (18.8 to 137 mg/kg), fluoride (4,090 to 15,100 mg/kg), iron (11,100 to 58,500 mg/kg), lead (34.2 to 444 mg/kg), nickel (17.9 to 84.9 mg/kg), total phosphorus (17,500 to 65,400 mg/kg), sulfate (14,700 to 13,500 mg/kg), vanadium (113 to 1,100 mg/kg), and zinc (142 to 566 mg/kg). Gross alpha and gross beta activities followed the same basic pattern, with gross alpha ranging from 31.1 ± 9.23 pCi/g to 156 ± 14.5 pCi/g and gross beta from 39.1 ± 7.32 pCi/g to 107 ± 7.18 pCi/g. The pH values also went from high (6.5) but impacted, to low (2.84).

Summary. Most concentrations of site-related constituents increased with depth. Soil pH also decreases in soil samples collected at increasing depth. The deepest fill samples collected from the 7-foot depth contain the highest concentrations of site-related constituents. However, given the description of the fill in the drilling log, this fill was mechanically placed and the presence of both the concentration pattern and the mix of these constituents is related to placement of different materials rather than infiltration from the surface. Because native soils were not encountered in this borehole, the depth of site-related constituents was not determined. Additional drilling is not advisable in this area because access problems prohibit the introduction of a rig that is capable of drilling through the gravels and aggregate encountered in the fill.

Phosphoric Acid Tank Containment Area. This is an engineered area for containment of potential liquid product releases. Any leakage of phosphoric acid

tanks or pipes in this area flows over a paved surface to a concrete sump from which it is pumped back to the phosphoric acid reactor or filter.

Two borings, S054B and S055B, were advanced in this area (see Figure 2.1-3). Boring S054B was advanced to a depth of 2.5 feet bgs and boring S055 to a depth of 5 feet bgs. Soil samples were collected from boring S054B at 0.5 foot bgs and 2.5 feet bgs. The entire depth of boring S054B was in fill material. Boring S055B was advanced through fill to a depth of 4 feet bgs and silt from 4 feet to approximately 6 feet bgs. Groundwater was not encountered in these borings. Soil samples were collected from boring S055B at 0.5, 2.5, and 5 feet bgs. Soil samples from both borings were analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2.

Boring S054B shows increasing concentrations of site constituents with depth from 0.5 foot bgs to 2.5 feet bgs. Examination of the boring log offers a rationale for this increase. The 0.5-foot sample is characterized as "pea gravel road base" whereas the 2.5-foot sample is a sandy gravel which grades to light gray silty sand and ends at 5 feet with a gypsum fill. It appears that the upper layer is the cleaner fill, and that the lower portion contains increasing amounts of gypsum-based fill material that is naturally higher in plant-related constituents (Table 4.2.2-9). Constituents with concentrations above representative levels in the 2.5-foot soil sample included cadmium (7 mg/kg), chromium (63 mg/kg), fluoride (640 mg/kg), magnesium (22,700 mg/kg), manganese (711 mg/kg), nickel (121 mg/kg), total phosphorus (11,400 mg/kg), vanadium (69.8 mg/kg), and zinc (436 mg/kg). In keeping with the inorganic constituent distribution, pH also fell with depth (6.34 to 4.89). Since native soils were not encountered in this borehole, the vertical extent of potential impact was not determined.

Boring S055B generally shows decreasing concentrations of constituents with increasing depth. In the 5-foot sample, only orthophosphate remained (53.1 mg/kg) above the representative level. Comparison of chemical results with the boring log is also useful for explaining this contaminant distribution for boring S055B. The upper 4 feet of this boring are logged as "road fill." The road fill ends at about 4 feet bgs. The soil beneath is logged as "yellowish brown silt," which is characteristic of naturally occurring site soils. This soil type is effective in attenuating site constituents.

Summary. Constituents found at concentrations above representative soil levels appear to be confined to existing fill layers (0 to at least 5.3 feet) in this area. From the available data, there does not appear to be any evidence of the downward migration of trace metals and other site-related constituents into the subsurface native soils.

Sulfuric Acid Plants #1 and #2. The former sulfuric acid plant #1 is located just west of the phosphoric acid tank containment area (see Figure 1.2-1), and the former

sulfuric acid plant #2 is located just west of sulfuric acid plant #1. These are both areas where spillage is known to have occurred. As part of the Phase I field investigation, two borings each were drilled in the area of former sulfuric acid plant #1 and former sulfuric acid plant #2.

Sulfuric Acid Plant #1. Soil borings S062B and S063B were drilled near the sulfuric acid plant #1 (Figure 2.1-3). Boring S062B was advanced to a depth of 9 feet bgs, and soil samples were collected from depths of 0.5, 2.5, 5, and 7.5 feet bgs. Boring S062B contained fill for the first 2 feet bgs, followed by a layer of silt from 2 to 6 feet bgs, and silty gravel from 6 feet bgs to completion at 9 feet bgs. Boring S063B was advanced to a depth of 7.5 feet bgs where cobbles caused refusal. At this depth, boring S063B still contained fill material. Soil samples were collected from depths of 0.5, 2.5, and 5 feet bgs. Soil samples from both borings were analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2. In addition, two samples from boring S063B collected at the surface and the 2.5-foot depth were analyzed for PCBs and total petroleum hydrocarbons. The chemical data from analysis of these samples are summarized in Table 4.2.2-10. Groundwater was not encountered in these borings.

An examination of the chemical data from analysis of soil samples from boring S062B indicates that a number of constituents were above the range for representative soils in the first soil horizon. These included barium (364 mg/kg), boron (34.8 mg/kg), cadmium (8.7 mg/kg), chromium (141 mg/kg), copper (184 mg/kg), fluoride (8,100 mg/kg), lead (52.3 mg/kg), nickel (79.7 mg/kg), total phosphate (9,060 mg/kg), vanadium (139J mg/kg), and zinc (314J mg/kg). These levels fell off to near or below representative levels in the 2.5- and 5-foot horizons, which were described as being native silts. The sharp interface differential in constituent concentrations indicates that very little downward migration is occurring in this borehole from the overlying material. The boring log at 7.5 feet bgs shows a return to what is probably fill as noted by the "light brownish gray" color description, which is not characteristic of the natural near-surface silts. In addition, this sample contains very low concentrations of aluminum (4,490 mg/kg), fluoride (140 mg/kg), and total phosphorus (130 mg/kg) that are also not indicative of the silts in general in this area. Coupled with the low concentrations of fluoride and total phosphorus are very enriched, above-representative-levels of chromium (67.7 mg/kg), cobalt (103 mg/kg), copper (325 mg/kg), iron (14,930.2 mg/kg), nickel (168 mg/kg), and zinc (228 mg/kg). Gross alpha and gross beta activities were low (8.32 ± 4.66 pCi/g and 14.2 ± 4.3 pCi/g, respectively). The pH values in this horizon were normal (8.48). The profile presented in this borehole is one of mechanically deposed layers of fill and native soils. Since fill was the last material sampled, the vertical extent of site-related constituents was not established.

Boring S063B is drilled in fill for its total depth. The soil chemistry results are from samples at 0.5 foot bgs, 2.5 feet bgs, and 5 feet bgs in depth. Above-representative levels of a number of constituents were encountered at all three sampling horizons.

These included barium (368 mg/kg at the surface), cadmium (9.5 to 2J mg/kg), chromium (47.9 mg/kg at the surface), copper (38.6 to 23 mg/kg), fluoride (6,200 to 650 mg/kg), lead (39 mg/kg at the surface), nickel (23.2 to 20.8 mg/kg), total phosphorus (8230 to 4,760 mg/kg), vanadium (74.8 mg/kg at the surface), and zinc (451 to 75.9 mg/kg). As can be seen, the trend is for diminishing concentrations with depth. Gross alpha and gross beta activities were above representative levels in the surficial sample only (46.7 ± 13.3 pCi/g and 38.0 ± 8.41 pCi/g). No PCBs were detected in either soil horizon at S063B. However, TPH was detected at 216 mg/kg in the surficial soils and at 20.8 mg/kg in the 2-foot horizon.

In summary, the concentrations of site-related constituents in soil samples from this area correlate with the presence of fill material. Concentrations of site-related constituents in natural soil samples taken from boring S062 were generally below representative levels. From these data, it appears that the distribution of site-related constituents in this area is due to mixing of fill materials with natural soil. The much lower concentrations of site-related constituents in natural soil samples taken from beneath areas of fill indicates that the site-related constituents are not migrating downward due to infiltration. Mechanical mixing of "fill" and "clean" material seems to control the spatial distribution of site-related constituents. However, the vertical extent of site-related constituents was not determined in Phase I.

Sulfuric Acid Plant #2. Soil borings S064B and S065B were drilled near the sulfuric acid plant #2 (Figure 2.1-3). Boring S064B was advanced to a depth of 7 feet bgs. Soil samples were collected from depths of 0.5 (sandy gravel), 2.5 (sandy gravel), and 5 (silt) feet bgs and analyzed for gross alpha, gross beta, and the inorganic parameters in Table 2.1-2. The surficial soil sample contained no constituents above representative levels, and, in fact, most constituents were on the low side of the mean (Table 4.2.2-10). Gross alpha and gross beta activities were within the representative range, and pH was normal (7.78). The soil sample taken in the 2.5-foot horizon showed somewhat enriched levels of some constituents (barium, 554 mg/kg; chromium, 23.8 mg/kg; lead, 32 mg/kg; and mercury, 0.49 mg/kg) while containing somewhat depleted concentrations of others (iron, 4,510 mg/kg; manganese, 82.2 mg/kg; nickel, 4.8 mg/kg; total phosphorus, 230 mg/kg; and vanadium, 7.4 mg/kg). The pH of this sample was very low (1.89), but the gross alpha and gross beta activities were not detectable. The 5-foot silt soil sample shows some evidence of attenuation from the overlying soil with fluoride (580 mg/kg), magnesium (18,100 mg/kg), manganese (635 mg/kg), and total phosphorus (729 mg/kg) showing some recovery from their levels in the 2.5-foot sample. pH values in this sample are normal (8.5). Given the distribution of constituents in the three soil horizons, it is not clear whether there has been a top down migration of an old release into the subsurface or a mechanical placement of unrelated materials. There is, however, sufficient evidence to say that the soils in this area have been impacted by site activities. This impact appears to be minimal.

Boring S065B was advanced to a depth of 9 feet bgs. It contained silty gravel from the surface to 2 feet, silt from 2 to 5 feet, and silty gravel from 5 to 9 feet bgs. Soil samples were collected from depths of 0.5 (silty gravel), 2.5 (silt), 5 (silty gravel), and 7.5 (silty gravel) feet bgs and analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2. The surficial soil horizon contained a number of constituents whose concentrations were above the range for representative soil samples (Table 4.2.2-10). These included barium (1930 mg/kg), cadmium (2.7 mg/kg), chromium (117 mg/kg), copper (73.1 mg/kg), fluoride (1600 mg/kg), iron (22800 mg/kg), lithium (19 mg/kg), nickel (72.1 mg/kg), total phosphorus (3450 mg/kg), vanadium (51.8 mg/kg), and zinc (277J mg/kg). Concentrations of enriched constituents in the subsurface samples were both lower than those found at the surface and erratic (i.e., no pattern of given elements). The pH values were in the normal range throughout all tested soil horizons (7.5 to 9.41), and no radionuclide activities levels were above those for representative soils. While there has been some impact on the subsurface soils in S065B, the affect appears from the available data to have been minimal. However, depth of impact was not determined in this boring.

Phase II Results for Sulfuric Acid Plant #1. Because the depth of vertical impact was not determined in Phase I , the Phase II field investigation placed boring S104B in the vicinity of boring S062 (Figure 2.1-3), which was the boring with the greatest overall above-representative levels of constituents. Samples were collected from the surface and the 5-, 10-, 15- and 20-foot depths; they were then analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2. Boring S104B contained fill to approximately the 6-foot depth. Silty gravel extends from 6 to 15 feet bgs, changing to gravel, which extends from 15 feet bgs to the completion of the boring to 41.5 feet bgs. Groundwater was not encountered in this boring.

The first two horizons sampled were in fill. The surficial sample contained above-representative concentrations of cadmium (6.7 mg/kg), chromium (111 mg/kg), fluoride (4,750 mg/kg), total phosphorus (6,130 mg/kg), sulfate (13,600 mg/kg), vanadium (143 mg/kg), and zinc (137 mg/kg). Gross alpha and gross beta activities were also above representative levels (79.1 ± 12.0 pCi/g and 41.5 ± 4.76 pCi/g receptively). Only sulfate was enriched in the 5-foot sample. The remaining samples taken in this borehole were in native materials and did not contain any constituent above representative levels. The pH readings followed the same trend as constituent concentrations. The surficial sample had a pH of 5.38, with the remaining horizons being in the 8 plus range. There is no evidence of subsurface impacts below the fill layer in this borehole.

Summary. There is some impact to soil in the area of the sulfuric acid plants. The deepest impacts measured were in the 7-foot horizon. These impacts appear to be related more to fill placement than leaching. Site-related constituents do not appear to be migrating into the subsurface. Sulfuric acid impact as measured by pH and sulfate content (S104B) are limited to surficial soils.

Phosphoric Acid Loading Dock. The location of the current phosphoric acid loading dock is shown in Figure 1.2-1. Boring S066B was attempted in this area, and drilling reached a depth of 7 feet bgs before refusal. This depth did not reach natural soil, ending in material logged as "road fill." Samples of this material were collected at 0.2 and 2.5 feet. A second boring, S067, was attempted in the same area, before refusal at 2 feet. This boring was not logged, but a single sample was collected from a 0.5-foot depth. Soil samples were analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2. In addition, the surface sample from boring S067 was analyzed for PCBs and total petroleum hydrocarbons.

The surficial fill sample collected from boring S066B contained a number of constituents with concentrations above representative levels (Table 4.2.2-11). These included cadmium (7.7 mg/kg), chromium (118 mg/kg), copper (26.4 mg/kg), fluoride (6,000 mg/kg), nickel (48.3 mg/kg), total phosphorus (13,500 mg/kg), vanadium (126 mg/kg), and zinc (229 mg/kg). Gross alpha activities were above representative levels (43.9 ± 26.2 pCi/g), and gross beta activities were enriched (31.1 ± 15.34 pCi/g). The pH was in the normal range (7.65). While several of the constituents detected at above-representative levels dropped to within the representative range in the 2.5-foot soil sample, fluoride (730 mg/kg), manganese (550 mg/kg), nickel (81.9 mg/kg), total phosphorus (12,400 mg/kg), and zinc (54.6 mg/kg) did not. The nature and vertical extent of site impact was not determined in this borehole.

It was only possible to take one sample from boring S067B. Analytical data from this soil horizon showed a number of constituents with concentrations above representative (Table 4.2.2-11). These included: cadmium (5.7 mg/kg), chromium (93.1 mg/kg), copper (146 mg/kg), fluoride (2,700 mg/kg), nickel (54.1 mg/kg), total phosphorus (7,940 mg/kg), vanadium (134 mg/kg), and zinc (207 mg/kg). Gross alpha activities (43 ± 26.2 pCi/g) are also above those expected for representative soils. These values indicate that the surficial soils have been impacted by facility activities. The depth of impact was not determined. Because of problems encountered by the laboratory, the PCB sample taken in the surficial horizon was rejected in the validation process. However, TPH was detected at 1054 mg/kg. Location S067B was resampled during Phase II and the soil sample was tested for PCBs. This analysis did not detect PCBs at a 0.2 mg/kg detection limit.

In summary, the surface soils/fill in this area have been influenced by site operations, with impact extending to the 2.5-foot bgs. Additional investigation was conducted in Phase II to determine the vertical extent of the impacted fill.

Phase II Results for Phosphoric Acid Loading Dock. The Phase II field investigation consisted of one boring, S105B, located as shown in Figure 2.1-3, between borings S066B and S067B. Boring S105B contained silty sandy gravel for the first 3.5 feet; this was classified as fill. Gravelly silt extended from 3.5 to approximately 7.5 feet; this also was classified as fill. Silty sandy gravel

predominates from 7.5 to 15 feet, and gravel from 15 feet to 25 feet. Groundwater was not encountered in this boring. Samples were collected at five levels from the surface to the 10-foot depth and analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2.

Analysis of the data from the soil samples collected in the fill horizons (0.5, 2, and 5-feet) in S105B indicates a number of constituents with concentrations above representative levels (Table 4.2.2-11). The greatest concentrations were generally found in the fine-grained fill horizon (5 feet). These constituents included: barium (6,910 mg/kg), cadmium (6.4 mg/kg), chromium (49.8 mg/kg), fluoride (1,720 mg/kg), lead (54.8J mg/kg), manganese (875 mg/kg), nickel 23.1 mg/kg), total phosphorus (4,180 mg/kg), vanadium (86.1J mg/kg), and zinc (205 mg/kg). The sample taken in the silty sandy gravel at 7.5 feet was at the fill/native soil interface. Since there were fines present in this sample that would tend to attenuate materials migrating from the overlying fill, it would be expected to find some constituents at concentrations above representative levels. However, this was not the case as all constituents tested for in this soil sample were at or below the representative range. This borehole is another example of the steep concentration gradients that exist on the site between impacted fills and native soils where no liquid head has been applied. The sample taken at the 10-foot horizon also contained no constituents above representative levels, indicating the lack of migration of site-related constituents from the overlying fills. Gross alpha activity in the surficial soil sample (25 ± 6.18 pCi/g) was the only radionuclide activity detected above the representative range in any of the samples tested. Soil pH was within the normal range for all samples tested in boring S105B.

Summary. From analysis of available data, it appears that the subsurface near the phosphoric acid loading dock contains a 7- to 8-foot fill layer. A number of site-related constituents were found at concentrations above representative levels. When native soils beneath the fill were tested, there appeared to be little to no migration of constituents from the overlying materials. It can therefore be concluded that the extent of site impact in this area is confined to the fill layer.

Ammonium Phosphate Plant Areas. Ammonium phosphate is among the solid products of the Simplot plant. There are two ammonium phosphate loadout areas: ammonium phosphate plant #1 and ammonium phosphate plant #2. The locations of these plant areas are shown in Figure 1.2-1. Phase I sampling was performed to determine the existence of potential facility impacts in these areas. If impacts were discovered, then a second phase in the investigation would be initiated to determine vertical extent of impact.

Ammonium Phosphate Plant #1. Eight surficial samples (S030B through S037B) and six samples from the 2-foot depth (S032B through S037B) were collected near the ammonium phosphate plant #1 (Figure 2.1-3). Refusal was met at a depth of 1.5 feet during the drilling of borings S030B and S031B. Surface samples were fill

material or gypsum. Samples from the 2-foot depth were silts (fill) in borings S032, S036, and S037B; sandy gravel (fill) in boring S033B; and silty sands (fill) in borings S034B and S035B. Soil samples were analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2.

In the surficial soil sample taken at S030B there were a number of constituents with concentrations above representative (Table 4.2.2-12). These included barium (332 mg/kg), boron (36.5 mg/kg), cadmium (17.4 mg/kg), calcium (84,500 mg/kg), chromium (180 mg/kg), fluoride (6,400 mg/kg), nickel (46.7 mg/kg), total phosphorus (20,900 mg/kg), vanadium (206 mg/kg), and zinc (331 mg/kg). Gross alpha was also above the representative level (34.4 ± 23.8 pCi/g). The pH value was normal (7.29). The somewhat enriched calcium level suggests the soil here has been mixed with gypsum. The vertical extent of the both the fill and potential facility impact was not determined at this boring location.

Analytical results for the surficial soil sample taken at S031B indicate that industrial activities have affected the soils in this area. A number of constituents had concentrations above representative levels (Table 4.2.2-12). They included: cadmium (36.2 mg/kg), chromium (203 mg/kg), copper (25.8 mg/kg), fluoride (7,400 mg/kg), lead (39.0J mg/kg), nickel (73.1 mg/kg), total phosphorus (17,500 mg/kg), vanadium (248 mg/kg), and zinc (602 mg/kg). Gross alpha was also above the representative level (29.4 ± 19.78 pCi/g). The pH value was slightly acidic (6.19). The vertical extent of the both the fill and potential facility impact was not determined at this boring location.

Soil samples were taken at both the surface and 2-foot horizons at S032B. Analytical results for the surficial soil horizon indicated a number of constituents with concentrations above representative levels (Table 4.2.2-12). These included boron (68.7 mg/kg), cadmium (28 mg/kg), calcium (256,980 mg/kg), chromium (241 mg/kg), fluoride (19,200 mg/kg), total phosphorus (7,620 mg/kg), vanadium (222 mg/kg), and zinc (293 mg/kg). Gross alpha and gross beta activities were both above representative levels (242.0 ± 87.2 pCi/g and 91.0 ± 25 pCi/g respectively). The pH value was normal (8.91). Only two constituents remained above representative levels in the 2-foot horizon. These were total phosphorus (21,800 mg/kg) and zinc (54.2 mg/kg). Gross alpha and gross beta activities were within the normal range. However, pH, which was normal in the surficial sample, was slightly acidic in the 2-foot horizon (6.56). The slightly acidic pH coupled with only enriched levels of total phosphorus may indicate an ammonium phosphate presence. The vertical extent of the both the fill and potential facility impact was not determined at this boring location.

As with S032B, soil samples were taken at both the surface and 2-foot horizons at S033B. Both were in fill. Analytical results for the surficial soil horizon indicated a number of constituents with concentrations above representative (Table 4.2.2-12). These included boron (32.5 mg/kg), cadmium (15.5 mg/kg), calcium (109,000 mg/kg),

chromium (147 mg/kg), fluoride (6,900 mg/kg), lead (54 mg/kg), total phosphorus (8,560 mg/kg), vanadium (129 mg/kg), and zinc (589 mg/kg). Gross alpha and gross beta activities were both above representative levels (54.7 ± 30.2 pCi/g and 33.4 ± 16.52 pCi/g, respectively). The pH value was normal (8.64). While fewer constituents were above representative levels in the 2-foot sample, several remained above these levels: cadmium (41.9 mg/kg); chromium (99.5 mg/kg), fluoride (3,700 mg/kg), nickel (42.3 mg/kg), total phosphorus (26,700 mg/kg), vanadium (143 mg/kg), and zinc (143 mg/kg). Gross alpha and gross beta also remained above representative levels (31.8 ± 14.6 pCi/g and 32.3 ± 10.08 pCi/g respectively). The vertical extent of the both the fill and potential facility impact was not determined at this boring location.

Soil samples were taken at both the surface and 2-foot horizons at S034B. Analytical results for the surficial soil horizon indicated a number of constituents with concentrations above representative (Table 4.2.2-12). These included cadmium (7.6 mg/kg), chromium (63.8 mg/kg), fluoride (1,790 mg/kg), total phosphorus (10,200 mg/kg), vanadium (93.7 mg/kg), and zinc (160 mg/kg). Gross alpha and gross beta activities were both above representative levels (27.2 ± 12.1 pCi/g and 34.8 ± 9.62 pCi/g, respectively). The pH value was slightly acidic (6.19). Only total phosphorus (1,150 mg/kg) remained above representative levels in the 2-foot horizon. Gross alpha and gross beta activities were within the normal range as was pH (8.41). These values indicate very little impact to subsurface soils in the area of S034B. However, since both samples were taken in fill, the vertical extent of impact was not determined.

Analytical results for the surficial soil sample taken at S035B indicated a number of constituents with concentrations above representative (Table 4.2.2-12). These included barium (577 mg/kg), boron (20.4 mg/kg), cadmium (35.2 mg/kg), chromium (141 mg/kg), copper (24.2 mg/kg), fluoride (5,170 mg/kg), lead (72.8 mg/kg), nickel (40.0 mg/kg), total phosphorus (23,800 mg/kg), vanadium (202 mg/kg), and zinc (653 mg/kg). Gross alpha and gross beta activities were both above representative levels (57.0 ± 14.90 and 43.8 ± 8.52 pCi/g, respectively). The pH value was acidic (6.21). The somewhat enriched total phosphorus level compared with calcium and fluoride concentrations suggests the soil here has been impacted by ammonium phosphate. Both the surficial and the 2-foot horizons in this borehole are silty sand fill. The same constituents that were above representative levels in the surficial sample were above representative levels in the 2-foot sample but at lower values. However, while the gross alpha and gross beta activities were below representative levels in the 2-foot sample (14.9 ± 8.96 pCi/g and 17.4 ± 5.7 pCi/g), the soil remained slightly acidic (pH of 6.32). The vertical extent of the both the fill and potential facility impact was not determined at this boring location.

Soil samples were taken at both the surface and 2-foot horizons at S036B. Analytical results for the surficial soil horizon indicated several constituents with concentrations above representative (Table 4.2.2-12). These included cadmium (7.8

mg/kg), chromium (35.2 mg/kg), fluoride (1,000 mg/kg), total phosphorus (6,720 mg/kg), vanadium (61.2 mg/kg), and zinc (190 mg/kg). Gross alpha and gross beta activities were both below representative levels (11.3 ± 7.12 pCi/g and 21.7 ± 6.48 pCi/g, respectively). The pH value was slightly acidic (5.81). Only total phosphorus (3,420 mg/kg) and zinc (55.7 mg/kg) remained above representative levels in the 2-foot horizon. Gross alpha and gross beta activities rose above the representative range (44.5 ± 14.08 pCi/g and 41.1 ± 8.68 pCi/g respectively). The pH levels rose to the normal range (8.16). While there is a definite presence of site-related constituents at the surface in this location, the concentrations found in the 2-foot silt indicate very little impact to subsurface soils in this area. However, since both samples were in fill, the vertical extent of site-related activities was not determined.

Soil samples were taken at both the surface and 2-foot horizons at S037B. As with all samples in this area, analytical results for the surficial soil horizon indicate a number of constituents with concentrations above representative (Table 4.2.2-12). These included boron (31.2 mg/kg), cadmium (12.6 mg/kg), calcium (82,100 mg/kg), chromium (119 mg/kg), fluoride (4,630 mg/kg), nickel (30.7 mg/kg), total phosphorus (16,050 mg/kg), vanadium (131 mg/kg), and zinc (289 mg/kg). Gross alpha and gross beta activities were both above representative levels (64.5 ± 17.18 pCi/g and 37.4 ± 8.14 pCi/g, respectively). The pH value was normal (7.54). Only two constituents remained above representative levels in the 2-foot horizon. These were fluoride (930 mg/kg) and total phosphorus (916 mg/kg). Gross alpha and gross beta activities were within the normal range, as was pH (7.96). While the concentration levels of constituents fell in the 2-foot sample, the vertical extent of facility impact was not determined in S037B.

Summary. The area sampled along the front of ammonium phosphate plant #1 contained a variety of fill materials. These fills were at least 2 feet in depth. They contained a number of site-related constituents that were detected at concentrations above those found in representative soils. The mix of constituents varied both with horizontal and vertical location. While several locations appeared to have been affected with ammonium phosphate spills (S032B, S033B, and S035B), impacts for the most part appeared to be associated with the fill material itself. Since vertical extent was not an objective of the Phase I investigation in this area, two borings were proposed for Phase II to determine the thickness of the fill and the extent of facility impact.

Phase II Results for Ammonium Phosphate Plant #1. The Phase II field investigation consisted of two borings, S106B and S107B, located as shown in Figure 2.1-3. S106B was located near S035B, which contained high concentrations of site constituents; S107B was located near S033B, which showed higher concentrations of site constituents in the 2-foot sample. Samples were collected from the surface and the 2-, 5-, 7-, and 10-foot depths and analyzed for gross alpha, gross beta and the inorganic parameters listed in Table 2.1-2. S106B contained fill to approximately the 5.5-foot depth. Silt extended from 5.5 to approximately 6.5 feet

bgs, and sandy gravel extended from 6.5 feet to completion of the boring at 12 feet. S107B contained fill to approximately 8.5 feet, gravel from 8.5 to 10.5 feet, and sandy gravel from 10.5 to completion of the boring at approximately 13 feet bgs. Groundwater was not encountered in these borings.

The surficial soil sample taken at S106B contained four constituents at concentrations that were above representative soil levels (Table 4.2.2-12). These were mercury (0.42 mg/kg versus 0.3 mg/kg for representative), total phosphorus (1,800 mg/kg), sulfate (790 mg/kg), and zinc (55.5 mg/kg). The following fill sample (2-foot) continued this pattern with the addition of fluoride and potassium. Concentrations found in this sample were fluoride (640 mg/kg), mercury (0.44 mg/kg), total phosphorus (1,950 mg/kg), potassium (4,680 mg/kg), sulfate (1,200 mg/kg), and zinc (73.8 mg/kg). This pattern continues through the 5-foot fill horizon (Table 4.2.2-12). There is a lithology change in the 7-foot sample to sandy gravel. The soil sample taken in this horizon contained only sulfate at above-representative levels (6,030 mg/kg), and the pH turned slightly acidic (6.94 down from 8 plus in the fills). The presence of only sulfate and the change in pH may indicate an old sulfuric acid impact. In the 10-foot sample, manganese (393 mg/kg), total phosphorus (1,150 mg/kg), and sulfate (2,790 mg/kg) were detected at levels above the representative soil range. The pH value of this soil remained acidic (6.76). Gross alpha and gross beta activities were within the naturally occurring range for all samples tested. Since the soils remained acidic in the 10-foot sample the vertical extent of facility-related impact was not determined by S106B.

The surficial sample taken in boring S107B contained several constituents that were above the range for representative soils. These included cadmium (1.3J mg/kg), nickel (25.4 mg/kg), total phosphorus (22,000 mg/kg), and sulfate (870 mg/kg). The sample was slightly acidic (6.54). The slightly acidic soil and the level of enrichment for the phosphate relative to other constituents would indicate that ammonium phosphate had probably been spilled in this area. The 2-foot fill sample contained a more normal suite of above-representative-level constituents. These included cadmium (4 mg/kg), chromium (31.5 mg/kg), fluoride (1,010 mg/kg), total phosphorus (4,450 mg/kg), potassium (4,240 mg/kg), sulfate (1,570 mg/kg), and zinc (92 mg/kg). The pH in this sample also rose to 7.32, which supports the hypothesis of a localized surficial release of ammonium phosphate. A 5-foot sample was not obtained. The 7-foot soil sample, also in fill, contained an enriched concentration of arsenic (8.2 mg/kg) and above-representative concentrations of nickel (25.6 mg/kg) and sulfate (11,500 mg/kg). Only sulfate was at above-representative levels (10,300 mg/kg) in the 10-foot soil horizon. Gross alpha and gross beta activities were within the representative ranges for all samples tested.

Summary. The Phase II investigation confirmed the presence of fills to depths of 8.5 feet. These fills varied widely in their chemical composition, suggesting mechanical placement. Movement into the naturally occurring soils appeared to be restricted to sulfate and phosphate. Both these constituents were

found at above-representative levels in the deeper soil horizons. The Phase II investigation did not determine the vertical extent of site impact but it appears to have been limited to these two constituents. Gross alpha and gross beta were rarely detected in Phase I or Phase II at elevated activities below the surficial soil horizon.

Ammonium Phosphate Plant #2. Seven surficial samples (S038B and S040B through S045B) and five samples at 2-foot depths (S038B and S042B through S045B) were collected in the vicinity of the ammonium phosphate plant #2 (Figure 2.1-3). Soil samples were analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2. The samples collected were composed of fill material.

Soil samples were taken at both the surface and 2-foot horizons at S038B. Analytical results for the surficial soil horizon indicated a number of constituents with concentrations above representative (Table 4.2.2-12). These included cadmium (3.4 mg/kg), chromium (55.2 mg/kg), fluoride (1,400 mg/kg), total phosphorus (6,140 mg/kg), and zinc (93.8 mg/kg). Gross alpha and gross beta activities were both below representative levels (12.5 U pCi/g and 13.6 ± 12.48 pCi/g respectively). The pH value was normal (7.89). Several of these constituents remained above representative levels in the 2-foot horizon. They were cadmium (1.4 mg/kg), fluoride (660 mg/kg), and total phosphorus (49,700 mg/kg). Gross alpha and gross beta activities remained within the normal range, as did pH (7.02). These values indicate a somewhat variable composition of the fill materials at S038B. The high total phosphorus value relative to other constituents in the 2-foot sample, combined with a pH on the low end of representative, might indicate the presence of an old ammonium phosphate release. Since both samples were taken in fill, the vertical extent of impact was not determined.

Boring location S040B was sampled only at the surface. Analytical results for this surficial soil horizon indicated a number of constituents with concentrations above representative (Table 4.2.2-12). These included cadmium (2.2 mg/kg), chromium (48.9 mg/kg), fluoride (1,200 mg/kg), and total phosphorus (6,770 mg/kg). Gross alpha and gross beta activities were both below representative levels (11.6U pCi/g and 19.8 ± 13.68 pCi/g, respectively). The pH value was normal (7.59). These values indicate the fill in the vicinity of S040B has been impacted by facility activities. The vertical extent of the fill and the impact were not investigated.

Boring location S041B was also sampled only at the surface. Of the constituents tested for, only total phosphorus (6,600 mg/kg) was above representative levels (Table 4.2.2-12). Neither gross alpha nor gross beta activities were at detectable activities. The pH value was normal (8.70) These values indicate the fill in the vicinity of S041B has had minimal impact by facility activities. The vertical extent of the fill and the impact were not investigated.

Soil samples were taken at both the surface and 2-foot horizons at S042B. Analytical results for the surficial soil horizon indicate that only two of the constituents tested

for had concentrations above representative levels. These were chromium (34.4 mg/kg) and total phosphorus (2,290 mg/kg) (Table 4.2.2-12). Gross alpha and gross beta activities were both below representative levels (9.46 U pCi/g and 12.9 ± 10.3 pCi/g, respectively). The pH value was normal (7.63). Only total phosphorus was detected at concentrations above representative levels in the 2-foot horizon. The level of the concentration (18,900 mg/kg) relative to the concentrations detected for other constituents, combined with the pH value being on the low end of normal (7.05), would indicate the potential presence of ammonium phosphate in the 2-foot fill horizon of this boring. Since both samples were taken in fill, the vertical extent of impact was not determined.

Boring S043B was sampled at both the surface and 2-foot horizons. Analytical results for the surficial soil horizon indicated a number of constituents with concentrations above those expected for representative soils (Table 4.2.2-12). These included cadmium (4.0 mg/kg), chromium (55.0 mg/kg), fluoride (3,000 mg/kg), total phosphorus (9,960 mg/kg), and zinc (83.0 mg/kg). Gross alpha and gross beta activities were both above representative levels (51.8 ± 21.6 pCi/g and 33.4 ± 11.48 pCi/g, respectively). The pH value was normal (8.46). Only fluoride (590 mg/kg) and total phosphorus (14,000 mg/kg) remained above representative levels in the 2-foot horizon. Gross alpha and gross beta activities fell below the normal range, and pH (7.62) remained within the normal range, albeit on the lower end. The high total phosphorus value relative to other constituents in the 2-foot sample, combined with a slightly lower pH, might indicate the presence of an old ammonium phosphate release. Since both samples were taken in fill, the vertical extent of impact was not determined.

As with S043B, soil samples were taken at both the surface and 2-foot horizons at S044B. Both were in fill. Analytical results for the surficial soil horizon indicated a number of constituents with concentrations above representative (Table 4.2.2-12). These included cadmium (2.8 mg/kg), chromium (45.2 mg/kg), fluoride (1,300 mg/kg), total phosphorus (3,490 mg/kg), and zinc (56.1 mg/kg). Gross alpha and gross beta activities were both below representative levels (17.7 ± 11.58 pCi/g and 15.3 ± 9.3 pCi/g, respectively). The pH value was normal (8.21). The 2-foot soil horizon contained a larger number of constituents with concentrations above representative levels. These included boron (19.6 mg/kg), cadmium (7.3 mg/kg), calcium (66,300 mg/kg), chromium (56.6 mg/kg), fluoride (4,200 mg/kg), nickel (76.9 mg/kg), total phosphorus (30,400 mg/kg), vanadium (95 mg/kg), and zinc (211 mg/kg). The pH in this sample fell to 6.88. Both of these samples were taken in what appeared to be fill that had been impacted by more than the ammonium phosphate operations. Neither the vertical extent of the fill nor the vertical extent of the impact was an objective at this borehole during Phase I.

Soil samples were taken at both the surface and 2-foot horizons at S045B. Analytical results for the surficial soil horizon indicated a number of constituents at above-representative levels (Table 4.2.2-12). These included cadmium (2.3 mg/kg),

chromium (43.3 mg/kg), fluoride (2,500 mg/kg), total phosphorus (4,160 mg/kg), and zinc (58.1 mg/kg). Gross alpha and gross beta activities were both below representative levels. The pH value was within the normal range (7.98). Only two parameters remained above representative levels in the 2-foot horizon. They were fluoride (610 mg/kg) and total phosphorus (12,100 mg/kg). Gross alpha and gross beta activities remained within the normal range, as did pH (8.61). These values indicate a somewhat variable composition of the fill materials at S045B. Since both samples were taken in fill, the vertical extent of impact was not determined.

Summary. All of the shallow soil samples taken in Phase I indicated some facility impact. Several of the 2-foot samples appeared to be related to the handling of ammonium phosphate. These samples were generally not associated with above representative levels of Simplot characteristic constituents found in a number of the boreholes. The objective of determining the existence of an impact was achieved in Phase I. Phase II sampling was conducted in this area to investigate vertical extent.

Phase II Results for Ammonium Phosphate Plant #2. The Phase II field investigation consisted of one boring, S108B, located as shown in Figure 2.1-3 between S043B and S044B. Samples during the Phase I investigation from S043B and S044B contained the highest concentrations of site constituents. Samples were collected from the surface and the 2-, 5-, 7-, and 10-foot depths and analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2. Boring S108B contained fill to a 1.5-foot depth, silt (loess) from 1.5 to 5 feet, sandy gravel from 5 to 10 feet, and gravel from 10 feet to completion at 12 feet. Groundwater was not encountered in this boring.

The first sample taken in this boring was directly below a 3-inch-thick asphalt layer in a fill. Analytical results showed only four constituents to be above the range expected for representative soils. The four were calcium (109,000 mg/kg), mercury (0.42 mg/kg), total phosphorus (7,560 mg/kg), and sulfate (1,220 mg/kg). The second soil sample was in a silt horizon and contained only total phosphorus (2,150 mg/kg) and sulfate (1,240 mg/kg) above representative levels. In the third soil horizon (approximately 5-7 feet), only sulfate (7,710 mg/kg) was above representative levels, as was the case in both the 7- to 9-foot sample (8,200 mg/kg) and the 10- to 12-foot sample (3,530 mg/kg). The pH values for each of the soil horizons sampled dropped with depth from 7.73 at 2 feet to 6.43 at 10 feet. This decreasing pH with depth pattern, combined with the sole sulfate as virtually the sole constituent above representative levels, would indicate that this area had experienced a sulfuric acid release at some time in the past. Since the lowest pH reading was in the 10-foot sample, the vertical extent of the impact was not determined.

Summary. Given the lithology and constituents found in boring S108B, it was probably not as representative of subsurface soil conditions as those seen in borings S106B and S107B. In other words, the fill regime and associated site-related constituents were probably somewhat deeper than the 2 feet found in S108B. On the

other hand, none of the deeper borings drilled in the areas associated with the ammonium phosphate plants encountered large impacts with depth. Given the levels of concentrations of constituents observed in the deeper boreholes, it would appear that, for the most part, facility-related impacts are confined to the fill layers and probably do not extend much below 10 feet in depth.

Roads. Roads within the Simplot facility are constructed of either asphalt, local soils, or various other materials such as gravel or slag. Soil samples were collected along the roads throughout the Simplot facility to assess the extent of potential impact due to application of oils and dust suppressants throughout the facility's operational history. Twelve locations (S082B through S086B, S088B through S090B, and S093B through S096B) were sampled at the surface or 0.5-foot depth (surficial samples) and at the 2-foot depth. The locations of these sampling points and the material currently comprising the road surface where each sample was collected are shown in Figure 2.1-3. These samples were analyzed for gross alpha, gross beta, total petroleum hydrocarbons, PCBs, and the inorganic parameters listed in Table 2.1-2.

Sampling point B082B is located due west of the southwest corner of the lower gypsum stack (Figure 2.1-3). It was sampled at the 0.5- and 2-foot horizons. The 0.5-foot horizon was described as a tan silt and the 2-foot horizon as a brown-tan silt. The 0.5-foot soil sample showed several constituents with concentrations above representative levels (Table 4.2.2-13). These included boron (19.8 mg/kg), cadmium (1.6J mg/kg), fluoride (3,200 mg/kg), total phosphorus (2,350 mg/kg), and zinc (56.5 mg/kg). The 2-foot sample also contained constituents with concentrations above representative levels. These included arsenic (10.6 mg/kg), cadmium (2.6 mg/kg), copper (26.4 mg/kg), fluoride (2,600 mg/kg), total phosphorus (918 mg/kg), and zinc (52.7J mg/kg). Gross alpha activity (34.3 ± 17.82 pCi/g) was above representative levels in the soils found in the surficial sample but not in those in the 2-foot sample. Gross beta activities were below representative levels in both soil horizons. No PCBs were detected in either soil horizon (detection limit of 0.065 mg/kg). Total petroleum hydrocarbons were not detected in the surficial sample (10 mg/kg detection limit) but were found at 47.6 mg/kg at the 2-foot horizon.

Sampling point B083B is located between the upper and lower gypsum stacks (Figure 2.1-3). It was sampled at the 0.5- and 2-foot horizons. Both the 0.5-foot and 2-foot horizons were described as tan-brown silts. In the 0.5-foot soil sample, several constituents had concentrations above representative levels (Table 4.2.2-13). These included boron (20.5 mg/kg), fluoride (780 mg/kg), and total phosphorus (990 mg/kg). Only boron (19.8 mg/kg) and total phosphorus (1,050 mg/kg) were present at above-representative levels in the 2-foot soil sample. Gross alpha and gross beta activities were below representative levels in both soil horizons. No PCBs were detected in either soil horizon (detection limit of 0.065 mg/kg). No TPH was detected in either of the soil horizon (10 mg/kg detection limit).

Sampling point B084B is located to the east of the southeast corner of the lower gypsum stack (Figure 2.1-3). It was sampled at the 0.5- and 2-foot horizons. Both the 0.5-foot and the 2-foot horizons were described as light tan, fine silts. The 0.5-foot soil sample showed several constituents with concentrations above representative levels (Table 4.2.2-13). These included boron (26.1 mg/kg), cadmium (2.3J mg/kg), chromium (29.6 mg/kg), fluoride (2,700 mg/kg), total phosphorus (1,470 mg/kg), and zinc (68J mg/kg). Only boron (20.1 mg/kg) was above the concentration expected for representative soils in the 2-foot horizon. Gross alpha and gross beta activities were below representative levels in both soil horizons. No PCBs were detected in either soil horizon (detection limit of 0.065 mg/kg). Total petroleum hydrocarbons were detected in the surficial sample (58.3 mg/kg), but were not found at the 2-foot horizon (10 mg/kg detection limit).

Sampling point B085B is located near the railroad tracks to the west of the ammonium phosphate plant in the northwestern section of the plant (Figure 2.1-3). It was sampled at the surficial and 2-foot horizons. The surficial horizon was described as a brown silty sand with gravel, and the 2-foot horizon as a tan-brown silt to silty, sandy gravel. The sample of the surficial soil showed several constituents with concentrations above representative levels (Table 4.2.2-13). These included barium (241J mg/kg), boron (26.1 mg/kg), cadmium (10.7 mg/kg), chromium (78.1 mg/kg), copper (19.7 mg/kg), fluoride (4,700 mg/kg), nickel (19.4 mg/kg), total phosphorus (25,600 mg/kg), vanadium (91.8 mg/kg), and zinc (206 mg/kg). The 2-foot sample did not contain any constituents with concentrations above representative levels. Gross alpha and gross beta activity (42.4 ± 20.20 pCi/g and 37.5 ± 11.78 pCi/g, respectively) were above representative levels in the soils found in the surficial sample but not those in the 2-foot sample. No PCBs were detected in the 2-foot horizon (detection limit of 0.065 mg/kg). However, the laboratory reported Aroclor 1260 at 0.0570J mg/kg in the surficial sample. Because of problems with the analysis of this sample, it was rejected during the validation process and this location was resampled in Phase II. Total petroleum hydrocarbons were detected in the surficial sample (24.6 mg/kg) but were not found at the 2-foot horizon (10 mg/kg detection limit).

Sampling point B086B is located west of the sulfuric acid loading dock in the southwestern section of the main plant area (Figure 2.1-3). It was sampled at the surficial and 2-foot horizons. The surficial horizon was a tan-brown silt with a trace of gravel, and the 2-foot horizon was a tan silt. Analysis performed on the surficial soil showed several constituents with concentrations above representative levels (Table 4.2.2-13). These included chromium (32.3J mg/kg), copper (47.5 mg/kg), fluoride (1,200 mg/kg), mercury (0.59 mg/kg), nickel (3,400 mg/kg), total phosphorus (4,850 mg/kg), and zinc (60.8 mg/kg). Only nickel (20 mg/kg) was above the concentration expected for representative soils in the 2-foot sample. Gross alpha and gross beta activity were not above representative levels in either soil horizon. Aroclor 1248 was detected in the surficial soil sample at 0.132J mg/kg. No PCBs were detected in the 2-foot horizon (detection limit of 0.065 mg/kg). TPH was detected in

the surficial sample (49.0 mg/kg) but was not found at the 2-foot horizon (10 mg/kg detection limit).

Sampling point B088B is located just east of the ammonium phosphate plants in the central portion of the main plant area (Figure 2.1-3). It was sampled at the 0.5- and 2-foot horizons. The 0.5-foot horizon was described as a red-brown sandy silt with gravel and the 2-foot horizon as a brown silt. The 0.5-foot soil sample showed several constituents with concentrations above representative levels (Table 4.2.2-13). These included chromium (16.8 mg/kg), fluoride (910 mg/kg), nickel (22.1 mg/kg), total phosphorus (23,330 mg/kg), and zinc (60.8 mg/kg). The 2-foot sample also contained constituents with concentrations above representative levels. These included: fluoride (610 mg/kg), nickel (16.2 mg/kg), and total phosphorus (20,600 mg/kg). The high total phosphorus values probably reflect the presence of spilled ammonium phosphate. Gross alpha and gross beta activity were not above representative levels in either soil horizon. No PCBs were detected in either soil horizon (detection limit of 0.065 mg/kg). However, there was a problem with the data submitted by the laboratory for the 2-foot sample, and several aroclor non-detects were rejected during the validation process. This location was resampled during Phase II to confirm the absence of PCBs. Total petroleum hydrocarbons were detected in the surficial sample (104 mg/kg) but were not found at the 2-foot horizon (10 mg/kg detection limit).

Sampling point B089B is east of the ammonium sulfate plant in the south-central section of the main plant area (Figure 2.1-3). It was sampled at the surficial horizon only. The horizon was described as a red-brown silty sand with gravel. The surficial soil sample showed several constituents at concentrations above representative levels (Table 4.2.2-13). These included boron (18.2 mg/kg), cadmium (5.5 mg/kg), chromium (45.5 mg/kg), copper (20 mg/kg), fluoride (2,600 mg/kg), total phosphorus (4,220 mg/kg), vanadium (51.5 mg/kg), and zinc (164 mg/kg). Gross alpha and gross beta activity were within the representative levels. No PCBs were detected in the soil sampled (detection limit of 0.065 mg/kg). TPH was detected in the surficial sample (209 mg/kg).

Sampling point B090B is due east of the sulfuric acid loading area in the southwestern portion of the main plant (Figure 2.1-3). It was sampled at the 0.5- and 2-foot horizons. The 0.5-foot horizon was described a red-brown silt with a trace of gravel and the 2-foot horizon as a brown silt. The 0.5-foot soil sample showed several constituents with concentrations above representative levels (Table 4.2.2-13). These included fluoride (760 mg/kg), total phosphorus (1,070 mg/kg), and zinc (58J mg/kg). Only zinc (61.2J mg/kg) was above the concentration for representative soils in the 2-foot sample. Gross alpha activity (25.6± 15.02 pCi/g) was above representative levels in the soils found in the surficial sample but not in the 2-foot sample. Gross beta activities were below representative levels in both soil horizons. No PCBs were detected in either soil horizon (detection limit of 0.065 mg/kg). However, there was a problem with the data submitted by the laboratory for the

0.5-foot sample and several aroclor non-detects were rejected during the validation process. This location was resampled during Phase II to confirm the absence of PCBs. Total petroleum hydrocarbons were not detected in either soil horizon (10 mg/kg detection limit).

Sampling point B093B is located to the west of the central portion of the lower gypsum stack (Figure 2.1-3). It was sampled at the surficial and 2-foot horizons. The surficial horizon was described as a brown silt with a trace of gravel and the 2-foot horizon as a tan silt. The surficial soil sample showed several constituents with concentrations above representative levels (Table 4.2.2-13). These included copper (39.3 mg/kg), fluoride (690 mg/kg), nickel (70.8 mg/kg), total phosphorus (924 mg/kg), and zinc (129 mg/kg). No tested constituents had concentrations above representative levels in the 2-foot horizon. Gross alpha and gross beta activities were below representative levels in both soil horizons. No PCBs were detected in either soil horizon (detection limit of 0.065 mg/kg). Total petroleum hydrocarbons were not found in either soil horizon (10 mg/kg detection limit).

Sampling point B094B is due east of the cooling tower area in the southeast corner of the main plant area (Figure 2.1-3). It was sampled at the 0.5-foot and 2-foot horizons. The 0.5-foot horizon was described as a gray gypsum and the 2-foot horizon as a tan-brown silt. The 0.5-foot sample showed several constituents with concentrations above representative levels (Table 4.2.2-13). These were barium (257 mg/kg), beryllium (1.7 mg/kg), boron (64.1 mg/kg), cadmium (14 mg/kg), calcium (214,000 mg/kg), chromium (219 mg/kg), copper (35 mg/kg), fluoride (16,700 mg/kg), nickel (28J mg/kg), total phosphorus (10,300 mg/kg), vanadium (204 mg/kg), and zinc (192 mg/kg). The 2-foot sample also contained a number of constituents with concentrations above representative levels. These were barium (218 mg/kg), cadmium (1.8 mg/kg), fluoride (850 mg/kg), mercury (0.53J mg/kg), total phosphorus (1,260 mg/kg), and zinc (63.3 mg/kg). Gross alpha and gross beta activity (139 ± 30.60 pCi/g and 54.2 ± 11.68 pCi/g, respectively) were above representative levels in the soils found in the 0.5-foot soil sample. Gross alpha (25.3 ± 13.96 pCi/g) was above representative levels in the 2-foot horizon, but not gross beta. PCBs were reported as "not detected" at the 1.0 mg/kg level in the 0.5-foot sample and at the 0.065 mg/kg level in the 2-foot horizon. However, because of analysis problems with the 0.5-foot sample, it was rejected during the validation process and this location was resampled in Phase II. Total petroleum hydrocarbons were not found in either soil horizon (20 mg/kg detection limit).

Sampling point B095B is located near the railroad tracks to the north of the triple superphosphate plant (Figure 2.1-3). It was sampled at the 0.5-foot and 2-foot horizons. The 0.5-foot horizon was described as a gravel and the 2-foot horizon as a tan silt. The 0.5-foot soil sample showed several constituents with concentrations at above-representative levels (Table 4.2.2-13). These included barium (823J mg/kg), boron (33.4J mg/kg), cadmium (87.3J mg/kg), calcium (159,000J mg/kg), chromium (165J mg/kg), copper (32.2 mg/kg), fluoride (16,000 mg/kg), lead (49.3J mg/kg), nickel

(20.8 mg/kg), total phosphorus (26,200 mg/kg), silver (16.1 mg/kg), vanadium (219J mg/kg), and zinc (2,440J mg/kg). The 2-foot sample did not contain any constituents with concentrations above representative levels, indicating that there has been no migration of the impacted soil constituents into the subsurface at this location. Gross alpha and gross beta activities (115 ± 36.00 pCi/g and 64.7 ± 15.34 pCi/g, respectively) were above representative levels in the 0.5-foot soil sample. Neither gross alpha nor gross beta were above representative activities in the 2-foot horizon. No PCBs were detected in the 2-foot horizon (detection limit of 0.065 mg/kg). However, the laboratory reported Aroclor 1254 at 0.0470J mg/kg in the surficial sample. Because of problems with this sample, it was rejected during the validation process and this location was resampled in Phase II. TPH was detected in the surficial sample (672 mg/kg) but was not found at the 2-foot horizon (10 mg/kg detection limit).

Sampling point B096B is located due south of the western plant area and west of the lower gypsum stack (Figure 2.1-3). It was sampled at the 0.5-foot and 2-foot horizons. The 0.5-foot horizon was described as tan-brown silt and the 2-foot horizon as a tan silt. The surficial soil sample showed several constituents with concentrations above representative levels (Table 4.2.2-13). These included boron (21.1 mg/kg), cadmium (2.3 mg/kg), chromium (44.1 mg/kg), copper (19.4 mg/kg), fluoride (1,300 mg/kg), nickel (17.7 mg/kg), total phosphorus (1,650 mg/kg), and zinc (72.8 mg/kg). Only fluoride (630 mg/kg) was above the representative level in the 2-foot sample. Gross alpha and gross beta activity were not above representative levels in either soil horizon. No PCBs were detected in either soil horizon (detection limit of 0.065 mg/kg). TPH was not found in either soil horizon (10 mg/kg detection limit).

Summary. All near-surface road samples showed some facility-related inorganic constituent impacts. For the most part, these diminished greatly or were not detected in the 2-foot soil horizons. Detectable concentrations of TPH were also primarily limited to surficial samples, with only one location (S082B) showing detectable concentrations of TPH in the 2-foot sample. PCBs were detected infrequently (twice) and then in surficial samples at levels below 1 mg/kg.

Radiological analyses of road samples show surface samples from seven of ten locations exceeded gross alpha background activity. Gross alpha decreased in the 2-foot samples, falling below background activity, with the exception of S082B. Soil from the 2-foot depth at location S089B was not analyzed for radiological activity.

Gross beta was slightly above representative activity in six of ten locations. Gross beta activity decreases in the 2-foot samples, falling below representative activity, with the exception of S090B. Soil from the 2-foot depth at location S089B was not analyzed for radiological activity.

Phase II for Roads. Locations S085B, S088B, S090B, and S094B were resampled at the surface during the Phase II field investigation. This was because

the laboratory experienced some difficulties in its PCB analysis and the results were rejected during the validation process. The results of the resampling are provided in Table 4.2.2-14. PCBs were not detected in any sample (detection limit range of 0.2 to 2 mg/kg).

Bone Yard. The location of the Simplot salvage and storage area bone yard is shown in Figure 1.2-1. Simplot has no records of any spillage or leakage in this area; due to the variety of materials that have been stored there, however, three sampling locations (S079B, S080B, and S081B) were randomly selected and sampled at the surface and at approximately 2 feet (Figure 2.1-3). Soil samples were analyzed for gross alpha, gross beta, TPH, PCBs, and the inorganic parameters listed in Table 2.1-2.

A surficial soil sample was taken in a dark brown sandy silt at boring S079B. In this sample, a number of constituents were at concentrations above representative levels (Table 4.2.2-15). These were barium (662J mg/kg), boron (22.9J mg/kg), cadmium (14.7 mg/kg), chromium (111 mg/kg), copper (25.5 mg/kg), fluoride (4,600 mg/kg), lead (31.4J mg/kg), nickel (26.3 mg/kg), total phosphorus (12,200 mg/kg) vanadium (132 mg/kg), and zinc (234 mg/kg). The 2-foot sample, which was taken in a silt, did not contain any constituents with concentrations above the representative level. Gross alpha activities were above the representative range in the surficial sample (29.5 ± 16.18 pCi/g), but were below this range in the 2-foot sample. Gross beta activities were below representative levels in both soil horizons. TPH was not detected in either soil horizon (detection limits of 10 to 20 mg/kg). Although no PCBs were detected in either soil horizon at the 0.65 mg/kg detection limit, the laboratory experienced some difficulties with the surficial sample. This area was resampled in Phase II to confirm the absence of PCBs at the surface.

Boring S080B was sampled at the surface in a brown sandy silt horizon. In this soil sample, a number of constituents were at concentrations above representative levels (Table 4.2.2-15). These included boron (21.5J mg/kg), cadmium (11.2 mg/kg), chromium (41.1 mg/kg), fluoride (1,900 mg/kg), nickel (40.1 mg/kg), total phosphorus (12,000 mg/kg), vanadium (84.5 mg/kg), and zinc (289 mg/kg). The 2-foot sample, taken in a silt, did not contain any constituents with concentrations above the representative level. Gross alpha and gross beta activities were below the representative range in both samples. TPH was detected in the surficial sample at 56.5 mg/kg. It was not present (10 mg/kg detection limit) in the 2-foot soil sample. With the exception of Aroclor 1254 (0.025J mg/kg), no PCBs were detected in either soil horizon at the 0.65 mg/kg detection limit. However, the laboratory experienced some difficulties with the surficial sample, so the area was resampled in Phase II to confirm the presence or absence of PCBs at the surface.

A surficial soil sample was taken in a tan-brown silt at boring S081B. In this soil sample, a number of constituents were found at concentrations above representative levels (Table 4.2.2-15). These were barium (248J mg/kg), boron (32.4J mg/kg), cadmium (13.9 mg/kg), chromium (74.9 mg/kg), copper (57.8 mg/kg),

fluoride (2,700 mg/kg), lead (31.2J mg/kg), nickel (46.1 mg/kg), total phosphorus (5,500 mg/kg) vanadium (71.5 mg/kg), and zinc (221 mg/kg). The 2-foot sample, which was also taken in a silt, did not contain any constituents with concentrations above representative levels. Gross alpha activities were above the representative range in the surficial sample (25.5 ± 15.52 pCi/g) but were below this range in the 2-foot sample. Gross beta activities were below representative levels in both soil horizons. Total petroleum hydrocarbons were detected in the surficial sample at 27.5 mg/kg. They were not present (10 mg/kg detection limit) in the 2-foot soil sample. PCBs were detected in the surficial sample (Aroclor 1242, 0.097J mg/kg) with a detection limit of 0.65 mg/kg. They were not detected in the 2-foot sample.

Phase II for the Bone Yard. Locations S079B and S080B were resampled at the surface during the Phase II field investigation, because the laboratory had experienced some difficulties in its PCB analysis and some of the results had been rejected during the validation process. The results of the resampling are provided in Table 4.2.2-16. PCBs were not detected in any samples (detection limit of 0.2 mg/kg for S079B and 1 mg/kg for S080B).

Summary. The surface soils in the bone yard area appear to have been influenced by site-related activities, due perhaps to wind-blown deposition or spillage of constituents onto the surficial layer. The spillage or mixing does not seem to have transported the site-related constituents to the soil samples collected from the 2-foot depth. Hence the vertical extent of site impact appears to be confined to the surficial soils.

Ammonium Sulfate Plant. Ammonium sulfate is among the solid products of the Simplot plant. The location of this plant area is shown in Figure 1.2-1. Four locations (S046B-S049B) near the ammonium sulfate plant were sampled at the surface and at the 2-foot depth (Figure 2.1-3). Both surficial and 2-foot samples were collected in fill consisting of gravel or a gravel/silt mixture. The eight samples were analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2.

A surficial soil sample was taken in a dark brown sandy gravel at boring location S046B. This soil sample contained a number of constituents at concentrations above representative levels (Table 4.2.2-17). These included barium (278J mg/kg), beryllium (1.5 mg/kg), boron (116 mg/kg), cadmium (18.1 mg/kg), chromium (165 mg/kg), copper (25.2 mg/kg), fluoride (8,800 mg/kg), lead (114J mg/kg), nickel (31.7 mg/kg), total phosphorus (25,000 mg/kg) vanadium (132 mg/kg), and zinc (429 mg/kg). The 2-foot sample, which was taken in a tan sandy gravel, contained only cadmium (1.4J mg/kg) and total phosphorus (2,550 mg/kg) with concentrations above representative levels. Gross alpha and gross beta activities (29.5 ± 16.18 pCi/g and 55.3 ± 14.62 pCi/g, respectively) were above the representative range in the surficial sample, but were below this range in the 2-foot sample. Hence, there appears to be very little migration of site-related materials into the subsurface.

Boring location S047B was sampled at the 0.5-foot depth in a dark brown silty gravel horizon and at the 2-foot depth in a sandy gravel. The surficial soil sample contained a number of constituents at concentrations above representative levels (Table 4.2.2-17). These included barium (1,340J mg/kg), beryllium (1.6 mg/kg), boron (71.4 mg/kg), cadmium (43.2 mg/kg), chromium (267 mg/kg), copper (93.9 mg/kg), fluoride (12,800 mg/kg), lead (100 mg/kg), nickel (51.1 mg/kg), total phosphorus (6,180 mg/kg) vanadium (273 mg/kg), and zinc (1,010 mg/kg). Only chromium (31.6 mg/kg), total phosphorus (2,430 mg/kg), and zinc (56.2 mg/kg) had concentrations above the representative level in the sandy gravel sample taken at the 2-foot horizon. Gross alpha and gross beta activities were above the representative range in the surficial sample (80.7 ± 28.80 pCi/g and 40.9 ± 12.78 pCi/g), but were below this range in the 2-foot sample. As with location S046B, there appears to be very little migration of site-related materials into the subsurface. However, the vertical extent of both the fill layer and site-related constituents was not defined for this borehole.

Both the 0.5-foot and the 2-foot horizons sampled at boring location S048B were in a fill consisting of dark brown clayey silts with gravels. Both samples contained a number of constituents at concentrations above representative levels (Table 4.2.2-17). With the upper sample listed first unless otherwise indicated, these were arsenic (11.6 mg/kg in the 0.5-foot sample), barium (1,080 and 310 mg/kg), boron (75 and 31.5 mg/kg), cadmium (58.3 and 12 mg/kg), chromium (285 and 91.6 mg/kg), copper (74.2 and 45.4 mg/kg), fluoride (14,400 and 2,090 mg/kg), lead (213 and 43.8 mg/kg), molybdenum (27.4 and 14.7 mg/kg), nickel (49.2 and 25.6 mg/kg), total phosphorus (62,230 and 15,100 mg/kg), vanadium (351 and 116 mg/kg), and zinc (1,200 and 403 mg/kg). Gross alpha and gross beta activities were above the representative range in the surficial sample (133 ± 32.00 pCi/g and 55.1 ± 10.70 pCi/g), but were below this range in the 2-foot sample. The color of the soil and the mix of constituents and concentrations in these samples indicate the presence of some quantity of ore. Since the results in the 2-foot sample are a subdued image of the surficial results, the vertical extent of site-related constituents was not defined for this borehole.

As in S048B, both the 0.5-foot and the 2-foot horizons of S049B were in a fill consisting of dark brown clayey silts with gravels. These soil samples contained a number of constituents at concentrations above representative levels (Table 4.2.2-17). With the upper sample listed first unless otherwise indicated, these were barium (221 mg/kg in the 2-foot interval), boron (18.7 and 25 mg/kg), cadmium (4.3 and 5.5 mg/kg), chromium (37.7 and 44.5 mg/kg), copper (15.1 and 25.1 mg/kg), fluoride (2,990 and 2,140 mg/kg), nickel (16.8 and 19.5 mg/kg), total phosphorus (7,110 and 8,830 mg/kg), vanadium (50.9 and 66.6 mg/kg), and zinc (135 and 171 mg/kg). Gross alpha and gross beta activities were below the representative range in the surficial sample, but above it in the 2-foot horizon (40.1 ± 8.96 pCi/g and 49.1 ± 25.8 pCi/g). Unlike the results found for the soil horizons in S048B, the 2-foot constituent concentrations were, in general, greater than those found in the surficial

horizon. This suggests a mechanical placement process. The vertical extent of both the fill layer and site-related constituents was not defined for this borehole.

Summary. Soil in this area contained fill materials affected by site-related constituents to at least the 2-foot depth. The varying relationship between constituent concentration and depth could indicate random mixing of the fill material. The areal extent of impact by site-related constituents was relatively consistent. Since fill at the 2-foot depth has been affected by site-related constituents, additional definition of the vertical extent of contamination was addressed in Phase II of the RI.

Phase II Results for Ammonium Sulfate Plant. To investigate the vertical distribution of site constituents within the soil profile, one boring (S109B) was added in Phase II. It was located (as shown in Figure 2.1-3) near S048, the sample location in this area generally containing highest concentrations of site constituents in the Phase I investigation. Samples were collected from the surface and the 2-, 5-, and 10-foot depths and analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2. S109B contained fill from the surface to 2 feet, a silty gravely sand from 2 feet to 3.5 feet, silt from 3.5 feet to.5 feet, and sandy gravel from 5 feet to completion of the boring at 21.5 feet. Groundwater was not encountered in this boring.

The surficial soil sample for S109B was collected in a silty gravel fill. It contained several constituents with concentrations above representative levels. These were cadmium (5.2 mg/kg), chromium (35.8 mg/kg), fluoride (4,370 mg/kg), nickel (18.3 mg/kg), total phosphorus (10,300 mg/kg), sulfate (10,500 mg/kg), and zinc (89.2 mg/kg). Gross alpha activities (44.8 ± 11.40 pCi/g) were above the range for representative soils; gross beta activities (30.7 ± 6.48 pCi/g), were near the upper range limit. With the exception of sulfate, which remained above representative levels throughout the soil column, an outlying lead value at 10 feet (41.7 mg/kg), a slightly elevated calcium value at 2 feet (79,200 mg/kg), and an above-representative concentration of iron at 5 feet (15,200 mg/kg), the constituents tested for in all three intervals were within the representative range for soils. The persistent sulfate values may be due to the area being one where ammonium sulfate is handled. There does not appear to be any significant migration of other site-related constituents into the subsurface. However, it should be noted that the fill encountered in this borehole was not the same as that encountered in S048B and S049B and may not be representative of their depth or concentrations.

Summary. The soils in the vicinity of the ammonium sulfate plant have a fill layer to a depth of at least 2 feet which contains above-representative concentrations of site-related constituents. Soil samples from a boring drilled to 10 feet did not detect migration into the subsurface of any constituent other than sulfate. While the sulfate may be related to the plant operations, the other constituents detected probably are not.

Sulfuric Acid Loading Dock. The sulfuric acid loading dock is located in the southwestern portion of the Simplot plant area, as shown in Figure 1.2-1. It serves both trucks and railcars; sulfuric acid is transferred from both for use in the plant's phosphoric acid production process.

Four locations (S058B through S061B) were sampled near the sulfuric acid loading dock (Figure 2.1-3). Maximum depth of sampling extended from 5 feet to 10 feet, depending upon location. The samples were analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2. Groundwater was not encountered in any of these borings.

A soil sample was collected from boring S058 at the 0.5-foot horizon in grayish, brown silty gravel fill. This sample contained above-representative concentrations of the following constituents: cadmium (8.9 mg/kg), chromium (78.6 mg/kg), copper (340J mg/kg), fluoride (1,300 mg/kg), lead (29.7 mg/kg) mercury (1.8 mg/kg), nickel (18.1 mg/kg), total phosphorus (4,620 mg/kg), vanadium (54.6J mg/kg), and zinc (398J mg/kg). With the exception of fluoride (520 mg/kg) in the 5-foot horizon, no other constituents were found at concentrations above the range for representative soils in any of the subsurface intervals sampled (2.5, 5, and 7.5 feet) (See Table 4.2.2-24). This result indicates little to no migration into the subsurface of site-related constituents at this boring location; pH was also within the normal range (7.27 to 8.14).

Soil samples were collected from boring S059B at depths of 0.5, 2.5, 5, 7.5, and 10 feet. All samples collected below 0.5 feet were silt. Concentrations of a number of constituents in the dark brown, silty gravel fill exceeded the range for representative soils (Table 4.2.2-18). These included cadmium (7.5 mg/kg), chromium (72.7 mg/kg), copper (21.6 mg/kg), fluoride (2,400 mg/kg), lead (35.2 mg/kg), nickel (18.7 mg/kg), total phosphorus (4,160 mg/kg), vanadium (59 mg/kg), and zinc (164 mg/kg). All declined to below-representative levels in the 2.5-foot sample, with the exception of fluoride (580 mg/kg) and total phosphorus (914 mg/kg), which remained slightly above representative levels. The concentrations in the 5-foot sample were below representative levels for all site constituents. Several constituents showed enrichment in the 7.5-foot horizons. These included aluminum (22,100 mg/kg), boron (18.7 mg/kg), chromium (25.2 mg/kg), copper (15.1 mg/kg), fluoride (650 mg/kg), iron (18,000 mg/kg), lithium (21.4 mg/kg), manganese (451 mg/kg), nickel (18.5 mg/kg), and zinc (68.3 mg/kg). The soil from the 10-foot-depth sample was below representative concentrations for all site-related constituents.

The mix of constituents found at the 7.5-foot horizon was somewhat different from that found in the surficial sample. It included enriched aluminum, manganese, and iron, which may indicate a more clayey silt than that found in the overlying soils. In addition, the absence of enrichment in the 5-foot-horizon silt would argue against migration from above. All the soil horizons sampled in this borehole had high pH (8.83 to 9.38), indicating that the constituents found in the 7.5-foot silt layer

are probably naturally occurring and there is no observable downward migration of site-related constituents in this borehole. Radionuclide activities were only above representative levels in the surficial sample, where gross alpha readings were 44.1 ± 19.14 pCi/g.

Soil samples were collected from boring S060B at depths of 0.5 feet (fill), 2.5 feet (silt), and 5 feet (silt). The 0.5-foot soil horizon sample contained a number of constituents whose concentrations exceeded the representative levels (Table 4.2.2-18). These included cadmium (1.6 mg/kg), chromium (27.3J mg/kg), copper (56.4J mg/kg), lead (44.7 mg/kg), total phosphorus (1,370 mg/kg), and zinc (59.8 J mg/kg). Gross alpha and gross beta activities also exceeded representative values in this sample (51.1 ± 19.10 pCi/g and 39 ± 15.04 pCi/g, respectively). This was the only sample horizon in which the radionuclide activities were above representative levels. Concentrations of fluoride (570 mg/kg) and manganese (510 mg/kg) were above representative levels in the 2.5-foot silt; concentrations of barium (400J mg/kg), cadmium (1.6 mg/kg), nickel (20.3 mg/kg), and zinc (64.1 mg/kg) exceeded the representative level in the 5-foot horizon soil sample. The lack of a mix pattern in these deeper exceedances would tend to argue for their being naturally occurring rather than a result of migration from the overlying fill.

Soil samples were collected from boring S061B at depths of 0.5 feet (fill), 2.5 feet (silt), 5 feet (silt), and 7.5 feet (gravel). As was true for the other boring locations, the 0.5-foot fill sample contained a number of constituents whose concentrations exceeded representative levels (Table 4.2.2-18). These included cadmium (1.3 mg/kg), chromium (31.6 mg/kg), copper (20.5 mg/kg), lead (50.2 mg/kg), mercury (18.5 mg/kg), total phosphorus (1,230 mg/kg), and zinc (55.2 mg/kg). Gross alpha and gross beta activities also exceeded representative values in this sample (100 ± 42.20 pCi/g and 51.1 ± 19.10 pCi/g, respectively). This was the only sample horizon where the radionuclide activities were above representative levels. Several constituents had concentrations above representative levels in the remaining sampling intervals, but there was very little pattern to their occurrence. These constituents included aluminum (17,100 mg/kg at 5 feet), fluoride (570 mg/kg at 2.5 feet and 590 mg/kg at 5 feet), manganese (489 mg/kg at 2.5 feet and 756 mg/kg at 5 feet), nickel (28.5 mg/kg at 2.5 feet and 24.3 mg/kg at 5 feet), total phosphorus (960 mg/kg at 2.5 feet), and zinc (58 mg/kg at 5 feet and 60.2 mg/kg at 7.5 feet). There may be some movement of constituents such as fluoride and phosphate into the subsurface from the overlying fill, but these appear to be the only constituents that can linked. The pH values for the soils in this borehole range from 7.13 at the surface to 8.72 at the 5-foot horizon.

Summary. A comparison of the distribution of site constituents among the four sample locations reveals a fairly consistent pattern of constituent mix in the 0.5-foot fill. There is a marked increase in the concentration of aluminum and iron in the 5-foot silts, but this does not necessarily lead to an enrichment of other constituents. The vertical distribution of constituents that may be related to facility

activities is very random and, with the possible exception of phosphates and fluoride, does not appear to be from migration from the overlying fill. However, the level at which these latter are found in the silts is generally not much greater than the upper range of representative soils. It can be concluded, then, that very little, if any, facility-related impact is seen in the subsurface soils in the vicinity of the sulfuric acid loading dock.

Water Reclaim Area. The location of the water reclaim area is shown in Figure 1.2-1. Some wetting of soils occurs in the water reclaim area as a result of pump and pipe leakage. The Phase I work to investigate the effects of these releases consisted of two soil borings (S072B and S073B), sampled at the surface and the 3- to 3.5-foot depth and analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2.

Soils at location S072B were sampled at the surface and 3-foot horizons. The surficial soil was a dark brown silty gravel; the 3-foot horizon consisted of a tan sandy gravel. An evaluation of the data in Table 4.2.2-19 shows that a number of site-related constituents were present in the surficial soil sample at concentrations exceeding representative levels. These included cadmium (16.1 mg/kg), calcium (88,600 mg/kg), chromium (101 mg/kg), copper (38.7 mg/kg), fluoride (11,200 mg/kg), nickel (27.8 mg/kg), total phosphorus (14,230 mg/kg) vanadium (175 mg/kg), and zinc (254J mg/kg). Gross alpha activities were above the representative range in the surficial sample (38 ± 25.60 pCi/g), but were below this range in the 3-foot sample. Both gross beta activities were below representative levels. No constituents were detected above representative concentrations in the 3-foot sandy gravel horizon. The pH values were in the normal range for both horizons (7.3 and 8.42).

Soils at boring location S073B were sampled at two horizons. The surficial soil was a dark brown sand with gravel. The 3.5-foot horizon was a tan sandy silt. pH values for these two horizons were 5.8 and 6.21, respectively. Testing of the two soil horizons indicates both have concentrations of facility-related constituents that are above representative levels (Table 4.2.2-19). Listing the upper sample first, unless otherwise indicated, these included barium (581 mg/kg at surface), boron (26.2 and 19.4 mg/kg), cadmium (37.3J and 33.8J mg/kg), calcium (120,000 and 111,000 mg/kg), chromium (128 mg/kg at the surface), copper (29.2 mg/kg at the surface), fluoride (21,000 mg/kg at the surface), nickel (36.4 and 47.3 mg/kg), total phosphorus (54,800 and 75,300 mg/kg), vanadium (207 mg/kg at the surface), and zinc (388J and 540J mg/kg). Gross alpha and gross beta activities were above the representative range in the surficial sample (57.9 ± 23.80 pCi/g and 40.7 ± 12.84 pCi/g), but were below this range in the 2-foot sample.

In summary, the Phase I investigation determined this area was affected by site-related constituents to at least the 3.5-foot depth. Since soil at the 3.5-foot depth has

been influenced by site-related constituents, a boring was advanced as part of the Phase II field investigation to determine the vertical extent of this influence.

Phase II Results for Water Reclaim Area. The Phase II field investigation consisted of one boring, S102B, located as shown in Figure 2.1-3. The location was near S073B, the more affected of the Phase I sampling locations. Samples were collected from the surface and the 2-, 5-, 7-, 10-, 15-, and 20-foot depths and analyzed for gross alpha, gross beta, and the inorganics parameters given in Table 2.1-2. Boring S102B contained fill to approximately 3 feet, silt from 3 feet to 9 feet, sandy gravel from 9 feet to 14 feet, and various gravels to completion at 22 feet. Groundwater was not encountered in this boring.

The surficial sample was taken in a silty sandy gravel fill and contained the greatest concentrations of facility related constituents. These included barium (733 mg/kg), boron (131 mg/kg), cadmium (37.7 mg/kg), calcium (181,000 mg/kg), chromium (193 mg/kg), copper (40.4 mg/kg), fluoride (45,400 mg/kg), mercury (.49 mg/kg), nickel (18.1 mg/kg), total phosphorus (41,700 mg/kg), sulfate (12,900 mg/kg), vanadium (314 mg/kg), and zinc (218 mg/kg). Gross alpha and gross beta activities were above the representative range in the surficial sample (218 ± 40.40 pCi/g and 86.7 ± 14.70 pCi/g), but were below this range for the rest of the boring. The pH in the surficial sample was measured at 4.01.

A gravelly sandy silt was sampled in the 2-foot horizon. This sample also had facility related constituents with concentrations above those expected for representative soils. However, there were fewer of them compared with the surface soil sample and they were generally at lower concentrations. They included barium (2,690 mg/kg), boron (21.3 mg/kg), cadmium (16.4 mg/kg), chromium (120 mg/kg), copper (19 mg/kg), fluoride (4,730 mg/kg), nickel (46.8 mg/kg), total phosphorus (37,000 mg/kg), sulfate (1,590 mg/kg), vanadium (225 mg/kg), and zinc (246 mg/kg). The pH value was measured at 5.68.

The next sampled interval in the S102B borehole was at 7 feet in a silt. With the exception of total phosphorus (1090 mg/kg) and sulfate (600 mg/kg), all other constituents that were tested for were within the range for representative soils. Sulfate alone continued to be above representative levels throughout the borehole depth, demonstrating its mobility and lack of attenuation. The pH value returned to the normal range at 7 feet (7.82) and remained so in the subsequent three sampling intervals.

Summary. Soil samples collected from this boring indicate that there was a facility-related impact by site constituents to approximately the top of the first silt (2-foot depth in the case of S102B). Above-representative concentrations of fluoride, phosphates, and sulfate were found in deeper samples, but the native silt soils were apparently retaining other site constituents between the 2-foot and 7-foot intervals.

Former Ore Pile. Before the completion of Simplot's phosphate ore slurry pipeline, dry phosphate ore was stockpiled in the area shown in Figure 1.2-1 labeled former ore pile. For the Phase I field investigation, five sampling locations were selected within the area. Samples were collected at the surface and at approximately a 2.5-foot depth and analyzed for gross alpha, gross beta, and the inorganics parameters listed in Table 2.1-2.

Analysis of the data in Table 4.2.2-20 shows that all of the surficial samples taken in the former ore pile area had constituents with concentrations greater than for representative levels. The mix and concentrations indicate for the most part that the material being measured was a mixture of native soils and ore. The following lists the range at which these constituents were found: barium (123 to 847 mg/kg), boron (20.4 to 74.6 mg/kg), cadmium (7.5 to 61 mg/kg), calcium (64,400 to 209,000 mg/kg), chromium (74.6 to 387 mg/kg), copper (23.2 to 53.6 mg/kg), fluoride (14,800 to 19,900 mg/kg), nickel (20.1J to 83.1 mg/kg), total phosphorus (14,500 to 56,000 mg/kg), vanadium (83.4 to 758 mg/kg), and zinc (99.3 to 877 mg/kg). Gross alpha activities ranged from 61.5J ± 19.54 pCi/g to 143 ± 70.40 pCi/g. Gross beta activities ranged from 43.1 ± 10.64 pCi/g to 79.7 ± 24.40 pCi/g. With the possible exception of the occasional orthophosphate value being slightly above representative, no constituents that were tested for were above representative values in any 2-foot horizons sampled in the former ore pile area.

Summary. The soil chemistry and radiological data collected in this area support the conclusion that the phosphate ore matrix is relatively insoluble and that the movement of residual phosphate ore and related constituents downward through the soils has not occurred. Above-representative concentrations of constituents characteristic of ore in surficial samples is a result of mechanical mixing of ore with site soils. This conclusion is supported by the sampling and testing of soils near the FMC ore pile and in the offsite soil sampling program.

Former Pillow Tank Area. Until 1991, Simplot stored phosphoric acid and UAN-32 (urea and ammonium nitrate) products in thirteen 200,000-gallon pillow, or hypalon tanks in a series of cells carved out of native soils to a depth of approximately 8 feet bgs. The location of this storage area is shown in Figure 1.2-1. Two locations (S010B and S011B) were selected to investigate potential leakage from the tank area (Figure 2.1-3). Samples were collected at depths from approximately 10 feet bgs to approximately 20 feet bgs. The rationale for this boring depth was that contaminants were not likely to have migrated more than 10 feet below the cell bottoms due to potential intermittent leakage. Samples were analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2. All soil samples collected were characterized as pale brown silt (loess).

Analysis of the data in Table 4.2.2-21 shows that the soil samples were generally below representative levels, even at the surface. Orthophosphate was slightly above

the representative level in the 10.5-foot samples in both S010B (12.9 mg/kg) and S011B (14.3 mg/kg).

Radiological activity in soils paralleled the relatively low chemical concentrations of site-related parameters. No gross alpha or gross beta activities exceeded representative levels.

Summary. The concentrations of constituents tested for in the pillow tank area were generally within the range of representative soil levels. Given the available data, the soil samples show no indication of past leakage from tanks and reflect typical naturally occurring concentrations of constituents.

4.2.2.3 Onsite Soils – Areas with Sustained Hydraulic Head

This section discusses the results of the RI Phase I and Phase II onsite soils investigation for areas where there was a sustained hydraulic head over the underlying soils. Areas without sustained hydraulic head are discussed in Section 4.2.2.2.

Areas with sustained hydraulic heads are treated as a separate investigation section because the water can become a means for subsurface transport of facility-related constituents. If site-related parameters do not migrate under the conditions supplied by a sustained head, they are very unlikely to migrate in the absence of a transport mechanism. The marginal amounts of precipitation in the area will not provide a more sustained head than that found in an unlined ditch or impoundment.

The areas with sustained hydraulic heads include the former water treatment settling pond, dewatering pit, upper gypsum stack, lower gypsum stack, former cooling pond, cooling tower area, wastewater treatment ponds, and the unlined ditch to the wastewater treatment ponds.

Former Water Treatment Settling Pond. The former water treatment settling pond is located immediately east of the current settling pond (see Figure 1.2-1). At one time the settling pond was approximately twice its current size, occupying its current location and the area immediately to the east. The water contained in this pond was of essentially the same quality as water transferred to the holding pond, and of poorer quality than water that enters the equalization pond.

As part of the potential source investigation, boring S007B (see Figure 2.1-3) was advanced to groundwater—a depth of 25 feet below ground surface (bgs). Soil samples were collected at three levels: at the surface, and at 15 and 25 feet bgs (surface elevation 4,406 feet above MSL); they were then analyzed for the inorganic parameters listed in Table 2.1-2 as well as gross alpha and gross beta to assess the impact of the pond on subsurface soils. The soil in this boring consisted of fill

(gypsum below 2 feet) from the surface down to approximately 12 feet bgs, followed by 3 feet of gravel. The sample at 15 feet bgs was collected in silty sand that extended approximately 7 feet. Groundwater was encountered at 24 feet bgs, and the sample at 25 feet bgs was collected in gravel. The 25-foot sample was a grab sample of drill cuttings from the bottom of the hole.

The soil chemistry of samples collected from this boring is summarized in Table 4.2.2-22. An examination of the data indicates that cadmium (5.1 mg/kg), chromium (37.5 mg/kg), fluoride (1,600 mg/kg), nickel (15.9 mg/kg), total phosphorus (3,230 mg/kg), and zinc (85.3 mg/kg) are above the expected range for representative soil. Cadmium, chromium, fluoride, total phosphorus, and zinc remain above representative levels in the 15-foot sample. This is to be expected as this sample was taken at the top of the first fine-grained unit below the gypsum fill, and only 3 feet of gravel separates the two units. All parameters except zinc are below the representative range in the 25-foot sample. This indicates there has been minimal migration into the subsurface from the overlying fill.

None of the soil horizons sampled contained radioactivity levels above the representative levels.

Summary. Soil samples from borings in the area of the settling pond show evidence of some downward migration of EMF-related constituents. Constituents found in the fill layer, which extends to 12 feet, are being attenuated by a 7-foot-thick fined-grained unit. This attenuation is evident in the soil sample taken at 15 feet—the top of the fine-grained unit. A sample taken below the fine-grained unit did not show evidence of EMF-related constituents.

Dewatering Pit. The dewatering pit is located directly to the west of the settling pond (Figure 1.2-1). Boring S008B was drilled from the bottom of the pit to groundwater (Figure 2.1-3). The soil in this boring consisted of pond sediment from the surface to approximately 2.5 feet bgs. The soil in the remainder of the boring consisted of sand (2.5 to 4 feet bgs) and gravel (4 to 27 feet bgs). Soil samples were collected at the surface and from depths of 2.5, 10, 20, and 26 feet bgs (surface elevation 4,409 feet above MSL). They were analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2 to assess the impact of the pond on subsurface soils. Groundwater was encountered at 26 feet bgs. The soil chemistry of samples collected from this boring is summarized in Table 4.2.2-22. An examination of the results of the chemical analysis indicates that the sediment sample contained above-representative concentrations of a number of constituents. These include arsenic (15 mg/kg), beryllium (5.2 mg/kg), cadmium (131 mg/kg), chromium (2,710 mg/kg), copper (116 mg/kg), fluoride (30,000 mg/kg), lead (81.6 mg/kg), nickel (154 mg/kg), total phosphorus (51,300 mg/kg) vanadium (1,290 mg/kg), and zinc (3,510 mg/kg). With the exception of fluoride (710 mg/kg), all constituents were at or below representative levels in the 2.5-foot soil sample. Chromium and nickel showed some increase in the 10- and 20-foot samples (30.9 to 31.1 mg/kg and

34.4 to 37.6 mg/kg, respectively) but since these increases were not accompanied by increases in any other parameter, they are probably not site-related.

As with the inorganic parameters, gross alpha and gross beta activities were above those expected for representative soils in the sediment sample (406 ± 81.2 and 138 ± 21 pCi/g, respectively). Samples from below the surface in the native soils were all below representative levels.

Summary. Site-related constituents were found in the sediment sample taken in the dewatering pit at concentrations above representative levels. Other than fluoride in the 2.5-foot horizon, there was no evidence of migration of these constituents into the subsurface soils.

Former East Overflow Pond. During the RI field activities, the former east overflow pond was active, which precluded drilling within its boundaries. As a surrogate to investigate subsurface soil conditions, boring S099B was located immediately against the northeastern berm. This location would detect any belling effects from leachate migrating from the unlined pond. Soil samples were taken at the 0-, 10-, 30-, and 50-foot horizons and tested for gross alpha, gross beta, and the inorganic parameters shown in Table 2.1-2.

The surficial sample is described as containing fill materials including gypsum. This description is confirmed in the analytical results where a number of constituent concentrations were above representative levels (Table 4.2.2-23). These included: boron (26.4 mg/kg), cadmium (71J mg/kg), calcium (247,000 mg/kg), chromium (50.1 mg/kg), fluoride (9,250 mg/kg), mercury (1.2 mg/kg), total phosphorus (3,960 mg/kg), and sulfate (15,300 mg/kg). Gross alpha activities were also elevated (49.8 pCi/g), but gross beta activities (9.82 pCi/g) were well within representative levels. Aluminum (1,310 mg/kg) and iron (397 mg/kg) were at depleted levels.

The next two soil samples were taken in sandy gravels. Fluoride (7,030 and 9,480 mg/kg), total phosphorus (1,360 and 4,230 mg/kg), and sulfate (640 and 610 mg/kg) were above representative levels; most of the remaining constituents were at or below representative levels. The exceptions were barium (396 mg/kg at 10 feet) and chromium (37.5 mg/kg at 20 feet).

The last sample was taken at 50 feet in a gravel approximately 4 feet above the water table. Again, fluoride (4,310 mg/kg), total phosphorus (2,780 mg/kg), and sulfate (420 mg/kg) were above representative levels. Zinc at 64.7 mg/kg was the only other constituents that exceeded representative levels in this sample.

An examination of the pH levels recorded for each soil horizon (4.04, 5.57, 4.95, and 5.62) indicates that all horizons have experienced some site impact. Since the pond is known to have managed acidic materials, these would appear to show a direct relationship.

Summary. The boring placed next to the former east overflow pond showed some evidence of impact from the pond. This is manifested in the above-representative levels of fluoride, total phosphorus, and sulfate, and reduced pH found in all tested soil horizons. There was no evidence that trace metals or other constituents had attenuated in the subsurface soils near the pond.

Upper and Lower Gypsum Stacks. The gypsum produced from the phosphoric acid process is slurried (25 to 40 percent solids) and pumped to the top of the gypsum stacks. Formerly a series of perforated high-density polyethylene (HDPE) pipes located beneath the gypsum stacks collected some of the water used to slurry the gypsum and delivered it to the lined decant pond. The decant pond has been taken out of service and replaced with a surge tank. The solids settle out of the water in this pond, and the water is subsequently recycled for further use in plant processes. Percolation of water placed at the top of the stacks is relatively slow due to the nature of the gypsum. This is because as the stacks have grown, the settled material has become compacted into what amounts to a dense silt with a permeability of between 10^{-5} and 10^{-6} cm/sec. The upper gypsum stack (the southernmost stack) has been in operation since 1966. The lower gypsum stack (the northernmost stack) is the original gypsum stack and is again in use. Four borings were drilled through the upper gypsum stack to groundwater, and two borings were drilled through the top of the lower gypsum stack to groundwater.

Upper Gypsum Stack. Borings S003B, S004B, S005B, and S006B were drilled through the north face of this stack (see Figure 4.2.2-4). Each boring was advanced to groundwater. Soil samples were collected beginning with the interface between the gypsum and native soil and then collected approximately every 10 feet until the termination of the boring. Cross-sectional diagrams show the depth and stratigraphy of these borings (Figures 4.2.2-5 through 4.2.2-7). To assess the impact of the stack on inorganics subsurface soils, soil samples were analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2. The soil chemistry of samples collected from these borings is summarized in Table 4.2.2-24.

The soils in borings S003B, S004B, and S005B are predominantly silt. Boring S004B contains a band of light gray tuff from approximately 115 to 130 feet bgs that does not appear in borings S003B and S005B. The tuff is a fine sand. Soils in borings S003B, S004B, and S005B are characteristic of loess, silty alluvium, or colluvium derived from loess. Boring S006B appears to have been drilled in an alluvial or colluvial soil that is predominantly sand and gravel, with bands of silt from 72 to 78 feet bgs and 94 to 119 feet bgs. Groundwater was encountered at 160 feet bgs in borings S003B and S004B and at 212 feet bgs in boring S005B. Groundwater depth was not logged in boring S006B. Ground surface was defined as the top of the gypsum stack at the time of boring. Gypsum thicknesses varied from 38 to 66 feet.

The soil chemistry of samples collected from borings S003B through S006B is summarized in Table 4.2.2-24. The first sample to be taken in S003B was

approximately 10 feet below the gypsum/native soil interface in a silt. The overlying material between the silt and the gypsum was a gravel. The sample was described as wet. The analytical results indicate that with the exception of boron, nickel, total phosphorus, and iron, the constituents tested for are all at or below representative soil levels. There were intermittent exceedances of representative soil concentrations for several parameters for the next 30 feet but with no apparent pattern. With the encountering of a clayey sand at 135 feet, fluoride (1,100 mg/kg), lithium (29.7 mg/kg), total phosphorus (2,660 mg/kg), and zinc (80.8 mg/kg) were found at levels above the representative range. With the exception of total phosphorus, these parameters remained above representative levels in the 145-foot sample. Aluminum values for the 135- and 145-foot samples were also relatively high (26,200 and 25,200 mg/kg, respectively), indicating the potential for a high clay content.

The distribution of constituents throughout the borehole column does not indicate the potential for a top-to-bottom migration pattern. Rather, the existence of silts through the first 40 feet of soils with little indication of site-related constituent attenuation seems to indicate that the constituents found in the clays were either naturally occurring or were the result of attenuation of constituents from groundwater flow whenever levels rise to permit saturation or capillary action. Groundwater in this area is known to be impacted by site-related constituents. Gross alpha and gross beta activities were within the representative range in all samples except in the clayey sands found at 135 and 145 feet where they were slightly above representative levels (26.4 ± 15.78, 34 ± 18.5 and 33.9 ± 11.6, 32.9 ± 11.44 pCi/g, respectively). This distribution pattern of the radionuclides also supports the theory that the constituents found in the clays were naturally occurring or derived from the underlying groundwater, not from infiltration from above.

The first sample taken in S004B was at the gypsum/native soil interface in the silt (53 feet). Analytical results indicate that a number of constituents were above the representative range. These included arsenic (13.2 mg/kg), beryllium (3.6 mg/kg), boron (42 mg/kg), cadmium (85.1 mg/kg), calcium (117,000 mg/kg), chromium (300 mg/kg), copper (454 mg/kg), fluoride (103,000 mg/kg), mercury (0.97 mg/kg), total phosphorus (29,200 mg/kg), selenium (27.8 mg/kg), vanadium (1,360 mg/kg), and zinc (551 mg/kg). With the exception of total phosphorus (1,190 mg/kg), all constituents were within the representative range in the next soil sample taken at the 60-foot horizon. Soil samples taken in the 70-, 80-, 90-, 100-, and 110-horizons in silts generally maintained this pattern. The 120-foot soil horizon is a tuff, and the total phosphorus concentration fell to well below representative levels (153 mg/kg), while the only constituents above representative levels were the gross alpha and gross beta activities (55.7 ± 32.4 and 46.4 ± 16.8 pCi/g). The higher radionuclide readings are expected in this volcanic material. In the silty sand immediately below the tuff, several constituents were found at above-representative levels—aluminum (30,400 mg/kg), beryllium (2.6 mg/kg), copper (53.8 mg/kg), fluoride (610 mg/kg), iron (21,300 mg/kg), lithium (32.4 mg/kg), and zinc (155 mg/kg). These values were

accompanied by extremely low values of calcium (2,240 mg/kg), chromium (10.5 mg/kg), total phosphorus (291 mg/kg), vanadium (21.1 mg/kg), and gross alpha (9.25 +/-13.2 UJ pCi/g). Since attenuation of site-related constituents was not observed in the silts immediately above the tuff and the mix of above-representative level constituents in the soil below the tuff was missing several key, mobile, site-related constituents, as well as containing high levels of unrelated aluminum and iron, it can be concluded that the constituents found in the silty sand at 130 feet were probably naturally occurring. (This soil type was not encountered in the samples used to estimate representative values.) With the exception of aluminum, beryllium, fluoride, iron, lithium, and nickel, most of which first appeared at above-representative levels in the brown silty sand below the tuff, all other constituents were within the representative range. The association of a brown silt with a specific suite of constituents that excludes parameters that would be expected in a site-related suite (e.g., total phosphorus and calcium) tends to confirm the theory that these parameters are naturally occurring.

The first soil horizon sampled in S005B was at 40 feet. This is about 3 feet below the gypsum/native silt interface. The following constituents were found to be above representative levels: cadmium (92.5 mg/kg), fluoride (1,600 mg/kg), nickel (30.8 mg/kg), total phosphorus (14,100 mg/kg), and zinc (481 mg/kg). Gross alpha and gross beta activities were within the range for representative samples. In the next soil horizon sampled (50 feet), only total phosphorus was above representative levels (8,070 mg/kg). Samples taken at the 60-, 70-, 80-, 90-, 100-, 110-, and 120-foot horizons contained no constituents above representative levels, with some minor exceptions (manganese, 520 mg/kg at 110 feet; nickel, 15.8 mg/kg at 120 feet; cobalt, 10.2 mg/kg at 110 feet; and iron, 16,200 mg/kg at 110 feet). The geologic log indicates an increase in trachyandesite content in the soil horizons at 110 and 120 feet, which may account for the slight exceedances found in these horizons. There is a distinct change in lithology at 130 feet with an increase in sand content. The grains and accompanying gravels are described as being quartzitic and basaltic, the latter having a greenish hue. This change in lithology is reflected in the aluminum content of the soil samples as it rises to the 15,000 to 20,000 mg/kg range from under 10,000 mg/kg in the overlying soils. Nickel content also rose (range of 14.7 to 16.4 mg/kg), as did zinc (range of 45.2 to 63.2 mg/kg). These increases were probably due to a change in native soil composition rather than any impact attributable to the gypsum stacks. For the most part, constituents in the soil horizons from 120 feet to 220 feet remained within the representative range. The only exceedances for radionuclide activities occurred with gross beta at 190 feet (33.1 ± 11.8 pCi/g) and at 220 feet (32.7 ± 11.24 pCi/g).

The first sample taken in S006B was at the gypsum/native soil interface (44.6 feet). The native soils in this borehole are primarily silty sandy gravels. This sample contained a number of constituents at above-representative levels. The next sample down (55 feet) was also taken in a sandy silty gravel and also contained above-representative levels of a number of constituents. The relative value of these

constituents suggest that the samples were switched at the laboratory as the deeper samples have, in general, greater concentrations of gypsum stack-related constituents than the shallower sample, including a much lower soil pH (5.8) than the upper sample (7.04). Nevertheless, both samples show site impact. Constituents that were above representative levels include cadmium (25.8 mg/kg at 44.6 feet and 17.8 mg/kg at 55 feet), copper (18.1 mg/kg at 55 feet and 5.1 mg/kg at 44.6 feet), fluoride (310 mg/kg at 44.6 feet and 4,000 mg/kg at 55 feet), nickel (34.1 mg/kg at 44.6 feet and 29.8 mg/kg at 55 feet), total phosphorus (16,300 mg/kg at 44.6 feet and 5,540 mg/kg at 55 feet), and zinc (52.5 mg/kg at 44.6 feet and 150 mg/kg at 55 feet). Gross alpha and gross beta activities exceeded representative values in the 55-foot sample (69.4 ± 28.4 pCi/g and 44.4 ± 12.88 pCi/g, respectively). With several exceptions, concentrations of constituents detected in the soil samples taken at the 65-, 70-, 85-, 105-, 115-, 125-, 135-, 145-, 165-, and 169-foot horizons were within the range expected for representative soils. The exceptions were calcium at 115 feet (122,000 mg/kg), iron at 85 and 165 feet (17,400 and 17,100 mg/kg, respectively), and total phosphorus at 70, 115, and 165 feet (1,180, 908, and 2,300 mg/kg, respectively). Gross alpha and gross beta activities were also intermittently above representative levels. With the exception of total phosphorus, these exceedances are probably not related to the gypsum stacks.

Summary. The native soils immediately below the gypsum stack contain concentrations of constituents above representative levels that are related to the gypsum stack operation. In most instances these concentrations have returned to representative levels by the next sampling interval (10 feet into the native subsurface). In all instances they have returned to representative levels by the 20-foot horizon (see Figures 4.2.2-5 through 4.2.2-7). There are several constituents that are above representative levels in deeper samples. With the possible exception of phosphate, these constituents do not appear in a pattern that could be attributable to migration from the gypsum stack as there is no evidence of a continuing attenuation downward in materials (silts and clays) that should, if migration of the trace metals were occurring, show above-representative levels before their indication in the deeper samples. There are changes in the lithology of the subsurface that could be responsible for these minor variations with depth. The lack of evidence for migration of trace metals into the deeper subsurface beneath the upper gypsum stack coincides with the finding that groundwater in this area also shows little to no trace metal impact. Other constituents that may be migrating, such as the alkali metals and alkaline earth metals, are generally found at naturally occurring levels in the subsurface that make differentiation between them and the native constituents very difficult. The presence of above-representative levels of these constituents in the groundwater would indicate that some migration has occurred.

Lower Gypsum Stack. Borings S001B and S002B were drilled through the top of this stack (see Figure 4.2.2-4). Each boring was advanced to groundwater, and soil samples were collected beginning with the gypsum/native soil interface and then

approximately every 10 feet until the termination of the boring. Cross-sectional diagrams showing the sample depth and stratigraphy of borings S001B and S002B are displayed in Figures 4.2.2-8 through 4.2.2-10.

The soils in borings S001B and S002B are a heterogeneous mixture of silt layers and sand and gravel layers, characteristic of the alluvial or colluvial soils in the EMF study area. Both borings were advanced through gypsum before encountering the native soil at approximately 65 feet bgs. Ground surface was measured from the top of the gypsum stack at the time of the boring. Both contain about 20 feet of silt from the gypsum/soil interface (65 feet bgs) to approximately 85 bgs. Boring S001B contains 20 feet of sandy gravel from 83 feet to 113 feet bgs, then another silt layer from 113 to 132 feet bgs, becoming more sandy from 132 to 137 feet bgs, and finishing in sand and gravel from 137 to 145 feet bgs. Groundwater was encountered in boring S001B at 138 feet bgs. Boring S002B is even more variable, with silty gravel from 88 to 100 feet bgs, changing to sandy gravel from 100 to 116 feet bgs. Boring S002B then contains another silt layer from 116 to 123 feet bgs, sand and sandy gravel from 123 to 148 feet bgs, and more silt from 138 to completion at 142 feet bgs. Groundwater was encountered in boring S002B at 136 feet bgs. Soils in borings S001B and S002B resemble those in boring S006B (upper gypsum stack).

The first sample taken in S001B was taken at the 65-foot horizon in a dark grayish brown silt. The large calcium (209,000 mg/kg), fluoride (13,180 mg/kg), and total phosphorus (4,000 mg/kg) values coupled with very low iron (605 mg/kg) and aluminum (3,070 mg/kg) values indicate that this sample has a preponderance of gypsum in it (Table 4.2.2-25). Other constituents that were found to be outside the representative range included cadmium (14.8J mg/kg), chromium (286 mg/kg), copper (111 mg/kg), mercury (26.6 mg/kg), selenium (8.9J mg/kg), vanadium (314 mg/kg), and zinc (73 mg/kg). Gross alpha (68.8 ± 29.6 pCi/g) and gross beta (43.3 ± 13.04 pCi/g) activities were also above representative levels. In the next soil horizon (75 feet) most constituents have returned to levels at or below the representative range. The exceptions were fluoride (580 mg/kg) and total phosphorus (7,450 mg/kg). Also in this sample, cobalt (13.8 mg/kg), manganese (591 mg/kg), and nickel (50.6 mg/kg) increased to above-representative levels. This increase may represent attenuation of these elements in the higher pH soil (6.94 versus 3.32 at 65 feet). No sample was recovered in the gravels at 85 feet. However, all constituents tested for in the 95-foot sample were within the range for representative soils. The gravel layer underlying the initial silt is approximately 30 feet thick. A sample taken approximately 2 feet into the underlying silt indicated that there had been some migration of site-related constituents into it. Fluoride (1,500 mg/kg), potassium (4,010 mg/kg), sodium (985 mg/kg), and zinc (58.4 mg/kg) were detected at above-representative levels. All constituents were again at representative levels in the 125-foot sample.

The 65-foot soil sample taken in S002B was described as pinkish gray fill. There were a number of constituents whose concentrations were above representative

levels in this sample. As with the first sample take in S001B, the high calcium (223,000 mg/kg), fluoride (6,920 mg/kg), and total phosphorus (3,410 mg/kg) concentrations and the low aluminum (1,710 mg/kg) and iron (790 mg/kg) concentrations indicated a large proportion of the sample was gypsum (Table 4.2.2-10). Other constituents with concentrations outside the range for representative soils included barium (680 mg/kg), boron (33.3 mg/kg), cadmium (6.5 mg/kg) chromium (207 mg/kg), copper (95.9 mg/kg), mercury (6.2 mg/kg), selenium (21.1 mg/kg), and vanadium (234 mg/kg). Gross alpha and gross beta activities were also enriched (150 ± 39.8 pCi/g and 31.5 ± 7.3 pCi/g, respectively). The brown silt in the 75-foot soil horizon also appears to have been strongly affected by gypsum as it, too, had high calcium (265,000 mg/kg), fluoride (2,470 mg/kg), and total phosphorus (4,150 mg/kg) levels and low aluminum (624 mg/kg) and iron (274 mg/kg) levels. Both the 65-foot horizon and the 75-foot horizon had very low pH values (3.24 and 3.29, respectively). The pH values in the brown silt in the 85-foot soil sample returned to near normal (7.32). At this soil horizon, there is a strong return of manganese (421 mg/kg from 7.1 in the 75-foot sample), nickel (33.1 mg/kg from 5.8U), and zinc (66.3 mg/kg from 13.5). This suggests that these constituents were leached in the acidic soil conditions and attenuated in the higher-pH soils. Total phosphorus levels were intermittently above representative levels for the remainder of the borehole. The higher values are directly correlated with silt layers and represent attenuation of the phosphates. Because of the absence of a thick silt layer in this borehole immediately below the gypsum, several trace metals migrated to deeper depths than found in other boreholes. For example, cadmium was found at 4.1 mg/kg in the first silt (120 feet) underlying the first gravel but was below representative levels in the 130- and 140-foot soil horizons. There were several enriched metals in the 140-foot silt sample. These included chromium (22.3 mg/kg), copper (12.1 mg/kg), iron (16,100 mg/kg), manganese (524 mg/kg), and zinc (105 mg/kg). Since these were not found at enriched levels in the silt immediately overlying them, it is unlikely that they were from downward migration. Since this silt was in the groundwater and the groundwater was impacted by low levels of these constituents, it is possible that the levels present represent attenuation of the metals from the groundwater. Other than in the first sample taken, gross alpha and gross beta activities were below representative levels in all samples tested.

Summary. In general, the observed pattern found in the upper gypsum stack of trace metal attenuation in the silts immediately underlying the stack is also seen in the lower stack area. However, where these silts are thin, such as is the case in S002B, there is some migration into the lower subsurface. This migration is observed in higher concentrations of several trace metals in underlying silt layers than would be expected in natural silts. Total phosphorus was the only constituent to be found in a generally top-down migration pattern that extended to the groundwater. This is expected since it is not as strongly adsorbed by silts as the metals are. There was no observed migration of radionuclides into the subsurface.

Former Cooling Pond. The former cooling pond location is shown in Figure 1.2-1. This unlined pond received cooling tower blowdown water discharged from the cooling tower during normal plant operations. Two borings, S070 and S071, were advanced in the area to a depth of 11 feet bgs during Phase I of the RI. Soil samples were collected from these borings at the surface, and at 2.5-, 5-, 7.5-, and 10-foot depths. The soil was analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2.

An examination of the chemical data from analysis of soil samples from boring S070B shows a pattern of layering consistent with mechanical placement of fill. For example, cadmium was at 28.1 mg/kg in the surficial sample (a sandy gravel), fell to 0.52U mg/kg in the 2.5-foot sandy gravel, rose again to 53.5 mg/kg in the 5-foot silty sand, fell to 1.4 mg/kg in the 7.5-foot silty sand, only to rise again to 44.1 mg/kg in the 10-foot silt. These sharp breaks indicate little soluble migration since the high and low concentrations are not correlatable to either depth or texture (i.e., sands have both high and low as well as gravels). Nonetheless, the entire soil column contained a number of constituents that were above representative levels. These included barium (825 mg/kg and 98.2 mg/kg), beryllium (0.57 mg/kg and 1.4 mg/kg), boron (152 mg/kg and 15.8 mg/kg), cadmium (28.1 mg/kg and 44.1 mg/kg), chromium (291 mg/kg and 17.8 mg/kg), copper (59.5 mg/kg and 8.4 mg/kg), fluoride (8,220 mg/kg and 850 mg/kg), nickel (28.1 mg/kg and 18.8 mg/kg), total phosphorus (49,000 mg/kg and 20,600 mg/kg), vanadium (455 mg/kg and 28.7 mg/kg), and zinc (273 mg/kg and 1,420 mg/kg) (see Table 4.2.2-26). The above concentrations were for the surficial samples and for the 10-foot horizon (bottom of the borehole) and are not necessarily the highest concentration encountered. The pH values also showed site impact ranging from 2.67 at the top of the soil column to 5.94 at 10 feet. The depth of impact was not determined in this borehole.

The lithology in boring S071B is somewhat different than that found in S070B insofar as the first 5 feet is described as a black silt fill. The two soil samples (surface and 2.5-foot) taken in this material were found to have various constituents at concentrations above those for representative soils (Table 4.2.2-26). These included barium (290 and 460 mg/kg), boron (151 and 156 mg/kg), cadmium (8.7 and 5.2 mg/kg), chromium (165 and 43.9 mg/kg), fluoride (123,000 and 177,000 mg/kg), mercury (5.4 mg/kg at 2.5 feet), total phosphorus (13,200 and 35,500 mg/kg), selenium (26.4 mg/kg at 2.5 feet), vanadium (165 and 39.5 mg/kg), and zinc (110J and 73.3 mg/kg).

The 10-foot soil horizon (red sand) continues to show some impact. Above-representative concentrations of barium (303 mg/kg), boron (92.6 mg/kg), fluoride (47,200 mg/kg), and total phosphorus (1,720 mg/kg) were evident. The pH remained low throughout the sampled soil column (range of 1.77 to 2.66). Gross alpha and gross beta were both above representative levels in the 2.5- and 5-foot soil samples (364 ± 71.2 and 111 ± 23.2 pCi/g at 2.5 feet and 160 ± 30.2 and 71.7 ± 12.96 pCi/g,

respectively). However, radionuclide activities decline with depth. The vertical extent of site impact was not determined in this borehole during Phase I.

Phase II Results for Former Cooling Pond. To determine the vertical extent of impact of the former cooling pond, boring S100B was drilled during the Phase II field investigation. It was located as shown in Figure 2.1-3. Samples were collected from the surface and the 2-, 5-, 7-, 10-, 12-, 15-, 25-, 45-, 55-, 65-, and 80-foot depths. Groundwater was encountered at 74 feet bgs.

The first 14 feet of soils in this borehole was visually identified as fill. The analytical results for the five soil samples taken in this horizon confirm this, with widely varying constituent concentrations that range from well below to well above representative levels with little discernible pattern. Radiological activities were above representative values in all cases. These results (Table 4.2.2-26) are indicative of mechanically placed fill. Below the 13-foot mark is an approximately 40-foot-thick sandy gravel. In other words, this borehole shows no intervening native silt between the fill layer and the gravels. The geologic log indicates that there are occasional thin silt layers within the gravels which may act as attenuating agents for trace metals.

Concentrations of constituents found in the first two gravel horizons (15 and 25 feet) showed little pattern but many were above representative levels. These included beryllium (2.2 mg/kg at 15 feet), boron (31.7J and 28.6J mg/kg, respectively), cadmium (143 mg/kg at 15 feet), chromium (91.4 mg/kg at 25 feet), fluoride (13,100 and 17,400 mg/kg, respectively), total phosphorus (23,100 and 5,060 mg/kg, respectively), sulfate (1,960 and 20,400 mg/kg, respectively), vanadium (114 mg/kg at 15 feet), and zinc (1,130 mg/kg at 15 feet). Only boron (25J mg/kg), chromium (38.3 mg/kg), fluoride (17,400 mg/kg), and total phosphorus (1,980 mg/kg) were above representative levels in the 45-foot gravel. The 55-foot sample, which is the first silt sampled in the borehole, contained above-representative values of fluoride (980 mg/kg), manganese (605J mg/kg), nickel (61.7 mg/kg), total phosphorus (23,700 mg/kg), and sulfate (380 mg/kg). Iron, while not above representative levels (12,900 mg/kg), was also enriched in this sample. The 55-foot sample was also the first one in which pH values approached neutral (6.57); the pH of the samples above 55 feet ranged from 2.47 (10 feet) to 5.75 (surface). The 65-foot sandy gravel horizon, with a pH of 9.01, contained no constituents above representative levels. The last sample in this borehole was taken at 80 feet in a clayey silt. This sample was some 5 feet below the water table. Several facility-related constituents were either enriched or above the representative level in this sample. They included chromium (22.7 mg/kg), copper (13.6 mg/kg), fluoride (540 mg/kg), lithium (20.1 mg/kg), nickel (22.1 mg/kg), total phosphorus (718 mg/kg), potassium (3,270 mg/kg), sulfate (2,930 mg/kg), and zinc (67.8 mg/kg). Iron (21,800 mg/kg) was also above representative levels. Chromium, copper, nickel, and zinc are somewhat mobile trace metals that are occasionally found at slightly elevated levels in the groundwater beneath the Simplot facility. It is likely that their slightly enriched

levels in this below-water clayey silt are due to attenuation from impacted groundwater. Likewise, lithium, total phosphorus, potassium, and sulfate are associated with impacted groundwater and their presence in this sample is also likely to be from the groundwater. The pH of the soil in this sample was basic (8.2).

Summary. The subsurface in the former cooling pond area consists of a 10- to 15-foot-thick fill layer with variable but above-representative levels of various site-related constituents. Impact from the cooling pond extends to at least 55 feet as evidenced by pH levels and above-representative concentrations of fluoride and total phosphorus. The silt layer at 55 feet appears to form an attenuating barrier to further downward migration. There is some evidence of site impact in the clayey silt sample taken at 80 feet. However, since this sample is below the groundwater level and the sample immediately above showed no site impact, it is likely that the constituents found in the 80-foot sample are due to attenuation from groundwater impacted by upstream sources. Radiological parameters were only above representative levels in the fill areas. There was no evidence of their migration into the native soils.

Cooling Tower Area. The cooling tower area location is shown in Figure 1.2-1. The objective of the soil investigation was to determine if the soil in this area has been impacted by cooling tower blowdown water sprayed or leaked from the cooling tower plant operations. Two borings, S068B and S069B, were drilled in this area (see Figure 2.1-3). Boring S068B was advanced to a depth of 9 feet bgs; because of gravel content, boring S069B could not be advanced beyond the 2-foot depth. Groundwater was not encountered in these borings. Soil samples were collected from boring S068B at the surface and at the 2.5-, 5-, and 7.5-foot depths. Soil samples were collected from boring S069B at the surface and the 0.5-foot depth. The samples collected from both borings S068B and S069B were characterized as fill material. These samples were analyzed for gross alpha, gross beta, and the inorganic parameters listed in Table 2.1-2.

An examination of the chemical data from analysis of soil samples from borings S068B and S069B indicates that samples taken in the first 5 feet of the subsurface contain concentrations of constituents that are above levels for representative soils (Table 4.2.2-27). The greatest values are generally found in the surficial soils and included boron (92.9 mg/kg and 122 mg/kg, respectively), cadmium (23.4 and 28.2 mg/kg, respectively), chromium (174 and 225 mg/kg, respectively), copper (38.8 and 39.7 mg/kg, respectively), fluoride (80,000 and 76,000 mg/kg, respectively), total phosphorus (14,300 and 11,500 mg/kg, respectively), vanadium (238 and 257 mg/kg, respectively), and zinc (174 and 230 mg/kg, respectively). Gross alpha and gross beta activities were also elevated in this interval, with the greatest values occurring in the surficial sample at S068B (146 ± 34.6 pCi/g and 55.9 ± 11.98 pCi/g) and in the 0.5-foot sample in S069B (205 ± 46.8 pCi/g and 77 ± 15.04 pCi/g). Only soils in S068B were sampled at the 7.5-foot horizon. Of the constituents tested for in this silty sand, only total phosphorus (8,730 mg/kg) and nickel (30.6 mg/kg) were above the range

for representative soils. While the total depth of impact was not determined during Phase I, it would appear that there is a distinct trend of decreasing impact with depth.

Phase II Results for Cooling Tower Area. The Phase II field investigation consisted of one boring, S101B, located as shown in Figure 2.1-3. Samples were collected from the surface and the 2-, 5-, 7-, 10-, 12-, 15-, and 17-foot depths. Boring S101B contains fill material to 3.8 feet bgs; it is primarily gravel to a total depth of 22 feet bgs with the exception of a thin silt layer from 10.8 to 11.2 feet bgs. Groundwater was not encountered in this boring.

The pattern observed in S068B is repeated in S101B regarding the fill layer. Above-representative concentrations of constituents in the first 3 feet included (maximum) barium (330 mg/kg), beryllium (1.7 mg/kg), boron (128 mg/kg), cadmium (18.5 mg/kg), calcium (192,000 mg/kg), chromium (239 mg/kg), fluoride (62,000 mg/kg), total phosphorus (33,700 mg/kg), potassium (6,570 mg/kg), sulfate (730 mg/kg), vanadium (239 mg/kg), and zinc (227 mg/kg). These concentrations declined steeply in the 5-foot sample, which was out of the fill area. Constituents above representative values in the 5-foot soil sample were cadmium (1.3 mg/kg), fluoride (1,330 mg/kg), nickel (20.6 mg/kg), total phosphorus (3,690 mg/kg), and zinc (117 mg/kg). The silt layer reported at the 10-foot horizon showed an attenuation of site-related constituents as reflected in the values of cadmium (2 mg/kg), fluoride (620 mg/kg), manganese (476 mg/kg), nickel (33.7 mg/kg), total phosphorus (2,560 mg/kg), sulfate (220 mg/kg), and zinc (155 mg/kg). While there was an occasional outlier, the only constituents consistently above representative levels in the 12-, 15-, and 17-foot soil horizons were total phosphorus and zinc, with total phosphorus falling below the representative range in the 17-foot sample. The pH at the 17-foot horizon was 7.11, a value indicative of slight impact. Radionuclide activities as indicated by gross alpha and gross beta values were not above representative levels in this borehole except in the designated fill horizons.

Summary. Soil samples collected from borings in this area indicate fill layers up to 7.5 feet. These fill layers contain concentrations of site-related constituents that are above the representative range. Once out of the fill layers, concentrations of site-related constituents declined rapidly. While there was some evidence of minor impact at 17 feet (pH not above 8; zinc at marginally enriched levels—55.9 mg/kg compared to 52.4 mg/kg for representative), it is unlikely that major impacts would be observed below this depth. The vertical extent of total impact is probably at a depth of approximately 20 feet. No groundwater impact is expected from this source.

Wastewater Treatment Ponds. A series of three lined ponds, located north of the main plant between U.S. Highway 30 and I-86, is used to treat noncontact cooling water, including boiler and cooling tower blowdown, compressor coolant water, demineralizer regeneration water, laboratory wastes (i.e., acids, ammonia, and

sodium hydroxide), and stormwater, as well as drainage from the former east overflow pond (Figure 1.2-1). Because the water treatment ponds are active, lined or sealed units, it was not practical to sample the soil beneath the ponds to assess the possibility of pond leakage. As an alternative, groundwater monitoring data were evaluated from wells located upgradient and downgradient of the ponds. The evaluation of water quality from these wells is discussed in Section 4.4.3.

Unlined Ditch to Water Treatment Ponds. The unlined ditch connects the facility drainage system to the water treatment ponds. It accepts the noncontact water from the facility drainage system through a pipe beneath U.S. Highway 30 as well as laboratory wastewaters and water from the former east overflow pond and its replacement. The water flows from the plant through the pipe and into the unlined ditch, eventually discharging to the water treatment ponds.

To assess the effects of these discharges on soils beneath the unlined drainage ditch, soil samples were collected at six locations along the ditch as shown in Figure 2.1-4. At each sampling location, samples were collected at the bottom of the ditch and, for locations UDP01, UDP02, UDP03, and UDP04, approximately 2 feet below the ditch bottom. Samples were not collected for UDP05 and UDP06 at the 2-foot depth. The samples were analyzed for gross alpha and gross beta activities as well as the inorganic parameters listed in Table 2.1-2. The soil chemistry data from analyses of these samples are summarized in Table 4.2.2-5. The findings for the surficial or sediment layer are discussed in Section 4.2.2.1, Potential Sources.

All four of the 2-foot soil samples contained concentrations of constituents above those for representative soils. The ranges for these constituents were barium (276 to 7,850 mg/kg), cadmium (6.1 to 51.3 mg/kg), chromium (138 to 1,470 mg/kg), copper (14.7 to 57.6 mg/kg), fluoride (935 to 13,100 mg /kg), lead (17.1 to 83.4 mg/kg), mercury (1.4 to 47.2 mg/kg), nickel (14.4 to 50.1 mg/kg), total phosphorus (7,130 to 60,500 mg/kg), vanadium (150 to 496 mg/kg), and zinc (115 to 665 mg/kg). Gross alpha activity ranged from 38.9 ± 8.6 pCi/g to 227 ± 23.2 pCi/g. Gross beta activity ranged from 31.3 ± 5.96 pCi/g to 150 ± 11.86 pCi/g.

In summary, all samples collected from the unlined ditch evidenced site impact. Since the soils at the 2-foot depth were influenced by site-related constituents, additional vertical definition of the extent of contamination was addressed in Phase II of the RI.

Phase II Results for Unlined Ditch to Water Treatment Pond. The Phase II field investigation consisted of two parts: completion of one boring, S097B, and collection of six sediment samples (SSODP01 through SSSODP06) and four subsurface samples (SBSODP01 through SBSODP04) at the 2-foot depth collected from the unlined ditch, located as shown in Figure 2.1-4. The 10 ditch samples were collected to verify high mercury concentrations in unlined ditch samples collected during the Phase I investigation. As a result, the ditch samples were analyzed for

total mercury only. The results of the analysis of the sediment samples are discussed in the potential source section above.

While mercury concentrations were found to be lower in the Phase II 2-foot ditch samples compared to those in Phase I samples, the analyses did confirm the presence of mercury in the soils at above-representative levels. The highest mercury concentration in the Phase II ditch samples was SBSODP01, a 2-foot sample containing 7.2 mg/kg of mercury. Results are provided in Table 4.2.2-6.

Boring S097B was advanced to a depth of 33 feet bgs. (See Figure 2.1-3 for location.) Soil samples were collected at the surface and the 2-, 5-, 7-, 10-, 15-, 20-, and 25-foot depths. They were analyzed for gross alpha and gross beta and the inorganic parameters listed in Table 2.1-2. Soils from this boring were all gravel (a silty sandy gravel from the surface to approximately 25 feet bgs, and alluvial gravel from 25 to 33 feet bgs). Groundwater was encountered at 25 feet bgs. Analysis of the data from soil samples collected from these borings indicates that there is no consistent pattern of impact on the soils in this borehole (Table 4.2.2-28). Although several constituents were found at concentrations above those for representative soils, the difference is generally very small. For example, total phosphorus was found only in the surficial sample at concentrations (1,230 mg/kg) above representative levels (840 mg/kg). Zinc was above representative levels at the 15-foot horizon (87.3 mg/kg) but at no other horizon. Fluoride was never above representative levels, nor were chromium and vanadium. In other words, there does not appear to be any ditch (or site) related impact on the soils in this borehole.

4.2.2.4 Summary

The RI investigation confirmed the theory that a large proportion of the main plant area of the Simplot facility has been graded with fills. In general, these fills contain native soils mixed with site-related materials. The depth of the fill layer rarely exceeds 8 feet. As shown in Section 4.2.2.1, the site-related materials often contain a number of constituents with concentrations that exceed the representative soil levels.

The investigation of areas where there has not been a sustained hydraulic head has led to the following conclusions:

- When native soils are encountered beneath a fill, trace metals are generally only found at the interface to several feet in depth. This indicates that there is little to no migration of the trace metals into the subsurface.
- Radioactivity as measured in terms of gross alpha and gross beta tended to follow the same pattern as the trace metals. They are generally associated only with fills.

- In a number of samples, there was some evidence of migration to 10 feet or somewhat greater depths below the fill/native soil interface of total phosphorus, fluoride, sulfate, and, to a lesser extent, zinc. These ions have been found to be particularly mobile at the site.
- Samples taken in roads generally exhibited sited-related impacts in the surficial horizon; very little to no impact was observed in the 2-foot horizon.
- TPH was detected in several locations near the surface and on the roads. It was not detected at depth.
- PCBs were detected at levels below 1 mg/kg in several surficial samples. However, most samples analyzed for PCBs did not contain any at detectable (generally 0.065 mg/kg) levels. PCBs were not detected in any sample at depth.

These conclusions support the hypothesis set out in the conceptual model that the plant area has widespread surficial impacts due to site-related activities. However, without an applied hydraulic head there has been little impact on the subsurface native soils.

The second major area of investigation was where an artificial hydraulic head had been applied by an industrial activity (e.g., the gypsum stacks, unlined ditches, former cooling pond). In these areas, the hydraulic head could provide a transport mechanism for dissolved and colloidal migration of constituents into the underlying soils.

The results of the investigation in these areas are as follows:

- Trace metals are generally attenuated within 20 feet below the source/native soil interface. In some areas where there is little to no silt horizon until some depth (northern portions of the facility), the migration could be deeper. Figures 4.2.2-5 to 4.2.2-6 and 4.2.2-8 to 4.2.2-9 are cross-sections of the upper and lower gypsum stacks, respectively, that illustrate these points for cadmium, lead, chromium, and copper.
- Total phosphorus, fluoride, sulfate, and some alkali metals can be observed through most if not all of the soil column, though not under all hydraulic head source areas. Figures 4.2.2-7 and 4.2.2-10 are cross-sections of the upper and lower gypsum stacks, respectively, that illustrate this point for fluoride and phosphate migration.

- Trace levels (i.e., less than 1 mg/l) of copper, arsenic, selenium, vanadium, and zinc have probably migrated throughout the entire soil column as their presence is periodically (for the trace metals) observed in the groundwater. However, the amount migrating is very low compared to native soil content and, hence, is not distinguishable in the soil sample analytical results. Figures 4.2.2-5 through 4.2.2-7 (upper gypsum stack) and 4.2.2-8 through 4.2.2-10 (lower gypsum stack) illustrate this point for arsenic, vanadium, and zinc.

4.2.3 Characterization of Potential Sources and Onsite Soils at FMC

This section is organized into three major subsections. In Section 4.2.3.1, constituents of potential concern that are characteristic of potential sources, and that allow them to be distinguished when mixed with soils, are identified. Sections 4.2.3.2 and 4.2.3.3 present results of the soil quality investigation within the FMC facility. Section 4.2.3.2 describes soil quality associated with units that lack a sustained hydraulic head; Section 4.2.3.3 describes results for units with sustained hydraulic head. The conclusion reached is that site-related constituents do not migrate from potential sources into the subsurface in the absence of a driving force, i.e., a sustained hydraulic head.

4.2.3.1 Potential Sources

To determine the potential constituents that may be released from FMC industrial activities, chemical analyses were performed on feedstock (ore and pond sediment from the coke-washing), byproducts (ferrophos and slag), and wastewater streams (phossy water/solids, precipitator slurry, calciner water/solids, and IWW). Standing water and sediments in the railroad swale were also collected and analyzed. Information gathered from these analyses was then compared with the chemical analyses of soil, groundwater, surface water, and sediment samples collected during the RI to determine the potential source of the constituents found in the soils. This section of the report discusses the ore, byproducts, and each wastestream, with emphasis on the general characteristics and any unique characteristic that may enable an analyst to uniquely identify the material.

Nine FMC source areas/materials were examined during Phases I and II to ascertain the chemical composition of their matrices. The following general conclusions were reached:

- Phosphate ore, slag, precipitator dust, phossy water/solids, ferrophos, and calciner water/fines contain significantly higher concentrations of various trace metals and other constituents than do the native soils and waters.
- There are six constituents that appear in all of the solid materials that enable the source material to be identified when it is mixed with native soils or sediments. These characteristic constituents are fluoride, total phosphorus, cadmium, chromium, vanadium, and zinc.
- In addition to the six characteristic constituents, each of the above materials has unique concentrations of other constituents that allow for its identification, provided it is mixed in a matrix (soil or sediment) in sufficient quantity. For example, a soil with ferrophos mixed in can be

distinguished from a soil in which precipitator dust is present based on the relative levels of arsenic, iron, or potassium.

- To a lesser extent than the solid matrices, the wastewaters associated with phossy wastes, precipitator slurry, and calciner slurry also have enriched concentrations of various constituents that can be used to identify sources that contributed releases to groundwater and surface water. These sources can be distinguished by the relative amount of arsenic, chloride, fluoride, total phosphorus, potassium, sodium, and sulfate.
- The railroad swale contains identifiable constituents of phosphate ore.
- The IWW ditch sediments contain identifiable quantities of precipitator dust and phosphate ore. The water in the ditch appears to contain constituents at representative concentrations.
- The coke settling pond does not appear to have any constituents in it that could affect the composition of the native soils.

This subsection describes the analytical results for samples of the feedstocks, byproducts, and wastewaters, as well as the samples from the railroad swale. This information is summarized at the end of the subsection.

FMC Phosphate Ore. The FMC facility uses ore that contains a substantial shale fraction, while the Simplot facility uses ore without the shale fraction. Until 1991, both FMC and Simplot obtained ore from the same mine. Since 1991, Simplot has obtained its ore from a different mining area. One composite ore sample was taken from ore piles during the RI and analyzed for inorganics and radioactivity. Previous data also exist on the composition of the ore used at FMC, but these data do not address all the constituents of interest. For those where there is comparison, the RI data appear representative given that the FMC analytical method is more aggressive in its digestion method (i.e., it dissolves more of the solid matrix), which causes an analytical instrument to detect higher concentrations.

Table 4.2.3-1 presents the analytical results for the ore sample. Compared with representative soils, it has a number of enriched constituents. Of note are arsenic (14.6 mg/kg), cadmium (77.8 mg/kg), chromium (822 mg/kg), copper (104 mg/kg), fluoride (13,200 mg/kg), nickel (126 mg/kg), total phosphorus (65,900 mg/kg), vanadium (996 mg/kg), and zinc (991 mg/kg). The characteristic constituents are underlined. Duplicate samples were analyzed for gross alpha and gross beta. Activities were greater than 200 pCi/g for gross alpha and about 100 pCi/g for gross beta (Table 4.2.3-2). A further distinguishing characteristic of the ore is its light reddish brown color.

Slag. Six composite samples of slag were taken during the RI and tested for inorganics and radioactivity (Table 2.1-2). The results indicated a calcium silicate base with fluoride and other impurities (Table 4.2.3-1). Of particular interest in making native soil/slag comparisons were the following: arsenic (not detected), cadmium (not detected to 32.4 mg/kg), calcium (255,000 to 290,000 mg/kg), chromium (172 to 290 mg/kg), fluoride (12,400 to 17,800 mg/kg), total phosphorus (1,610 to 5,680 mg/kg), potassium (6,780 to 8,220 mg/kg), vanadium (150 to 250 mg/kg), and zinc (36.4 to 450 mg/kg). Gross alpha activity ranges were between 179 ± 22.4 pCi/g and 240 ± 37 pCi/g, and gross beta activity ranges were between 74.7 ± 9.34 pCi/g and 102 ± 9.74 pCi/g) (Table 4.2.3-2). These activities are relatively high compared to natural soils and can be further utilized to identify a material that contains slag. Uranium-238 was detected in the slag samples, but lead-210 was not (Table 4.2.3-2). A further characteristic of slag is its dull gray color. Note the presence of the six characteristic constituents (underlined).

Ferrophos. Three ferrophos composite samples collected during the RI were analyzed for inorganics and radioactivity (Table 2.1-2). Ferrophos, as analyzed by nonstandard EPA methods, was approximately 50 to 60 percent iron, 25 to 30 percent total phosphorus, 4 to 5.5 percent vanadium, 3.5 to 4.5 percent chromium, 0.5 to 4.5 percent silicate, plus impurities (Table 4.2.3-1). The material has a slight gloss when first produced but oxidizes to a dull light gray with time. Note the presence of three of the six characteristic constituents (underlined).

The results reported by the commercial laboratory utilizing standard EPA methods (Table 4.2.3-1) indicated an iron-, chromium-, and vanadium-rich material with noticeably (compared to native soils) high levels of copper (404 to 851 mg/kg), molybdenum (90.6 to 151 mg/kg), and nickel (535 to 1,150 mg/kg). Leachable (by nitric acid digestion) quantities of total phosphorus and potassium were relatively low (1,070 mg/kg and 603 mg/kg, respectively). Gross alpha activities were high compared with soils but low compared with slag (24.8 ± 11.98 pCi/g to 70.4 ± 32.8 pCi/g) (Table 4.2.3-2). Gross beta activities ranged from 22.5 ± 8.46 pCi/g to 55.4 ± 15.12 pCi/g.

Phossy Water and Solids. A composite sample of a phossy wastewater stream was taken during the RI. The results are displayed in Table 4.2.3-3. Of interest were the levels of the following trace metals: arsenic (0.145 mg/l), cadmium (0.023 mg/l), chromium (0.41 mg/l), vanadium (0.37 mg/l), and zinc (41.8 mg/l). Potassium (2,890 mg/l), total phosphorus (1,370 mg/l), and fluoride (436 mg/l) were also detected. Because this sample was not filtered, the results represent both dissolved-phase and solid-phase constituents. Note the presence of all six characteristic constituents (underlined).

Composite sediment samples were also collected from four phossy wastewater ponds (8S, 11S, 12S, and 15S). The results of analyses of these samples are presented in Table 4.2.3-1. There were a number of enriched trace metals and other constituents. Those of interest included arsenic (20.4 to 256 mg/kg), cadmium (1,100 to 2,040 mg/kg), chromium (71.6 to 133 mg/kg), copper (41.7 to 74.9 mg/kg), fluoride (8,600 to 17,100 mg/kg), lead (185 to 386 mg/kg), total phosphorus (21,300 to 28,000 mg/kg), potassium (7,910 to 20,100 mg/kg), selenium (10.8 to 49.6 mg/kg) , silver (106 to 199 mg/kg), vanadium (42.9 to 93.4 mg/kg), and zinc (10,400 to 26,600 mg/kg). Note the enriched presence of all six characteristic constituents (underlined). The pH at which these solids exist within the ponds is in the acidic range (less than 5.5). It is doubtful that they would be soluble in a higher pH environment. Phossy solids are gray to dark gray in color.

Comparison of the concentrations found in the pond sediment versus those detected in the wastestream indicated that the values found in the wastewater were probably contributed by constituents present in the solid phase, rather than in the dissolved phase.

Gross alpha and gross beta activities for phossy wastewater indicated enriched levels of gross beta (Table 4.2.3-3). The levels detected for the one composite measured were 21.8 ± 26.2 pCi/l for gross alpha and 2,420 ± 37.1 pCi/l for gross beta. While a portion of the gross beta can be attributed to the presence of naturally occurring potassium-40 in the potassium-rich wastewater, there were other unidentified beta emitters contributing to this total. Radium-226 was also detected at 1.9 ± 0.56 pCi/l.

The gross alpha and gross beta activities in the sediment samples were enriched (Table 4.2.3-2). Gross alpha values ranged from 71.1 ± 21.6 pCi/g to 289 ± 39.8 pCi/g. Gross beta ranges were from 254 ± 26.2 pCi/g to 783 ± 44.4 pCi/g. Lead-210 was also analyzed in these samples and the range detected was from 204 ± 53.8 pCi/g to 465 ± 117 pCi/g. Uranium-238 activities were below the 5 pCi/g detection limit.

Precipitator Slurry. A composite sample of precipitator slurry was taken from the pipeline transporting slurry to Pond 8E. The sample was not filtered and contained a considerable amount of suspended solids. The concentrations detected of note are cadmium (1.66 mg/l), chromium (2.03 mg/l), fluoride (1,510 mg/l), mercury (0.00027 mg/l), nickel (2.45 mg/l), total phosphorus (7,680 mg/l), potassium (9,890 mg/l), silver (2.45 mg/l), and zinc (5,210 mg/l). Full analytical results are in Table 4.2.3-3. Note the presence of five of the six characteristic constituents (underlined).

A composite sample of sediments from Pond 9E was collected during Phase I and analyzed for inorganics and radioactivity (Table 2.1-2). As can be seen in Table 4.2.3-1, the sample was enriched in all trace metals that are associated with the ore,

with some being at greatly increased concentrations. Of particular note were the concentrations of cadmium (2,410 mg/kg), fluoride (16,100 mg/kg), lead (338 mg/kg), total phosphorus (33,500 mg/kg), selenium (45.3 mg/kg), silver (218 mg/kg), vanadium (169 mg/kg), and zinc (21,400 mg/kg). Precipitator slurry is dark gray to black in color.

In Pond 8E wastewater, gross alpha and gross beta activities were enriched relative to representative groundwater values (Table 4.2.3-3). The values detected were 668 ± 122 pCi/l and 6,480 ± 136 pCi/l, respectively. While radium-228 was not detected, radium-226 was present at 103 ± 4.48 pCi/l. No other radionuclides were analyzed.

The sediments from Pond 9E contained 120 ± 26 pCi/g of gross alpha and 579 ± 33.4 pCi/g of gross beta (Table 4.2.3-2). Unlike the phossy waste, no lead-210 was detected in the precipitator slurry sediments. There was, however, some uranium-238 activity (8.36 ± 5.32 pCi/g).

Calciner Pond Wastewater and Sediments. In 1987, FMC changed the operation of its calciner unit to enable recycling of the scrubber water. This change in process also changed the composition of the wastewater by concentrating the dissolved solids. Wastewater released from the former, unlined calciner ponds would have had a composition somewhat different than that now found in the double-lined ponds. The available chemical composition (FMC, 1993) of the scrubber water in 1987 before the change was fully implemented indicates that the following constituents were present: fluoride (148 to 964 mg/l), chloride (149 to 1,175 mg/l), orthophosphate (140 to 4,300 mg/l), sulfate (250 to 1,250 mg/l), and cadmium (656 to 5,268 mg/l). These values are somewhat different from those detected in samples collected from the calciner ponds during the period of the RI (Table 4.2.3-3). In these recent samples, the following constituents were detected: fluoride (134 mg/l), chloride (3,750 mg/l), orthophosphate (3,930 mg/l), sulfate (19,800 mg/l), cadmium (0.818 mg/l), arsenic (4 mg/l), total phosphorus (5,340 mg/l), potassium (19,330 mg/l), selenium (2.785 mg/l), vanadium (1.14 mg/l), and zinc (10.13 mg/l).

Calciner pond sediments, as shown both in the actual sediment sample (Table 4.2.3-1) and in the sludges stored to the south of the ponds near borings F050B and F051B (Table 4.2.3-4), were enriched with a variety of constituents. Of special note for identification and evaluation purposes were cadmium (426 mg/kg), calcium (284,000 m/kg), chromium (531 mg/kg), fluoride (191,000 mg/kg), total phosphorus (91,000 mg/kg), potassium (79,800 mg/kg), selenium (3.8 mg/kg), sodium (20,300 mg/kg), vanadium (607 mg/kg), and zinc (6,000 mg/kg) in the calciner pond sediments. The characteristic constituents are underlined. In the samples taken in the calciner sludges, selenium values ranged from 0.94 to 47.5 mg/kg. The selenium value in the pond sediment sample was less than the levels of selenium present in

value in the pond sediment sample was less than the levels of selenium present in calciner sediment found in the calciner sediment storage areas. Calciner sludges have a reddish gray to reddish brown color, depending upon the amount of weathering that has occurred.

Gross alpha was detected at 225 ± 33.6 pCi/g and gross beta at 111 ± 10.88 pCi/g in pond sediment samples. The latter value is considerably less than the activity found in the liquid sample. Given the amount of potassium in the sample, the gross beta value reported here is probably understated. Neither lead-210 nor uranium-238 was detected in the sediment sample.

IWW Ditch Water and Sediment. Inconsistent results were obtained between the samples of the IWW ditch water collected during Phase I and Phase II. The Phase I samples indicated the presence of site-related constituents. These constituents were not found in multiple samples collected during Phase II.

A grab sample of IWW ditch water was taken during Phase I and analyzed for inorganics and radioactivity (Table 2.1-3). The results of these analyses indicated that the ditch water contained a number of constituents above representative groundwater and upstream river water concentrations (Table 4.2.3-3). These included arsenic (1.76 mg/l), cadmium (0.034 mg/l), copper (0.163 mg/l), fluoride (61.6 mg/l), total phosphorus (2,590 mg/l), potassium (7,470 mg/l), selenium (4.2 mg/l), sulfate (8,400 mg/l), and zinc (5.25 mg/l). Note the presence of four of the six characteristic constituents (underlined).

Gross alpha and gross beta activities were both enriched in the Phase I water sample (155 ± 95.9 pCi/l and 6,890 ± 145 pCi/l).

Six sediments samples were taken along the length of the IWW ditch (Figure 2.1-2) and analyzed for inorganics and radioactivity. The composition of the soil matrix among these samples was varied, as seen by the range in calcium concentrations (72,800 to 161,000 mg/kg) (Table 4.2.3-3). All six samples contained above-representative ranges of a number of constituents related to EMF industrial activities. Using the characteristic constituent scheme presented in the summary above, it appears that the soil matrices contain varying percentages of precipitator dust and ore. The presence of ore in the ditch sediments is expected because the ditch runs immediately to the east of the FMC ore piles. The presence of precipitator dust is unexpected because the IWW wastewater is well water used for noncontact cooling. However, as will be described in the sediments section of this report (Section 4.5), microscopic analysis of thin sections made from river sediments taken at the mouth of the ditch, and compared with samples of ore, slag, and precipitator dust, indicates the matrix contained ore and precipitator dust.

Gross alpha and gross beta levels were also obtained on the ditch sediments (Table 4.2.3-3). As would be expected for materials that contain ore and precipitator dust, both gross alpha and gross beta activities were enriched. The range for gross alpha was 116 ± 16.72 pCi/g to 299 ± 32.8 pCi/g. The range for gross beta was 73.4 ± 7.98 pCi/g to 134 ± 19.44 pCi/g.

Phase II Results for IWW Ditch Water. During Phase II, 14 time-composite samples were taken of the ditch water over a 2-week period, and the six samples obtained during the three highest periods of flow and the three lowest periods of flow were sent to the laboratory for analyses. The results of these analyses indicate a significantly different water quality than that found in the ditch in Phase I. (A comparison of Phase I and Phase II IWW ditch water is given in Section 4.5.1.3.) For the most part, all six samples have the same water quality as that found in monitoring well 125, which is not impacted by site releases near the FMC production well (FMC-3) from which the water is pumped. The time composites are more representative of ditch water quality. FMC is investigating the cause of the Phase I excursion. Gross alpha activities in the Phase II samples were either not detected (2 pCi/l) or were within the representative groundwater levels. Gross beta activities were also low. However, there was one sampling event in Phase II (July 29, 1993-sample IWG) where radium-228 was detected at 6.5 ± 0.8 pCi/l.

Railroad Swale. One sample of standing water in the railroad swale was taken and analyzed for inorganics and radionuclides. Because the aluminum concentration found in this sample was elevated, it is likely that the parameters found in the water are more reflective of suspended sediments than the dissolved fraction. Compared with surface water or representative groundwater concentrations, this water sample contained enriched levels of a number of site-related constituents. These included cadmium (0.152 mg/l), copper (0.139 mg/l), fluoride (4.2 mg/l), total phosphorus (21.3 mg/l), vanadium (0.77 mg/l), and zinc (1.58 mg/l) (Table 4.2.3-3). Note the presence of five of the six characteristic constituents (underlined).

Analysis of the sediment sample from the bottom of the swale revealed a range of constituents whose concentrations were above those found in representative soils (Table 4.2.3-3). An examination of the individual constituent concentrations and their ratios indicates that this sample contains a substantial amount of ore. This is not surprising given that it is just downwind from the ore pile and the ore handling facilities.

Gross alpha (155 ± 25.6 pCi/g) and gross beta (72 ± 8.94 pCi/g) activities were above the representative range for soils (Table 4.2.3-3). This is not unexpected if the swale sediment sample contains an ore fraction. In the ore sample, the ratio of gross alpha to gross beta was about 2 to 1; the same ratio was found in the swale sediment.

Coke-Washing Pond. A sediment sample was collected during Phase I from the concrete-lined coke-washing pond (Figure 2.1-2). This sample was tested for inorganics and radioactivity (Table 2.1-2). The results indicate a mineral-poor matrix with no constituents above surface-soil representative levels (Table 4.2.3-5).

No detectable levels of gross alpha or gross beta were found in the coke-settling pond sediment sample (Table 4.2.3-5).

Summary. In general, the ore processing operations concentrate or disperse ore-related constituents in relatively unique ways. There is a set of six characteristic constituents in the ore that typically appear in the byproduct and waste streams. These six constituents are total phosphorus, fluoride, cadmium, chromium, vanadium, and zinc. At least four of these constituents will be present in any byproduct or waste material.

There are other trace metals and cations that allow source materials to be identified by the level of their enrichment or depletion. However, these six are characteristic of FMC-related byproducts and wastes. The following list presents distinguishing characteristics for each of the examined materials, as analyzed using EPA methods. The constituents highlighted by bold print are the most distinguishing characteristics. The EPA methods do not guarantee total digestion of a sample. The values are estimates, as they are not based on a statistically significant number of samples. Figures 4.2.3-1, 4.2.3-2, and 4.2.3-3 present the following characteristics in a graphical format.

- Ferrophos:
  - **Greater than 2,000 mg/kg vanadium and chromium**
  - **Greater than 30,000 mg/kg iron**
  - Less than 10 mg/kg arsenic and lead
  - Greater than 50 mg/kg molybdenum
  - Greater than 500 mg/kg nickel
  - Less than 2,000 mg/kg total phosphorus and potassium
  - Less than 70 pCi/g gross alpha
  - Less than 55 pCi/g gross beta
- Slag:
  - **Greater than 200,000 mg/kg calcium**
  - **Less than 10 mg/kg lead and arsenic**
  - **Up to 500 mg/kg vanadium and zinc**
  - Greater than 6,000 mg/kg potassium
  - Greater than 10,000 mg/kg fluoride
  - Between 180 and 240 pCi/g gross alpha
  - Between 75 and 100 pCi/g gross beta

- Ore:
  - **Greater than 60,000 mg/kg total phosphorus**
  - **Greater than 500 mg/kg chromium, vanadium, and zinc**
  - **Greater than 10 mg/kg arsenic**
  - Greater than 200,000 mg/kg calcium
  - Greater than 10,000 mg/kg fluoride
  - Greater than 200 pCi/g gross alpha
  - Approximately 400 pCi/g gross beta
- Phossy solids:
  - **Greater than 20,000 mg/kg zinc**
  - **Greater than 1,500 mg/kg cadmium**
  - **Greater than 200 pCi/g lead-210**
  - Less than 100 mg/kg vanadium and silver
  - Greater than 15,000 mg/kg potassium
  - Greater than 20,000 mg/kg total phosphorus
  - Greater than 20 mg/kg arsenic
  - Greater than 200 mg/kg lead
  - Between 70 and 300 pCi/g gross alpha
  - Between 250 and 770 pCi/g gross beta
- Precipitator slurry/dust:
  - **Greater than 10,000 mg/kg zinc**
  - **Greater than 100 mg/kg silver**
  - **Greater than 10,000 mg/kg potassium**
  - **No lead-210**
  - Greater than 200 mg/kg arsenic
  - Greater than 20,000 mg/kg total phosphorus
  - Approximately 120 pCi/g gross alpha
  - Approximately 580 pCi/g gross beta
- Calciner fines
  - **Greater than 100,000 mg/kg fluoride and calcium**
  - **Greater than 20,000 mg/kg potassium**
  - **Up to 800 mg/kg selenium**
  - Greater than 15,000 mg/kg total phosphorus and sodium
  - Greater than 2,000 mg/kg zinc
  - Greater than 600 mg/kg vanadium
  - Greater than 300 mg/kg cadmium
  - Greater than 20 mg/kg silver
  - Approximately 225 pCi/g gross alpha
  - Approximately 110 pCi/g gross beta
  - No lead-210 or uranium-238

4.2.3.2 Onsite Soils – Areas Without Sustained Hydraulic Head

This section discusses the results of the RI Phase I and Phase II onsite soil investigation for areas where there was no sustained hydraulic head accompanying the potentially impacted soil. Where appropriate, results from the 1990 FMC Facility Assessment (FFA) are also included. As discussed in Section 3, the Pocatello area receives only about 11 inches of precipitation during the course of a year. Evapotranspiration is, in fact, negative. Therefore, areas where dry materials have been placed either deliberately (grading fill, slag pile) or inadvertently (wind-blown particulates) will lack a sustained driving head of liquid to promote subsurface migration. For this reason, these areas are examined separately from former unlined ponds that would have had a transport mechanism.

Areas without sustained hydraulic heads include: the PCB storage shed; phossy waste/precipitator slurry pipeline cleanout areas; FMC septic drainfields; railroad swale; tree-line area adjacent to former Pond 7S; long-term phosphorus storage area; railcar loading/unloading area; secondary condenser area; former transformer salvage area; Bannock Paving Company area; chemical laboratory drain pit; paved area north of the furnace building; area west of the mobile shop; phos dock area; shale ore handling area; roads; waste oil storage area; 9S storage area; active landfill; and 8S recovery process.

Former PCB Storage Shed. The PCB storage shed was a concrete structure formerly used to store drums of transformer oil that contain concentrations of PCBs in excess of 50 mg/kg. Three borings (F043B, F044B, and F045B) were advanced in the former PCB storage shed area (see Figure 2.1-1 for locations). Five soil samples were taken at approximately 2.5-foot intervals in each borehole and tested for inorganic parameters and PCBs. The EPA-approved work plan provided for the first sample in each borehole to be taken just below the fill and native soil interface. Hence, no samples were taken at the surface in this area.

The first sample at boring F043B was obtained at a depth of 17 feet in a dark, yellowish brown silt. This means there was approximately 17 feet of identifiable fill material above the sampling point. An examination of the data showed concentrations of several constituents above or in the higher end of the representative range in the first 5 feet below the fill/native soil interface (Table 4.2.3-5). These included barium (223 mg/kg at 17 feet), lead (21.3 mg/kg at 17 feet), potassium (3,310 mg/kg at 17 feet), and zinc (71 mg/kg and 55.6 mg/kg at 17 feet and 19.5 feet, respectively). Mercury was above representative levels in the 22-foot sample (0.79 mg/kg), and sodium concentrations increased with depth to above-representative levels (1,000 to 1,550 mg/kg). The mercury value appears to be isolated and is likely to be a laboratory artifact. While there are several constituents

above representative levels at the interface, there does not appear to be any penetration into the subsurface of the trace metals, nor are the characteristic constituents of the site present at above-representative levels.

Radioactivity levels in F043B were generally within the representative range (Table 4.2.3-6). The one exception was for gross alpha (25.3 ± 10.76 pCi/g) in the 27-foot soil horizon. This is just above representative levels (24.7 pCi/g), and the high uncertainty value was an indication of a "soft" result. In other words, the gross alpha is probably not above representative levels.

The first sample at boring F044B was taken at 2 feet in a very dark grayish brown silt. This color pattern was repeated for the next two samples (4.5 feet and 7 feet). Surficial soils having a grayish hue were generally linked with fill materials. This was confirmed by the analytical data for these three samples (Table 4.2.3-5). All contained significantly elevated concentrations of trace metals, calcium, fluoride, and total phosphorus. For example, high values for the FMC characteristic constituents were 229 mg/kg of cadmium, 834 mg/kg of chromium, 19,800 mg/kg of fluoride, 84,000 mg/kg of total phosphorus, 881 mg/kg of vanadium, and 1,610 mg/kg of zinc. However, the 9.5- and 12-foot samples were yellowish brown silts, which is typical of native soils. In these horizons, the trace metal levels fell to representative levels (except zinc, which was slightly above the representative level [60.9 mg/kg]), and fluoride and total phosphorus, which were close to representative levels (630 and 1,400 mg/kg, respectively). This abrupt break in concentration levels indicates that there is little subsurface migration occurring from the fill into the natural soils.

Both gross alpha and gross beta readings were above the representative level for the first three sample horizons in boring F044B (Table 4.2.3-6). Since radionuclides are associated with ore and site byproducts, this was expected given the presence of site-related inorganics. The 9.5-foot sample also contained above-representative levels of gross alpha (81.6 ± 23.4 pCi/g) and gross beta (45 ± 10.1 pCi/g). This indicates that there has been some radionuclide migration into the native soils. However, the depth of migration is limited as readings in soil samples taken at 12 feet (19.9 ± 10.72 pCi/g for gross alpha and 26.1 ± 8.34 pCi/g for gross beta) were within the range for representative soils.

The first sample in boring F045B was taken at 3 feet. Further samples were taken at 5.5, 8, 10.5, and 13 feet below the ground surface. However, while the entire sampled column was a yellowish brown silt, it was also a fill; that it is a fill material is seen by examining the chemical analysis data. Concentrations of boron, cadmium, potassium, total phosphorus, and zinc fluctuated above representative levels for much of the sample intervals (Table 4.2.3-5). By the 10.5-foot horizon, all

constituents were close to representative levels and at 13.5 feet were below representative levels. The area sampled by this boring appeared to be a mixture of predominantly native silts with some site-related byproduct. The observed distribution of constituents indicated mechanical mixing rather than a chromatographic gradient caused by leaching.

Gross alpha readings, while on the high side of the representative range, were still within that range (Table 4.2.3-6) for the 3-, 5.5-, and 10.5-foot horizons. They were well below the upper representative range in the 13-foot sample. Gross beta readings were slightly above representative levels in the 5.5-foot soil horizon (32.6 ±5.2 pCi/g) but below in all others.

The PCB Aroclor 1260 was detected in boring F044 at 2 feet (0.58 mg/kg), 4.5 feet (0.03 mg/kg), and 7 feet (0.01 mg/kg). All three samples were taken in fill. No other soil samples tested for PCBs had detectable (at 0.65 mg/kg) quantities. Hence, there does not appear to have been any movement of PCBs into the native soil subsurface.

Summary. Fill was found in all three boreholes. It ranged from 7.5 feet to 17 feet deep. All three fills sampled at this location showed some facility impact. Native soils sampled beneath the fills indicated that little to no migration of trace metals, radionuclides, or other inorganics had occurred. Low levels of PCBs were detected in three of 15 soil samples taken in the subsurface at the former PCB storage shed. The three affected samples were in fill. There was no evidence of movement into the native soils below the fill.

Phossy Waste/Precipitator Slurry Pipeline Cleanout Areas. As was discussed in Sections 1 and 2, the pipelines leading from the production area to the surface impoundments in the western portion of the facility require periodic maintenance. These maintenance activities may lead to releases of small amounts of waste-related materials to the ground in the vicinity of maintenance access ports. Ten areas were selected for investigation. As with the former PCB storage shed investigation, the intent was to advance borings to the first native soil encountered and take two samples. Soil samples were tested for inorganics and radioactivity (Table 2.1-2).

As discussed above, precipitator slurry and phossy water/solids were generally very rich in cadmium, copper, lead, silver, and zinc, as well as containing other FMC-related trace metals and inorganics. These metals were used in the analysis described below to determine if there is any impact from releases of precipitator slurry or phossy water/solids.

Boring F070B is located just to the north of Pond 8E (Figure 2.1-1). Two samples were taken at depths of 3 and 5 feet below ground surface. The materials sampled

were a brown and brown-tan silt. Native silts in this area and at those depths should be yellowish brown. Therefore, it is likely that the materials sampled were a mixture of fill and native soils. This is borne out by the chemistry results of the two samples (Table 4.2.3-7). The following constituent concentrations were above the representative range for native soils: cadmium (1.9 to 8.3 mg/kg); fluoride (720 to 1,090 mg/kg); total phosphorus (1,030 to 2,020 mg/kg); and zinc (88.8 to 209 mg/kg). The lower values were all from the 5-foot horizon. Gross alpha was above the representative range in both samples (high of 31.9 ± 18.28 pCi/g in the 5-foot horizon) (Table 4.2.3-6). Gross beta was also above the representative level in the 5-foot sample. All of the readings had relatively high uncertainty levels. Given the relative degree of enrichment of the inorganic parameters, it is likely that the reported radioactivity readings are biased high. Parameters directly traceable to precipitator slurry or phossy water/solids were not apparent at this location. Depth of facilities impact was not determined at this boring.

Two samples were taken from boring F071B at depths of 5 and 7 feet below ground surface. Boring F071B is located just to the east of the mobile shop (Figure 2.1-1). The materials sampled were brown silt with trace of slag and a gray gravelly silt. Native silts in this area and at those depths should be yellowish brown. Therefore, it is likely that the material sampled was primarily fill. However, the enrichment in these samples of FMC-related parameters was relatively low (Table 4.2.3-7). The following constituent concentrations were above the representative range for native soils: boron (20.6 mg/kg at 5 feet); cadmium (2.3 mg/kg at 5 feet); fluoride (750 mg/kg at 5 feet); mercury (0.4 mg/kg at 5 feet); total phosphorus (1,140 to 1,700 mg/kg at 7 and 5 feet, respectively); and zinc (58.2 to 85 mg/kg at 7 and 5 feet, respectively). Both gross alpha and gross beta readings were within the range for representative levels (Table 4.2.3-6). Parameters directly traceable to precipitator slurry or phossy water/solids were not apparent at the depths sampled at this location. While the vertical extent of site impact was not determined at this boring, it appeared to decline with depth.

Boring F072B was sampled at two depths (8 and 10 feet). Slag fill was encountered above these depths. The borehole is located to the south of F071B (Figure 2.1-1). The samples were brown silt with a trace of slag and brown silt. Neither of these samples was from native soils. The analytical results indicated some site impact (Table 4.2.3-7). Concentrations of constituents over representative levels included boron (21.2 mg/kg at 8 feet); cadmium (4.1 mg/kg at 8 feet); chromium (43.5 mg/kg at 8 feet); fluoride (840 to 2,450 mg/kg at 10 and 8 feet, respectively); total phosphorus (1,020 to 1,150 mg/kg at 8 and 10 feet, respectively); and zinc (71.3 to 199 mg/kg at 10 and 8 feet, respectively). Both gross alpha (33.3 ± 11.52 pCi/g) and gross beta (33.7 ± 7.36 pCi/g) were above the representative range in the 8-foot sample (Table 4.2.3-6). Parameters directly traceable to precipitator slurry or phossy water/solids were not

apparent at the depths sampled at this location. While the vertical extent of site impact was not determined at this boring, it appeared to decline with depth.

Boring F073B is located approximately 300 feet to the west of boring F072B. It was sampled at two depths (14 and 16 feet). Slag fill was encountered above these depths. The samples were slag (2 to 3 inches) to brown silt. The analytical results indicated some site impact (Table 4.2.3-7) in the upper sample that contained the slag. Constituent concentrations above representative levels included cadmium (11.6 mg/kg); fluoride (740 mg/kg); total phosphorus (2,620 mg/kg); and zinc (316 mg/kg). With the exception of mercury (0.44 mg/kg), which was not detected in the 14-foot sample, and total phosphorus (2,160 mg/kg), constituents at the 16-foot horizon were within the representative range. While the vertical extent of facility-related impact with respect to total phosphorus was not determined, the remaining constituents appeared to be confined to the 14-foot level or above. Gross alpha and gross beta were below representative levels in both soil samples (Table 4.2.3-6). Parameters directly traceable to precipitator slurry or phossy water/solids were not apparent at the depths sampled at this location.

Boring F074B is located just south of boring F073B (Figure 2.1-1). It was also sampled at two depths (10 and 12 feet). Slag fill was encountered above these depths. The samples were gravel/slag fill and brown silt. The analytical results confirmed the presence of slag in the top sample and showed some site impact in the lower sample (Table 4.2.3-7). Constituents at above-representative levels for the slag/gravel sample included cadmium (32.3 mg/kg); fluoride (2,690 mg/kg); lead (84.5 mg/kg); mercury (0.33 mg/kg); total phosphorus (12,000 mg/kg); vanadium (52.9 mg/kg); and zinc (3,750 mg/kg). As is true with most slag/natural soil interfaces, there was little evidence of downward migration of trace metals. With the exception of zinc, which at 59.4 mg/kg was barely above the representative range of 52 mg/kg, all other trace metals were at representative levels in the silt. The only other constituent that was found at above-representative levels in the lower sample was total phosphorus (2,320 mg/kg). Constituents directly traceable to precipitator slurry or phossy water/solids were not apparent at this location.

Gross alpha activity was reported at above-representative levels in the 12-foot sample taken in boring F074B (71.8 ± 16.04 pCi/g) (Table 4.2.3-6). Gross beta was also reported at above-representative levels for the 12-foot sample (77.8 ± 10.2 pCi/g). They were both reported as being below representative levels in the 10-foot sample. At the EMF facilities, radioactivity levels should parallel the inorganic content of the samples analyzed. In other words, a soil impacted by site-related inorganics such as is found at 10 feet in F074B should also contain enriched levels of radionuclides. Since this does not appear to be the case here, there is strong reason to believe the sample results were switched. The one exception to the relative correlation of site-

related inorganics to radioactivity readings would be in the case of volcanic rocks (especially rhyolitic) or gravel where naturally occurring radionuclides could give readings above the representative range of the EMF soils.

Boring F075B is approximately 200 feet southeast of boring F074B. It was sampled at two depths (5 and 7 feet). Slag fill was encountered above these depths. The samples were brown silt with a trace of gravel. The analytical results indicate that these samples were not site-impacted (Table 4.2.3-7). There was a slightly above-representative level of zinc in the upper sample (65 mg/kg) but this could be associated with the gravel. Site impact at this boring was only to the depth of the overlying slag. Parameters directly traceable to precipitator slurry or phossy water were not apparent at this location.

Gross alpha was above the representative range in the sample taken at 7 feet (31.1 ± 17.56 pCi/g) (Table 4.2.3-6). Gross beta was also above the representative range in the 7-foot sample. Both readings had relatively high uncertainty levels. Given the relative degree of enrichment of the inorganic parameters, it is likely that the reported radioactivity readings are biased high.

Two samples were taken at boring F076B (15 and 17 feet). Slag fill was encountered above these depths. Both samples were brown silt. This boring is located approximately 300 feet west of F075B. The soil in the upper sample contained levels of constituents that are within the representative range (Table 4.2.3-7), with the exception of boron (23.1 mg/kg) and total phosphorus (1,470 mg/kg). However, the lower sample indicated site-related impact. Constituent concentrations found at above-representative levels in the deeper sample included boron (26.1 mg/kg); cadmium (3.3 mg/kg); fluoride (820 mg/kg); total phosphorus (4,760 mg/kg); and zinc (139 mg/kg). Unless the samples were reversed in the field (mislabeled), the analytical results indicated the potential for mechanical mixing (i.e., these two samples are in fill, not native soils). An assumed leaching migration pattern from the top to the bottom should leave some evidence of impact in the upper sample. This did not appear to be the case. The radioactivity readings support the theory that the sample results were mislabeled (Table 4.2.3-6). Gross alpha levels were higher in the upper sample than in the lower. This would indicate some migration from the overlying slag, not an unusual occurrence. Hence, there appeared to be little vertical migration of site-related constituents beyond 15 feet.

Boring F077B is located approximately 100 feet to the northeast of F076B (Figure 2.1-1). It was sampled at two horizons (5 and 14 feet). Slag fill was encountered above these depths. The samples were brown sandy silt with gravel and brown silt to gravel, respectively. It is likely that the gravels called out in the log were slag. The analytical results confirmed the presence of slag in both samples (Table 4.2.3-7).

In fact, a large portion of what was analyzed in the 5-foot sample appeared to be slag. This was concluded from an examination of the calcium values obtained in the samples. Slag is a calcium silicate that is also rich in fluoride with impurities. The very high value of calcium detected in this sample (196,000 mg/kg) coupled with the relatively high fluoride value (12,600 mg/kg) indicated a high percentage of slag matrix. Other constituent concentrations found at above-representative levels for the 5- and 14-foot samples included the usual range of site-related elements: cadmium (14.2 and 98.2 mg/kg, respectively); chromium (124 and 208 mg/kg, respectively); fluoride (12,600 and 2,660 mg/kg, respectively); lead (106 mg/kg in the 14-foot horizon); total phosphorus (5,840 and 9,960 mg/kg, respectively); vanadium (114 and 211 mg/kg, respectively); and zinc (302 and 5,080 mg/kg, respectively). In general, the 14-foot sample contained higher concentrations of site-related elements than did the 5-foot sample. An evaluation of the concentrations and mix of the elements contained in the lower sample indicates the presence of more than slag. In fact, the presence of elevated levels of zinc, nickel (48.2 mg/kg), silver (32.4 mg/kg), and lead points to the presence of phossy water/solids or precipitator slurry components.

Boring F078B was also sampled at two depths (25 and 27 feet). Slag fill was encountered above these depths. The samples were tan silt and brown silt. With the exception of fluoride (800 mg/kg) and total phosphorus (1,140 mg/kg) at the 25-foot horizon, the analytical results indicated that the soils at these depths are not site-impacted (Table 4.2.3-7). Gross alpha and gross beta were also within the representative range for both sample horizons (Table 4.2.3-6). This continues to confirm the hypothesis that slag-related materials are not mobile in the subsurface. Parameters directly traceable to precipitator slurry or phossy water/solids were not apparent at this location, which is just to the west of Pond 8S.

Boring F079B is located to the north of the 8S recovery process (Figure 2.1-1). It was sampled at 5 and 7 feet below the ground surface. Slag fill was encountered above these depths. The samples were red-brown clayey silt and red-brown silt, which are not naturally occurring colors in FMC near-surface soils. This boring is located in the area of former Pond 6S. The analytical results indicated a potential precipitator slurry or phossy water/solids impact in both soil samples (Table 4.2.3-7). This indication was given by the elevated levels of boron (18.8 and 35.4 mg/kg, respectively); cadmium (121 and 231 mg/kg, respectively); copper (20.9 mg/kg at the 7-foot horizon); fluoride (1,730 and 3,650 mg/kg, respectively); lead (28.8 and 84.1 mg/kg, respectively); silver (5.8 and 25.3 mg/kg, respectively); and zinc (1,960 and 6,960 mg/kg, respectively) and relatively low levels of calcium. In addition there were a number of other parameters that were above representative levels. However, precipitator slurry and/or phossy water solids are generally not reddish in color, so there is the possibility that this was another site-related material. Since the

7-foot sample was impacted and contained elements at higher concentrations than those found in the 5-foot sample, the vertical extent of the impact was not determined at this location.

Both the 5-foot and the 7-foot samples contained above-representative levels of gross alpha and gross beta (Table 4.2.3-6). This is in keeping with the theory that site-impacted soils will generally have above-representative radioactivity readings.

Summary. Ten locations along the pipelines leading from the plant to the surface impoundments that carry phossy water/solids and precipitator slurry were sampled to investigate the presence of releases from these two potential sources. Two locations (borings F077B and F079B) were found to have evidence of releases. The vertical extent of the impact was not determined during Phase I or Phase II. However, neither location was sampled at a substantial depth (greater than 10 feet) into the naturally occurring soils to determine if migration was actually occurring.

Impacts related to other site activities, such as placement of fill, were evident in most of the locations sampled. The depth of visually recognizable fill, which generally contains slag and other site-related materials, varied considerably (3 to 25 feet) across the locations sampled. For the most part, when native subsurface soils were sampled, site-related parameters did not appear to be migrating into them from the overlying fill. The parameters that are noted to have some migration potential are fluoride, total phosphorus, potassium, sodium, and low levels of zinc.

Septic Drainfields. Four locations were sampled in the area of the septic drainfields east of the facility main gate. Each boring was advanced to between 10 and 11 feet, and three to five separate soil samples were taken at each location. The samples were analyzed for the normal suite of inorganic parameters plus gross alpha and gross beta.

Three soil samples were obtained at depths of 0, 7.5, and 10 feet at boring F046B (Figure 2.1-1). The three samples were topsoil (fill), slag gravel, and dark yellowish brown silt, respectively. The uppermost sample contained slightly elevated concentrations of fluoride (640 mg/kg), nickel (17 mg/kg), potassium (4,290 mg/kg), sodium (939 mg/kg), and zinc (59.2 mg/kg) (Table 4.2.3-8). The fill sample taken at the 7.5-foot horizon also contained slightly above-representative values for cadmium, total phosphorus, and zinc. Fluoride was present at 1,160 mg/kg, about twice the representative range; all other parameters were within the representative range. The 10-foot sample, which was taken in natural soils, contained no above-representative levels of any of the parameters tested. No above-representative readings of gross alpha or gross beta were detected in any of the samples (Table 4.2.3-6). Hence there is no evidence of migration from the overlying fill of

materials into the subsurface natural soils. Also, no evidence was found of a septic field impact.

Boring F047B was advanced to 10 feet and samples taken at 2.5-foot intervals (total of five). The surficial topsoil sample had above-representative levels of cadmium (2.7 mg/kg), chromium (26.8 mg/kg), copper (20.1 mg/kg), fluoride (700 mg/kg), nickel (17 mg/kg), total phosphorus (1,200 mg/kg), potassium (5,270 mg/kg), and zinc (90.4 mg/kg) (Table 4.2.3-8). With the exception of fluoride (610 mg/kg) in the 2.5-foot horizon, no constituent was at above-representative levels in the next two sample depths. These soils were dark yellowish-brown silts. There was a slight soil-type change at 7.5 feet to a dark brown silt, and with it appeared above-representative levels of cadmium (4.4 mg/kg), fluoride (800 mg/kg), nickel (14.3 mg/kg), total phosphorus (1,320 mg/kg), and zinc (89.8 mg/kg). Since the horizon immediately above did not contain above-representative levels of these constituents, it can be concluded either that they are naturally occurring or that the soils have been laid down mechanically by site personnel. Concentrations of constituents in the soil sample at the 10-foot horizon, with the exception of total phosphorus (873 mg/kg), have returned to representative levels. Therefore, there does not appear to be migration of trace metals from the overlying soil horizons into the subsurface. Gross alpha readings were at the high end of representative levels (22.1 ± 9.52 pCi/g) for the surficial sample but were well within representative levels for the remaining horizons (Table 4.2.3-6). Gross beta readings remained relatively constant and below representative levels for all horizons.

Like boring F047B, F048B was advanced from the surface to 10 feet, with soil samples taken at 2.5-foot intervals. Of the trace metals tested for, only zinc was above the representative level, and that was in the surficial sample. The uppermost sample was a dark brown topsoil fill; the remaining four were yellowish brown silts. While there were several above-representative fluoride values at the surface and 5-foot levels, there does not appear to be any systematic association between them and other (potassium and total phosphorus) constituents that were above representative levels (Table 4.2.3-8). The surficial sample had enriched levels of gross alpha (85.8 ± 25.6 pCi/g) and gross beta (36.5 ± 8.26 pCi/g) (Table 4.2.3-6). However, gross alpha and gross beta in the remaining soil horizons were all within representative levels.

Finally, samples were taken at five horizons in boring F049B. All five intervals are yellowish to light yellowish-brown silts. Fluoride and potassium were consistently high at all five sample horizons, and mercury was present at detectable to slightly above representative levels in all five soil samples (Table 4.2.3-8). The remaining constituents were generally at representative levels. Since fluoride, potassium, and mercury are not generally associated together without the presence of other constituents, their source in this borehole is unknown. Gross alpha (54.8 ± 19.38

pCi/g) and gross beta (37 ± 8.3 pCi/g) were above representative levels in the surficial soil sample (Table 4.2.3-6). As with boring F048B, the remaining sample horizons did not contain above-representative levels of radioactivity.

Summary. The septic drainfield area appears to have trace metals, anions (fluoride and total phosphorus), gross alpha, and gross beta in the surficial topsoils that are at above-representative levels. With a few exceptions, the concentrations of these parameters do not persist with depth. The impact of site-related activities has been minimal in the area.

Railroad Swale. The railroad swale occupies an area approximately 30 feet wide and 1,000 feet long. It has been partially excavated by FMC, and the excavated zone has been filled with slag to create a drainage trench. The swale is being lined with HPPE as a temporary measure. It receives runoff principally from the main plant area. Four boreholes (F039B, F040B, F041B, and F042B) were used to investigate subsurface conditions in this area during Phase I (Figure 2.1-1). An additional boring (F131B) was drilled to groundwater (80 feet) near F042B during Phase II. The samples were tested for inorganics and radioactivity (Table 2.1-2).

Boring F039B was advanced to 10 feet and soil samples taken at 2.5-foot intervals. The first three samples are dark, yellowish brown, silty gravel fill. The remaining two samples are grayish brown silt. The soil samples taken at the surface and 2.5-foot horizon were heavily enriched with both trace metals and fluoride and total phosphorus (Table 4.2.3-9). A comparison of the metals mix found in these two horizons with that determined to be in slag, ferrophosphorus, precipitator dust, and ore indicates that the majority, if not all, of the enrichment is related to the presence of phosphate ore. Grayish brown silt generally indicates some non-native impact (mixing) since the native silts are yellowish brown to brown. The soil samples taken in the lower two horizons (7.5 and 10 feet) are both grayish in hue and showed some enrichment of trace metals, total phosphorus, and fluoride. Since there is no definitive high-to-low gradient between the two horizons across all parameters, it is not clear whether the levels found in the 10-foot-horizon soils are from mechanical mixing at the time of placement or leaching.

Gross alpha and gross beta activities were above representative levels for both the surficial and 2.5 -foot horizons. The highest readings (280 ± 57 pCi/g for gross alpha and 82.2 ± 12.92 pCi/g for gross beta) were at 2.5 feet (Table 4.2.3-6). Radioactivity in the remaining samples was within the representative range. This indicates little to no migration from the upper layers is occurring. The vertical extent of site impact was not reached at this boring.

Two soil samples were taken in boring F040B at depths of 14 and 16.5 feet below the soil surface. The first 14 feet of the boring was in slag. The samples are a yellowish brown silt, the color of native representative soils. An evaluation of the analytical results for the 14-foot-horizon sample indicates that with the exception of total phosphorus (1,450 mg/kg), constituent concentrations were within the representative range (Table 4.2.3-9). However, the 16.5-foot sample contained above-representative levels of cadmium (13.4 mg/kg), chromium (35.2 mg/kg), fluoride (1,260 mg/kg), nickel (15.5 mg/kg), total phosphorus (2,450 mg/kg), and zinc (232 mg/kg). Since these levels were not present in the overlying sample, it appears that there has been some mechanical mixing at this location during construction of the swale.

Gross alpha and gross beta activities were within the representative range for the 14-foot sample (Table 4.2.3-6). An insufficient quantity of sample was obtained at the 16.5-foot horizon to allow for a radioactivity analysis. This was due to refusal in a sandy gravel at 17 feet. The vertical extent of site impact was not determined in this borehole.

Three samples were collected at F041B at depths of 7.5, 10, and 12.5 feet. The first (top) sample was slag fill and the two remaining were black silt (fill). The upper sample contained a number of constituents well above representative levels (Table 4.2.3-9): arsenic (21.1 mg/kg), cadmium (282 mg/kg), chromium (988 mg/kg), copper (125 mg/kg), fluoride (13,300 mg/kg), nickel (188 mg/kg), total phosphorus (53,600 mg/kg), selenium (17.5 mg/kg), silver (17.7 mg/kg), vanadium (1,290 mg/kg), and zinc (4,210 mg/kg). The chemical makeup of this sample indicates that the slag is probably mixed with ore. There is a sharp break in constituent makeup between the slag and the silt fill, with most constituents in the silt being well within the representative range. Since the boring did not penetrate to native soils, the vertical extent of potential impact was not defined in this location. However, it can be observed that there is little to no migration of constituents from the impacted upper horizons into the lower zones.

Gross alpha and gross beta activities were above representative levels in the 7.5-foot sample (96.91 ± 22 pCi/g and 62.62 ± 11.7 pCi/g, respectively). However, both were within representative levels for the 10- and 12.5-foot horizons (Table 4.2.3-6). These results further demonstrate that the site-impacted fills are associated with above-representative levels of radioactivity and that these radionuclides are not particularly mobile in the subsurface.

Boring F042B was advanced to 12.5 feet below ground surface. Soil samples were taken at 7.5, 10, and 12.5 feet. All three soil samples are brown silts. Several constituents in the 7.5-foot sample (beryllium, cadmium, chromium, fluoride, total

phosphorus, vanadium, and zinc) were slightly above the expected representative range (Table 4.2.3-9). This sample was taken at the slag/soil interface. However, by the 12.5-foot horizon, all constituents (except beryllium at 1.5 mg/kg versus 1.2 mg/kg representative) had returned to representative levels. Gross alpha and gross beta readings were within representative levels for all three samples (Table 4.2.3-6). Since these samples appear to have been taken in native soil, the depth of impact has been determined at this location.

Phase II Results for the Railroad Swale. Because only one of the sample locations in this area actually determined the depth of impact during Phase I, during Phase II boring F131B was advanced to 80 feet near the location of F040B. Groundwater was encountered at 67 feet. The first 18 feet of the borehole was in slag. Due to the high gravel content of the horizon between 18 and 37 feet, no samples were recovered. The first sample to be successfully taken was at the 40-foot horizon. It was described as a medium- to coarse-grained sand. Total phosphorus was the only constituent detected at concentrations above representative levels (Table 4.2.3-9). Gross alpha and gross beta were within representative levels in this horizon (Table 4.2.3-6).

The next horizon sampled was a yellowish-brown clayey silt at 60 feet. This sample also only had total phosphorus at above-representative concentrations (880 mg/kg, representative level is 851 mg/kg). At 70 feet, a fatty, pale, olive-gray clay was sampled. This clay contained above-representative levels of cadmium (1.9 mg/kg), calcium (107,000 mg/kg), and fluoride (648 mg/kg). Other than cadmium, no other trace metals were enriched. The last sample taken was at 80 feet where all constituents were within the representative range. The first real opportunity to determine if there was measurable migration of site-related constituents into this subsurface was at 60 feet, where the first fine-grained horizon was encountered. Since this sample was essentially at representative levels, it can be concluded that there has been no deep migration of measurable quantities in this subsurface. The above-representative constituents found in the fatty clay appear to be naturally occurring since they are not accompanied by other site-related constituents that would be expected to be mobile (e.g., total phosphorus and potassium).

Summary. Borings in the area of the railroad swale encountered slag and fill layers from 7.5 to 18 feet thick. Samples taken within these layers contained above-representative concentrations of site-related constituents, which include gross alpha and gross beta. These concentrations were observed to decrease with depth. In two borehole locations, soil samples were taken at depths greater than 2.5 feet below the fill/native soil interface. Samples taken at these depths showed little to no impact from site-related activities. This supports the conceptual model, in that areas with little to no hydraulic head do not have materials migrating into the subsurface.

Tree-Line Area Adjacent to Former Pond 7S. Former Pond 7S was used for impounding precipitator slurry. The tree-line area lies just to the east along an access road. Three sample points were located between the trees and the pond itself (Figure 2.1-1). Soils taken from this area were tested for inorganics, gross alpha, gross beta, and PCBs.

Boring F055B was advanced to 5 feet, and two samples were taken at the 3- and 5-foot horizons. The samples were a brown silty material. The 3-foot soil sample contained several trace metals (cadmium, chromium, copper, lead, nickel, silver, vanadium, and zinc) and fluoride and total phosphorus (Table 4.2.3-10) considerably above representative levels. While chromium, copper, lead, silver, and vanadium values returned to representative levels at the 5-foot horizon, the remaining constituents did not. This is not surprising as the samples were probably within the pond area and consisted of slurry mixed with fill. No PCBs were detected at this location. Gross alpha and gross beta activities were above the representative levels in the 5-foot sample (46 ± 19 pCi/g, and 42 pCi/g, respectively) (Table 4.2.3-6).

Boring F056B was advanced to 7 feet, and two samples were taken at the 5- and 7-foot horizons. The samples were a tan-brown silt and a tan to black silt, respectively. The 5-foot soil sample contained above-representative levels of several trace metals, including cadmium, chromium, copper, mercury, nickel, vanadium, and zinc (Table 4.2.3-10). Fluoride and total phosphorus were also above the representative range. The sample taken at the 7-foot horizon appears to have been made up almost entirely of pure precipitator dust. Above-representative concentrations of constituents encountered in this sample included 5,610 mg/kg of cadmium, 242 mg/kg of chromium, 221 mg/kg of copper, 44,800 mg/kg of fluoride, 1,300 mg/kg of lead, 24.4 mg/kg of selenium, 786 mg/kg of silver, and 499,000 mg/kg of zinc. No PCBs were detected at this location. As would be expected with the levels of inorganic concentrations detected, gross alpha and gross beta were above the representative range (Table 4.2.3-6). The 7-foot sample had the higher levels of the two (1,530 ± 199.8 pCi/g and 1,070 pCi/g, respectively).

Boring F057B was advanced to 7 feet, and two samples were taken at the 5- and 7-foot horizons. The samples were a tan silt and a tan sand/silt with gray clay, respectively. The 5-foot soil sample contained above-representative levels of several constituents, including cadmium, chromium, mercury, nickel, silver, and zinc. Fluoride and total phosphorus were also above the expected representative range (Table 4.2.3-10). The sample taken at the 7-foot horizon appears to contain precipitator dust, as can be expected by its gray clay description. Above-representative concentrations of constituents encountered in this sample included 235 mg/kg of cadmium, 109 mg/kg of chromium, 28.3 mg/kg of copper, 3,330 mg/kg of fluoride, 56.9 mg/kg of lead, 9.1 mg/kg of selenium, 30 mg/kg of silver, and 3,860

mg/kg of zinc. No PCBs were detected at this location. Both samples had above-representative activities of gross alpha and gross beta (Table 4.2.3-6).

Summary. The stated purpose for sampling in this area was to determine the presence or absence of PCBs. In addition, inorganics and radioactivity were measured to give an idea of the levels of constituents that may be found in the area of former Pond 7S. There was no intention to determine the depth of potential impact, and, hence, no further activities were conducted in this area during Phase II. The sampling exercise confirmed the absence of PCBs and the presence of precipitator dust in the subsurface to a depth of at least 7 feet.

Long-Term Phosphorus Storage Area. Elemental phosphorus product is stored in tanks in this location. Two borings were drilled in the area to investigate subsurface soil conditions (Figure 2.1-1). The soil samples were analyzed for their inorganic and radioactivity content (Table 2.1-2).

Boring F062B was advanced to 3 feet, and soil samples were taken at the 1- and 3-foot horizons (Figure 2.1-1). Both soil samples were described as tan-brown silts. Fluoride (1,500 and 1,010 mg/kg, respectively), total phosphorus (8,880 and 3,070 mg/kg, respectively), and zinc (58.9 and 55.9 mg/kg, respectively) were found above the representative range (Table 4.2.3-11). Boron was detected in the 1-foot sample at an estimated value of 24.7 mg/kg, which is above the representative concentration of 18.1 mg/kg. Gross alpha and gross beta were within the representative range for both soil horizons (Table 4.2.3-6).

Boring F063B was advanced to 7 feet, and soil samples were taken at the 5- and 7-foot horizons. Both soil samples were described as brown silts. Several trace metals were detected in these soil horizons at above-representative levels (Table 4.2.3-11): chromium (47.2 and 126 mg/kg, respectively), copper (15.1 and 23.3 mg/kg, respectively), nickel (18.8 and 36.1 mg/kg, respectively), vanadium (59.2 and 131 mg/kg, respectively), and zinc (59 and 57.3 mg/kg, respectively). Fluoride and total phosphorus, generally strong indicators of site-related impacts, were barely above representative levels in the 5-foot horizon (600 mg/kg and 855 mg/kg, respectively) and below representative levels in the 7-foot horizon. In addition, iron and manganese were above representative levels in both horizons. The mix of above-representative constituents, representative constituents, and below-representative constituents is not typical of FMC wastewaters or byproducts, and, while these are impacted soil horizons, the source is not clear. Values in the 7-foot soil horizon were generally greater than those found in the 5-foot horizon. This is also true of gross alpha and gross beta where the 7-foot-horizon activities were above representative levels while the 5-foot sample's were not (Table 4.2.3-6). This may be

an indication of downward migration. The extent of impact was not determined at this location.

Summary. The investigation at the long-term phosphorus storage area indicates that subsurface soils in some parts of the area have been impacted. The extent of this impact is to at least 7 feet. The source of the impact has not been identified.

Railcar-Loading and -Unloading Area at Bannock Paving Company. Bannock Paving Company has historically loaded railcars with ferrophos and slag for offsite shipment. Soil conditions in the area of this railcar-loading area were investigated during Phase I. Two borings were placed in this area and soil samples tested for TPH, PCBs, and inorganic parameters. (Figure 2.1-1 shows their locations.)

Boring F083B was advanced to 9 feet, and two samples were taken at the 5- and 9-foot horizons. The 5-foot sample is a tan-brown silt, and the 9-foot sample is a brown silt. Of the constituents tested for, five were slightly above the representative range (Table 4.2.3-12). These were cadmium (1.3 mg/kg at 9 feet), zinc (54.4 mg/kg at 5 feet), aluminum (15,900 mg/kg at 5 feet), iron (15,000 mg/kg at 5 feet), and mercury (0.57 mg/kg at 9 feet). Fill material (generally slag) was encountered above 5 feet.

Boring F084B was advanced to 7 feet, and two samples were taken at the 5- and 7-foot horizons. The 5-foot sample is a tan-brown silt with slag; the 7-foot sample is a brown silt. The sample containing slag had above-representative concentrations of cadmium (3.1 mg/kg), fluoride (1,680 mg/kg), mercury (0.38 mg/kg), total phosphorus (1,900 mg/kg), potassium (5,080 mg/kg), and zinc (207 mg/kg). The 7-foot sample had reduced levels of fluoride, total phosphorus, potassium, and zinc. However, these values were still above representative levels. Mercury values remained nearly the same (0.42 mg/kg), and cadmium values were below representative levels (Table 4.2.3-12). Fill material was encountered above 5 feet.

No PCBs or TPH were detected in any of the samples tested at F083B or F084B. Gross alpha and gross beta activities were also within the representative range at these boreholes (Table 4.2.3-6).

Summary. The subsurface in the vicinity of the Bannock railcar-loading area appears to have a fairly uniform 5-foot-thick slag fill layer. There is evidence that material from this fill has been mixed into the underlying soils to a minor degree. This mixing zone is to at least 7 feet in some areas.

Secondary Condenser Area. The secondary condenser is used to remove elemental phosphorus from furnace exhaust gases. It is in the same location as the former

fluid bed drier which was used to dry and oxidize precipitator slurry. Subsurface conditions in this area were investigated by advancing two boreholes to a depth of 20 feet (locations shown in Figure 2.1-1). Soil samples taken from these boreholes were tested for their inorganic and gross alpha and gross beta content.

Boring F052B was advanced to 20 feet and sampled at 2.5-foot intervals starting at 10 feet. The material above the 10-foot horizon was identifiable fill. The soil is a yellowish-brown silt. The soil at the 15-foot horizon also contained a trace of gravel. The samples taken in the first two intervals contained slightly above- or near-representative concentrations of cadmium (1.7 mg/kg and 1.6 mg/kg, respectively), zinc (47.9 mg/kg and 53 mg/kg, respectively), and total phosphorus (896 mg/kg and 914 mg/kg, respectively). Fluoride values for these samples (1,390 mg/kg and 1,140 mg/kg, respectively) were clearly above representative levels. In general, fluoride values drop off with depth (Table 4.2.3-13). While several of the above constituents had above-representative concentrations in the deeper zones, there does not appear to be a migration pattern, especially of trace metals. The same pattern is observable for gross alpha and gross beta. Gross alpha activities were above representative levels in the 10- and 12.5-foot horizons but fell off with depth (Table 4.2.3-6). Gross beta were at or near the high end of the representative range for the 10-, 12.5-, and 15-foot horizons. They were well below representative levels in the 17.5- and 20-foot horizons.

Boring F053B was also advanced to 20 feet and sampled at 2.5-foot intervals starting at 10 feet. The material above the 10-foot horizon was identifiable fill. The soil is a uniformly dark brown silt. The sample taken at the 10-foot horizon contained no constituents above representative levels. However, the 12.5-foot samples contained a suite of above-representative constituents that suggest slag particulate was part of the soil matrix (Table 4.2.3-13). This conclusion was reached because of the high levels of calcium (120,000 mg/kg) coupled with elevated levels of boron (35.9 mg/kg), cadmium (4.1 mg/kg), chromium (91.9 mg/kg), fluoride (6,530 mg/kg), total phosphorus (1,760 mg/kg), vanadium (84.6 mg/kg), and zinc (79.1 mg/kg). The presence of particulate suggests there may have been some mechanical mixing of the natural soils in this area before fill placement. Soil horizons below 12.5 feet do not have these characteristics. However, there is some evidence of migration of zinc, fluoride, and phosphate into the deeper soil horizons. The same pattern is observed with gross alpha. The highest activity was at the 10-foot horizon (43.4 ±7.34 pCi/g). This declined to below representative levels at 15 feet but returned to an above-representative activity at 17.5 feet. The 20-foot sample was once again below representative levels. This pattern shows a downward migration of gross alpha emitters to at least 17.5 feet. The fall in activity at 15 feet can be attributed to a small gravel zone. Gross beta activities were above representative levels only at the 10-foot horizon (43.5 ± 4.87 pCi/g) (Table 4.2.3-6).

Summary. Some evidence of site impact was found below the fill/native soil interface. However, the constituents encountered appeared to be related to slag rather than precipitator slurry. Also, there was evidence that the native soils had been disturbed by mechanical mixing of the soil with the fill probably before or during the placement of the 10-foot-thick slag-fill overburden. Some migration of zinc, fluoride, and phosphate, as well as alpha emitters, was also evident.

Former Transformer Salvage Area. The former transformer salvage area was used for storage of used transformers. Transformers are no longer stored there, and the area has been cleaned and graded. It is located near former Pond 1S. Subsurface conditions in this area were investigated by advancing two boreholes to a depth of approximately 12 feet (Figure 2.1-1). The soil taken from these borings was tested for inorganics, radioactivity, and PCBs (Table 2.1-2).

Boring F035B was advanced to 12 feet, and samples were taken at 2.5-foot intervals starting at the 2-foot horizon. The first sample was a slag fill; the remaining soil samples were reddish yellow silts. The first two sample horizons contained above-representative levels of boron (50.1 mg/kg at 2 feet), cadmium (135 mg/kg and 81.7 mg/kg, respectively), chromium (94.6 mg/kg at 4.5 feet), copper (26.3 mg/kg at 4.5 feet), fluoride (1,330 mg/kg and 3,620 mg/kg, respectively), lead (98.7 mg/kg at 4.5 feet), nickel (45.4 mg/kg at 4.5 feet), total phosphorus (33,400 mg/kg and 49,900 mg/kg, respectively), potassium (13,600 mg/kg and 8,670 mg/kg), silver (26.8 mg/kg at 4.5 feet), vanadium (90.8 mg/kg at 4.5 feet), and zinc (19,300 mg/kg and 4,250 mg/kg, respectively) (Table 4.2.3-14). The high zinc values and the presence of above-representative levels of copper, silver, and nickel combined with the absence of high calcium values indicate the presence of precipitator dust or phossy water solids in these samples. The soil sample taken at 7 feet had a sharp break in constituent concentrations, with all but potassium and total phosphorus being at representative levels. This indicates that there has been no downward migration of the trace metals. Both potassium and phosphate continued to be found at above-representative levels in the 9.5- and 12-foot horizons. However, with the exception of zinc slightly above representative values, the remaining constituents were within the representative range.

Radioactivity levels in boring F035B exceeded the representative range in the slag sample (Table 4.2.3-6). Gross alpha in this sample was 311 ± 25 pCi/g; gross beta was 187 ± 8.6 pCi/g. There was no migration into the subsurface from this layer. This demonstrates both the association of radionuclides with slag material and their immobility in its matrix. Analyses of the soil samples taken from F035B for PCBs did not detect any at the 0.65 mg/kg level of detection. However, there was some problem with the laboratory analysis of particular Aroclors, and these values were rejected during the validation process. New samples taken during Phase II were

submitted to the laboratory. The results of these analyses were also negative at a detection limit of 0.2 mg/kg.

Boring F036B was advanced to 11 feet, and samples were taken at 2.5-foot intervals starting at the 1-foot horizon. All samples were light brown silts. The first four sample horizons all showed evidence of site impact. The horizon containing the highest concentrations of constituents was at 6 feet. This soil sample contained above-representative levels of cadmium (118 mg/kg), chromium (47.3 mg/kg), copper (25.2 mg/kg), fluoride (2,700 mg/kg), lead (69.7 mg/kg), nickel (19.5 mg/kg), total phosphorus (7,160 mg/kg), silver (21 mg/kg), vanadium (59.3 mg/kg), and zinc (2,740 mg/kg) (Table 4.2.3-14). This mix of constituents is usually associated with precipitator dust or phossy water solids. The lack of a discernible leach pattern (e.g., high values tapering off or low values increasing) indicates that the soils are probably not in their native state and are native silts that have been mechanically mixed with small amounts of precipitator dust or phossy water solids. This would explain the apparent random distribution of the various concentrations. All constituents except potassium and total phosphorus were at representative levels in the 11-foot sample.

Gross alpha and gross beta activities mimic the inorganic trends (Table 4.2.3-6). They were above representative levels in the 1-foot horizon, fell in the 3.5-foot-horizon, rise again in the 6-foot horizon, and reached their lowest point in the 11-foot horizon. Again, this demonstrates both the association of the radionuclides with the site-related material and their lack of mobility. No PCBs were detected in the samples taken from this borehole (0.65 mg/kg detection limit).

Summary. Soils in the vicinity of the transformer storage area have been impacted by site activities. For at least the first 6 to 10 feet, native soils appear to have been mechanically mixed with precipitator dust or phossy solids either during grading or placement. There is no evidence of leach migration for the trace metals. Phosphate and potassium, however, do appear to be moving downward into the subsurface. No PCBs were detected in the soil samples. Gross alpha and gross beta activities were above representative levels in several samples. However, their presence and mobility appeared to be similar to those of the trace metals.

Bannock Paving Area. In the past, Bannock Paving Company purchased slag from FMC for use in paving operations. This slag was stored in piles at various locations throughout the leased area. Three shallow boreholes were drilled in the area and sampled to investigate subsurface conditions (Figure 2.1-1). The soil samples were tested for inorganics, radioactivity, TPH, and PCBs.

Boring F080B was advanced to 7 feet. Soil samples were taken at the 5- and 7-foot horizons. The overlying material was visually determined to be fill. Both of the soils taken from this borehole were tan-brown silts. Slightly above-representative values of fluoride (560 mg/kg), lithium (18 mg/kg), and zinc (60.2 mg/kg) were found in the soil at the 5-foot horizon. Above-representative values of fluoride (760 mg/kg), total phosphorus (934 mg/kg), and zinc (61.6 mg/kg) were found in the 7-foot interval (Table 4.2.3-15). The absence of any other associated parameters and the levels encountered in this borehole indicate that some minor leaching of the three constituents has occurred from the overlying fill.

Boring F081B was advanced to 7 feet. Soil samples were taken at the 4- and 7-foot horizons. The overlying material was visually determined to be fill. As with F080B, both of the samples taken from this borehole are tan-brown silts. With the exception of fluoride (670 mg/kg) and potassium (4,520 mg/kg) in the 4-foot interval, all other constituents are within the representative range (Table 4.2.3-15). The absence of any other associated constituents and the levels encountered in this borehole indicate that some minor leaching of the two constituents has occurred from the overlying fill.

Boring F082B was advanced to 9 feet. Soil samples were taken at the 5- and 9-foot horizons. The overlying material was visually determined to be fill. Soils in the 5-foot interval were tan-brown sandy silts; soils at the 9-foot horizon were tan silt with sand. Nickel was slightly above representative levels in the 9-foot soil sample (Table 4.2.3-15). All other constituents were within the representative range. The absence of any other associated constituents indicates that no site-related impacts were observed in the samples taken in this borehole.

Gross alpha and gross beta activities were within the representative range for all samples tested (Table 4.2.3-6). Results for TPH were negative with a detection limit of 10 mg/kg. No PCBs were detected at the 0.65 mg/kg level of detection. However, there was some problem with the laboratory analysis of particular aroclors, and these values were rejected during the validation process. New samples taken during Phase II were submitted to the laboratory. The results of these analyses were also negative at a detection limit of 0.2 mg/kg.

Summary. Minor leaching from overlying fill was observed in soils taken from two of the three boreholes drilled in this location. There does not appear to be any significant site impact at the 5-foot horizon under the Bannock Paving Company operation.

Chemical Laboratory Seepage Pit. Prior to 1980, inorganic and organic chemical waste from the laboratory was disposed of in the laboratory seepage pit. Two

boreholes were advanced to 70 feet and the soils sampled at 10-foot intervals (with the exception of the 40- and 50-foot horizons where no samples were obtained in gravelly materials) to investigate subsurface conditions in this area (Figure 2.1-1). The soils were tested for a suite of inorganic and organic parameters as well as gross alpha and gross beta (Table 2.1-2).

The surficial sample at borehole location F028B contained slag. The analytical results showed cadmium (1.3 mg/kg), calcium (149,000 mg/kg), chromium (95.7 mg/kg), copper (17 mg/kg), total phosphorus (3,810 mg/kg), potassium (5,650 mg/kg), silver (2.3 mg/kg), and vanadium (99.5 mg/kg) to be above representative levels (Table 4.2.3-16). Zinc (at 51.9 mg/kg) was just within the representative range. However, with the exception of total phosphorus at 20 feet (952 mg/kg) and nickel at 70 feet (15.6 mg/kg), no constituents were detected above representative levels at any of the other remaining four sample horizons. As would be expected with a sample containing slag, gross alpha and gross beta activities were above representative levels in the surficial sample (78.21 ± 4.86 pCi/g and 45.82 ± 3.26 pCi/g, respectively) (Table 4.2.3-6). Radioactivity in all other soil horizons was below representative levels.

Two semivolatile compounds were detected in the soil samples in F028B. These were Bis(2-ethylhexyl)phthalate and Di-n-butyl phthalate. Since they were always at levels below 1 mg/kg and are common analytical artifacts associated with sample handling and analysis, they are not considered to be a result of facility-related activities. Carbon disulfide was detected in several soil samples. This compound is a commonly used laboratory extractant. It is also very reactive and unlikely to be found in the environment in its free state. It is unlikely that carbon disulfide is linked with facility-related activities. Acetone was detected in the sample taken at 10 feet. It was also detected in the laboratory method blank. Since it was not detected above or below the 10-foot horizon and was in the laboratory method blank, it is probably a laboratory artifact. Xylene was detected (0.008 mg/kg) in the surficial sample but not in any others. If it is present in this location, it is only surficial. Toluene, on the other hand, was detected at low levels (0.031 mg/kg to 0.159 mg/kg) in all soil horizons tested. Toluene is a chemical used by the laboratory and has also been detected at low levels in the groundwater in this area. It is probably related to site activities. 1,1,1-trichloroethane (TCA) was detected at the 70-foot horizon (0.006 mg/kg) but not at any shallower depth. This would indicate that its source, if it is present at all, is not from the shallower depths. Since low-level chlorinated volatile organics occur at isolated locations in the groundwater, and this sample was taken where groundwater was encountered, the source of the TCA may be the groundwater. No other volatile organic was detected at F028B.

The first soil-sampling interval at boring F029B was at 1 foot. The sample was a yellowish brown gravelly silt. From the constituents detected at above-representative levels, it appears that the soil was mixed with some precipitator dust or phossy water solid (Table 4.2.3-16). Above-representative constituents included cadmium (7.3 mg/kg), chromium (30.7 mg/kg), fluoride (1,560 mg/kg), lead (56.4 mg/kg), total phosphorus (5,460 mg/kg), silver (9.8 mg/kg), and zinc (1,390 mg/kg). A 10-foot soil sample was not taken. However, soil from the 20-foot horizon contained above-representative levels of zinc (57.3 mg/kg) and total phosphorus (1,100 mg/kg) only. All other inorganic parameters were within the representative range. The gross alpha and gross beta readings were enriched in the 1-foot sample (33.09 ± 3.36 pCi/g and 33.5 ± 3.04 pCi/g, respectively) and, like the trace metals, fell off with depth (Table 4.2.3-6).

As with F028B, the same two semivolatile compounds were detected (Bis(2-ethylhexyl)phthalate and Di-n-butyl phthalate). These are not related to site activities as explained above. Carbon disulfide was also detected and, as explained above, is probably not related to site activities. Toluene and xylenes were found at low levels in the surficial and 20-foot samples. They did not appear in the 30- and 60-foot samples. However, xylenes and ethylbenzene were present (0.018 mg/kg and 0.004J mg/kg, respectively) in the 70-foot sample. The two depths of detection (shallow and deep) are probably unrelated. However, there may be a low-level plume of aromatics in the groundwater in this area. No other volatile organic compounds were detected.

Summary. Surficial samples at the two locations chosen to investigate the chemical laboratory seepage pit showed evidence of site impact with reference to inorganic parameters. However, this soil horizon is not sufficiently deep to reflect impacts from the drain pit. The deeper horizons in one borehole showed no evidence of site impact, and those in the other borehole indicated slight downward migration of phosphate and zinc to a depth of 20 feet. Soils beneath this depth did not show evidence of site impacts. Above-representative levels of gross alpha and gross beta were confined to the first sample taken in both boreholes. The level of activity was directly correlated with the presence of other site-related parameters. There was no evidence of vertical migration.

Toluene was found at low levels in most soil samples taken in F028B and several samples taken in F029B. Its presence in the subsurface is probably related to site activities. Several volatiles (TCA, xylenes, ethylbenzene) found in low concentrations at depth near the groundwater table may be related to groundwater contamination from a source other than the one investigated here. Other semivolatile and volatile organics found in the two boreholes are probably artifacts of the sampling and analysis process.

Paved Area North of the Furnace Building. Subsurface conditions beneath four paved areas north of the furnace building were investigated during Phase I. Two soil samples were taken in each borehole and tested for inorganic parameters and gross alpha and gross beta (Table 2.1-2).

Boring F066B was advanced to 5 feet. Soil samples were taken at the 3- and 5-foot horizons. The overlying material was visually determined to be fill. Soils in the 3-foot interval were tan-brown silt and sand; soils at the 5-foot horizon were tan-brown silt and sand with slag. Since slag was visibly identified in the lower sample, neither of these horizons can be considered undisturbed native soils. No constituents were found to be above representative levels in the first horizon and the only evidence of slag in the second was slightly elevated levels of total phosphorus (860 mg/kg) and zinc (56.1 mg/kg) (Table 4.2.3-17). Gross alpha and gross beta activities in the upper sample were well within the representative range (Table 4.2.3-6). However, as would be expected with the presence of slag, the 5-foot sample had activities close to the upper representative limit for gross alpha (23.2 ± 7.57 pCi/g versus 24.7 pCi/g for representative). Site impact to 5 feet in this area was minimal.

Boring F067B was advanced to 9 feet. Soil samples were taken at the 5- and 9-foot horizons. The overlying material was visually determined to be fill. However, soils in both the 5-foot and 9-foot intervals were tan-brown silt with slag. Since slag was visibly identified in both samples, neither of these horizons can be considered undisturbed native soils. The 5-foot interval showed definite chemical evidence of the presence of slag (Table 4.2.3-17). This soil sample contained above-representative levels of cadmium (8.5 mg/kg), calcium (85,400 mg/kg), chromium (48.9 mg/kg), fluoride (4,300 mg/kg), mercury (1.1 mg/kg), total phosphorus (1,440 mg/kg), vanadium (54.6 mg/kg), and zinc (199 mg/kg). However, even though slag was visually seen in the second interval, the analytical results show no above-representative constituents. This same pattern is repeated for the gross alpha and gross beta activities (Table 4.2.3-6). The upper sample was above representative levels for both gross alpha (32 ± 9.14 pCi/g) and gross beta (36.6 ± 3.82 pCi/g). Activities in the lower soil sample were well within representative levels. The conclusion may be that the visual classification of the lower sample as containing slag is incorrect.

Boring F068B was advanced to 5 feet. Soil samples were taken at the 3- and 5-foot horizons. The overlying material was visually determined to be fill. Soils in the 3-foot interval were red-brown silt; soils at the 5-foot horizon were tan-brown silt. No site-related constituents (including gross alpha and gross beta) were found to be above representative levels in either horizon (Tables 4.2.3-17 and 4.2.3-6).

Boring F069B was advanced to 5 feet. Soil samples were taken at the 3- and 5-foot horizons. The overlying material was visually determined to be fill. Soils in the 3-foot interval were brown silt; soils at the 5-foot horizon were tan-brown fine silt. No site-related parameters were found to be above representative levels in either horizon (Table 4.2.3-17). Gross alpha, however, was at the upper representative limit in the 5-foot sample (24.1 ± 6.92 pCi/g); gross beta activity was slightly over the representative range for the same sample (32.1 ± 5.31 pCi/g) (see Table 4.2.3-6).

Summary. In general, this area contained a fill layer of varying depth that showed some evidence of the presence of site-related parameters. Impacts, however, appeared to be limited to 3 to 5 feet. Two of the locations investigated did not have impacts at or below 3 feet.

Area West of the Mobile Shop. The mobile shop is thought to be built over or near the former precipitator dust Ponds 0S and 00S. It handles oils and lubricants. Two shallow borings were drilled to the west of the shop to investigate subsurface conditions. Soil samples were tested for inorganic parameters, TPH, PCBs, gross alpha, and gross beta (Table 2.1-2).

Soil samples were taken at 1 and 2 feet in borehole F060B. The top sample was described as a dark brown silt with gravel. The bottom sample was described as a dark brown to black sandy silt with gravel. Both of these samples are probably fill. Both of these samples contained a substantial amount of slag with precipitator dust or phossy water solids (Table 4.2.3-18). Constituents with concentrations above representative levels included cadmium (82.1 mg/kg), chromium (281 mg/kg), fluoride (12,210 mg/kg), lead (122 mg/kg), silver (28.8 mg/kg), and zinc (4,690 mg/kg).

Gross alpha and gross beta activities were above representative levels in both soil samples tested at F068B. The greatest activities were in the 2-foot sample (135 ± 17.5 pCi/g and 79.1 ± 6.94 pCi/g, respectively) (Table 4.2.3-6). No PCBs were detected at the 0.65 mg/kg level of detection. However, there was some problem with the laboratory analysis of particular aroclors, and these values were rejected during the validation process. New samples taken during Phase II were submitted to the laboratory. The results of these analyses were also negative at a detection limit of 0.2 mg/kg. TPH was detected in both soil horizons. The value for the surficial sample was 9,025 mg/kg; the 2-foot sample concentration was 2,262 mg/kg. The vertical extent of impacted soils was not determined in this borehole.

Soil samples were taken at 1 and 2 feet in borehole F061B. The top sample was described as a dark brown sandy silt with gravel. The bottom sample was described as a gray-black silty sand with gravel. Both of these samples are probably fill. As

with location F060B, analytical results indicate that both of these samples contained a substantial amount of slag with precipitator dust (Table 4.2.3-18). Characteristic constituents with concentrations above representative levels included cadmium (446 mg/kg), chromium (241 mg/kg), fluoride (9,280 mg/kg), lead (420 mg/kg), silver (124 mg/kg), and zinc (20,400 mg/kg).

Gross alpha and gross beta activities were above representative levels in both soil samples tested at F068B. The greatest activities were in the 2-foot sample (192 ± 20.6 pCi/g and 145 ± 9.75 pCi/g, respectively) (see Table 4.2.3-6). No PCBs were detected at the 0.65 mg/kg level of detection. However, there was some problem with the laboratory analysis of particular aroclors and these values were rejected during the validation process. New samples taken during Phase II were submitted to the laboratory. The results of these analyses were also negative at a detection limit of 0.2 mg/kg. TPH was detected in both soil horizons. The value for the surficial sample was 162 mg/kg, while the 2-foot sample concentration was 33.6 mg/kg.

Summary. Soils in the shallow subsurface in the vicinity of the mobile shop have been heavily impacted by site activities. These soils appeared to be fill. Native soil was not encountered at the 2-foot mark.

Phos Dock Area. Elemental phosphorus is handled in the paved phos dock area. Two borings were planned for this location, but because of the presence of numerous overhead lines, only one was actually drilled (Figure 2.1-1). The soils were tested for inorganics and gross alpha and gross beta (Table 2.1-2).

Boring F064B was advanced to 4.5 feet. Two soil samples were taken at the 2.5- and 4.5-foot horizons. The 2-foot sample is described as a brown sandy silt with a trace of slag. The 4.5-foot sample is described as a brown silt with a trace of gravel. Both samples appeared to be fill and contained above-representative levels of various constituents: cadmium (1.8 mg/kg at 4.5 feet), chromium (29.8 mg/kg and 31.5 mg/kg, respectively), fluoride (2,520 mg/kg and 3,860 mg/kg, respectively), mercury (0.72 mg/kg and 1.4 mg/kg, respectively), total phosphorus (17,100 mg/kg and 15,600 mg/kg, respectively), and zinc (150 mg/kg and 157 mg/kg, respectively) (Table 4.2.3-19). Since total phosphorus and fluoride were relatively elevated and calcium was not, the above-representative constituents do not appear to be associated with slag.

Gross alpha and gross beta activities were below representative levels in the 2.5-foot horizon, although the gross beta was in the upper end of the range (30.4 ± 5.18 pCi/g). Gross alpha was above representative levels in the 4.5-foot sample (38.8 ± 7.52 pCi/g); gross beta activities were at the top end of the range (Table 4.2.3-6). As usual, the radioactivity pattern mimics that found with the inorganics (i.e., the

deeper sample—which contains greater concentrations of inorganic parameters—also contains greater activities of gross alpha and gross beta).

Summary. Both soil samples taken in the phos dock area had above-representative levels of parameters generally associated with materials handled by the facility. The soils were apparently from a fill zone. Native soils were not sampled. Hence the area can be said to have impacted fill to at least a depth of 4.5 feet.

Shale Ore Handling Area. Shale ore is dumped into a below-ground hopper where it is placed on the stockpile by conveyers and other specialized equipment. Five locations were selected to investigate the impact of these activities on the subsurface soils (Figure 2.1-1). The soil samples were subjected to analysis for inorganics, TPH, and PCBs (Table 2.1-2).

Soil samples were taken at 3 and 5 feet in borehole F090B. The top sample was described as a dark brown silt with a trace of gravel. The bottom sample was described as a dark brown silt. Representative values were exceeded for a number of constituents in both sample horizons (Table 4.2.3-20). An evaluation of the constituents and their detected concentrations suggests that both samples are primarily ore.

No PCBs were detected in either soil horizon at F090B (detection limit of 0.65 mg/kg). In the surficial sample, 96.2 mg/kg of TPH was detected. This value fell to 37.4 mg/kg in the deeper sample. Soils in both the 3- and 5-foot horizons contained enriched gross alpha and gross beta activities (Table 4.2.3-6). The greater of the two was 262 ± 28.7 pCi/g for gross alpha in the 5-foot horizon and 84 ± 6.16 pCi/g in the 3-foot sample. The radioactivity values are consistent with those found in potential source investigations of the ore.

Soil samples were taken at the surface and at 2 feet in borehole F091B. The surface sample was described as a tan-red-brown silt with a trace of gravel. The 2-foot sample was described as a brown silt with gravel. Representative values were exceeded for a number of parameters in both sample horizons (Table 4.2.3-20): cadmium (7.1 mg/kg and 3 mg/kg, respectively); chromium (66.1 mg/kg and 36.9 mg/kg, respectively), fluoride (1,060 mg/kg and 1,030 mg/kg, respectively), total phosphorus (5,080 mg/kg and 2,770 mg/kg, respectively), vanadium (86.3 mg/kg and 52.6 mg/kg, respectively), and zinc (123 mg/kg and 73.9 mg/kg, respectively). These samples appear to be impacted fills.

No PCBs were detected in either soil horizon at F091B (detection limit of 0.65 mg/kg).

TPH was also below detection limits in both samples taken from F091B (detection limit of 10 to 20 mg/kg). Relative levels of gross alpha and gross beta followed the same pattern as the inorganics, with the greater activities being found in the upper sample. Gross alpha exceeded representative values in the surficial sample (186 ± 20.3 pCi/g) but not in the 2-foot sample. Gross beta was also above representative levels in the surficial sample (65.1 ± 5.09 pCi/g), but slightly below in the 2-foot sample (Table 4.2.3-6).

Soil samples were taken at the surface and at 2 feet in borehole F092B. The surface sample was described as a red-brown to light tan silty sand. The 2-foot sample was described as a brown silt with gravel. Representative values were exceeded for a number of constituents in the surface sample (Table 4.2.3-20): arsenic (15.2 mg/kg), cadmium (83.3 mg/kg), calcium (212,000 mg/kg), chromium (689 mg/kg), fluoride (18,500 mg/kg), lead (32.2 mg/kg), total phosphorus (68,700 mg/kg), vanadium (848 mg/kg), and zinc (1,220 mg/kg). The relatively high values of arsenic, cadmium, calcium, fluoride, total phosphorus, vanadium, and zinc, along with the relatively low values of lead, potassium, selenium, and silver, indicate that the values being measured in this sample are primarily related to ore. Most parameters in the 2-foot sample are at or near the representative range, indicating little downward migration.

TPH was detected in the surficial soil sample (384 mg/kg) but not in the 2-foot sample (10 mg/kg detection limit). No PCBs were detected in either sample.

Borehole F093B was advanced to 5 feet and soil samples taken at the 3- and 5-foot horizon. The 3-foot sample was described as a brown/red-brown silt. The 5-foot sample was a red-brown silt. Representative values were exceeded for several constituents in the 3-foot sample (Table 4.2.3-20): cadmium (2.4 mg/kg), chromium (29.5 mg/kg), fluoride (2,070 mg/kg), mercury (2.5 mg/kg), total phosphorus (5,160 mg/kg), and zinc (76.7 mg/kg). Most constituents in the 5-foot sample are at or near the representative range, indicating little downward migration.

No PCBs were detected in either soil horizon at F093B (detection limit of 0.65 mg/kg). TPH was also below detection limits in both samples taken from F093B (detection limit of 10 mg/kg).

Borehole F094B was advanced to 8 feet and soil samples taken at the 6- and 8-foot horizons. The 6-foot sample was a dark brown to tan silt/sand. The 8-foot sample was described as a dark brown silt. Representative values were not exceeded for any parameters in the 6-foot sample (Table 4.2.3-20). With the exception of mercury (1.3 mg/kg) and zinc (56.1 mg/kg), all constituents were within the representative range in the soil sampled at 8 feet. These levels may not be site-related, and the absence of

fluoride and phosphate as well as other site-related parameters indicates that there is no downward migration in this area.

As with boring F093B, no PCBs were detected in either soil horizon at F094B (detection limit of 0.65 mg/kg). TPH was also below detection limits in both samples (detection limit of 10 mg/kg).

There would appear to be a problem with sample labeling or analysis with the gross alpha and gross beta samples taken for F092B and F093B (Table 4.2.3-6). An evaluation of the relative activities found in these samples with the relative levels of inorganics found in their corresponding sample horizons would indicate that the sample labeled F092B is more appropriately F093B and the sample labeled F093B is more appropriately F092B. This is because the surficial sample in F092B appears to contain an ore, which would place its expected gross alpha activity in excess of 200 pCi/g, not the 35.9 pCi/g that is listed. On the other hand, F093B, while an impacted soil, has relatively low levels of site-related parameters that are much more in line with a gross alpha reading of 35.9 pCi/g than the 222 pCi/g that is listed. If it becomes necessary to positively determine if this switch occurred, new samples will be taken and an analysis performed again. However, it is believed that the weight of the evidence is in favor of the above switch and that no further action is necessary.

Summary. Ore-related materials can be found to at least 5 feet in some parts of the phosphate ore handling area. Where native soils were encountered, there was little to no evidence of downward migration of ore-related constituents.

Roads. There are over 15 miles of roads at FMC and Bannock Paving. Most of these are constructed from slag materials. Dust suppressants that may have included waste oils have been applied during the history of plant operations. Twenty-three locations were sampled during Phase I. The sampling routine was to bore to what appeared to be below the road base (not necessarily native soil), take a soil sample at the interface, and then a subsequent sample 2 feet below that. The soil samples were tested for inorganics, TPH, PCBs, gross alpha, and gross beta (Table 2.1-2). The locations where the road samples were taken are given in Figure 2.1-1.

Boring 101B is located in the far southwest area of the FMC facility near former Pond 6E. It was advanced to 7 feet and soil samples were taken at the 5- and 7-foot horizons. The 5-foot sample is a brown silt with slag gravel. The 7-foot sample is a brown silt. For the most part, constituents in both these samples were within the representative range, indicating little to no downward migration of facility-related constituents (Table 4.2.3-21).

Gross alpha and gross beta activities were above representative values in the 5-foot sample (94.1 ± 27 pCi/g and 47.5 ± 11.86 pCi/g, respectively). These values fell to just below representative levels in the 7-foot sample (Table 4.2.3-6). No PCBs were detected at the 0.65 mg/kg level. However, there was some problem with the laboratory analysis of particular aroclors, and these values were rejected during the validation process. New samples taken during Phase II were submitted to the laboratory. The results of these analyses were also negative at a detection limit of 0.2 mg/kg. TPH was not detected in either soil horizon.

Boring 101R was advanced to 1.5 feet and samples were taken at the 0.5- and 1.5-foot horizons. This boring was located next to boring F101B. The 0.5-foot sample was a dark brown silty sand with a trace of gravel. The 1.5-foot sample was a gray sandy silt with a trace of gravel. Both of these samples contained a number of constituents above representative levels: cadmium (340 mg/kg and 204 mg/kg, respectively), chromium (108 mg/kg and 141 mg/kg, respectively), copper (22 mg/kg and 19.7 mg/kg, respectively), fluoride (12,380 mg/kg and 12,890 mg/kg, respectively), lead (69.9 mg/kg and a nondetect at a detection limit of 41 mg/kg, respectively), total phosphorus (11,800 mg/kg and 6,850 mg/kg, respectively), silver (35.2 mg/kg and 22.4 mg/kg, respectively), vanadium (105 mg/kg and 134 mg/kg, respectively) and zinc (8,020 mg/kg and 5,180 mg/kg, respectively) (Table 4.2.3-21). The mix of above-representative constituents suggests that the 0.5-foot sample was enriched primarily with precipitator dust, while the 1.5-foot sample contained both precipitator dust or phossy solids and slag.

Gross alpha and gross beta activities were above representative levels in both soil horizons (Table 4.2.3-6). The greatest readings were found in the 1.5-foot horizon (182 ± 65 pCi/g and 81 ± 19.52 pCi/g, respectively). These readings are not unusual for slag or precipitator slurry or phossy water solids. No PCBs were detected at the 0.65 mg/kg level in either sample, nor was TPH present (10 mg/kg detection limit).

The near-surface soils in the vicinity of boring 101 are enriched with precipitator dust or phossy solids and slag. The fill layer extends to at least 5 feet in depth in the immediate vicinity of 101B. The data indicate that constituents do not appear to have migrated beyond 7 feet into the subsurface.

Boring F102B was advanced to 5 feet and soil samples taken at the 3- and 5-foot horizons. This boring is located on the northern side of Bannock Paving. Both the 3-foot and 5-foot samples were tan-brown silts. The 3-foot sample was enriched in cadmium (2.2 mg/kg), chromium (38.6 mg/kg), fluoride (970 mg/kg), nickel (16 mg/kg), vanadium (48.3 mg/kg), and zinc (79.5 mg/kg). With the exception of zinc (53.4 mg/kg), all constituents were within the representative range in the 5-foot

sample (Table 4.2.3-21). This indicates little to no downward migration of site-related constituents into the subsurface.

Neither soil horizon in F102B contained above-representative levels of gross alpha or gross beta activity (Table 4.2.3-6). TPH was not detected at the 10 mg/kg level in either sample, nor were PCBs (0.65 mg/kg detection limit).

Boring F103B was advanced to 5 feet, and soil samples were taken at the 3- and 5-foot horizons. This boring is located on the northern side of Bannock Paving, just to the east of F102B. Both soil samples were tan-brown silts. The 3-foot sample was enriched in fluoride (600 mg/kg), mercury (1.1 mg/kg), total phosphorus (855 mg/kg), and zinc (55.9 mg/kg). All constituents were within the representative range in the 5-foot sample (Table 4.2.3-21). This indicates little to no downward migration of site-related constituents into the subsurface.

Neither soil horizon in F103B contained above-representative levels of gross alpha or gross beta activity (Table 4.2.3-6). TPH was detected at 61.4 mg/kg in the 3-foot sample but was not detected in the 5-foot sample at the 10 mg/kg limit. No PCBs were detected (0.65 mg/kg detection limit) in either sample, indicating that while the road may have been oiled for dust control in this area, the oil did not contain PCBs.

Boring 104R, adjacent to a ferrophos storage pile, was advanced to 1.5 feet, and samples were taken at the 0.5- and 1.5-foot horizons. Both samples were described as gray slag. Both samples contained a number of constituents at above-representative levels (Table 4.2.3-21): cadmium (12.6 mg/kg and 5.5 mg/kg, respectively), calcium (253,000 mg/kg and 192,000 mg/kg), chromium (820 mg/kg and 2,830 mg/kg, respectively), copper (84.3 mg/kg and 348 mg/kg, respectively), fluoride (17,260 mg/kg and 14,540 mg/kg, respectively), iron (39,100 mg/kg in the 1.5-foot sample), nickel (139 mg/kg and 641 mg/kg, respectively), total phosphorus (3,490 mg/kg and 4,100 mg/kg, respectively), silver (6 mg/kg and 17.8 mg/kg, respectively), vanadium (757 mg/kg and 2,620 mg/kg, respectively), and zinc (200 mg/kg and 452 mg/kg, respectively). The mix of above-representative constituents suggests that both samples were enriched with a mixture of slag and ferrophos. This conclusion was reached by examining the levels of calcium, fluoride, and total phosphorus, which are indicative of slag, and the levels of iron, chromium, nickel, and vanadium, which are indicative of ferrophos. The lower levels of arsenic, cadmium, lead, and zinc rule out the presence of precipitator dust or ore. Native soils were not encountered at this location, and the vertical extent of the fill is not known.

Gross alpha and gross beta activities were elevated in both soil horizons that were sampled (Table 4.2.3-6). The greatest readings occurred in the soil from the 0.5-foot

horizon (177 ± 63 pCi/g and 82.4 ± 24.8 pCi/g, respectively). TPH was detected in both samples (702 mg/kg and 300 mg/kg, respectively). No PCBs were detected in either sample although the 1.5-foot sample had a slightly higher detection limit (1 mg/kg compared to 0.65 mg/kg).

Boring F105B is located just south of the former PCB storage shed. It was advanced to 3 feet, and soil samples were taken at the 1- and 3-foot horizons. Both horizons are described as dark grayish brown silt fill. Both of these samples contained the following constituents above representative levels: arsenic (54.2 mg/kg and 13.7 mg/kg, respectively), cadmium (159 mg/kg and 106 mg/kg, respectively), calcium (223,000 mg/kg and 192,000 mg/kg, respectively), chromium (622 mg/kg and 269 mg/kg, respectively), copper (86 mg/kg and 37.9 mg/kg, respectively), fluoride (19,700 mg/kg and 14,100 mg/kg, respectively), lead (44 mg/kg and 51 mg/kg, respectively), nickel (134 mg/kg and 50.3 mg/kg, respectively), total phosphorus (103,000 mg/kg and 35,800 mg/kg, respectively), silver (6.4 mg/kg and 11.7 mg/kg, respectively), vanadium (724 mg/kg and 311 mg/kg, respectively), and zinc (1,400 mg/kg and 1,290 mg/kg, respectively) (Table 4.2.3-21). The mix of above-representative constituents suggests that both samples were enriched with a mixture of slag and other site-related materials. Native soils were not encountered.

As would be expected given the concentrations detected for inorganic parameters, gross alpha and gross beta activities were at above-representative levels for both sample horizons (Table 4.2.3-6). The greatest was at the 1-foot horizon (281 ± 52.2 pCi/g and 108 ± 13.88 pCi/g, respectively). The 1-foot sample contained 2,134 mg/kg of TPH. This concentration, however, fell to 92 mg/kg by 3 feet, which indicates limited downward migration. Aroclor 1260 was detected at 0.069J mg/kg in the 1-foot horizon and again at 0.018J in the 3-foot horizon. There was some difficulty at the laboratory with the 1-foot sample, and this location was resampled during Phase II. The re-analysis did not detect any aroclors at a detection limit of 0.2 mg/kg in a 1-foot sample. The results of the PCB analysis indicate the presence of insignificant levels of PCBs in the near-surface soils. This presence does not appear to be widespread nor does there appear to be significant vertical migration.

Boring F106B was advanced to 3 feet and soil samples taken at the 1- and 3-foot horizons. This boring is located in the southern part of the site on the road running between the slag piles. The soil sample taken at 1 foot was a tan-brown silt. The sample taken at 3 feet was a tan silt. The 1-foot sample was enriched in cadmium (5.4 mg/kg), chromium (36.2 mg/kg), fluoride (2,050 mg/kg), and zinc (93.6 mg/kg) (Table 4.2.3.2-17). The mix and level of these parameters indicate minor mixing with slag. All parameters were within the representative range in the 3-foot sample. This indicates little to no downward migration of site-related constituents into the subsurface beneath the road.

Both gross alpha and gross beta readings were within the representative range for the two soil sample horizons (Table 4.2.3-6). No PCBs were detected in either of the soil horizons (0.65 mg/kg detection limit). TPH was detected in the 1-foot soil sample at 78.4 mg/kg. The 3-foot sample did not contain detectable TPH (detection limit of 10 mg/kg). This indicates that no downward migration is occurring.

Boring F107R is located just north of former Pond 3S. It was advanced to 1.5 feet, and soil samples were taken at the 0.5- and 1.5-foot horizons. The 0.5-foot sample is a slag gravel. The 1.5-foot sample is a slag/gravel/brown silt mixture. As expected, both of these samples contained a number of constituents above representative levels (Table 4.2.3-21). The mix of above-representative constituents suggests that both samples were enriched with a mixture of slag and other site-related materials. Native soils were not encountered.

As expected, given the concentrations detected for inorganic parameters, gross alpha and gross beta activities were above representative levels for both sample horizons (Table 4.2.3-2). The greatest was at the 0.5-foot horizon (234 ± 71.6 pCi/g and 88.4 ± 25.6 pCi/g, respectively). The 0.5-foot sample contained 1,462 mg/kg of TPH. This concentration, however, fell to 28.2 mg/kg by 1.5 feet, indicating limited downward migration. No PCBs were detected in either soil horizon. However, the detection limit for the 0.5-foot sample was 1 mg/kg compared to the 0.65 mg/kg detection limit for the 1.5-foot sample.

Boring F108B is located between the eastern slag pile and the calciner sludge drying area (Figure 2.1-1). It was advanced to 2.5 feet and soil samples taken at the 0.5- and 2.5-foot horizons. The 0.5-foot sample is a tan silt with gravel. The 2.5-foot sample is a dark tan silt. Both of these samples contained a number of constituents above representative levels (Table 4.2.3-21). The mix of above-representative constituents suggests that they were enriched with slag. Native soils were not encountered.

Gross alpha and gross beta activities indicate some slag enrichment (Table 4.2.3-6). The greatest readings were in the 2.5-foot soil horizon with gross alpha at 57.2 ± 18.2 pCi/g and gross beta at 38.5 ± 9.14 pCi/g. No PCBs were detected in either sample nor was any TPH detected (Table 4.2.3-21).

Boring F109B is located at the southeastern boundary between FMC and Simplot. This area is roughly between the gypsum stack to the east and calciner sludge piles to the west (Figure 2.1-1). It was advanced to 2.5 feet and soil samples taken at the 0.5- and 2.5-foot horizons. The 0.5-foot sample is a road-surface combination of gypsum, slag, and gravel. The 2.5-foot sample is a tan silt. Both of these samples contained a number of constituents above representative levels (Table 4.2.3-21). The mix of

above-representative constituents indicates that the samples contained small amounts of either gypsum or calciner fines. Native soils were not encountered.

Gross alpha and gross beta were detected slightly above representative levels in the 0.5-foot sample (30.2 ± 11.44 pCi/g and 32.4 ± 8.08 pCi/g, respectively). Radioactivity levels were within the representative range in the 2.5-foot sample (Table 4.2.3-6). No PCBs were detected in either sample nor was any TPH detected (Table 4.2.3-21).

Boring F110B is located between the IWW basin and the silica pile (Figure 2.1-1). It was advanced to 2.5 feet and soil samples taken at the 0.5- and 2.5-foot horizons. The 0.5-foot sample is a dark brown to black silt with gravel. The 2.5-foot sample is a brown-black silt with a trace of gravel. Both of these samples contained a number of constituents above representative levels (Table 4.2.3-21). The mix of above-representative constituents indicates the samples contained varying amounts of slag and ore. While the trend was down with regard to constituent concentrations, the 2.5-foot sample still contained above-representative levels of most of the site-related constituents. Native soils were not encountered.

Gross alpha and gross beta readings were above representative levels for both sample horizons (Table 4.2.3-6). The greatest readings were found in the 2.5-foot sample: 90.3 ± 22.8 pCi/g of gross alpha and 53.3 ± 10.62 pCi/g of gross beta. No PCBs were detected in either sample tested. However, while the 0.5-foot sample did not have any detectable TPH (10 mg/kg detection limit), the 2.5-foot sample did (1,115 mg/kg). This indicates the soils have been laid down in lifts since oils could not travel from top to bottom without impacting the soils they passed through. In other words, the 2.5-foot sample contained TPH when it was laid down or, alternatively, was subsequently covered by newer soils at a later date.

Boring F111R is located on the slag haul road just north of the slag piles (Figure 2.1-1). It was advanced to 2 feet and soil samples taken at the 0.5- and 2-foot horizons. Both samples are gray silts with slag. Both contained a number of constituents above representative levels (Table 4.2.3-21). The deeper sample was more enriched with trace metals. The mix of above-representative constituents is characteristic of slag. Native soils were not encountered.

As expected, given the concentrations detected for inorganic parameters, gross alpha and gross beta activities were above representative levels for both sample horizons (Table 4.2.3-21). The greatest was at the 0.5-foot horizon (334 ± 94.2 pCi/g and 125 ± 26.2 pCi/g, respectively). The 0.5-foot sample contained 109 mg/kg of TPH. This concentration, however, had fallen to 52 mg/kg by 2 feet, indicating limited downward migration. No PCBs were detected in either soil horizon (Table 4.2.3-21).

However, the detection limit for the 0.5-foot sample was 2 mg/kg compared to 1 mg/kg in the 2-foot horizon.

Boring F112R is located on the road just east of the slag pit (Figure 2.1-1). It was advanced to 2 feet and soil samples taken at the 0.5- and 2-foot horizons. Both samples are gray silts with slag. Both contained a number of constituents above representative levels (Table 4.2.3-21). The deeper sample was more enriched with trace metals. Native soils were not encountered.

Gross alpha and gross beta activities were above representative levels for both sample horizons (Table 4.2.3-6). The greatest was at the 2-foot horizon (188 ± 33.4 pCi/g and 107 ± 12.92 pCi/g, respectively). The 0.5-foot sample contained 51.3 mg/kg of TPH (Table 4.2.3-21). This concentration, however, had fallen to 30.1 mg/kg by 2 feet. No PCBs were detected in either soil horizon (0.65 mg/kg detection limit).

Boring F113R is located on the road south of the furnace building (Figure 2.1-1). It was advanced to 2 feet and soil samples taken at the 0.5- and 2-foot horizons. The 0.5-foot sample is a dark brown/gray sand/silt with a trace of gravel. The 2-foot sample is a tan-brown sandy silt. The 0.5-foot sample contained a mix of parameters that are characteristic of slag and ore (Table 4.2.3-21). The concentrations of most site-related parameters found in the 2-foot sample, while at above-representative levels, indicate decreasing concentrations with depth. Native soils were not encountered.

Gross alpha and gross beta activities were above representative levels in both soil samples (Table 4.2.3-2). However, there is a marked decline in both readings between the 0.5-foot horizon (145 ± 27.8 pCi/g and 79.8 ± 10.52 pCi/g, respectively) and the 2-foot sample (28.6 ± 19.26 pCi/g and 33.5 ± 13.8 pCi/g, respectively). This pattern follows that noted above for the inorganic parameters. No TPH was detected in either sample. However, Aroclor 1260 was detected in the 2-foot sample at 0.018J mg/kg. The presence of an aroclor at a low level in a deeper sample without a corresponding TPH value is suspect and is probably a laboratory artifact.

Boring F114R is located on the road south of the calciner building (Figure 2.1-1). It was advanced to 2 feet and soil samples taken at the 0.5- and 2-foot horizons. The 0.5-foot sample is a dark brown/gray sand/silt with a trace of gravel. The 2-foot sample is a brown sandy silt. The 0.5-foot sample contained a mix of constituents characteristic of slag and ore (Table 4.2.3-21). The concentrations of most site-related constituents found in the 2-foot sample, while above representative levels, indicate decreasing concentrations with depth. Native soils were not encountered at this location.

Gross alpha and gross beta activities were considerably above representative levels for the 0.5-foot sample and declined to near or below representative levels in the 2-foot sample (Table 4.2.3-6). No PCBs were detected (0.65 mg/kg detection limit), nor was any TPH (detection limit of 20 to 21 mg/kg).

Boring F115R is located on the road east of the calciner complex (Figure 2.1-1). It was advanced to 2 feet and soil samples taken at the 0.5- and 2-foot horizons. The 0.5-foot sample is a dark brown sandy silt. The 2-foot sample is a tan-brown silt. The 0.5-foot sample contained a mix of constituents characteristic of ore (Table 4.2.3-21). The concentrations of most site-related constituents found in the 2-foot sample, while at above-representative levels, indicate decreasing concentrations with depth. Native soils were not encountered at this location.

As would be expected with an ore sample, gross alpha and gross beta activities were considerably above representative levels (151 ± 27 pCi/g and 81.4 ± 10.72 pCi/g) in the 0.5-foot horizon. These values, like the inorganic parameters in the sample, declined to near or below representative levels in the 2-foot sample (Table 4.2.3-2). No PCBs were detected (0.65 mg/kg detection limit), nor was any TPH (detection limit of 20 mg/kg).

Boring F119R is located on the road just west of the ore pile (Figure 2.1-1). It was advanced to 2 feet and soil samples taken at the 0.5- and 2-foot horizons. Both samples are described as ore. The analytical results for both samples support this description (Table 4.2.3-21). Native soils were not encountered at this location.

The values obtained for gross alpha and gross beta in this borehole, like the inorganic parameters, are indicative of ore (226 ± 77.8 pCi/g and 153 ± 89 for gross alpha in the 0.5- and 2-foot horizons, respectively, and 96 ± 26.6 pCi/g and 85.1 ± 38.4 pCi/g for gross beta in the 0.5- and 2-foot horizons, respectively) (Table 4.2.3-6). No PCBs were detected (0.65 mg/kg detection limit) in either sample. However, TPH was detected at 270 mg/kg in the 0.5-foot sample (Table 4.2.3-21). By the 2-foot sample, this level had declined to 27.8 mg/kg, indicating a definite attenuation gradient.

Boring F121R is located by the railroad track north of the silica pile (Figure 2.1-1). It was advanced to 2 feet and soil samples taken at the 0.5- and 2-foot horizons. The 0.5-foot sample is a gray silt slag. The 2-foot sample is a gray silt slag with gravel. Both samples contained a mix of constituents characteristic of slag (Table 4.2.3-21). The concentrations of most site-related constituents found in the 2-foot sample, while above representative levels, indicate decreasing concentrations with depth. Native soils were not encountered at this location.

Both samples in this borehole had above-representative activities for gross alpha and gross beta (Table 4.2.3-6). Both were at about the same level (129 ± 26.6 pCi/g and 126 ± 22.8 pCi/g for gross alpha and 65.6 ± 9.78 pCi/g and 69.6 ± 9.82 pCi/g for gross beta). No PCBs were detected in either sample (detection limit of 0.65 mg/kg). TPH was detected in the 0.5-foot sample at 27.6 mg/kg but was not detected in the 2-foot sample.

Boring F122R is located southwest of the slag pit and east of the old PCB transformer storage area (Figure 2.1-1). It was advanced to 2 feet and soil samples taken at the surface and 2-foot horizons. The texture of the samples is a brown silt fill. The surficial sample contained above-representative levels of cadmium (6 mg/kg), chromium (42.6 mg/kg), fluoride (1,250 mg/kg), total phosphorus (4,320 mg/kg), vanadium (54.3 mg/kg), and zinc (169 mg/kg). The 2-foot sample contained constituents at greatly reduced levels, but still above the representative range for cadmium (1.3 mg/kg), fluoride (620 mg/kg), total phosphorus (876 mg/kg), and zinc (81.6 mg/kg) (Table 4.2.3-21). Native soils were not encountered at this boring.

Radioactivity readings were above representative levels for the surficial sample but declined to below representative levels in the 2-foot sample (Table 4.2.3-6). Gross alpha activity was at 38.2 ± 17.34 pCi/g and gross beta at 34.1 ± 10.28 pCi/g in the surficial sample. No PCBs were detected (0.65 mg/kg detection limit). However, TPH was found at 51.8 mg/kg in the surficial sample and at 32.8 mg/kg in the 2-foot sample, indicating some migration.

Boring F123B is located just north of the western slag pile (Figure 2.1-1). It was advanced to 4 feet and soil samples taken at the 2- and 4-foot horizons. The 2-foot sample is a brown sandy silt with a trace of gravel. The 4-foot sample is a brown silt. With the exception of potassium (3,990 mg/kg) and orthophosphate (143 mg/kg), concentrations of constituents tested for in the 2-foot sample were within the representative range (Table 4.2.3.-21). The 4-foot sample contained above-representative levels of fluoride (900 mg/kg) and total phosphorus (871 mg/kg), indicating some minor migration of these two constituents from the sandy silt into the silt. All other constituents tested for were within the representative range.

Gross alpha was slightly above the representative activity in the 2-foot sample (25.8 ± 15.78 pCi/g). All other activity measurements for both gross alpha and gross beta were within the representative range (Table 4.2.3-6). No PCBs were detected in the Phase I sampling (detection limit of 0.65 mg/kg). However, the quality control process invalidated several of the results. Soils in the area of F123B were resampled in Phase II and submitted for PCB analysis. The new analysis results were once again negative at a 0.2 mg/kg detection limit. TPH was not detected in the surficial

soil sample (10 mg/kg detection limit), but was detected at 34.8 mg/kg in the subsurface sample.

Boring F124B is located just north of Pond 8S (Figure 2.1-1). It was advanced to 12 feet and soil samples taken at the 10- and 12-foot horizons. The 10-foot sample is described as a slag/gravel. The 12-foot sample is a tan-brown silt/sandstone. The 10-foot sample contained above-representative concentrations of constituents indicative of the presence of slag (Table 4.2.3.-21). The 12-foot sample contained concentrations of constituents that are indicative of precipitator slurry or phossy water solids. These are the materials found in Pond 8S. Since the color and texture of the sample are not those of either of these two materials, the above-representative levels of constituents are probably the result of contact with liquids associated with either of the two wastestreams.

Gross alpha and gross beta activities were above representative levels for both sample horizons (Table 4.2.3-6). No PCBs were detected in either sample (detection limit 0.65 mg/kg). TPH was also not detected in the two soil samples at F124B (detection limit 10 mg/kg).

Boring F125B is located about 100 feet to the east of Pond 8S (Figure 2.1-1). It was advanced to 3 feet and soil samples taken at the 1- and 3-foot horizons. The 1-foot sample is a tan fine silt. The 3-foot sample is a brown silt. The following constituents had concentrations above the representative range: cadmium (2.6 mg/kg and 3.2 mg/kg, respectively), chromium (30.6 mg/kg at the 3-foot horizon), fluoride (2,180 mg/kg and 2,580 mg/kg, respectively), total phosphorus (1,340 mg/kg and 1,150 mg/kg, respectively), and zinc (113 mg/kg and 97.2 mg/kg, respectively) (Table 4.2.3-21). The lack of a clear-cut high-to-low or low-to-high migration pattern indicates these are probably samples of a site-impacted fill.

Gross alpha activities were above representative levels in the 1-foot sample (29.9 ± 19.34 pCi/g) but fell to below representative levels in the 3-foot horizon (Table 4.2.3-6). Activities for both the 1-foot and 3-foot horizons were below representative for gross beta. No PCBs were detected in either sample (detection limit of 0.65 mg/kg). TPH was also not detected in the two soil samples at F125B (detection limit of 10 mg/kg).

Boring F126B is located to the south of Pond 8S (Figure 2.1-1). It was advanced to 2 feet and soil samples taken at the surface and 2-foot horizons. Both samples are tan silts with gravel. Both contained concentrations of site-related constituents above the representative range (Table 4.2.3-21). These are probably samples of a site-impacted fill.

Gross alpha activities for boring F126B were below representative levels (Table 4.2.3-6). Gross beta activities were slightly above representative levels in the surficial sample (33.2 ± 11.42 pCi/g) but returned to values within the upper range of representative in the 2-foot sample. The levels of reported activity in this borehole does not track well with the concentrations reported for the inorganics. No PCBs were detected in either sample (detection limit of 0.65 mg/kg). TPH was also not detected in the two soil samples at F126B (detection limit of 10 mg/kg).

Phase II Results for Roads. To determine the depth of impact at the location of boring 112R, boring F129B was placed in the general area during Phase II and advanced to 26 feet. The drilling log describes a 0.3-foot-thick asphalt layer, followed by 3.7 feet of light olive-gray gravelly sand, with the remaining texture being a moderately yellowish brown silty sand to silt. The descriptions of the two boring subsurfaces demonstrate the spatial variability of the soils on the FMC site. Soil samples were taken at the 0.5-, 5-, 10-, 15-, 20-, and 25-foot horizons and tested for inorganics and radioactivity (Table 2.1-2).

The 0.5-foot sample contained a number of constituents at above-representative levels: cadmium (10.6 mg/kg), calcium (213,000 mg/kg), fluoride (13,500 mg/kg), total phosphorus (4,390 mg/kg), potassium (6,520 mg/kg), vanadium (190 mg/kg), and zinc (137 mg/kg) (Table 4.2.3-21). This mixture of constituents indicates that the sample was a mixture of soils and slag. With the exception of the total phosphorus level (879 mg/kg) at 10 feet, which is just above the representative range, no other constituent was above representative levels for the remainder of the borehole, indicating there has been no subsurface migration of site-related materials at this borehole.

The same pattern of results was found for the gross alpha and gross beta activities (Table 4.2.3-6). Both were above representative values in the surficial sample (62.4 ± 11.6 pCi/g and 35.3 ± 5.29 pCi/g, respectively). However, the activities of the remaining five samples were all within the representative range.

Summary. With few exceptions, all of the road samples taken at FMC indicated that they were constructed from site-related fill materials (generally slag but in some cases ore and other native soils mixed with site-related materials). These materials, by their very nature, contained above-representative levels of inorganics and radionuclides. The RI sampling effort has amply demonstrated this. However, when the borings were drilled sufficiently deep to get below the fill materials, very little to no migration of the bed materials was observed for any constituents. The most prevalent constituents showing some mobility tended to be phosphates, fluoride, potassium, and to some extent zinc. The radionuclides and other trace metals were immobile.

PCBs and TPH were also extensively tested for in the road samples. While the presence of TPH was occasionally observed at very elevated levels (hundreds of mg/kg), PCBs were rarely detected, and then at less than 1 mg/kg. This observation coincides with observations from other soil sampling at the site.

Waste Oil Storage Area. The waste oil storage area was constructed in 1990 for drummed waste oils. This storage area overlies of former Pond 2S, a phossy water pond. One of the two originally planned borings was drilled in this area to investigate subsurface soil conditions. During the drilling operations, elemental phosphorus was encountered several times, forcing the relocation of the borehole. The soil samples were tested for inorganics, radioactivity, PCBs, and TPH (Table 2.1-2).

Boring F037B was advanced through a fill related to Pond 2S to a depth of 20 feet. A soil sample was taken at 20 feet just below the fill soil interface. This sample is a white silt that is possibly fill. Above-representative levels of boron (33.9 mg/kg), fluoride (1,550 mg/kg), lithium (19.2 mg/kg), total phosphorus (8,020 mg/kg), potassium (9,490 mg/kg), and zinc (449 mg/kg) were detected. No PCBs or TPH were detected in this sample (Table 4.2.3-22). Analyses for gross alpha and gross beta were both above the representative range (32.6 ± 14.96 pCi/g and 62.7 ± 10.12 pCi/g, respectively). The gross beta level was probably due to the enriched levels of potassium in the sample. Since no further samples were taken, the depth of migration of these materials is unknown.

Gross alpha and gross beta activities in the 20-foot sample were above representative levels (32.6 ± 14.96 pCi/g and 62.7 ± 16.12 pCi/g, respectively) (Table 4.2.3-6). This is not unexpected given the above-representative levels of the inorganics. No PCBs or TPH were detected in this sample.

Summary. The subsurface in the vicinity of the waste oil storage area contains materials related to Pond 2S to a depth of at least 20 feet. Evidence of elemental phosphorus was found in the subsurface. No organics were detected at 20 feet, although gross alpha and gross beta activities were above representative levels. The depth of impact of the pond (not materials from the waste storage area) was not determined.

9S Storage Area. Area 9S has been used as a storage area for dried precipitator dust. It is an unlined excavated area covering approximately 3 acres. Soils in the eastern portion of the area were tested during the 1990 FFA investigation. The results of these analyses are discussed below along with the Phase I data. To further characterize the area, one boring was drilled in the western portion of 9S, and the soil samples were tested for inorganics and radioactivity.

In 1990, boring B-2 was advanced to 11.5 feet, and three soil samples were taken—at the 0.5-, 6.5-, and 11.5-foot horizons. The first sample was a dark gray to black slag fill. The second was an olive-gray silty sand taken at the fill/soil interface. The 11.5-foot sample was a moderate yellowish brown silt. The fill sample had above-representative levels of a number of constituents whose mix suggested it was precipitator dust (Table 4.2.3-23). Of special note were cadmium (4,150 mg/kg), lead (574 mg/kg), potassium (50,800 mg/kg), silver (69.9 mg/kg), and zinc (52,600 mg/kg). However, by 6.5 feet, only fluoride (189 mg/kg soluble), potassium (7,110 mg/kg), total phosphorus (1,970 mg/kg), and zinc (180 mg/kg) were at levels above the representative range. These same constituents persisted at above-representative levels into the 11.5-foot sample, but at lower levels. While the depth of impact of all constituents was not determined in this borehole, it was demonstrated that the trace metals are not mobile.

Boring F034B was advanced to 20 feet, and four soil horizons were sampled. The 5- and 10-foot horizon were characterized as pale brown silts. The 15- and 20-foot horizons were reddish yellow, sandy gravel. The 5-foot soil sample contained above-representative concentrations of the following constituents: cadmium (25.1 mg/kg), fluoride (1,980 mg/kg), lithium (18 mg/kg), total phosphorus (2,730 mg/kg), potassium (7,870 mg/kg), and zinc (366 mg/kg) (Table 4.2.3-23). The cadmium is unexpected, but otherwise, these elements are, as was seen above, the more mobile of the constituents that would be found in precipitator dust. Dust itself was obviously not sampled. In the 10-foot sample, fluoride, total phosphorus, potassium, and zinc were still at above-representative, but reduced, levels (Table 4.2.3-23). At the 20-foot horizon, all constituents were within the representative range.

Gross alpha and gross beta activities were above representative levels (32.1 ± 11.54 pCi/g and 47.3 ± 9.36 pCi/g, respectively) in the 5-foot sample (Table 4.2.3-6). These levels fell considerably in the 10-foot silt but were back above representative levels in the first of the sandy gravels. This 15-foot sandy gravel sample also contained above-representative levels of zinc and cadmium, but representative levels of other trace metals and fluoride and total phosphorus. Since cadmium is not particularly mobile, there is a good possibility that the increased radioactivity in this gravel is natural, as are the levels of cadmium and zinc. Gross alpha and gross beta activities were well below representative levels in the 20-foot sample.

Summary. About a 5-foot-deep fill layer was encountered in borings in the eastern and western sections of the 9S storage area. This fill appears to be a mixture of slag and precipitator dust. Below this depth most trace metals (with the exception of zinc) are not migrating into the subsurface. There is evidence of fluoride, phosphate, and potassium, as well as zinc migration to 10 to 15 feet below the land

surface. However, in the boring that went to 20 feet, representative levels of all constituents were observed.

Active Landfill. The active landfill is located south of the slag pile. To assess subsurface conditions, one borehole was drilled just to the north (downgradient) side. The plan was to drill to groundwater or bedrock, whichever came first. During the 1990 investigation, boring 138 was advanced in a downgradient position to the landfill to 168 feet after encountering weathered tuff at 140 feet. No groundwater was encountered. Boring F027B encountered weathered tuff at 138 feet and, as previously determined, no groundwater was present. Soil samples were taken at 10-foot intervals to 120 feet and analyzed for inorganics, radioactivity, and volatile and semivolatile organics (Table 2.1-2).

The soil texture for most samples is a brownish yellow (10-, 20-, 30-, 40-, and 50-foot horizons) to yellowish brown (70-, 80-, 90-, 100-, 110-, and 120-foot horizons) silt. The two exceptions are for the surficial soil horizon (brown silt) and for the sample taken at 60 feet, a yellowish brown gravelly silt. For the most part, all inorganic parameters were near or below the representative range (Table 4.2.3-24). There were several excursions such as sodium (1,010 mg/kg) and potassium (3,760 mg/kg) at 30 feet, and zinc (53.4 mg/kg and 55.2 mg/kg) at the surface and 110-foot horizons, respectively. Other than zinc, no other trace metal was above the representative range, nor were fluoride or total phosphorus.

An evaluation of the gross alpha and gross beta results obtained for all sample intervals in F027B indicates that none were above the representative range (Table 4.2.3-6).

One semivolatile compound was detected in all the samples analyzed: bis (2ethylhexyl)phthalate at 25 mg/kg in the 60-foot soil sample. Since it was not detected in any other sample and is a recognized artifact in sample handling and analysis, it is assumed to be an artifact of the handling procedures. A number of volatile organics were reported in various soil horizons at very low levels. All of them, except ethylbenzene (0.003 mg/kg in the surficial sample and 0.002J mg/kg in the 100-foot sample), are associated with laboratory contamination. They include carbon disulfide (range 0.001 to 0.002 mg/kg), 2-butanone (0.018 in the surficial sample and 0.0175 in the 130-foot sample), toluene (range 0.002J to 0.175 mg/kg), xylenes (0.005 to 0.016 mg/kg), and acetone (0.087B to 0.380 mg/kg). The toluene range is much narrower than appears, as the 0.175 mg/kg sample is surficial and the remaining samples are all less than 0.005 mg/kg. The acetone samples are frequently accompanied by a laboratory qualifier (B) signifying that the laboratory blank was also contaminated with acetone. Given that the samples were analyzed using SW-846 8042, which has a method-detection limit around 0.010 mg/kg for

water samples (not soil), along with the random occurrence of the volatiles and their concentration levels, there does not appear to be a measurable volatile organic problem in the soils taken from this borehole.

Summary. Analyses of the soil samples taken from this borehole indicate little to any site impact with regards to inorganic or radioactive parameters. There were a number of volatile organics detected in a random fashion within the borehole. For the most part these organics are associated with laboratory-introduced contamination. There does not appear to be a clear association with site landfill activities.

8S Recovery Process. The 8S recovery process was built in 1983 and operated as a test facility to recover elemental phosphorus from Pond 8S. The processing equipment was located on a concrete pad within a dike near Pond 8S. Two borings (F058B and F059B) were drilled to the north and west, respectively, of the recovery process to assess subsurface conditions (Figure 2.1-1). Soil samples were tested for inorganics, radioactivity, TPH, and PCBs.

Boring F058B was advanced to 9 feet, and soil samples were taken at the 7- and 9-foot horizons. The 7-foot sample is a black-gray gravel/slag sludge. The 9-foot sample is a black-gray sludge to dark brown silt. Both of these soil samples contained numerous constituents at above-representative concentrations (Table 4.2.3-25). A comparison of the relative levels of the constituents detected indicates the presence of phossy water solids or precipitator dust. Since the 8S recovery process was constructed in the vicinity of former Pond 6S, which contained phossy water solids and precipitator slurry, it is probable that the sludge encountered in F058B is, in fact, the bottom of former Pond 6S and not related to 8S recovery process operations. The vertical extent of impact from facility operations was not determined in this borehole.

Boring F059B was advanced to 10 feet, and one sample taken at the 10-foot horizon. The texture was a black-gray slag. Evaluation of the chemical analysis of the sample indicates a preponderance of precipitator slurry/phossy water solids material. This material appears to be a northward continuation of the sludge found in F058B and supports the theory that this is the sludge-filled bottom of former Pond 6S. Native soils were not encountered.

Samples from both boreholes had above-representative levels of gross alpha (143 ± 49.2 pCi/g to 1,660 ± 149 pCi/g) and gross beta (81.7 ±21.6 pCi/g to 1,220 ± 59.6 pCi/g). These values are consistent with those expected for precipitator slurry/phossy water solids. Most of the gross beta can be accounted for by the high potassium content of the samples (Table 4.2.3-6).

No PCBs were detected in any of the samples tested. TPH was, however, found in the F059B sample at 13.5 mg/kg.

Summary. Borings drilled to the west and north of the recovery process encountered fill to at least 9 feet. Analysis of the lower reaches of this fill indicated elevated levels of trace metals, fluoride, total phosphorus, and radioactivity that are associated with precipitator slurry and phossy water solids. These sludges are believed to be associated with former Pond 6S rather than the recovery process operations. The vertical depth of the impact was not determined.

4.2.3.3 Onsite Soils—Areas with Sustained Hydraulic Heads

Areas with former or current sustained hydraulic heads are treated in a separate investigation section because the water used in their operation can become a means for subsurface transport of site-related parameters. If site-related parameters do not migrate under the conditions supplied by a sustained head, they are very unlikely to migrate in the absence of a transport mechanism. The marginal amounts of precipitation in the area will not provide a more sustained head than that found in an unlined ditch or pond. For purposes of analysis, the calciner sludge drying areas have been included in this section.

Areas investigated with sustained hydraulic head include the former Pond 1E; former Pond 4E; former Pond 5E; former Pond 6E; Pond 8S; IWW basin and ditch; former calciner ponds; and the former kiln scrubber overflow pond.

Pond 8S. Pond 8S is an active, unlined phossy waste surface impoundment that is in the process of being closed; closure of the pond began in the fall of 1993. Since it is active, no borings could be drilled into it. However, three borings (B150, B12, and B13) were located near it and advanced to groundwater. Boring B150 was subsequently converted to groundwater monitoring Well 150. Soil samples taken from the boreholes were analyzed for inorganics and radioactivity (Table 2.1-2).

Boring B150 is located to the north of Pond 8S (Figure 2.1-1) and is the closest to the pond. It was sampled at 10-foot intervals to 90 feet. The first sample contained above-representative levels of cadmium (13.5 mg/kg), calcium (211,000 mg/kg), chromium (178 mg/kg), fluoride (11,400 mg/kg), total phosphorus (4,080 mg/kg), potassium (6,880 mg/kg), vanadium (157 mg/kg), and zinc (239 mg/kg) (Table 4.2.3-26). This mix of constituents is indicative of slag. This conclusion is expected since the boring is near the toe of a slag dike. Concentrations of all constituents decreased with depth. At 20 feet, only total phosphorus (1,630 mg/kg), potassium (4,550 mg/kg), and zinc (64.3 mg/kg) were above the representative range. Unlike results from other deeper boreholes, levels of zinc remained near or above

representative levels through the entire column. Other constituents were generally near or below representative levels. Gross alpha and gross beta were also tested in this borehole (Table 4.2.3-6). With the exception of the slag sample at 10 feet (gross alpha of 172 ± 11.72 pCi/g and gross beta of 84 ± 7.28 pCi/g), all gross alpha and gross beta results were within the representative range. Other than zinc, there do not appear to be any constituents impacting the subsurface soils from site activities at boring B150.

Boring B-12 is located to the southwest of Pond 8S. It is closer to former Pond 2E than to Pond 8S. Soil samples were taken at 10-foot intervals (starting at 10 feet) to 90 feet below the ground surface. The description of the soil column above the 10-foot horizon indicates fill. The 10-foot soil sample contained a number of constituents above representative levels: cadmium (535 mg/kg), calcium (83,900 mg/kg), chromium (154 mg/kg), copper (40.8 mg/kg), fluoride (7,030 mg/kg), lead (137 mg/kg), nickel (35.7 mg/kg), total phosphorus (9,980 mg/kg), silver (56 mg/kg), vanadium (138 mg/kg), and zinc (10,800 mg/kg) (Table 4.2.3-26). This mix of constituents indicates the presence of precipitator dust or phossy water solids. At 20 feet, all but fluoride (784 mg/kg), total phosphorus (1,610 mg/kg), potassium (6,410 mg/kg), and zinc (96 mg/kg) returned to representative levels. Of the constituents analyzed, only zinc remains consistently at above-representative levels throughout the soil column.

Total phosphorus and potassium returned to above-representative levels at the 70- and 80-foot horizons, with above-representative levels of total phosphorus continuing to the 90-foot horizon. Since the groundwater in the area contains above-representative levels of potassium and total phosphorus (but not zinc), the elevated levels of these two constituents in the 70- to 90-foot horizons may be related to it.

Gross alpha and gross beta activities were only above representative levels in the 10-foot sludge sample (143 ± 21.8 pCi/g for gross alpha and 117 ± 13.46 pCi/g for gross beta). However, the gross alpha activities were somewhat higher in the 80- and 90-foot samples than those above. This may indicate that there are alpha emitters in the groundwater (Table 4.2.3-6).

Boring B-13 is located east of Pond 8S. It was sampled at 10-foot intervals to 90 feet. Groundwater was encountered at 98 feet. The first 14 feet of the boring appears to be a fill. The soil sample at 10 feet is just above a material similar to the 10-foot sample at B-12; however, this material was not sampled. The 10-foot sample contained above-representative levels of cadmium (15.2 mg/kg), total phosphorus (3,250 mg/kg), and zinc (637 mg/kg) (Table 4.2.3-26). The 20-foot soil horizon contained above-representative concentrations of total phosphorus (992 mg/kg) and zinc (52.7

mg/kg), while in the 30-foot sample, only zinc (111 mg/kg) was above representative levels. The distribution of zinc in the subsurface does not follow either a leachate pattern (high-to-low or low-to-high) or a soil texture pattern (sands low, silts/clays high). It may or may not be entirely related to site activities. Regardless, from the available data there does not appear to be any evidence of migration of trace metals from the surface or the subsurface in this borehole. Gross alpha and gross beta activities were within representative ranges for all samples taken (Table 4.2.3-6).

Summary. Pond 8S is surrounded by a fill layer of variable depth (10 to 14 feet). To the north is a slag layer and to the south is a black clayey material with the constituents of phossy water solids or precipitator dust. The fill in general contains above-representative levels of various constituents associated with site activities. Beneath this fill there is little evidence of downward migration of any constituents other than total phosphorus, fluoride, and zinc. The zinc occurs with such persistence compared with other sampling locations that it is not possible to distinguish whether it is naturally occurring or site-related. These three borings may have been close enough to the unlined ponds (either 8S or 2E) to have been slightly influenced by belling from their contents. Gross alpha and gross beta activities were above representative values only in identifiable fill horizons.

Former Pond 1E. Former Pond 1E is located in the southwestern portion of FMC (Figure 2.1-1). It was unlined and received phossy water/solids and precipitator slurry. The subsurface was initially investigated in 1990 with boring B-1. These results are presented below. In Phase I, an additional boring was drilled in the pond and four soil samples taken at approximately 5-foot intervals. These samples were analyzed for the presence of inorganics and radioactivity (Table 2.1-2).

In 1990, boring B-1 was advanced to 31 feet and samples taken at the 0.5-, 6.5-, 11.5-, and 31-foot horizons. The drilling log indicates that the first 4 feet consisted of fill, while the remaining depth was a very pale orange silt. The 0.5-foot sample contained above-representative levels of cadmium (5,110 mg/kg), chromium (278 mg/kg), copper (155 mg/kg), lead (683 mg/kg), potassium (66,300 mg/kg), selenium (77.6 mg/kg), silver (79.6 mg/kg), vanadium (234 mg/kg), zinc (69,800 mg/kg), fluoride (106 mg/kg), and total phosphorus (86,000 mg/kg) (Table 4.2.3-27). By the 6.5-foot horizon the only constituents that are above representative levels are potassium (9,295 mg/kg), zinc (1,590 mg/kg), fluoride (156 mg/kg), and total phosphorus (5,770 mg/kg). These same constituents were still above representative levels by the 31-foot horizon, albeit at reduced levels. This pattern is one that can be observed in most of the former pond areas in the southwestern area of FMC.

In Phase I of the RI, boring F033B was advanced to 19.5 feet and sampled at the 4.5-, 9.5-, 14.5-, and 19.5-foot horizons. The soil texture is a brownish yellow silt for all

horizons. A slag fill was in the first 4.5 feet of boring. The 4.5-foot sample, which was taken at the fill/soil interface, contained above-representative levels of boron (50.6 mg/kg), cadmium (485 mg/kg), chromium (51.8 mg/kg), copper (22.9 mg/kg), fluoride (4,130 mg/kg), lead (79.6 mg/kg), total phosphorus (6,410 mg/kg), potassium (15,900 mg/kg), silver (46.1 mg/kg), vanadium (55 mg/kg), and zinc (7,320 mg/kg) (Table 4.2.3-27). By the 9.5-foot horizon, all trace metals except for zinc (295 mg/kg) returned to the representative range. The deepest sample horizon (19.5 feet) still had above-representative levels of fluoride (1,210 mg/kg), total phosphorus (1,630 mg/kg), potassium (4,740 mg/kg), and zinc (75.7 mg/kg).

In F033B, above-representative levels of both gross alpha (114 ±22.4 pCi/g) and gross beta (152 ± 15.2 pCi/g) were measured in the 14.5-foot horizon (Table 4.2.3-6). However, gross alpha readings were within the representative range for the remaining three horizons. Gross beta, on the other hand, reflecting the above-representative levels of potassium, remained above representative levels for all sampling intervals.

Summary. Investigation of former Pond 1E has found evidence of precipitator slurry dust and/or phossy water solids to a depth of at least 4.5 feet in some areas of the former pond. These materials contain elevated levels of trace metals, fluoride, total phosphorus, and radioactivity. Evaluation of the analytical results of soil samples taken beneath the fill area indicates that with the exception of zinc, there is little to no migration into the soils of any trace metals. There is evidence of the continued migration to depth of fluoride, total phosphorus, potassium, and to a lesser extent zinc. It appears that the natural attenuation properties of the soils in the area (calcareous and alkaline) combined with the solubility of the deposited solids will preclude migration of measurable quantities of most of the constituents into the subsurface. Measurable is meant here as the ability to distinguish between representative and enriched concentrations of a given constituent in the soil.

Former Pond 4E. Former Pond 4E, which has been partially covered by active Pond 11-14S construction, is located in the southwestern portion of FMC. It lies just to the west of 1E (Figure 2.1-1). Pond 4E received phossy water/solids, precipitator slurry, and dried precipitator dust and slag. This pond was not investigated in 1990. One boring was advanced in Pond 4E to groundwater during Phase I to investigate subsurface conditions. Soil samples taken in this boring were analyzed for inorganics and radioactivity (Table 2.1-2).

Boring F024B was advanced 75 feet to groundwater. Samples were taken at 10-foot intervals at the following horizons: 0, 10, 20, 30, 40, 50, 60, 70, and 75 feet. The boring log describes the first 11 feet as being fill with the top 6 inches called out as

slag. The 20-, 30-, 40-, and 50-foot horizons are brown silt. This changes to a silty gravel between 56 and 60 feet. At 60 feet, the texture changes again to a brown, coarse, sandy gravel. At 73 feet, a light yellowish brown silt is encountered. Examination of the analytical results of tests on the 0.5-foot sample indicates that the material was impacted primarily by precipitator dust or phossy solids (Table 4.2.3-28). This is evident from the relatively high values of cadmium (918 mg/kg), lead (157 mg/kg), potassium (15,700 mg/kg), silver (87.1 mg/kg), and zinc (15,200 mg/kg), and the relatively low levels of calcium and molybdenum.

All trace metals except zinc (85.3 mg/kg) were within the representative range at the 10-foot horizon. However, above-representative levels of fluoride (1,510 mg/kg), total phosphorus (1,640 mg/kg), and potassium (8,000 mg/kg) were present. This pattern persisted throughout the soil column to groundwater where zinc was at representative levels (43.1 mg/kg). There was an abrupt increase in iron content at the 40-foot horizon that continued to at least the 70-foot horizon (through two soil textures). This was accompanied by an increase in observed sodium and nickel values. These latter changes are probably not related to site activities.

Radioactivity results follow concentration patterns that are similar but somewhat different from the inorganic pattern observed above (Table 4.2.3-6). The 0.5-foot sample had above-representative activities for both gross alpha (95.3 ±22.2 pCi/g) and gross beta (113 ± 13.32 pCi/g). Given the presence of precipitator dust and/or phossy solids, this is expected. The 10- through 50-foot-horizon samples were all well within representative levels. At the 60-foot horizon there was a change in lithology to gravel, and at this change the radioactivity also increased to levels at or slightly above representative levels. These returned to representative levels in the 75-foot silt. The higher results for the gravels are probably native and not a result of facility activities.

Summary. As with former Pond 1E, the investigation of former Pond 4E has found evidence of precipitator slurry dust and/or phossy water solids in the near-surface soils of the former pond. These materials contained elevated levels of trace metals, fluoride, total phosphorus, and radioactivity. Evaluation of the analytical results of soil samples taken beneath the fill area indicates that with the exception of zinc, there is little to no migration into the soils of any trace metals. There is evidence of the continued migration to depth of fluoride, total phosphorus, potassium, and to a lesser extent zinc. It appears that the natural attenuation properties of the soils in the area (calcareous and alkaline) combined with the solubility of the deposited solids will preclude migration of measurable quantities of most of the constituents into the subsurface. There was a change in lithology from silt to gravel at approximately 55 feet that had a commensurate increase in radioactivity. This is believed to be naturally occurring.

Former Pond 5E. Former Pond 5E is located in the southwestern portion of FMC (Figure 2.1-1). It was unlined and received primarily phossy water/solids. It is partially overlain now by Pond 15S. The subsurface was initially investigated in 1990 with boring 114. These results are presented below. In Phase I, an additional boring (F025B) was drilled in the pond to groundwater (approximately 71 feet below ground surface). Samples taken in this boring were analyzed for the presence of inorganics and radioactivity (Table 2.1-2).

In 1990, boring 114 was drilled to 141 feet and completed as a groundwater monitoring well. Soil samples were taken at the 5.5-, 21-, 51-, 71-, 96-, and 141-foot horizons. Soils in the first 5 feet of the boring were slag gravel fill. The 5.5-foot horizon was grayish brown silt, an indication of the presence of dark gray to black phossy solids. The soil samples taken at 21 and 51 feet were dark yellowish brown silts. The 71-foot sample was taken at the interface of a dark yellowish brown silt and a dusky yellow-brown gravel with sand. Both the 96-foot and the 141-foot horizons were dark yellowish brown silts.

Analytical results for the 5.5-foot sample indicate it had been impacted by site activities. The constituents detected at above-representative values included cadmium (21.7 mg/kg), potassium (6,170 mg/kg), fluoride (350 mg/kg), total phosphorus (3,400 mg/kg), and zinc (1,720 mg/kg). At the next sampled horizon (21 feet), all constituents were at representative levels except potassium, fluoride, and total phosphorus (Table 4.2.3-29). These three constituents remained above representative levels to groundwater. The last sample, which was taken at approximately 26 feet below the water table, contained no above-representative constituents.

Boring F025B was advanced to groundwater (approximately 70 feet). Soil samples were taken at the 5-, 10-, 20-, 30-, 60-, and 70-foot horizons. The first two samples are a dark olive-gray silt. Their color indicates the potential for their being impacted by phossy water solids. The 20-foot sample is a yellowish brown silt. The remaining three samples are brown sandy gravels to brown gravelly silts. An evaluation of the analytical results indicates that the 5- and 10-foot samples were impacted by site activities (Table 4.2.3-29). The 10-foot sample appeared to contain a substantial percentage of phossy solids. The above-representative constituents included cadmium (2,080 mg/kg), chromium (108 mg/kg), fluoride (35,000 mg/kg), lead 360 (mg/kg), total phosphorus (33,600 mg/kg), potassium (23,700 mg/kg), silver (152 mg/kg), vanadium (78 mg/kg), and zinc (200,000 mg/kg).

The 20-foot soil sample contained no trace metals (including zinc) above the representative range. However, above-representative values for fluoride, potassium, and total phosphorus remained. As can be expected, the sandy gravel at

30 feet did not have a high mineral content, as even the concentrations of potassium, fluoride, and total phosphorus were well below the representative range. However, with the return of silts these three, but no others, were once again above representative levels and remained so to groundwater.

As expected, gross alpha and gross beta activities were above-representative levels for the 5- and 10-foot samples (Table 4.2.3-6). The greater value was found at 10 feet (302.95 ± 17.78 pCi/g for gross alpha and 265 ± 14.44 pCi/g for gross beta), which is also the horizon of greatest trace metal concentrations. Gross alpha was also slightly above the representative range at the 20-foot horizon (26.39 ± 5.94 pCi/g). The remainder of the sampling intervals were at or below representative levels for both gross alpha and gross beta. The above-representative value found at 20 feet is indicative of some mobility of an alpha-emitting radionuclide.

Summary. Investigation of former Pond 5E has found evidence of phossy water solids to a depth of at least 10 feet in some areas of the former pond. These materials contained elevated levels of trace metals, fluoride, total phosphorus, and radioactivity. Evaluation of the analytical results of soil samples taken beneath the fill area indicates that there is little to no migration into the soils of any trace metals. There is evidence of the continued migration to depth of fluoride, total phosphorus, and potassium. It appears that the natural attenuation properties of the soils in the area (calcareous and alkaline) combined with the solubility of the deposited solids will preclude migration of measurable quantities of most of the constituents into the subsurface. Measurable is taken here as the ability to distinguish between representative and enriched concentrations of a given constituent in the soil.

Former Pond 6E. Former Pond 6E is located in the southwestern portion of FMC (Figure 2.1-1). It was unlined and received primarily phossy water/solids. It is partially overlain now by Pond 15S. The subsurface was initially investigated in 1990 with boring 130. These results are presented below. In Phase I, an additional boring (F026B) was drilled in the pond to groundwater (approximately 60 feet below ground surface). Samples taken in this boring were analyzed for the presence of inorganics and radioactivity.

Boring 130, which was drilled in 1990, is located in the far eastern corner of the pond. It was drilled to 180 feet and sampled at the 16-, 41-, and 71-foot horizons. Groundwater was encountered at approximately 70 feet. The 16- and 41-foot horizons are yellowish to moderately yellowish brown silts. The 71-foot sample is pale yellowish brown silty sand. Of the trace metals, only zinc (66.5 mg/kg) was above the representative range in the 16-foot sample (Table 4.2.3-30). Also at above-representative levels were fluoride (330 mg/kg), total phosphorus (1,700 mg/kg), and potassium (6,250 mg/kg). No trace metals were above the representative range

in the 41- and 71-foot horizons. However, as with other subsurface pond samples, fluoride, total phosphorus, and potassium remained at elevated levels to groundwater.

Boring F026B was advanced to groundwater, and three samples were taken at the surface, 10-foot, and 60-foot horizons. It is located in the central portion of the pond to the west of boring 130. The surficial and 10-foot samples are light yellowish brown silt. The 60-foot sample is a light yellowish brown gravelly silt. No samples were taken between 20 and 60 feet because of the inability of the split spoon to penetrate through the gravelly silt. The logbook indicates 50 blow counts with no advance of the spoon. The only trace metal parameter found above the expected representative range in the surficial sample was zinc (53.8 mg/kg). As is usual for these ponds, fluoride, total phosphorus, and potassium were also found at above-representative levels (Table 4.2.3-30). In the 10-foot sample, the zinc level was below representative levels, but fluoride, total phosphorus, and potassium remained at elevated levels. At 60 feet in the water table, the level of total phosphorus rose from 1,640 mg/kg in the 10-foot sample to 13,900 mg/kg. This rise in total phosphorus was also accompanied by a rise in potassium and fluoride levels as well as boron, lithium, and sodium. However, trace metal levels did not show an increase. Since this sample was taken in the saturated zone, these results may indicate an accumulation of mobile ions in the saturated silts below the unit. The absence of trace metals also reflects their lack of mobility.

Radionuclide activities were within the representative range for all three soil horizons (Table 4.2.3-6). This indicates that there was little to no radionuclide migration from this pond into the subsurface.

Summary. Although drilled into the center of former Pond 6E, F026B encountered no visible fill layer. There was no evidence of facility-related sludges in the surficial sample. However, there was the distribution of fluoride, total phosphorus, potassium, and zinc values that are characteristic of migration from FMC phossy water/solids or precipitator slurry ponds. As is also characteristic of these ponds, no evidence of trace metal migration in the subsurface, other than zinc, was found.

IWW Basin and Ditch. The IWW basin and ditch transport noncontact cooling water from the plant to an NPDES outfall on the Portneuf River. The water and the ditch sediments were discussed in Section 4.2.3.1, Potential Sources. To investigate the potential impact this unlined ditch may have had on subsurface soils, a boring was located directly on its bank and advanced to groundwater. It was thought that by locating the boring on the immediate bank, it would be sufficiently close to the

waterflow to intercept the seepage which may be emanating from the bottom of the ditch into the subsurface. Soil samples were tested for inorganics and radioactivity.

Boring F030B was advanced to a depth of 75 feet (Figure 2.1-1). Soil samples were taken at the surface, 10-, 20-, 30-, 40-, 50-, 65-, and 75-foot horizons. Samples taken at 0, 10, and 20 feet were brown clayey silt. The 30- and 40-foot horizons were yellowish brown gravel and sandy silt. The 50-foot sample was a brown silty sand, and the 65-foot sample was a dark brown silty sand. Gravel was encountered at 75 feet. The surficial sample contained constituents in a mix generally associated with phosphate ore (Table 4.2.3-31). The 10-, 20-, and 30-foot samples all contained constituents within the representative range. At the 40-foot horizon, which is in the middle of a gravel and sandy silt zone, arsenic (9.5 mg/kg), chromium (34.4 mg/kg), and iron (15,300 mg/kg) all increased to above-representative levels; fluoride (170 mg/kg), total phosphorus (268 mg/kg), potassium (870 mg/kg), and zinc (27 mg/kg) all fell to very low levels. Because the increase in arsenic and chromium does not appear to be associated with any other facility-related parameters, they are probably natural components of the gravel at the 40-foot horizon. Mercury was found at above-representative concentrations in this borehole at 20 feet (1.7 mg/kg), 30 feet (1 mg/kg), and 50 feet (1.1 mg/kg). With the exception of sodium at 65 feet, no other constituents were above representative levels.

Gross alpha was above representative levels in two soil horizons. These were 171.19 ± 24.6 pCi/g in the surficial sample and 96.96 ±12.5 pCi/g in the 30-foot soil sample (Table 4.2.3-6). The surficial sample is associated with ore which contains above-representative gross alpha. There were no above-representative site-related constituents in the 30-foot sample. Gross alpha was well within the representative range in both the 20-foot silt and the 40-foot gravel below. Hence this gross alpha exceedance is either a laboratory error or is related to the type of gravel encountered in the upper gravel zone. As with gross alpha, gross beta was elevated in the surficial soil sample (67.26 ± 7.8 pCi/g). However, it was at representative levels in the 30-foot sample.

Summary. There was no evidence of the migration of site-related parameters into the subsurface at the IWW ditch, including the more mobile cations and anions. Therefore, it can be concluded that the ditch is not a source of impact to either the subsurface soils or the groundwater at the site.

Calciner Ponds and Calciner Pond Sediments. The new lined calciner ponds occupy a large portion of the same area that the former unlined calciner ponds were in. There is, however, an uncovered section to the southwest of the new ponds that was part of one of the former ponds. To investigate the potential impact the

unlined ponds had on the subsurface, one boring was located in this area and advanced to groundwater. In addition to the ponds themselves, two areas were investigated where calciner pond sediments have been placed to dry. One of these areas (F050B) lies just to the south of the active ponds and is herein termed calciner pond sediment storage area A. The other investigated area (F051B) is approximately 1,400 feet further to the south of the ponds (Figure 2.1-1) and is herein termed calciner pond sediment storage area B. Soil samples taken from these borings were tested for inorganics and radioactivity (Table 2.1-2).

Boring F023B was advanced to 60 feet. Soil samples were taken at the 0-, 10-, 20-, 30-, 40-, 50-, and 60-foot horizons. The surficial sample was a light brown sandy silt. The 10-, 20-, and 30-foot horizons were dark, yellowish brown clayey silts. The remaining horizons were dark, yellowish brown sandy gravels. The gravels become coarser and more permeable with depth. The surficial sample showed a range of above-representative trace metals, as well as fluoride and total phosphorus (Table 4.2.3-4), including cadmium (36.2 mg/kg), chromium (141 mg/kg), mercury (1.8 mg/kg), nickel (24.8 mg/kg), total phosphorus (13,800 mg/kg), potassium (5,590 mg/kg), selenium (47.5 mg/kg), vanadium (146 mg/kg), and zinc (328 mg/kg). Most of the trace metals, with the exception of cadmium, nickel, and zinc, returned to concentrations within the representative range in the 10-foot horizon, indicating that little to no migration of these elements had occurred. Concentrations of fluoride and total phosphorus, which are fairly mobile, were also high. By the 30-foot sample, only nickel (27 mg/kg), fluoride (690 mg/kg), and total phosphorus (1,410 mg/kg) remained substantially above representative levels. As would be expected in a sandy gravel, there was little to no presence of site-related constituents in the next three horizons.

Radioactivity in boring F023B was above representative levels for gross alpha in the surficial sample (53.12 ± 11.86 pCi/g), and also in all three of the gravel zones (Table 4.2.3-6). This same pattern was apparent for gross beta. The levels detected in the surficial sample are probably related to site influences. However, those detected in the volcanic gravels are more likely naturally occurring. The lack of enriched readings in the silts indicates that the alpha and beta emitters have low mobility in them.

Storage Area A. Boring F050B was drilled approximately 200 feet to the east of F023B (Figure 2.1-1). It was drilled to a depth of 10 feet into a sludge storage area. Soil samples were collected at 0, 2, 5, 7, and 10 feet. The log description is of a red-brown clay with silt for all five samples. This is a visual description of calciner sludge. The analytical results confirm this assumption as all five samples had above-representative levels of constituents associated with calciner pond sediment (Table 4.2.3-32). Native soils were not encountered in this boring, so migration

potential could not be assessed. Above-representative levels of gross alpha and gross beta were also detected in all five samples taken in this boring (Table 4.2.3-6).

Storage Area B. Boring F051B was advanced to 17 feet. It was sampled at five horizons: 5, 7, 9, 11, and 14 feet. The texture of all the samples was red-brown to tan silty sand. All the samples appeared to be a mixture of calciner fines and fill. All the samples had calciner-related constituents that were above the representative range. The highest concentrations were generally found in the surficial sample: cadmium (261 mg/kg), calcium (280,000 mg/kg), chromium (328 mg/kg), copper (76.1 mg/kg), fluoride (54,400 mg/kg), nickel (120 mg/kg), total phosphorus (85,800 mg/kg), selenium (805 mg/kg), vanadium (390 mg/kg), and zinc (1,250 mg/kg) (Table 4.2.3-33). All but one of the samples had gross alpha counts above representative levels (Table 4.2.3-6). The one sample horizon that did not have gross alpha above representative levels is suspect because of its extremely high accuracy range (9-foot horizon with 22.3 ± 14.62 pCi/g). It was also, in all likelihood, above representative levels. Gross beta was also above representative levels in all but 9-foot horizon samples. No native soils were sampled in this borehole.

Phase II Results for Calciner Ponds and Calciner Pond Sediments. To investigate the vertical extent of the impact of the calciner ponds and fines areas that was not determined during Phase I, two boreholes were drilled during Phase II. One was located near F050B and the other in the vicinity of F051B. Soil samples taken from these borings were analyzed for inorganics, gross alpha, and gross beta (Table 2.1-2).

Storage Area A. Boring F128 was located in the vicinity of boring F050B and advanced to 100 feet. Groundwater was not encountered. Soil samples were taken for analysis at the 0-, 10-, 20-, 30-, 40-, 50-, 60-, 70-, 80-, and 100-foot horizons. The surficial sample shows above-representative concentrations of constituents associated with calciner fines, including cadmium (68.1 mg/kg), chromium (334 mg/kg), fluoride (62,600 mg/kg), total phosphorus (15,100 mg/kg), potassium (18,400 mg/kg), selenium (73.9 mg/kg), and zinc (389 mg/kg) (Table 4.2.3-32). At the 30-foot horizon, cadmium continued to remain high (82.4 mg/kg) as did zinc (851 mg/kg), but fluoride (2,090 mg/kg), total phosphorus (2,510 mg/kg), and potassium (3,430 mg/kg) decreased considerably. Also, with the exception of nickel, all other trace metal concentrations decreased to within the representative range. The depth of penetration of cadmium in this borehole indicates that there was more of a hydraulic head applied in the area than that provided by drying sludges. The 40-foot soil sample was a sandy gravelly silt. It displayed a high manganese and nickel content, but otherwise contained no other trace metals that were above representative levels. However, the mobile cations (calcium, 71,300 mg/kg, and potassium, 4,280 mg/kg) and anions (fluoride, 3,030 mg/kg, and total phosphorus,

8,470 mg/kg) continued to be above the representative range. There was some enrichment of zinc in several of the remaining gravel samples (50-, 60-, and 70-foot horizons), but it does not appear to be related to the calciner sludges. At the 100-foot horizon, the soil texture changed to a moderately dense to dense silt. In this silt, constituents that had migrated through the gravel zone were once again attenuated. Three constituents were detected in this zone whose concentrations were above the representative range: fluoride (890 mg/kg), total phosphorus (31,800 mg/kg), and potassium (3,870 mg/kg). No trace metals had above-representative levels in this horizon, indicating that the trace metals have not migrated to this depth in a measurable concentration.

Radioactivity measurements in this borehole showed above- or near-representative levels of gross alpha in the surficial sample and the samples taken at 60 and 70 feet. The surficial sample is likely related to site activities. The samples taken at 60 and 70 feet are in rhyolitic gravels. Volcanic rhyolites are known to exhibit enriched radioactivity. Gross beta was above representative levels in several samples (Table 4.2.3-6).

Storage Area B. To determine to what depth the impact of the calciner pond sediments in storage area B extended, boring F127B was drilled northwest of boring F051B (Figure 2.1-1). Rhyolitic bedrock was encountered 38 feet below the surface. Five horizons were sampled in the boring. The first horizon was in the calciner sludge. The remaining four (5, 15, 25, and 35 feet) were in a yellowish brown silt. The first sample, as expected, contained above-representative levels of constituents associated with calciner sludges (Table 4.2.3-33). The silt in the 5-foot horizon contained elevated concentrations of total phosphorus (1,850 mg/kg), potassium (4,790 mg/kg), and zinc (63.5 mg/kg). No other constituents were above the representative range in this horizon, indicating little to no migration of trace metals. Representative values were exceeded by only two constituents—potassium (4,840 mg/kg at 15 feet) and zinc (54 mg/kg at 35 feet)—in the remaining soil sample horizons.

Representative radioactivity levels were exceeded only in the sludge sample for both gross alpha and gross beta (Table 4.2.3-6).

Summary. Calciner sediments were found in the bed of the former pond. By the 10-foot level, most of the trace metals had returned to representative levels. The exceptions, which appeared consistently at deeper horizons in all the calciner areas, were cadmium, nickel, and zinc. Given the general mobility of cadmium, its presence at depth (30 feet) is unusual. By 40 feet, all site-related trace metals (with the exception of zinc) had returned to representative levels. However, there continued to be an above-representative presence of the more mobile cations

(calcium and potassium) and anions (total phosphorus and fluoride). Radionuclides appear to be associated only with sludge samples and do not appear to be mobile.

Former Kiln Scrubber Overflow Pond. The former kiln scrubber overflow pond is the only remaining accessible member of the kiln scrubber ponds. The other ponds are now covered by calciner #2. The former kiln scrubber overflow pond is presently located under an area used to store calciner fines (not calciner pond sediments, which are stored elsewhere). To assess the potential impact of the unlined former pond, a 10-foot boring was drilled beneath the silica pile. Five soil samples were taken and analyzed for inorganics and radioactivity (Table 4.2.3-34).

Sampling began in boring F054B at 40 feet, the base of the storage pile. Five samples were taken at the 0-, 2.5-, 5-, 7.5- and 10-foot horizons. The boring log indicates all these samples are reddish yellow silts. A number of trace metals were detected in all five horizons at concentrations above the representative range (Table 4.2.3-34). The same was true for fluoride and total phosphorus. The constituents with the maximum values detected and the depth of their horizon were cadmium (355 mg/kg at 2.5 feet), fluoride (2,700 mg/kg at 0 feet), nickel (26 mg/kg at 0 feet), total phosphorus (2,580 at 0 feet), selenium (21.8 mg/kg at 2.5 feet), vanadium (174 mg/kg at 0 feet), and zinc (1,100 mg/kg at 2.5 feet). With the exception of the 7.5-foot reading, gross alpha (29.3 ± 7.66 pCi/g) and gross beta (41 ± 5.8 pCi/g) activities were within the representative range (Table 4.2.3-6). The vertical extent of the impact of the scrubber overflow pond was not determined in this borehole.

Phase II Results for Former Kiln Scrubber Overflow Pond. During Phase II, a second borehole (F130) was advanced through the silica pile to 90 feet below the ground surface. Groundwater was encountered at 80 feet. Soil samples were taken at 10-foot intervals beginning with the silica pile/soil interface. The interface sample contained above-representative levels of cadmium (77.7 mg/kg), calcium (264,000 mg/kg), chromium (304 mg/kg), copper (77.7 mg/kg), fluoride (37,400 mg/kg), mercury (1 mg/kg), nickel (75.4 mg/kg), total phosphorus (69,300 mg/kg), vanadium (281 mg/kg), and zinc (605 mg/kg) (Table 4.2.3-34). This sample was a dark yellowish brown silt. The above-representative constituents found in it indicate it is a silt mixed with ore.

The soil sample from the 10-foot horizon contained above-representative levels of arsenic (11.3 mg/kg), cadmium (281 mg/kg), fluoride (3,380 mg/kg), nickel (22 mg/kg), total phosphorus (3,150 mg/kg), selenium (11.6 mg/kg), vanadium (155 mg/kg), and zinc (823 mg/kg). Above-representative concentrations of cadmium and zinc persisted to 50 feet. For the most part, the other constituents that were analyzed reached representative levels at either the 30- or 40-foot horizon, which are

both gravels. The first retentive soil zone below the gravels is at 70 feet. In this zone, trace metal, fluoride, and total phosphorus concentrations showed an increase over concentrations in the gravel areas, possibly indicating some migration and attenuation, but the values were all within the representative range (Table 4.2.3-34).

Gross alpha and gross beta activities were within the representative range for boring F054B (Table 4.2.3-6). Above-representative activities (126 ± 19.6 pCi/g for gross alpha and 59.5 ± 8.36 for gross beta) were present in the surficial sample in boring F130B. This is attributable to the presence of ore. Samples below the surface did not contain above-representative levels of gross alpha or gross beta. Hence, migration of radionuclides does not appear to be an issue in this location.

Summary. Two borings were advanced into the subsurface at the former kiln scrubber pond. Boring F054B encountered 10 feet of site-impacted soils. The predominant above-representative constituents were cadmium, fluoride, total phosphorus, and zinc. While there was some decrease with depth, the zinc and cadmium levels remained relatively high. In B130, this same pattern is observed, with the cadmium and zinc maintaining above-representative but diminishing levels to 50 feet. Most concentrations of the trace metals and anions fell off to representative levels by 30 feet. There is little to no evidence of soil impacts near the groundwater table. Radionuclides were detected only in the surficial ore layer in boring B130. There was no evidence of their migration into the deeper subsurface.

4.2.3.4 Summary

The RI investigation confirmed the theory that a large proportion of the FMC facility, as well as Bannock Paving, has been graded with fills composed of native soils and facility-related materials (primarily slag). The depth of the fill layer ranges from several feet to over 30 feet. As shown in the potential source section above, the site-related materials often contain a number of constituents with concentrations that greatly exceed expected soil background levels.

The investigation of areas where there has not been a sustained hydraulic head has led to the following conclusions:

- When native soils are encountered beneath a fill, trace metals are generally only found at the interface to several feet in depth. This indicates that there is little to no migration of the trace metals from the fill into the subsurface. This is shown graphically in Figures 4.2.3-4 through 4.2.3-6.. Borings 103, 119, and 120 are in areas where no hydraulic head has been applied. Figure 4.2.2-4 shows the boring locations and lines of sections.

- Radioactivity as measured in terms of gross alpha and gross beta tended to follow the same pattern as trace metals.
- In a number of samples, there was some evidence of migration to 10 feet below the fill/native soil interface of total phosphorus, fluoride, potassium, sodium, and to lesser extent zinc. These ions have been found to be particularly mobile at the site. This phenomena is not as apparent in Figure 4.2.3-6 for the borings 103, 119, and 120 as it was for other areas on the site.
- Native soils tested beneath roads showed little to no migration of constituents related to road/fill materials into the subsurface.
- Volatile organic compounds (primarily xylenes and toluene) were found near detection limits in the boreholes drilled in the chemical drain field and near the active landfill. No site-related semivolatile organics were detected in any sample.
- TPH was detected in several locations near the surface and on the roads. It was not detected at depth.
- PCBs were detected at levels below 1 mg/kg in several road samples as well as in surficial soil samples. However, most of samples analyzed for PCBs did not contain any at detectable levels. PCBs were not detected in any sample at depth.

These conclusions support the hypothesis set out in the conceptual model that the site has widespread surficial impacts due to the use of site-related materials for fill. However, without an applied hydraulic head there has been little impact on the subsurface native soils.

The second major area of investigation was where an artificial hydraulic head had been applied by an industrial activity (e.g. unlined impoundments or ditches and sludge drying areas). In these areas, the hydraulic head could provide a transport mechanism for dissolved and colloidal migration into the underlying soils.

The results of the investigation in these areas are visually summarized in Figures 4.2.3-4 through 4.2.3-9. The conclusions are as follows:

- Trace metals are generally attenuated within 20 feet below the source/native soil interface. In some areas (calciner ponds) the depth is to 30 feet. The general exception to this is zinc, which can be observed at enriched levels to greater depths.
- Total phosphorus, fluoride, sulfate, and alkali metals such as sodium and potassium are mobile and can be observed throughout the entire soil column at generally enriched levels. These are also generally found in the

groundwater at enriched levels near sources that have had a hydraulic head applied.

- While there is a preponderance of attenuation of most trace elements by the underlying soils (e.g., vanadium, copper, selenium, arsenic), some portion of the dissolved fraction does continue through the subsurface to the groundwater. This fraction is generally at levels of under 1 mg/l in the solute. When the head is removed and the elements made immobile their solute concentration is so much less than their naturally occurring soil concentration levels that their presence is not distinguishable from the natural concentration by the analytical techniques used. Hence, there is no observable downward migration of these elements in the soil. This explains why a 0.020 mg/l vanadium solute that reaches the groundwater can be detected as an impact (vanadium representative level of around 0.010 mg/l) but is not seen in the soil column (representative level of 50 mg/kg).

Figures 4.2.3-5 and 4.2.3-9 are subsurface cross sections of the southwest pond area and the calciner pond area at the FMC facility, respectively. Cadmium, lead, and vanadium have been plotted on these to illustrate their attenuation with depth. Note the generally steep falloff of concentrations between levels observed at the surface in the sludge/fill and levels observed in the native soils at 20 feet.

Figures 4.2.3-4 and 4.2.3-7 are cross sections for the two areas showing arsenic, chromium, and copper. The same general pattern of high surficial values and rapidly declining concentrations with depth is observed. (Selenium follows the same patterns as arsenic.)

Finally, Figures 4.2.3-6 and 4.2.3-8 display data for fluoride, total phosphorus, potassium and zinc. While the concentrations in the surficial samples are elevated in comparison with those in the subsurface, the return of these constituents to representative levels before groundwater is encountered occurs only at depth if at all.

4.2.4 Summary

Section 3 presented a framework of the characteristics of the soils in the EMF study area within which data from the investigation of onsite soil quality can be evaluated. In general, the soils in the EMF study area are unsaturated calcareous silts and clays (loess) with a pH in the alkaline range (usually 8 or greater). This type of soil is very conducive to the precipitation or attenuation of free trace metal cations and, in addition, has low permeability. The soil, therefore, tends to act as a natural barrier against vertical migration of metals released from feedstocks, byproducts, and wastes.

The silts and clays are thickest in the western part of the EMF study area and thin to the east. The northeastern portion of the FMC facility, and the northern border of the Simplot facility, have the thinnest veneer of these fine-grained soils. The silts and clays overlay a sequence of gravels that are mixed with various proportions of silts, clays, and sands. The gravel units are less likely to attenuate dissolved cations unless they contain significant proportions of silt and clay. Some of the gravels are derived from volcanic rocks that contain naturally occurring radionuclides and trace metals (nickel and zinc, in particular). There are volcanic materials of this type in the eastern portion of the FMC facility and in several areas of the Simplot facility. The presence of these materials increases the natural variability of representative (background) soil conditions.

The model for onsite movement of site-related materials includes three modes of transport: deliberate placement or redeposition of feedstocks, byproducts, and waste by site personnel through mechanical means (slurry pipeline, front-end loader, etc.); horizontal transport of particulates and dissolved species by overland flow and vertical migration into the subsurface of dissolved species; and transport of particulate and gaseous materials by wind, with subsequent deposition on surface soils.

Mechanical transport occurs in two fashions. Both facilities transport materials by slurry pipeline. FMC has three such operations (calciner slurry, precipitator slurry, and phossy waste). Formerly, the three FMC lines and the east overflow line of Simplot emptied into unlined impoundments. The Simplot gypsum slurry presently empties into unlined impoundments (i.e., the gypsum stacks). Both FMC and Simplot also operate unlined ditches for transporting wastewater.

In addition to moving materials with water, FMC moves dry and wet materials to storage areas by truck. These areas are the slag pile, ferrophos storage area, and calciner sludge-drying areas. Simplot also has a sludge-drying area near its wastewater treatment ponds. Over the course of plant expansion and construction, both facilities have made extensive use of native fill and byproducts to level and grade the properties.

Overland flow on both facilities is generally restricted to onsite ponding, diversion to the wastewater treatment system (Simplot), or diversion to the railroad swale along the northern boundary of FMC. Both facilities retain potentially impacted

runoff within their respective property boundaries (see Section 3.2). Vertical migration of dissolved constituents can occur when there is a hydraulic head. Heads were provided in the former unlined pond areas and currently in Pond 8S (FMC), the gypsum stacks (Simplot), and wastewater ditches.

Finally, strong winds can move particulates from the surface of the facilities as well as gases from industrial stacks. Winds pose the greatest potential for the offsite movement of materials related to industrial activities at the EMF facilities.

An examination of the potential source data shows that the phosphate ore contains a variety of trace metals as well as common cations (e.g., calcium and sodium) and anions (fluoride and phosphate). The various methods used in processing the ore at the two facilities both concentrates and disperses these materials into various byproduct streams and wastestreams. These byproducts and wastes, as well as the ore, can be identified by a suite of characteristic constituents. These were described in Sections 4.2.2.1 (Simplot) and 4.2.3.2 (FMC). There are always four of six indicator elements present in the solid fraction of these materials above the representative range for soils/sediments; these are fluoride, total phosphorus, cadmium, chromium, vanadium, and zinc. There are also enriched levels of silver, lead, copper, or other parameters in some materials, but at least four of these six indicator elements are common to all. This is an important finding insofar as it allows the sources of releases to be recognized in both offsite soils and onsite soils.

The non-pond or ditch areas investigated at the EMF facilities were grouped in Sections 4.2.2.2 (Simplot) and 4.2.3.2 (FMC) as areas where there was no sustained artificial waterhead. Because annual precipitation is low in the EMF study area, there is little to no driving head in these areas to transport materials into the subsurface. The conclusions drawn from analysis of sampling results from these areas are as follows:

- There has been widespread use of facility byproducts for grading in some portions of the EMF facilities; this has been more prevalent at FMC than at Simplot. These byproduct-affected areas range in depth from less than 1 foot to over 30 feet. The byproducts and the fill associated with them contained concentrations of various constituents above the range for representative soils.
- Samples taken in the native soils beneath areas of fill generally showed little to no migration of site-related constituents of potential concern if the native soil is a silt or clay. Where some migration was apparent, the parameters concerned were generally fluoride, total phosphorus, sulfate (at Simplot), and to a lesser extent zinc. Penetration to depth (more than 20 feet) was generally not found.
- PCBs were detected in scattered locations across both sites at less than 1 mg/kg concentrations. There was no evidence of vertical migration.

- Radioactivity, as measured by gross alpha and gross beta activities, is generally confined to fill materials. There was no evidence of radionuclide migration into the subsurface in areas lacking a driving head.

Evaluation of the analyses of soil samples taken from beneath areas that had (or may still have) applied hydraulic head (i.e., former ponds and pond sediment drying areas) leads to the following conclusions:

- Most trace metals that migrate as cations have been precipitated or attenuated in the first 10 to 20 feet of the subsurface soil if this soil is a clay or silt. Clay or silt in near-surface soils predominate in the western and central pond area of the FMC facility and beneath the upper gypsum stack at the Simplot facility.
- Several metals suspected to migrate in oxyanionic dissolved states (selenium and vanadium) have been also, to a large extent, attenuated in the silt and clay layers beneath source areas. However, they are also observed at slightly above representative levels in groundwater samples.
- In areas underlain by few fine-grained soils, metals such as zinc and nickel may have penetrated the subsurface to a depth greater than 20 feet. However, they are rarely above representative levels near the water table. These conditions are generally confined to the northern portion of the Simplot facility and the eastern part of the FMC facility.
- Gravels containing volcanic rock fragments and fines often have constituent concentrations that differ from the representative characteristics of loess-related materials.
- Major cations (calcium, potassium, and sodium), and to a lesser extent lithium and magnesium, were not completely attenuated by the subsurface soils. They were found at enriched levels in the groundwater beneath sources containing these cations. This pattern is not observed with the trace metals.
- Anions (fluoride, total phosphorus, and sulfate) were more mobile than metals through the soil column, and were found in elevated levels in groundwater.
- Arsenic, probably in oxyanionic form, was not generally observed at enriched levels in the soil column; it was, however, observed in groundwater and in some fill and waste materials.

4.3 OFFSITE SOILS

The purpose of the offsite soils investigation was to assess the presence of site-related constituents that may have been deposited from potential airborne releases from the FMC and Simplot facilities. To meet this objective, Phase I sampling locations were selected using a radial grid that originated near the northern boundary between the FMC and Simplot facilities and extending a distance of 3 miles from this center.

The 360 degrees of this circle were divided into 16 equal radials (see Figure 2.3-1). Sampling locations along these radials were chosen based on a regularly increasing spacing with distance from the center point. Four locations were identified at regular intervals within the first mile, and sample identification suffixes A, B, C, and D designate the relative distance of each location from the facilities. Three locations were sampled within the second mile, and sample suffixes A, B, and C again designate relative distance. Two locations were sampled within the third mile, and suffixes A and B designate relative distance. Four samples of surface soils (the top 2 inches) were taken at each point thus identified and composited for analysis. A subsurface soil sample was also obtained at each location at a depth of 2 feet. Sampling locations were locally adjusted, as necessary, to avoid sampling in plowed or irrigated fields and areas of runoff.

In Phase II, additional samples were collected in an area immediately north of the facilities, in order to better assess constituent variance. Samples were also collected further along southwestern radials and near distant outliers to further characterize constituent concentrations. Samples were also collected in Pocatello to assist in determining the representative composition of surface soils.

All samples collected in Phase I and II were tested for inorganics and selected radionuclides (see Table 2.3-2). Samples collected in Phase II were also tested for sulfate, potassium, and calcium to assist in comparing the soils with the characteristic constituents of onsite sources (see related discussion in Section 4.2).

The conclusions of Section 4.3 include the following:

- The highest concentrations of EMF-related constituents are found to the north and east of the facilities, where windblown ore has been deposited in a pattern consistent with the prevailing winds. Constituent concentrations decrease rapidly with increasing distance from the facilities.
- The distribution and concentration of constituents (fluoride, total phosphorus, zinc, and cadmium) along the 338-degree (north/northwest) radial suggest a nonfugitive dust EMF source. Further investigation is being performed as part of the air pathways investigation and in further evaluations of the offsite soils data.
- Subsurface soils have not been impacted by airborne releases. An exception is in several samples taken near I-86 just north of the EMF study area, where

mechanical turning of surface soils during highway construction may have introduced constituents into the subsurface.

- Because overland flow (precipitation runoff) does not escape the boundaries of the facilities (see Section 3.2), air deposition is the sole mechanism for initial placement of site-related materials outside the facilities' boundaries.

As noted in Section 4.1.4.2, clarification of the analytical accuracy reported for radiological parameters was not completed when this report was published. As stated in that section, further evaluation of these results will be reported in the RI. This evaluation will assess whether the soils have been impacted by airborne releases that contained enriched levels of specific isotopes, such as polonium-S10.

Section 4.3.1 presents a review of study area investigation results. This is organized in subsections specific to four geographic quadrants: the northeastern, southeastern, southwestern, and northwestern. Summaries of quadrant-specific findings are presented at the end of each subsection. Overall conclusions are presented in Section 4.3.2. The organization and major conclusions of this section are illustrated in the Section 4.3 overview on the following page. The analytical results for all offsite soil samples are presented in Appendix L.

Overview of Section 4.3
Offsite Soils

Quadrant Analysis *(Section 4.3.1)*:	Samples were collected in a radial grid that originated near the northern boundary between the FMC and Simplot facilities, and extended out to 3 miles. Characteristic constituents (cadmium, chromium [total], fluoride, total phosphorus, vanadium, and zinc) were utilized to determine if EMF feedstock, byproducts, or wastes were deposited due to potential airborne releases from the site. Sampling results are presented in Tables 4.3-1 to 4.3-5.
Conclusions *(Section 4.3.2)*:	■ Highest concentration of EMF-related constituents are found to the north and east, where windblown ore has been deposited. Constituent concentrations decrease rapidly with increasing distance from the facilities. ■ The distribution and concentrations of constituents along the 338-degree radial (north-northwest) suggests a nonfugitive dust EMF source. Further investigation is being performed as part of the air pathways investigations. ■ Subsurface soils have not been impacted by airborne releases. An exception is in several samples taken near I-86 just north of the site, where mechanical turning of subsurface soils during highway construction may have introduced constituents into the subsurface. ■ Because overland flow does not escape the boundaries of the facilities, air deposition is the sole mechanism for initial placement of site-related materials outside the facilities' boundaries.

4.3.1 Quadrant Analysis

This discussion of the offsite soil sampling results is organized into four subsections: the northeastern quadrant (encompassing sampling radials 0 through 90 degrees), the southeastern quadrant (radials 113 through 180 degrees), the southwestern quadrant (radials 203 through 270), and the northwestern quadrant (radials 293 through 338). Within each discussion, the results are presented in order of increasing distance along the radial from the center of the sampling grid. Figure 2.3-1 illustrates this radial grid and associated Phase I and Phase II sampling locations.

The initial focus of data interpretation was to determine if the constituents characteristic of EMF particulate source materials were present in the soils above representative levels. If patterns clearly indicative of particulate sources were not evident, the data were evaluated for characteristic secondary constituents to determine if either particulate or nonparticulate sources could be identified. Section 4.2.2 (Simplot) and 4.2.3 (FMC) describe the source characteristics used.

The composite 5-year windrose developed from data collected at the Simplot meteorological site 1 (Figure 3.5-2) was used in evaluating the potential origin of site-related constituents.

4.3.1.1 Northeastern Quadrant

The northeastern quadrant is downgradient of the prevailing southwesterly wind. The quadrant has been defined to include sampling radials along 0, 23, 45, 68, and 90 degrees.

Within the First Mile. Constituents found in surface soils within the 1-mile radius of the grid center (samples with suffix 1A through 1D) were frequently present in concentrations greater than the levels found in representative surface soils (Table 4.3-1). These constituents included arsenic (up to 16.7 mg/kg), cadmium (up to 163 mg/kg), chromium (up to 471 mg/kg), fluoride (up to 27,200 mg/kg), lead (up to 142.0 mg/kg), total phosphorus (up to 84,900 mg/kg), selenium (up to 16.3 mg/kg), vanadium (up to 729 mg/kg), and zinc (up to 1,220 mg/kg).

With the inclusion of calcium and potassium in the analysis of samples collected during Phase II to assist in the comparison of results with potential source characteristic constituents, it appears that the elevated constituents in soils were attributable to the presence of phosphate ore mixed with native soils within the first mile of the northeast quadrant. Samples collected along the 45-degree and the 90-degree radials contained the greatest concentrations of phosphate-ore-related constituents.

Samples along the 45-degree radial had, on the whole, less fluoride (highest concentration 16,900 mg/kg) and total phosphorus (highest concentration 52,600

mg/kg) than the 90-degree radial samples (which contained a maximum of 27,200 mg/kg of fluoride and 84,900 mg/kg total phosphorus).

Soil samples were also analyzed for polonium-210, lead-210, and uranium-238. The range of activities for the radionuclides within the 1-mile radius was as follows: polonium-210 (1.96 ± .64 pCi/g to 50.9 ± 34.8 pCi/g); lead-210 (five nondetect to 36.3 ± 24 pCi/g) and uranium-238 (five nondetect to 26.9 ± 5.22 pCi/g). Radionuclide activities followed much the same pattern as the inorganic concentrations (Table 4.3-2). The greatest values are found within the first mile and, where comparison was possible, the samples from the "A" locations (nearest to the facilities) tended to be greater than those obtained at the "B" locations, which in turn were greater than the "C" locations and "D" locations (farthest from the facility). This represents a direct correlation of activity with distance from the EMF study area.

Unlike onsite soil and potential source samples, offsite soil samples were not analyzed for gross alpha and gross beta activities. Consequently, comparisons cannot be made for these parameters between offsite soils and potential sources.

Sampling Results Beyond First Mile Along the 0-Degree Radial. The distribution of constituents present in excess of representative concentrations within the second mile was different than that found within the first mile. With the exception of sample point 2A, constituents found in 2B and 2C of radial 000 were within representative levels (Table 4.3-1). The sample from location 2A had characteristic EMF particulate constituents, with enriched concentrations of cadmium (12 mg/kg), fluoride (1,290 mg/kg), total phosphorus (3,400 mg/kg), vanadium (54.7 mg/kg), and zinc 134 (mg/kg). However, the other metals associated with phosphate ore in samples collected within the 1-mile radius were all below representative levels. The two samples taken between the 2-mile and the 3-mile radii (3A and 3B) on the 000 radial did not contain any constituents above the representative range. The only radionuclide activity detected in the three samples analyzed from this radial was found in the sample from 2A (polonium-210 at 5.35 ± 3.84 pCi/g), which is within representative levels. All other samples were nondetect at generally a 5 pCi/g detection limit (Table 4.3-2).

Sampling Results Beyond First Mile Along the 23-Degree Radial. The EMF constituents characteristic of particulates were not present in the samples taken beyond the 1-mile mark along radial 023. The sample taken at 2A also had a somewhat different metals profile than would be expected in native soils. The copper (33.6 mg/kg), iron (20,000 mg/kg), and lead (39.9 mg/kg) concentrations were above representative levels; an automotive influence is suggested. The sample was taken in the vicinity of an active gravel pit.

Only two soil samples were taken within the 1- to 2- and the 2- to 3-mile segments along the 23-degree radial. The sample taken at 2B contained polonium-210 at 5.02(J) ± 4.04 pCi/g, which is within representative levels. The other radionuclides were not detected at the 5 pCi/g level. There does not appear to be deposition of radionuclides beyond the 2-mile range in either the due north (000) or 23-degree directions.

Sampling Results Beyond First Mile Along the 45-Degree Radial. The EMF characteristic parameters were present in all three of the 45-degree radial samples taken between 1 and 2 miles (2A, 2B, and 2C). However, the level of enrichment was greatly reduced from that found within the 1-mile radial (Table 4.3-1). Also, higher concentrations occurred in the 2A sample. The range of concentrations for the characteristic parameters was as follows: cadmium (up to 12.7 mg/kg), fluoride (up to 1,300 mg/kg), total phosphorus (up to 2,960 mg/kg), vanadium (up to 54.3 mg/kg), and zinc (up to 137 mg/kg). Arsenic was well within the representative range (1.3[U] mg/kg to 2.8 mg/kg). With the exception of silver (1.1 mg/kg), which marginally exceeded the representative level (1.0 mg/kg), all other parameters were within the representative range.

Two samples were collected in the 2- to 3-mile segment along the 45-degree radial. Most of the EMF characteristic parameters were within the expected representative surface soil levels. The only parameter that substantially exceeded the representative level was lead (59.5(J) mg/kg at 3A and 64.4 mg/kg at 3B). It is unlikely that the presence of lead in these samples is attributable to a release from the EMF facilities, because other constituents that predominate over lead in potential sources (e.g., total phosphorus) were not present in sufficient abundance. Hence, these lead values are due to another source unrelated to the EMF facilities.

Polonium-210 was the only radionuclide detected in samples from the 1- to 3-mile radial, and it was only found once within representative levels (2.76J ± 1.1 pCi/g).

Sampling Results Beyond First Mile Along the 68-Degree Radial. Similar to samples along the 45-degree radial, the EMF characteristic parameters were present at above-representative levels in all samples taken along the 1- to 3-mile segment of the 68-degree radial (Table 4.3-1). This probably indicates higher windspeeds in this direction than found in the 000- and 23-degree radials, which did not show enrichment at this range. In additon to the six EMF characteristic parameters, antimony (17.4[J] mg/kg at 2A), molybdenum (3.8 mg/kg at 2A), lead (56.7[J] mg/kg at 3A), and selenium (1.5 mg/kg at 3A) were above the representative range.

Polonium-210 was detected in the 3B sample at 4.43(J) ± 3.76 pCi/g and lead-210 was detected in the 2B soil sample at 8.09 ± 7.76 pCi/g. Both numbers have high counting uncertainties and are less than representative levels.

Sampling Results Beyond First Mile Along the 90-Degree Radial. The EMF characteristic parameters were generally above representative levels in the samples taken in the 1- to 2-mile range of the 90-degree radial, indicating a site impact. The levels, however, were not significantly elevated: cadmium (up to 9.8 mg/kg), fluoride (up to 1,460 mg/kg), total phosphorus (up to 3,190 mg/kg), vanadium (up to 37.4 mg/kg), and zinc (up to 124 mg/kg). Other above-representative constituents included barium (235 mg/kg at 2A and 224 mg/kg at 2B) and lead (63.3(J) mg/kg at 2A). Barium is not associated with EMF-related materials. While the lead can be present in some potential sources, it would be expected to be accompanied by other trace metals such as arsenic or silver, which it is not.

In the samples collected in the 2- to 3-mile segment of the 90-degree radial, the EMF characteristic constituents were not present. Nor were any of the metals above the representative range. Only polonium-210 was detected (3.29(J) ± 3.06 pCi/g) in the two soil samples, but within representative levels.

Northeastern Quadrant Summary. Above-representative levels of trace metals, fluoride, total phosphorus, polonium-210, lead-210, and uranium-238 related to phosphate ore particulate were found in surficial soils within the first mile of the EMF study area in the northeastern quadrant. Within this 1-mile radius, concentrations generally fell with distance from the plants' boundary. The EMF-related constituents that can be distinguished from representative levels appear to have been deposited as a single particulate matrix rather than as individual species.

The EMF characteristic parameters (which are not necessarily related to ore only) were detected at some locations above representative levels in the area between 1 and 2 miles. Other parameters that are associated with ore were either not present or were below representative levels. Several metals, lead, copper, and zinc were sporadically detected in soil samples at above-representative concentrations throughout the quadrant. Unless linked with the characteristic parameters, these did not appear to be EMF-related activities. The EMF characteristic parameters were not present in the 2- to 3-mile radius of the 000-, 23-, 45-, or 90-degree radials and were only faintly recognizable in samples from the 68-degree radials.

As explained in the representative soil section (Section 4.2.1), offsite below-surface soils make up the majority of sample points used to determine representative subsurface levels. With the exception of several samples within the 1-mile radius that appear to have been impacted by mechanical mixing, there has been no impact on subsurface soils by EMF industrial activities in this quadrant (Table 4.3-1).

There is a distinct constituent distribution pattern in the northeastern quadrant. As would be expected with a wind-distributed depositional environment, the concentrations of site-related particulate are asymptotic in nature. That is to say, the highest concentrations (probably correlated with the heaviest particles) were found near the fencelines of the two facilities. These values declined dramatically with distance until they were either not measurable against representative levels (radials 000, 023, 045, and 090) or were faintly recognizable between the 2- and 3-mile range (radial 068).

The asymptotic pattern, with minor variation, holds true for the EMF characteristic parameters, as illustrated by Figures 4.3-1 through 4.3-6 for cadmium, chromium, fluoride, total phosphorus, vanadium, and zinc. For each, there is a relatively smooth decrease from high levels near the site to low levels away from it. The suite of characteristic constituents found in potential onsite sources of particulate matter provides a valuable tool in interpreting the data insofar as the six characteristic parameters are concerned. With minor exceptions concerning zinc, no single parameter's concentration is above the representative level unless most of the others also are above representative levels.

Figures 4.3-7 through 4.3-10 are bar graphs (for selenium, lead, arsenic, and copper) like those plotted for the characteristic parameters. All of these elements are associated with EMF industrial activities and were found in the ore at levels above those associated with surface soil representative concentrations. Hence, their presence in above-representative concentrations in soil samples taken near the EMF facilities is not unexpected. However, in plotting their concentrations, no steady decline with distance from the EMF facilities is seen. Rather, the values fluctuate over distance. This fluctuation suggests that the concentrations measured beyond the area associated with ore deposition are due to factors other than releases from the EMF facilities. If EMF releases were the source, whether as non-ore particulate or gaseous oxide form, there should be a distinguishable depositional pattern, which is not seen.

4.3.1.2 Southeastern Quadrant

The southeastern quadrant encompasses the 113-, 120-, 125-, 130-, 135-, 158-, and 180-degree radials. All sampling points along the first 1-mile segment of each radial are within the Simplot facility; the analytical results for these samples are described in Section 4.2.2 (onsite soils). The offsite samples along these radials have a suffix of 2 or higher. Discussion of constituent distributions within the southeastern quadrant is presented by examination of sampling results along each radial coupled with a discussion of local topography.

Sampling Results Along the 113-Degree Radial. There were three sampling points along the 113-degree radial at the northeastern base of the Bannock foothills along a railroad track (Figure 2.3-1). Points 2B and 3A were just to the west and east, respectively, of a waste disposal site, unrelated to the EMF facilities, with heavy metals contamination (lead) that is currently the subject of a remedial study under CERCLA. Samples from locations 2A and 2B had above-representative concentrations (Table 4.3-3) of the EMF particulate source characteristic constituents. Sampling point 3A did not. Sampling point 2A, which is closer to the Simplot facility, contained, in general, the higher concentrations of the subject parameters. The above-representative parameters included cadmium (7.8 and 7.3 mg/kg, respectively), copper (17.6 and 20.2 mg/kg, respectively), fluoride (1,020 and 733 mg/kg, respectively), lead (2,030[J] mg/kg at 2A), mercury (0.35 mg/kg at 2A), total phosphorus (2,690 and 1,350 mg/kg, respectively), vanadium (42.2 and 43.6 mg/kg, respectively), and zinc (127 and 123 mg/kg, respectively). Only lead (52.8 mg/kg) was above representative level in the soil sample taken at the more distant location 113(3A), indicating an absence of EMF-related impact.

The 113(2A) soil sample contained 4.93 ± 4.68 pCi/g of polonium-210. Lead-210 and uranium-238 were not detected at the 5 pCi/g detection limit. The high level in the count uncertainty makes it difficult to evaluate this result and whether there is an above-representative value of polonium-210 at this station. No radionuclide analyses were performed on the samples collected at 113(2B), and no radionuclides were detected at 113(3A) above the 5 pCi/g detection limit.

The 113-degree radial may be within the zone of easterly winds described in the discussion of the 90-degree radial of the northeastern quadrant. As such, samples within the 2-mile segment may have been influenced by deposition of ore from the former Simplot ore pile.

Sampling Results Along the 120- and 125-Degree Radials. One offsite sample was collected along radial 120 and radial 125. These sampling locations are in the northeastern portion of the foothills south of radial 113 (Figure 2.3-1). The locations are shielded from direct wind contact from the operations area of the facilities by the hills to the west. Constituent levels in both samples were below the representative surface soil levels (Table 4.3-3).

Both lead-210 (6.67 ± 6.3 pCi/g) and polonium-210 (11.7 ± 9.32 pCi/g) were detected at station 120(2C). Uranium-238 was not detected. As at station 113, the count uncertainty values make the results suspect. Station 125(3A) also had detectable levels of polonium-210 (5.49 ± 4.56 pCi/g), but neither lead-210 nor uranium-238 was detected. The count uncertainty level also make the results suspect.

Sampling Results Along the 135-Degree Radial. Sampling locations along radial 135 are on a ridge immediately east of the gypsum stack. Because the land surface rises steadily to the south away from the site, the sampling locations are not shielded from the site by intervening topography. Several constituents (cadmium, and mercury) detected in soil samples collected from the two locations closest to the site (135[2A] and 135[2B]) (Table 4.3-3) were slightly above representative levels. Samples collected along the remainder of the radial at locations 2C, 3A, and 3B, as well as the single sample taken at 130(3B), in general had few constituents above the representative surface soil range. The above-representative constituents were antimony (14.6 mg/kg at 130[3B]) and manganese (1,330 mg/kg at 135[3A]). None of these excursions would be EMF-related activities.

Polonium-210 was detected in two soil samples collected along radial 135 (6.15 ± 4.4 pCi/g at 135[2A] and 9.13 ± 7.78 pCi/g at 135[3B]). Lead-210 and uranium-238 were not detected (Table 4.3-2). As in all the radionuclide results for samples collected within this quadrant, the high count uncertainty makes it difficult to determine if the values are above representative levels.

Sampling Results Along the 158-Degree Radial. Offsite sampling along radial 158 began at the top of a draw immediately south of the gypsum stack and continued first uphill (to 158[3A]) and then along the back, or south-facing, slope (Figure 2.3-2). With the exception of a chromium value of 86 mg/kg detected in the 158(2B) sample, all other constituents were near or substantially below representative levels for all five sampling points (Table 4.3-3). These results indicate that there is no measurable impact from the gypsum stack on the surficial soils along this radial. Of particular note is that no fluoride concentration was above the representative surface soil levels mean, and only one was at or above the subsurface mean. This indicates that there has been no fluoride enrichment of the soil occurring in this area.

Polonium-210 was detected in two 158-degree radial samples (5.74 ± 4.3 pCi/g in 158[2B] and 6.3 ± 5.78 pCi/g in 158[3B]). These are not high compared with the activities detected in the first quadrant, and the count uncertainty values suggest that the results are suspect. Lead-210 was detected in one sample (5.24 ± 5.14 pCi/g in 158[2B]). Uranium-238 was not detected in any sample tested.

Sampling Results Along the 180-Degree Radial. Sampling locations along the 180-degree radial lie primarily upwind along the top of a ridge due south of the EMF facilities (Figure 2.3-2). Constituent concentrations in the five samples collected along this radial (180-2B, 2C, 3A, 3B, and 4A), with the exception of lead (38.2 mg/kg) and lithium (22.7 mg/kg) at station 180(3B), were below representative surface soil levels. This indicates that there has been no impact on the surficial soils in this area from industrial operations at the EMF facilities.

Polonium-210 was detected in the soil sample taken at 180(2B) (7.5(J) ± 7.46 pCi/g) and at 180(3A) (5.79 ± 2.22 pCi/g). Neither of the other radionuclides analyzed was detected. The first polonium value is very doubtful due to the high count uncertainty, while the second appears to be within the representative range.

Southeastern Quadrant Summary. Enrichment of EMF-related parameters was observed along the base of the Bannock Range in samples taken along the 113-degree radial. The remainder of the soil samples collected in this quadrant did not have measurable indications of an EMF-related impact. Of specific interest, those sampling points that were in a position to measure potential emissions and subsequent deposition from the gypsum stack, particularly potential gaseous emissions of fluorides, did not show any indication of enrichment.

Unlike the patterns found for the northeastern quadrant, bar graphs for selected constituents detected in samples collected along the radials of the southeastern quadrant do not display, for the most part, the asymptotic relationship of high concentrations near the source and declining concentrations with distance (Figures 4.3-11 to 4.3-20A). The only radial displaying this pattern (113) is strongly linked to EMF influence. This further illustrates the lack of impact on surficial soils the EMF operations have had on the soils in the southeast.

The following exceedances of representative subsurface soil levels were noted for this quadrant: the sample from location 113(3A) contained manganese at 535 mg/kg; the sample from location 135(2A) contained barium at 214 mg/kg; the sample from location 135(2B) contained barium at 240 mg/kg, manganese at 572 mg/kg, nickel at 17.3 mg/kg, silver at 2.2 mg/kg, and zinc at 52.8 mg/kg; the sample from location 158(3B) contained manganese at 482 mg/kg, mercury at 0.35 mg/kg, and nickel at 15.5 mg/kg. The results of all subsurface sample analyses for this quadrant are in Table 4.3-3. These results do not appear to be significant. They are either marginally greater than representative concentrations or are not associated with EMF-related constituents.

4.3.1.3 Southwestern Quadrant

The southwestern quadrant encompasses the 203-, 205-, 225-, 230-, 240-, 248-, and 270-degree radials. In Phase I, samples were collected along radials 203, 225, 248, and 270. Eight additional samples were collected along the 205, 230, and 240 radials (and in some cases at greater distances than during Phase I) during Phase II to further investigate results obtained during Phase I.

As in the southeastern quadrant, the first offsite sampling point in the southwest is over 1 mile from the designated center point of the sampling grid. Hence, all southwestern radials have a "2" or greater suffix. The exception to this is radial 270, which runs in an east/west direction north of FMC near I-86.

Sampling Results Along the 203-Degree Radial. Three sampling points were located along radial 203 (3A, 3B, and 4A). See Figure 2.3-1 for locations. There has been a marginal EMF-related enrichment of all three samples (Table 4.3-4), as determined by the presence of constituents at levels marginally above representative levels. Ranges of these parameters were as follows: cadmium (up to 5.9 mg/kg), total phosphorus (up to 1,640 mg/kg), vanadium (up to 36.7 mg/kg), and zinc (up to 90.3 mg/kg). The concentrations detected of both the characteristic parameters and other elements were not great enough to be able to identify the potential source.

No parameters were above the representative range in the 2-foot samples taken at 203(3A) and 203(3B). However, chromium (81.7 mg/kg), copper (16.9 mg/kg), and total phosphorus (842 mg/kg) did exceed the representative levels in 203(4A). Since these are not accompanied by other parameters generally associated with EMF activities, they are probably unrelated to the site.

Samples from locations 203(3A) and 203(4A) were analyzed for the presence of lead-210, polonium-210, potassium-40, and uranium-238. Polonium-210 and potassium-40 were detected in both samples (polonium-210: 7.35 ± 5.64 and 5.03 ± 2.62 pCi/g, respectively; potassium-40: 17.2 ± 4.24 and 18.0 ± 2.48 pCi/g, respectively), while uranium-238 and lead-210 were not (Table 4.3-2). Only potassium-40 was detected in the subsurface samples.

Sampling Results Along the 205-Degree Radial. During Phase II, three additional samples were taken along the 205-degree radial (3A, 3B, and 4A). There is a faint suggestion of the suite of EMF characteristic constituents in the 3A and 3B samples but not in the sample from location 4A (Table 4.3-4). Constituents characteristic of EMF particulate sources found in marginally above-representative concentrations were fluoride (732 mg/kg at 3B) and total phosphorus (1,520 mg/kg at 3B).

Several parameters were slightly above representative levels in the subsurface samples taken along this radial (Table 4.3-4). Because of the lack of associated EMF parameters that were above representative levels, their presence cannot be attributed to EMF activities.

Lead-210 (5.77 ± 1.35 pCi/g) and polonium-210 (1.59 ± 0.62 pCi/g) were detected in the 3B sample below representative levels but were not present at detectable levels in the other two surficial samples. Polonium-210 was also present in the 3B subsurface sample at a very low level (1.05 ± 0.547 pCi/g).

Sampling Results Along the 225-Degree Radial. Samples were collected along the 225-degree radial at five locations (2A, 2B, 2C, 3A, and 3B). See Figure 2.3-1 for these locations. The EMF characteristic parameters are present in all five samples at above-representative concentrations (Table 4.3-4). The range of concentrations was as follows: cadmium (up to 28.1 mg/kg), chromium (up to 87.7 mg/kg), fluoride (up to 1,680 mg/kg), total phosphorus (up to 4,860 mg/kg), vanadium (up to 95.8 mg/kg), and zinc (up to 209 mg/kg). Also at slightly enriched levels were silver (up to 2.3 mg/kg), nickel (up to 20.4 mg/kg), and copper (up to 16.2 mg/kg).

The samples from locations 2A and 2B, and perhaps the remainder, contained varying amounts of precipitator dust. Initial examination of the data suggested that the source might be either precipitator dust or slag. Because data on calcium and potassium were not available for these samples, identification based only on major characteristic constituents was not possible. However, the radioactivity results for samples from the 225-degree radial are not characteristic of slag. Slag contains measurable levels of uranium-238 (22.1 ± 12.68 pCi/g to 30.7 ± 17.8 pCi/g in the slag samples tested), whereas uranium-238 was not detected in the samples from the 225-degree radial (detection level of 5U pCi/g). Polonium-210 was detected at measurable activities in the 225-degree radial samples (Table 4.3-2). The location of this line of samples is south/southwest of the old pond area where uncovered precipitator slurry pond 1E and precipitator dust storage area 9S are situated.

Boron (23.4J mg/kg at BS225[2C]) was the only parameter detected at a concentration above the representative level in the below-surface samples along the 225 radial.

Sampling Results Along the 230-Degree Radial. During Phase II, three samples (3A, 3B, and 4A) were collected along a 230-degree radial, immediately southwest of the 225-degree radial samples (Figure 2.3-1). Several samples had a faint EMF characteristic image with slightly above-representative concentrations of cadmium (5.2 mg/kg in 3B), fluoride (668 mg/kg in 3A, and 681 mg/kg in 3B), and total phosphorus (1,520 mg/kg in 3A and 1,560 mg/kg in 3B). All constituents were below representative surficial levels in the 4A sample, indicating that the horizontal extent of site impact in this direction has been found. With the exception of calcium values in all three samples, no other parameter concentrations exceeded the representative subsurface range.

Radionuclide activities were within the representative range for all three sample locations.

Sampling Results Along the 240-Degree Radial. In Phase II, two samples were collected near Michaud Creek along the 240-degree radial (Figure 2.3-1). Neither of the soil samples (240(3A) and 240(3B)) contained constituents at concentrations that exceeded the representative range in either the surficial or subsurface horizons.

Radionuclides were also within the representative range for both horizons. The available data indicate there is no EMF-related impact in this area.

Sampling Results Along the 248-Degree Radial. Two samples were collected along the 248-degree radial (Figure 2.3-1). Sampling point 248(3B) is near Michaud Creek, and sampling point 248(4A) is approximately 0.67 mile to the west. Of the constituents detected, antimony (11.8J mg/kg) was slightly above the representative surface soil level in sample 248(3B), and vanadium (36.9 mg/kg) was slightly above the representative surface soil level at 248(4A). Because no other constituents associated with the EMF site were present at enriched concentrations, it appears that this area has not been impacted by EMF facility activities. No parameters were detected at above-representative concentrations in the subsurface samples. Radionuclide activities were also within the representative range for both surface and subsurface samples.

Sampling Results Along the 270-Degree Radial. The northernmost samples collected in this quadrant were along the 270-degree radial, which begins at the far northeastern portion of the FMC property (near I-86) and extends west to the Pocatello airport (Figure 2.3-1). Sampling point 270(1D) is located on a line due north of the FMC southwestern pond area, between the drag strip and I-86. There are a number of constituents present in this sample at greater than representative concentrations (Table 4.3-4). The mix in constituents suggests an EMF impact. Sample 270(2A) lies approximately 0.3 mile to the west of 270(1D), 0.3 mile due north of the facility fenceline, and just to the north of I-86 near a dirt road. The constituent concentrations in this sample display a subdued EMF characteristic image, with above-representative values of cadmium (8 mg/kg), silver (1.4 mg/kg), vanadium (36.5 mg/kg), and zinc (170 mg/kg). Sample point 270(2B) is approximately 0.5 mile due southwest of 270(2A). It too is just north of I-86 and in an agricultural field. None of the EMF characteristic constituents exceeded representative surface soil levels (Table 4.3-4).

In the 270(2C) soil sample, which was collected near the airport and northwest of 270(2B), the following EMF characteristic constituents were present at above-representative levels: chromium (55.8 mg/kg), fluoride (1,900 mg/kg), total phosphorus (1,610 mg/kg), and vanadium (60.3 mg/kg). While these concentrations are only slightly greater than representative levels, they do suggest some EMF facility influence. Soil sample 270(3A) was taken just to the southwest (Figure 2.3-1). Constituent concentrations were within representative surface soil levels. This soil sample does not appear to have been impacted by EMF activities. The last soil sample taken in the 270-degree radial series was 270(3B). No constituent detected in this sample was above the representative level. Hence it can be concluded that there is no EMF impact in the vicinity of this sample.

Three subsurface samples were taken along the 270-degree radial. They were 270(1D), 270(2A), and 270(3B). With the exception of calcium (75,800 mg/kg) and magnesium (22,000 mg/kg) in soil sample 270(3B), no constituent was above the representative level. This indicates, as has been demonstrated before, that there is no evidence of subsurface migration of EMF-related constituents in the offsite soils.

Four radionuclides were analyzed in five of the 270-degree radial surficial soil samples (1D, 2B, 2C, 3A, 3B). Uranium-238 was not detected in any of the samples, and potassium-40 was present at representative range. Polonium-210 was detected in all the samples but with count uncertainty values that call into question whether it was above the representative level (highest value 8.87 ± 7.14 pCi/g). Lead-210 was also detected in one sample (SS270[2C]). Like polonium-210, the uncertainty value calls into question its significance (9.52 ± 8.46 pCi/g).

Unlike bar graphs for the southeastern quadrant, where there is very little EMF site influence, graphs for selected constituents along the radials of the southwestern quadrant display a subdued asymptotic relationship of higher concentrations near the facility boundary and lower concentrations with increasing distance from it (Figures 4.3-20B through 4.3-29). This is much more the case in radial 270, which is downwind or crosswind.

Southwestern Quadrant Summary. With the exception of radial 270, the southwestern quadrant sample points are upwind to crosswind of the predominant wind patterns. There is some indication of EMF site influence in the surficial soils near the site boundary ("2" series sampling points). The concentrations of site-related parameters diminish with distance from the site to below representative levels in the 1- to 2-mile range from the facility boundary ("3 to 4" series samples). There was no apparent site effect on subsurface soil samples.

The 270-degree radial is north of the EMF facilities area and hence crosswind to partially downwind. Above-representative concentrations of parameters related to EMF facilities-related activities were detected in the samples collected in the eastern portion of the radial (closer to the central portion of the EMF facility). These concentrations diminished with distance to the west and were below representative levels in the "3" series samples. There was no apparent site effect on subsurface soil samples, indicating no vertical migration is occurring.

4.3.1.4 Northwestern Quadrant

Samples were collected along three radials in the northwestern quadrant: 293, 315, and 338 degrees. The northwestern quadrant is subject to evening breezes from the adjoining valleys as well as winds generated during winter inversions that flow north to northwest across the site, in addition to the stronger northeasterly flows of the predominant winds.

Sampling Results Along the 293-Degree Radial. Soil samples taken within the first mile along radial 293 lie just to the north of the FMC ore pile and extend westerly to just north of the drag strip at I-86 (Figure 2.3-1). Four samples were collected in this area during Phase I. An additional eight samples were collected in the same area during Phase II. These additional samples were collected to estimate the variance of metals in the area after it was observed that cadmium levels detected in some Phase I samples exceeded 100 mg/kg.

The results follow the trend seen in the samples collected in the northeastern quadrant. Constituents in the "A" samples (which are closest to the facilities' boundaries) are elevated above representative values, and decline significantly with increasing distance from the facilities (see Table 4.3-5). Constituents exceeding representative levels included: arsenic (up to 18.4 mg/kg at 1A), cadmium (up to 189 mg/kg at 1A3), chromium (up to 608 mg/kg at 1A3), fluoride (up to 18,600 mg/kg at 1A3), lead (up to 109 mg/kg at 1A2), total phosphorus (up to 51,500 mg/kg at 1A2), vanadium (up to 713 mg/kg at 1A3), and zinc (up to 1540 mg/kg at 1A3). The additional samples confirmed the presence of elevated cadmium concentrations in the "A" and "B" areas.

As expected, a similar pattern for radionuclides is seen (Table 4.3-2). The maximum activity detected for polonium-210 was 26.1 ±7.49 pCi/g at 1A3, which is above representative levels. The maximum activity for lead-210 was 41.4 ± 19.9 pCi/g at 1A3, also above representative levels. Uranium-238 was also detected but much less frequently. The highest activity was 22.2 ± 5.25 pCi/g at 1A3.

There is a faint EMF characteristic pattern in the soil samples taken within the 1- to 2-mile radius (samples 293[2A], 293[2B], and 293[2C]). See Table 4.3-5. This disappears altogether in the samples collected along the 2- to 3-mile segment of the radial, in which most of the constituents are below representative levels.

With several exceptions in the "A" and "B" area samples taken in the 2-foot horizon were at or below the representative range. The above-representative samples did not contain elevated concentrations relative to those detected in samples from overlying surface soils. Because they are found in the area where road construction activities have taken place over the years, their presence is probably due to mechanical mixing rather than leaching.

Radial 293 trends approximately east to west, along the northern boundary of the FMC facility. The north to south distance between the facility boundary and the radial is fairly constant. Concentrations of EMF-related parameters are much higher in samples collected in the east than in the west in the segment of the radial that directly fronts along the facility. This suggests that the source of impact is in the eastern part of the FMC facility at the ore pile, and not in the western portion of FMC or Bannock Paving.

The source of the elevated constituents within the "A" sample area appears to have been the FMC ore pile, which is located just south of this area. The mix of constituents detected (arsenic; elevated calcium, fluoride, and total phosphorus; moderate lead, vanadium, and zinc; plus low potassium) is characteristic of phosphate ore. The air pathways investigation program will be better able to refine the hypothesis that the strong prevailing winds from the southwest have distributed particulates from the FMC ore pile.

Sampling Results Along the 315-Degree Radial. The southernmost sampling location along this radial is south of I-86 (Figure 2.3-1). As expected, this sample contained elevated concentrations relative to representative levels of ore-related

constituents (Table 4.3-5). The EMF-related constituents in soil samples collected from the 1- to 2-mile segment of the radial were all below representative surface soil concentrations. Nor were the EMF characteristic constituents present above representative levels in the two (3A and 3B) samples collected along the 2- to 3-mile segment of the radial.

There was a faint indication of the EMF-related constituents in the subsurface soil sample collected at the southernmost location (315[1A]), but no other subsurface sample collected along the radial contained above-representative concentrations of EMF characteristic constituents (Table 4.3-5). Some samples had above-representative concentrations of individual parameters, such as lead, chromium, or zinc, but rarely in the same sample and not associated with cadmium, fluoride, or total phosphorus. Hence these are not considered EMF-related.

The only surficial soil sample containing elevated activities of radionuclides was collected at 1A (polonium-210 at 31.4 ± 8.32 pCi/g and uranium-238 at 19.5 ± 7.22 pCi/g). Lead-210 was not detected (Table 4.3-2). During Phase I, an anomalously high polonium-210 activity (29.8 ± 15.5 pCi/g) was detected in the subsurface sample taken at 315(3B). This was the only activity great enough to be detected in the subsurface samples on this radial among the Phase I samples. During Phase II, four additional samples were taken in the immediate vicinity of this sample (315(3B) to determine if the previously detected polonium-210 activity was an outlier. No above-representative activities were found in these samples, and it can be concluded that the reported value of 29.8 pCi/g was probably due to laboratory error.

Sampling Results Along the 338-Degree Radial. The last radial in the northwestern quadrant is 338, which runs along the western side of the Portneuf River (Figure 2.3-1). The first sampling point along this radial is just north of I-86. This soil sample contained above-representative levels of EMF-related parameters: arsenic (6.8 mg/kg), cadmium (22 mg/kg), chromium (90.7 mg/kg), fluoride (2,600 mg/kg), total phosphorus (3,880 mg/kg), vanadium (97 mg/kg), and zinc (183 mg/kg). With several exceptions, the concentrations of these constituents detected in samples collected further along the radial decreased with distance from the site. However, unlike other radials, they did not, for the most part, fall below representative concentrations in samples collected within the 2- to 3-mile segment of the radial. Sample 338(3B), the last sampling point on the radial, contained above-representative concentrations of fluoride (1,300 mg/kg) and total phosphorus (1,530 mg/kg).

Polonium-210 activities were present in all sample points (Table 4.3-2). The activities ranged from 5.46 ± 2.34 to 8.68 ± 7.22 pCi/g. The count uncertainty values were generally high, and caution should be used in interpreting these values. With the exception of uranium-238 in 338(2C) at 6.79 ± 5.14 pCi/g, lead-210 and uranium-238 were not detected in the surficial soil samples.

The subsurface samples are generally below the expected representative range. The one parameter that does not follow this pattern is fluoride, which has higher values with distance (Table 4.3-5). Radionuclide activity was measured at three sampling

points in the subsurface (1B, 1D, and 2C). No activity was detected above representative levels.

The enriched concentrations of fluoride and polonium-210 in samples collected along the entire radial 338, along with the presence of total phosphorus suggest a stack or vent emission as a potential source. This will be further investigated in the air pathways program.

Examination of bar graphs for selected constituents detected in samples within the northwestern quadrant shows a strong asymptotic relationship along the 292- and 315-degree radials, which is comparable to the pattern found along the other prevailing downwind radials in the northeastern quadrant (Figures 4.3-30 through 4.3-39). However, as was discussed above, constituents detected in samples collected along the 338-degree radial show a less pronounced asymptotic pattern, suggesting a nonfugitive dust source.

Northwestern Quadrant Summary. There is an asymptotic pattern in the distribution of EMF-related constituent concentrations, with higher levels near the site. Representative levels are seen in samples collected along the 293 and 315 degree radials beyond 2 miles from the facilities.

Subsurface soils, with some exceptions in the "1A" range of the 293-degree radial, have not been affected by site activities. However, above-representative concentrations of fluoride in many of the 338-degree radial samples are found in subsurface soils, including those taken within the 3-mile segment from the facilities.

Samples from the 338-degree radial generally have above-representative values for most of the EMF characteristic parameters along its entire length. The pronounced asymptotic pattern is not seen along this radial, possibly indicating a nonfugitive dust source.

4.3.2 Conclusions

The greatest concentrations of site-related constituents are found within a 1-mile radius to the immediate north and east of the facilities, where windblown ore has accumulated over the years. These concentrations taper off with distance to where they are either not present or barely perceptible beyond 2 miles. This pattern is best illustrated by examining EMF signature parameters.

Figures 4.3-30 through 4.3-39 also display summaries of constituents found by distance from the site within each quadrant. This information is presented on the right side of these figures. Figure 4.3-40 displays cadmium concentrations both in plan view and using map-related histograms. The histograms provide a schematic view of the data "looking" at the site from the southwest (top part of the figure) and the northeast (bottom part of the figure). The maps illustrate the relatively low concentrations found in the southern quadrants (generally upwind) compared with those in the downwind northern quadrants. The only noticeable excursions in the south are those connected with the samples just to the south of the FMC pond area.

Figures 4.3-41 through 4.3-48 present the same views for chromium, fluoride, total phosphorus, zinc, lead, selenium, vanadium, and arsenic. Patterns similar to those seen in the distribution of cadmium can be observed.

Radionuclides follow the same distribution pattern as the inorganic constituents. Where site-related parameters were elevated, above-representative radionuclide activity levels were also noted.

Subsurface soils, with some exceptions in the area near I-86, do not appear to have been impacted by deposition of EMF-related constituents, indicating very little to no tendency for the EMF-related constituents present in offsite soils to leach. The one exception is fluoride detected in samples along the 338-degree radial, which appears at above-representative concentrations in most of the subsurface soils out to the 2- to 3-mile range from the facilities.

Constituent concentrations distribution in samples collected along the 338-degree radial did not show a pronounced asymptotic pattern as did the distribution along other downwind radials. This is also the only radial that contained detectable quantities of polonium-210 along its entire length. One possible explanation is that the constituents detected in samples collected along the outer reaches of the radial did not originate as fugitive dust. This will be investigated during the air pathway monitoring program, and in further evaluation of the offsite soil data.

Tables for Section 4.1

Table 4.1-1
Samples Not Representative of Groundwater
(Collected in May and June 1992)

Well Number	Sample ID	Sample Date	Sample Type
139	FG139	5/17/92	GW
140	FG140B	5/11/92	GW
140	FG140BD	5/11/92	GW
141	FG141	5/17/92	GW
142	FG142	5/29/92	GW
143	FG143	5/12/92	GW
143	FG143D	5/12/92	GW
144	FG144	5/8/92	GW
144	FG144D	5/8/92	GW
145	FG145	5/7/92	GW
145	FG145D	5/7/92	GW
146	FG146	5/9/92	GW
146	FG146D	5/9/92	GW
147	FG147	5/12/92	GW
147	FG147D	5/12/92	GW
148	FG148	5/13/92	GW
149	FG149B	5/13/92	GW
149	FG149BD	5/13/92	GW
149	FGDUP1	5/13/92	GWD
149	FGDUP1A	5/13/92	GWD
149	FGDUP1AD	5/13/92	GWD
149	FGDUP1B	5/13/92	GWD
149	FGDUP1BD	5/13/92	GWD
149	FGDUP1D	5/13/92	GWD
150	FG150B	5/12/92	GW
150	FG150BD	5/12/92	GW
151	FG151B	5/7/92	GW
151	FG151BD	5/7/92	GW
152	FG152	6/4/92	GW
300	SG300	5/26/92	GW
300	SG300D	5/26/92	GW
304	SG304	5/8/92	GW
304	SG304D	5/8/92	GW
306	SG306	5/28/92	GW

Table 4.1-1 (Cont'd)

Well Number	Sample ID	Sample Date	Sample Type
307	SG307	5/10/92	GW
307	SG307D	5/10/92	GW
308	SG308	5/8/92	GW
312	SG312	6/1/92	GW
312	SGDUP2	6/1/92	GWD
312	SGDUP2A	6/1/92	GWD
312	SGDUP2B	6/1/92	GWD
313	SG313	5/29/92	GW
317	SG317	5/7/92	GW
317	SG317D	5/7/92	GW
318	SG318	5/7/92	GW
318	SG318D	5/7/92	GW
321	SG321	5/27/92	GW
322	SG322	6/11/92	GW
500	OG500	6/14/92	GW
501	OG501	6/3/92	GW
502	OG502	5/30/92	GW
503	OG503	5/30/92	GW
504	OG504	5/31/92	GW
505	OG505	5/31/92	GW
506	OG506	5/29/92	GW
507	OG507	5/28/92	GW
508	OG508	6/3/92	GW
509	OG509	6/2/92	GW
510	OG510	6/10/92	GW
511	OG511	6/10/92	GW
512	OG512	6/1/92	GW
513	OG513	5/31/92	GW

Notes:
GW = Groundwater sample.
GWD = Duplicate groundwater sample.

Table 4.1-2
Comparison of Analytical Methods of Determining Fluoride Concentrations in Soil

Location	Total	Soluble
SS-045-1-A	10000	187
BS-023-3-B	520	24
SD-17	3900	38
SD-22	540	18
BS-150-11	5300	76
BS-B-13-90	480	16
BS-B-12-70	500	19

Notes:

SS - Surface sample.

BS - Below surface sample.

SD - Sediment.

Results in mg/kg.

Tables for Section 4.2

Table 4.2.1-1
Concentrations Defining the Upper Representative Limits in Chemicals in Surface and Subsurface Soil

Parameter, mg/kg	Representative Levels[a]	
	Subsurface	Surface
Aluminum	14638.59	15961.47
Antimony	30.93	10.44
Arsenic	8.48	6.66
Barium	203.20	205.66
Beryllium	1.16	1.45
Boron	18.08	17.35
Cadmium	1.17	4.88
Calcium	65574.37	NC
Chromium	26.95	52.96
Cobalt	8.72	7.79
Copper	15.22	17.19
Fluoride	559.21	656.28
Iron	14930.15	17137.51
Lead	26.13	35.76
Lithium	17.79	19.25
Magnesium	18700.01	8722.48
Manganese	475.92	908.97
Mercury	0.33	0.23
Molybdenum	5.23	2.13
Nickel	14.89	18.62
Orthophosphate	8.88	21.83
Phosphorus, Total	840.17	1512.44
Potassium	3562.30	4934.23
Selenium	6.53	1.23
Silver	2.00	1.04
Sodium	970.68	NA
Thallium[b]	20.45	0.33
Vanadium	52.60	35.49
Zinc	52.44	89.71

Table 4.2.1-1 (Cont'd)

Radiological Parameter, pCi/g	Representative Levels[a]	
	Subsurface	Surface
Lead-210	1.1	8.2
Polonium-210[c]	13.5	11.1
Potassium-40	21.6	28.2
Uranium-238	2.7	4.3
Gross alpha	24.7	NA
Gross beta	31.4	NA

Notes:

(a) Values = mean + 2 standard deviations.
(b) Reflects high analytical detection levels.
NA = Not analyzed.
NC = Not calculated due to insufficient sample size.
(c) Large analytical uncertainties are associated with analyses. This reduces confidence placed on values.

Table 4.2.1-2
Derivation of the Upper Representative Limits in Chemicals in Surface and Subsurface Soil

Parameter	Subsurface				Surface			
	Number of Samples	Mean (mg/kg)	Standard Deviation	Mean + 2 STD	Number of Samples	Mean (mg/kg)	Standard Deviation	Mean + 2 STD
Aluminum	88	10455.00	2091.79	14638.59	27	12685.19	1638.14	15961.47
Antimony	88	9.39	10.77	30.93	27	5.31	2.56	10.44
Arsenic	93	4.56	1.96	8.48	27	4.09	1.29	6.66
Barium	93	144.81	29.20	203.20	27	151.96	26.85	205.66
Beryllium	88	0.63	0.26	1.16	27	0.84	0.30	1.45
Boron	88	6.94	5.57	18.08	27	6.65	5.35	17.35
Cadmium	93	0.54	0.32	1.17	27	1.96	1.46	4.88
Calcium	28	43996.43	10788.97	65574.37	2	18750.00	NC	NC
Chromium	93	17.56	4.70	26.95	27	24.51	14.22	52.96
Cobalt	88	5.37	1.67	8.72	27	5.61	1.09	7.79
Copper	93	10.43	2.39	15.22	27	13.77	1.71	17.19
Fluoride	88	417.84	70.69	559.21	27	441.96	107.16	656.28
Iron	93	11961.29	1484.43	14930.15	27	14251.85	1442.83	17137.51
Lead	93	11.70	7.21	26.13	27	19.17	8.30	35.76
Lithium	88	12.42	2.69	17.79	27	12.89	3.18	19.25
Magnesium	28	13253.57	2723.22	18700.01	7	6942.86	889.81	8722.48
Manganese	93	357.70	59.11	475.92	27	545.89	181.54	908.97
Mercury	88	0.13	0.10	0.33	27	0.11	0.06	0.23
Molybdenum	88	2.16	1.53	5.23	27	1.34	0.39	2.13
Nickel	88	11.12	1.89	14.89	27	12.45	3.09	18.62
Orthophosphate	93	2.11	3.38	8.88	27	9.98	5.92	21.83
Phosphorus, Total	93	578.10	131.04	840.17	27	904.70	303.87	1512.44
Potassium	7	2505.71	528.29	3562.30	8	3583.75	675.24	4934.23
Selenium	93	1.74	2.40	6.53	27	0.67	0.28	1.23
Silver	93	0.99	0.50	2.00	27	0.61	0.22	1.04
Sodium	7	670.71	149.98	970.68	NA	NA	NA	NA
Thallium	88	4.48	7.98	20.45	27	0.19	0.07	0.33
Vanadium	92	29.76	11.42	52.60	27	24.94	5.27	35.49
Zinc	93	41.61	5.41	52.44	27	68.16	10.77	89.71
Radiological Parameters								
Gross alpha, pCi/g	21	14.02	5.34	24.7	NA	NA	NA	NA
Gross beta, pCi/g	21	22.64	4.38	31.4	NA	NA	NA	NA
Lead-210, mg/kg	37	0.19	0.45	1.08	19	3.26	2.49	8.24
Polonium-210, mg/kg	37	2.92	5.27	13.45	18	3.39	3.34	11.18
Potassium-40, mg/kg	37	17.14	2.2	21.58	19	18.80	4.70	28.2
Uranium-238, mg/kg	37	0.83	0.94	2.72	19	1.37	1.44	4.26

Notes:
NA - Not analyzed.
NC - Not calculated.

Table 4.2.1-3
Descriptive Statistics for Chemical Constituents in Subsurface Soil Samples

Parameter	Well 101[a]			All Representative Subsurface Samples			
	Mean (mg/kg)	Standard Deviation	Mean + 2 STD	Number of Samples	Mean (mg/kg)	Standard Deviation	Mean + 2 STD
Aluminum	NA	NA	NA	88	10455.00	2091.79	14638.59
Antimony	NA	NA	NA	88	9.39	10.77	30.93
Arsenic	NA	NA	NA	93	4.56	1.96	8.48
Barium	120.9	34.98	190.85	93	144.81	29.20	203.20
Beryllium	NA	NA	NA	88	0.63	0.26	1.16
Boron	NA	NA	NA	88	6.94	5.57	18.08
Cadmium	0.6	0	NC	93	0.54	0.32	1.17
Calcium	39260	9652.62	58565.23	28	43996.43	10788.97	65574.37
Chromium	12.7	0.97	14.64	93	17.56	4.70	26.95
Cobalt	NA	NA	NA	88	5.37	1.67	8.72
Copper	13.78	4.60	22.99	93	10.43	2.39	15.22
Fluoride[b]	NC	NC	NC	88	417.84	70.69	559.21
Iron	11100	514.78	12129.56	93	11961.29	1484.43	14930.15
Lead	6.96	0.69	8.34	93	11.70	7.21	26.13
Lithium	NA	NA	NA	88	12.42	2.69	17.79
Magnesium	12160	1350.19	14860.37	28	13253.57	2723.22	18700.01
Manganese	340.8	33.28	407.36	93	357.70	59.11	475.92
Mercury	NA	NA	NA	88	0.13	0.10	0.33
Molybdenum	NA	NA	NA	88	2.16	1.53	5.23
Nickel	NA	NA	NA	88	11.12	1.89	14.89
Orthophosphate	1.26	1.09	3.44	93	2.11	3.38	8.88
Phosphorus, Total	846	35.78	917.55	93	578.10	131.04	840.17
Potassium	2360	569.17	3498.33	7	2505.71	528.29	3562.30
Selenium	NA	NA	NA	93	1.74	2.40	6.53
Silver	0.8	0	NC	93	0.99	0.50	2.00
Sodium	625.4	157.16	939.71	7	670.71	149.98	970.68
Thallium	NA	NA	NA	88	4.48	7.98	20.45[c]
Vanadium	21.72	2.45	26.63	92	29.76	11.42	52.60
Zinc	41.78	3.85	49.47	93	41.61	5.41	52.44
Radiological Parameters							
Gross alpha, pCi/g	NA	NA	NA	21	14.02	6.47	26.97
Gross beta, pCi/g	NA	NA	NA	21	22.64	4.38	31.4
Lead-210, mg/kg	NA	NA	NA	37	0.19	0.45	1.08
Polonium-210, mg/kg	NA	NA	NA	37	2.92	5.27	13.45
Potassium-40, mg/kg	NA	NA	NA	37	17.14	2.2	21.58
Uranium-238, mg/kg	NA	NA	NA	37	0.83	0.94	2.72

Notes:
(a) Data from five samples taken in Well 101.
(b) Well 101 samples "soluble" measured not "total" fluoride.
(c) Reflects high analytical detection limits.
NA = Not analyzed. NC = Not calculated.

Table 4.2.2-1 Chemical Data for Ore/Gypsum Slurry

Parameter	Ore Slurry – S3040R1, mg/kg				Gypsum Slurry – S304GP1, mg/kg				Gypsum Slurry Liquid – SGSFEF01, mg/l	
	HNO3		HF/Perchlor		HNO3		HF/Perchlor			
Aluminum	4,800.00		7,240.00		1,180.00		3,240.00		51.0000	
Ammonia									318	
Antimony	3.80	U	6.00		3.80	U	23.40	U	0.0892	UJ
Arsenic	5.30		5.40		0.72		0.94	U	0.2050	
Barium	51.20		72.60		39.70		53.70		0.6640	
Beryllium	1.90		2.30		0.23		2.80		0.0199	
Boron	225.00		12.50		14.00		6.00	UJ	10.0000	J
Cadmium	109.00		111.00		34.80		37.10	J	2.0000	
Calcium	302,000.00		292,000.00		233,000.00		243,000.00	J	1,400.0000	
Chloride									162	
Chromium	404.00		476.00		110.00		228.00	J	5.3100	
Cobalt	0.39	UJ	0.48		0.39	UJ	2.40	U	0.0379	
Copper	75.50		76.50		38.60		43.10		0.7700	
Fluoride	33,300.00		35,700.00		6,900.00		7,650.00	J	8,480.0000	J
Iron	2,980.00		3,090.00		480.00		711.00	J	32.4000	
Lead	8.60		5.40		5.40		7.30		0.0086	J
Lithium	3.70		4.70		0.39		2.40	U	0.3540	
Magnesium	1,550.00		1,580.00		213.00		301.00		55.5000	
Manganese	37.00		39.70		4.90		4.70		1.4800	
Mercury	0.46	U	0.12		0.38	U	0.11	U	0.0002	U
Molybdenum	14.00		18.80		5.30		7.80	J	0.0742	
Nickel	94.10		100.00		25.50		42.30	J	1.6800	
Phosphorus, Total	74,300.00		136,000.00		6,560.00		9,450.00		2,460.0000	
Potassium	2,120.00		3,130.00		1,300.00		2,160.00		176.0000	
Selenium	11.50	J	28.30		15.60	J	23.00	J	0.0451	
Silver	10.00		12.30		7.30		6.20	J	0.0084	UJ
Sodium	3,490.00		3,670.00		2,090.00		2,400.00		768.0000	
Sulfate	NA		NA		540,000.00		601,000.00		4,480.0000	
Thallium	3.30	J	0.10		0.64	J	0.10	R	0.0251	J
Vanadium	701.00		732.00		190.00		262.00	J	3.8100	
Zinc	1,140.00		1,130.00		211.00		227.00	J	12.6000	
Radiological Parameter (pCi/g)										
Gross alpha	567				81.7				644	
Gross beta	184				40.2				619	

Notes:
J = Estimated.
NA = Not analyzed.
R = Rejected result.
U = Not detected.

Table 4.2.1-4
Descriptive Statistics for Chemical Constituents of USGS and EMF Samples

Parameter	27 EMF Samples		40 USGS Samples	
	Geometric Mean	95th Percentile	Geometric Mean	95th Percentile
Arsenic	3.77	8.31	5.2	10.9
Boron	5.21	15.70	32	69
Chromium	22.17	43.01	64	98
Copper	13.65	16.93	17	20
Lead	16.42	52.42	19	30
Lithium	12.51	18.63	20	25
Mercury	0.10	0.23	0.02	0.03
Selenium	0.61	1.26	0.1	0.3
Vanadium	24.30	36.01	67	150
Zinc	67.32	87.26	74	138

Note: Concentrations given in mg/kg.

Table 4.2.2-2
Wastewater Analytical Parameters

Alkalinity, bicarbonate	Lithium, total
Alkalinity, carbonate	Magnesium
Aluminum, total	Manganese, total
Ammonia (NH_3 as N)	Mercury, total
Antimony, total	Molybdenum, total
Arsenic, total	Nickel, total
Barium, total	Nitrate (NO_3 as N)
Beryllium, total	Orthophosphate (PO_4 as P)
Boron, total	Phosphorus, total
Cadmium, total	Potassium
Calcium	Selenium, total
Chloride	Silver, total
Chromium, total	Sodium
Cobalt, total	Sulfate
Copper, total	Thallium, total
Fluoride	Total dissolved solids
Iron, total	Vanadium, total
Lead, total	Zinc, total

Table 4.2.2-3
Concentrations of Parameters in the Former East Overflow Pond

Parameter	Sludge from Former East Overflow Pond (mg/kg, dry weight basis)	Water from Former East Overflow Pond (mg/l)	Groundwater from Well 318 [a] (mg/l)
Arsenic	<8.1	0.13	0.383
Barium	202.0	0.23	0.340
Cadmium	21.9	1.14	3.45
Chromium	204	1.18	3.91
Copper	77.6	0.47	0.689
Fluoride	52,200	6,380	2,730
Nickel	41.2	0.55	2.132
Phosphorus, total	6,160	563	2,250
Silver	8.2	<0.01	0.002
Sulfate	NM	746	2,090
Vanadium	362.0	3.39	13.12
Zinc	298.0	6.01	17.41
pH	NM	NM	1.69

Notes:
(a) Sample collected September 20, 1992.
NM = Not measured.

Table 4.2.2-4
Concentrations of Parameters in
Wastewater Treatment Ponds at Simplot

Parameter	Holding Pond (SWWWP101)	Settling Pond (SWWWP201)	Equalization Pond (SWWWP301)
Arsenic	0.04J	0.01U	0.002UJ
Barium	0.20	0.11	0.10
Cadmium	0.54J	0.01J	0.00
Chromium	0.42J	0.01J	0.01J
Copper	0.15	0.01	0.02U
Fluoride	26.60	2.30	2.30
Nickel	0.28	0.01UJ	0.01UJ
Phosphorus, Total	1,320.00	4.82	3.06
Silver	0.003U	0.004U	0.004U
Sulfate	2,590.00	416.00	270.00
Vanadium	1.67	0.02U	0.02U
Zinc	5.19	0.32	0.37

Notes:
Results are in mg/l.
J = Estimated.
U = Not detected.

Table 4.2.2-5
Concentrations of Parameters in Soil in the Unlined Ditch to Water Treatment Ponds

Parameter	SSSUDP01[a]	SBSUDP01[b]	SSSUDP02	SBSUDP02	SSSUDP03	SBSUDP03	SSSUDP04	SBSUDP04	SSSUDP05	SSSUDP06
Aluminum	4080	7390	6370	8490	2960	5180	4610	7010	7270	8800
Antimony	10.2	9.3	12.9	10.3	10.3	10.9	10.2	12.2	16.0	15.1
Arsenic	<7.9	<5.8	<8.1	<5.8	<6.6	<7.5	<8.7	<9.4	<9.5	13.0
Barium	60.1	276.0	212.0	961.0	10,800.0	7,850.0	1,020.0	2,970.0	1,820.0	633.0
Beryllium	2.1	2.0	2.5	1.1	0.5	0.9	2.4	2.0	2.0	2.4
Boron	193	20.6	45	15	12.9	14.4	43.4	33.6	26.3	43.3
Cadmium	103.0	51.3	108.0	7.4	14.1	6.1	80.6	31.1	27.0	91.1
Calcium	571,000	99,100	273,000	9,560	12,200	8,910	201,000	66,900	58,600	171,000
Chromium	363.0	476.0	584.0	138.0	1,260.0	853.0	447.0	1,470.0	2,350.0	705.0
Cobalt	0.53	2.4	1.3	2.3	3.2	3.3	0.72	3.0	4.1	6.5
Copper	64.0	52.5	79.3	14.7	34.2	29.9	64.8	57.6	76.4	165.0
Fluoride	25,900	10,800	18,300	935	1,230	1,230	16,100	13,100	3,530	8,800
Iron	2,570	9,710	5,840	7,540	21,000	18,900	4,780	22,500	20,500	16,400
Lead	15.3	42.0	23.5	17.1	119.0	43.9	16.8	83.4	67.8	89.1
Lithium	4.7	4.5	7.0	5.0	2.0	3.2	6.2	4.5	5.2	7.9
Magnesium	2,120	2,020	3,860	1,620	661	945	2,830	1,680	1,970	5,480
Manganese	55.5	74.1	336.0	63.1	93.1	38.6	54.1	72.8	115.0	649.0
Mercury	<0.41	4.50	<0.72	3.40	1.20	1.40	<0.45	47.20	10.30	3.80
Molybdenum	11.9	13.7	18.4	1.9	12.5	12.1	16.3	23.6	16.3	17.2
Nickel	86.6	45.6	122.0	14.4	20.2	12.3	94.4	50.1	60.8	133.0
Orthophosphate	2,670	4,350	2,750	1,370	1,370	1,850	917	1,200	1,730	2,730

Table 4.2.2-5 (Cont'd)

Parameter	SSSUDP01[a]	SBSUDP01[b]	SSSUDP02	SBSUDP02	SSSUDP03	SBSUDP03	SSSUDP04	SBSUDP04	SSSUDP05	SSSUDP06
Phosphorus, total	123,000	60,500	114,000	7,130	17,900	8,550	81,600	46,900	30,100	61,000
Potassium	1,970	1,850	2,670	2,120	1,330	1,980	2,130	2,530	1,960	2,430
Selenium	46.5	8.0	61.2	2.6	4.9	<2.2	46.3	8.3	4.2	11.4
Silver	13.2	2.4	7.4	<0.53	33.7	6.5	5.4	2.6	<0.83	4.2
Sodium	3,920	1,710	3,900	553	613	562	3,760	1,460	1,250	2,330
Thallium	4.3	0.49	10.0	0.53	0.54	0.57	9.3	0.63	0.83	0.69
Vanadium	685.0	496.0	960.0	150.0	202.0	192.0	917.0	433.0	350.0	616.0
Zinc	1,080.0	665.0	1,400.0	147.0	231.0	115.0	1,100.0	419.0	435.0	1,370.0

Notes:

Results are in mg/kg.

(a) SS prefix refers to surface sample.

(b) SB prefix refers to subsurface sample (2 feet bgs).

Table 4.2.2-6
Concentrations of Mercury Detected in Soil Near the Unlined Ditch to the Water Treatment Ponds

Station ID	Concentration Detected (mg Hg)
SBSODP01	7.2
SBSODP02	3.2
SBSODP03	2.3
SSSODP01	0.46
SSSODP02	3.9
SSSODP03	4.9
SSSODP04	2
SSSODP05	3
SSSODP06	1.2

Notes:

Samples taken at surface and 2-foot depth.

Table 4.2.2-15
Concentrations of Parameters in Soil in the Bone Yard

S079B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic	Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper	Fluoride	Iron		Lead	
0	Dark brown sandy silt with gravel	13000	J	8.5	U	6.8	*662*	J	0.89	U	*22.9*	J	*14.7*	J	36900	J	*111*	J	7	J	*25.5*	*4600*	12400	J	*31.4*	J
2	Tan silt	12400	J	9.1	U	3.4	132	J	0.66	U	16.6	J	0.59	UJ	52200	J	12.5	J	5.7	J	10.4	500	12800	J	8.5	J
Representative		14638.6		30.9		8.5	203.2		1.2		18.1		1.2		65574.4		27.0		8.7		15.2	559.2	14930.2		26.1	

Sample Depth	Sample Description	Lithium	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver		Thallium		Vanadium		Zinc		Gross Alpha		Gross Beta
0	Dark brown sandy silt with gravel	10.8	4810	J	296	J	0.14	U	2.4		*26.3*	*198*	*12200*	2.5	0.44	U	13.2	U	*132*	J	*234*	J	*29.5*		30.8
2	Tan silt	14.8	10800	J	365	J	0.1	U	1.5	U	11.3	5.4	690	0.5	0.47	U	14.2	U	21	J	47.4	J	8.97	UJ	21.9
Representative		17.8	18700.0		475.9		0.3		5.2		14.9	8.9	840.2	6.5	2.0		20.4		52.6		52.4		24.7		31.4

S080B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic	Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper	Fluoride	Iron		Lead	
0	Brown sandy silt	*17900*	J	8.7	U	3.2	151	J	1.1	U	*21.5*	J	*11.2*	J	11100	J	*41.1*	J	6	J	14.3	*1900*	*15300*	J	7.9	J
2	Brown tan silt	11400	J	8.8	U	6.9	133	J	0.56	U	11.4	UJ	0.57	UJ	41400	J	11.8	J	5.2	J	10.3	490	12300	J	6.7	J
Representative		14638.6		30.9		8.5	203.2		1.2		18.1		1.2		65574.4		27.0		8.7		15.2	559.2	14930.2		26.1	

Sample Depth	Sample Description	Lithium	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver		Thallium		Vanadium		Zinc		Gross Alpha		Gross Beta
0	Brown sandy silt	11.1	5530	J	389	J	0.09	U	1.5	U	*40.1*	*916*	*12000*	0.62	0.45	U	13.6	U	*84.5*	J	*289*	J	21.2		31
2	Brown tan silt	12.1	11200	J	357	J	0.15	U	1.5	U	10.2	*19.2*	665	0.61	0.46	U	13.8	U	21.8	J	46.3	J	10.5	UJ	14.1
Representative		17.8	18700.0		475.9		0.3		5.2		14.9	8.9	840.2	6.5	2.0		20.4		52.6		52.4		24.7		31.4

S081B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic	Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper	Fluoride	Iron		Lead	
0	Tan brown silt - trace fine gravel	14300	J	8.3	U	6.4	*248*	J	0.74	U	*32.4*	J	*13.9*	J	34200	J	*74.9*	J	6.3	J	*57.8*	*2700*	*17700*	J	*31.2*	J
2	Tan brown silt	13900	J	8.6	U	5.2	124	J	0.67	U	12.2	UJ	0.56	UJ	33600	J	14.6	J	5.9	J	10.5	530	13400	J	8.9	J
Representative		14638.6		30.9		8.5	203.2		1.2		18.1		1.2		65574.4		27.0		8.7		15.2	559.2	14930.2		26.1	

Sample Depth	Sample Description	Lithium	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver		Thallium		Vanadium		Zinc		Gross Alpha		Gross Beta
0	Tan brown silt - trace fine gravel	12	7450	J	399	J	0.16	U	*16.2*		*46.1*	*41*	*5500*	2.1	0.43	U	12.9	U	*71.5*	J	*221*	J	*25.5*		29
2	Tan brown silt	12.8	11200	J	385	J	0.08	U	1.4	U	10.5	4.5	713	0.96	0.45	U	13.4	U	25.7	J	47	J	13		23.3
Representative		17.8	18700.0		475.9		0.3		5.2		14.9	8.9	840.2	6.5	2.0		20.4		52.6		52.4		24.7		31.4

Notes:
- Results are in mg/kg, except for gross alpha and gross beta, which are in pCi/g.
- Depths are in feet.
- Above-representative values are in italics.
- J - Estimated value.
- U - Not detected.

Table 4.2.2-14
Concentrations of PCBs in Soils Associated with Roads (mg/kg)

Phase II Results

S085B

Sample Depth	Aroclor 1016		Aroclor 1221		Aroclor 1232		Aroclor 1242		Aroclor 1248		Aroclor 1254		Aroclor 1260	
0	1	UJ	1	UJ	1	UJ	1	UJ	2	UJ	2	UJ	1	UJ
2	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ

S088B

Sample Depth	Aroclor 1016		Aroclor 1221		Aroclor 1232		Aroclor 1242		Aroclor 1248		Aroclor 1254		Aroclor 1260	
0	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ
2	0.65	R	0.65	R	0.65	R	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ

S090B

Sample Depth	Aroclor 1016		Aroclor 1221		Aroclor 1232		Aroclor 1242		Aroclor 1248		Aroclor 1254		Aroclor 1260	
0	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
2	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ

S094B

Sample Depth	Aroclor 1016		Aroclor 1221		Aroclor 1232		Aroclor 1242		Aroclor 1248		Aroclor 1254		Aroclor 1260	
0	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
1	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
2	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ

Notes:
J - Estimated value.
R - Rejected value.
U - Not detected.
Depths are in feet.

Table 4.2.2-7
Concentrations of Parameters in Soil in the Triple Superphosphate Area

S050B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.5	Black/gray silty gravel	11100	7.7 UJ	1.9 UJ	*210*	0.79	*19.2* J	*1.8*	*79700*	*115* J	8.5	*350*	*73000*	8460	4.3
2	Tan silt	10500	9.3 UJ	3.9 UJ	101	0.48	13.4 J	*9.9*	*82100*	15.8 J	3	6.6	510	8840	3.7 UJ
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0.5	Black/gray silty gravel	9	4510	200 J	*0.61* U	3.5	*93.9*	4.9	*2130*	2.7 UJ	1.9	12 U	*102*	*291*	*49.1* J	*34*
2	Tan silt	9.1	4220	*729* J	0.24 U	1.6 U	*45.6*	*909*	*54700*	2.3 UJ	0.48 U	14.4 U	21.6	*187*	11.2 UJ	21.1
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

S051B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.5	Dark brown silt with trace fine gravel	*22100* J	8.5 U	2.3 J	183	*1.7*	*60*	*7.7*	*208000*	*254* J	6.3	*44.2* J	*14500*	5950	3.4 U
2	Brown sandy silt/gravel	7380 J	7.9 U	4.1 J	124	0.43	10.4	*4.9*	38200	*51.6* J	8.1	*53.2* J	*2300*	9270	6.7
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0.5	Dark brown silt with trace fine gravel	15.3	5100 J	220	0.11 UJ	2.9	*35.5* J	*15*	*5140*	3.9	*4.1* J	13.2 U	*238*	*143*	*136* J	*57.7* J
2	Brown sandy silt/gravel	6.4	3160 J	183	*1.3* J	1.3 U	*23.5* J	*65.7*	*10100*	0.65 U	0.41 UJ	12.3 U	*54.5*	*141*	*27.2*	26.3
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

S052B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.5	Brown silt with fine gravel	*17500* J	7.9 U	2.6 J	170	*1.3*	*41.9*	*6.1*	*160000*	*196* J	5.6	*28.1* J	*11600*	5680	20.9
2	Brown silt	8150 J	8.3 U	5.7 J	*713*	0.66	16.4	*30.4*	*111000*	*103* J	0.46	*16.8* J	*4800*	6800	7.5
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0.5	Brown silt with fine gravel	12.1	3780 J	181	*0.81* J	2.3	*31.2* J	*15.3*	*8950*	3.1	*2.7* J	12.4 U	*183*	*219*	*133* J	*52.3* J
2	Brown silt	3.2	2510 J	142	*2.1* J	1.4 U	*19.4* J	*1580*	*7040*	1 U	1.3 J	0.13 U	*154*	19.9	*49.1* J	29.7 J
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

S053B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.5	Dark brown silt with gravel	14600 J	28.4	*55* J	145	1.2	*43.3*	*14.1*	*137000*	*199* J	*10.7*	*36.8* J	*10600*	5180	*2370*
2	Tan silty clay with gravel	10500 J	11.6	*12.8* J	176	0.45	17	0.75	*106000*	12.7 J	4.9	7.7 J	530	10000	4.8
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0.5	Dark brown silt with gravel	10.5	3740 J	184	*1.9* J	5.2	*39.1* J	*314*	*3150*	2.6	*3.1* J	12.1 U	*207*	*9730*	*107* J	*54.6* J
2	Tan silty clay with gravel	12	13800 J	249	*0.67* J	1.5 U	14.8 J	*118*	*1260*	0.31 U	0.82 J	14.1 U	22.9	50.4	17.7 J	15.2 J
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

Table 4.2.2-7 (Cont'd)

S098B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium		Beryllium	Boron	Cadmium		Calcium	Chromium		Cobalt	Copper	Fluoride	Iron	Lead	Lithium	
0	Sandy gravel	10700	4.6	UJ	7.2		*2020*	J	1.2	*31.4*	*26*	J	*78800*	*159*	J	1.2	*22.1*	*7820*	9910	18.1	5.8	
2	Gravelly clayey silt	9410	4.6	UJ	4.2		133	J	0.86	10	0.35	U	*85600*	12.6	J	5.6	7.1	540	11600	8.3	13.1	
5	Yellowish-brown silt	12300	4.5	UJ	5.1		*572*	J	0.75	*29.7*	*3.6*	J	*69700*	*32.6*	J	5.4	*15.7*	*1770*	11900	*38.8*	14.1	
7	Yellowish-brown silt	11500	4.5	UJ	4.4		*235*	J	0.87	13.9	0.37	J	44500	19.3	J	5.6	9.2	570	12100	8.2	10.7	
10	Yellowish-brown silt	9940	4.7	UJ	7.5		98.4		0.52	9.6	0.36	U	42700	17.3	J	4.8	8.2	450	11800	16.7	9.2	J
Representative		**14638.6**	**30.9**		**8.5**		**203.2**		**1.2**	**18.1**	**1.2**		**65574.4**	**27.0**		**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**	

Sample Depth	Sample Description	Magnesium	Manganese	Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Thallium		Vanadium		Zinc		Gross Alpha	Gross Beta
0	Sandy gravel	4740	205	1.00		2.7	U	*37.6*	*1710*	*44800*	2930	0.87		0.35	U	0.12	UJ	*274*	J	*440*	J	14.2	23.2
2	Gravelly clayey silt	17000	303	0.04	U	1.5	U	11.7	*34.4*	*879*	2190	0.58	U	0.35	U	0.14	J	17.1	J	43.6	J	18.6	24.2
5	Yellowish-brown silt	12100	321	0.04	U	2.0	U	*16.6*	*70.6*	*2210*	3350	0.88		0.35	U	0.51	J	47.2	J	*162.0*	J	17.7	24.6
7	Yellowish-brown silt	14500	335	0.06		1.5	U	14.0	*565.0*	*2960*	2550	0.59	U	0.35	U	0.12	UJ	26.8	J	49.3	J	NS	NS
10	Yellowish-brown silt	14000	440	*0.35*		1.6	U	11.6	*492*	*7000*	2010	0.61	U	0.36	U	0.12	U	24.9		40.9	J	6.94	17.1
Representative		**18700.0**	**475.9**	**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**—**	**6.5**		**2.0**		**20.4**		**52.6**		**52.4**		**24.7**	**31.4**

Notes:
Results are in mg/kg, except for gross alpha and gross beta, which are in pCi/g.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.
NS - Not sampled.

Table 4.2.2-8
Concentrations of Parameters in Soil in the Former Phosphoric Acid Loading Area/Railcar Cleaning Area

S056B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium	Boron	Cadmium	Calcium		Chromium		Cobalt	Copper		Fluoride		Iron		Lead	Lithium	Magnesium	
0.5	Black silty gravel (Railroad fill)	10500	J	8.1	UJ	5.4	U	89.2	J	0.97	*19*	*55.6*	63400	J	*306*	J	0.95	*20.5*	J	*10000*		11600	J	16	4.4	3650	J
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**	**18.1**	**1.2**	**65574.4**		**27.0**		**8.7**	**15.2**		**559.2**		**14930.2**		**26.1**	**17.8**	**18700.0**	

Sample Depth	Sample Description	Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium		Silver	Thallium		Vanadium		Zinc		Gross Alpha	Gross Beta
0.5	Black silty gravel (Railroad fill)	154	J	0.19	U	*7.3*	U	*35.1*	*10400*	*45400*	3.4	U	1.2	12.6	U	*408*	J	*485*	J	*86.7*	*55.1*
Representative		**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**6.5**		**2.0**	**20.4**		**52.6**		**52.4**		**24.7**	**31.4**

S103B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium	Magnesium
0	Sandy Gravel	9260	4.4	UJ	3.7	*638*	0.68	15.8	11.3	35900	*69.8*	2.1	*18.8*	*4090*	11100	*34.2*	6.2	4320
2	Sandy Gravel	6870	4.4	UJ	3.7	*481*	0.57	12	10.2	38600	*61.8*	1.5	14.8	*3870*	7450	*134*	4.2	3650
5	Gravelly silt	10200	4.4	UJ	4.4	*1040*	0.77	*32.6*	*11.2*	39100	*78.5*	2.4	*51.2*	*4810*	10900	*154*	8.2	4340
7	Gravelly silt	*18100*	4.6	UJ	*25.9*	*828*	*2*	*63.8*	*61.2*	*77800*	*636*	0.48	U *137*	*15100*	*58500*	*444*	4	1930
Representative		**14638.6**	**30.9**		**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**	**18700.0**

Sample Depth	Sample Description	Manganese		Mercury		Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sulfate	Thallium		Vanadium	Zinc	Gross Alpha	Gross Beta
0	Sandy Gravel	159	J	*0.72*		1.6	*17.9*	*514*	*17500*	2320	0.55	U	0.34	U	14700	0.43		*113*	*142*	*31.1*	*39.1*
2	Sandy Gravel	136	J	*0.83*		2	*17.3*	*643*	*13200*	1890	0.57	U	0.34	U	10300	0.11	U	*97.8*	*138*	*27*	*37.8*
5	Gravelly silt	152	J	0.16	U	3.9	*20.9*	*829*	*18500*	2640	0.58	U	0.34	U	11300	0.3		*128*	*149*	20.8	*32.7*
7	Gravelly silt	339	J	*2.1*		*22.8*	*84.9*	*6360*	*65400*	*3650*	0.9	U	0.36	U	13500	0.77		*1100*	*566*	*156*	*107*
Representative		**475.9**		**0.3**		**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**			**20.4**		**52.6**	**52.4**	**24.7**	**31.4**

Notes:

Results are in mg/kg except for gross alpha and gross beta, which are in pCi/g.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
R - Rejected value.
U - Not detected.

Table 4.2.2-9
Concentrations of Parameters in Soil in the Phosphoric Acid Tank Containment Area

S054B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.5	Pea gravel (road base)	1820 J	7.8 UJ	0.51 U	45.2 J	0.51 U	2.6	0.76	2650 J	14.4 J	1.3	4.8 J	*670*	5230 J	3.2 U
2.5	Sandy gravel (road base)	13100 J	9.1 UJ	7.1 U	107 J	*1.8* U	*19.8*	*7*	31500 J	*63* J	*11.9*	9.9 J	*640*	11700 J	4.7
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0.5	Pea gravel (road base)	0.8 U	424 J	30.8 J	0.05 U	1.3 U	3	*45.5*	*1970*	0.99 U	0.41 U	12.2 U	13.2 J	17.3 J	8.07 UJ	13
2.5	Sandy gravel (road base)	6.3	*22700* J	*711* J	0.06 U	3.5 U	*121*	*5690*	*11400*	1.3 U	0.47 U	14.1 U	*69.8*	*436* J	NS	NS
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

S055B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.5	Brown silty gravel (road fill)	4740	7.7 UJ	2.9	102 J	0.35	3.7 U	*2.6*	22100	25.7	3.5	10.8	*1600*	10200	7.2
2.5	Brown silty gravel (road fill)	4840	7.9 UJ	2.7	117 J	0.3	3.7 U	*2.3*	16000	19.9	3.7	8.1	*1100*	9250	7.6
5	Yellowish-brown silt	10800	8.5 UJ	7.3	113 J	0.61	8.9 U	0.55 U	49100	14.2	4.9	7.8	380	11100	6.4
Representative	**Groundwater not encountered**	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0.5	Brown silty gravel (road fill)	5	4940	179	0.15 U	1.3 U	11.4	*148*	*3930*	1.7 U	1.4	12 U	33.7	*70.4*	NS	NS
2.5	Brown silty gravel (road fill)	5.9	2980	162	0.12 U	1.3 U	9.2	*110*	*2310*	0.73 U	0.41 U	12.3 U	22.8	51.2	10.6	13.5
5	Yellowish-brown silt	13.1	12600	290	0.12 U	1.4 U	9.7	*53.1*	786	1.7 U	0.44 U	13.2 U	24.1	34.1	12.6	22.5
Representative	**Groundwater not encountered**	**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

Notes:
Results are in mg/kg, except for gross alpha and gross beta, which are in pCi/g.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.
NS - Not sampled.

Table 4.2.2-10
Concentrations of Paramaters in Soil in the Sulfuric Acid Plants #1 and #2

Sulfuric Acid Plant #1

S062B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt	Copper	Fluoride	Iron		Lead		Lithium
0.5	Very dark grayish-brown silty sand (backfill)	10600	J	8	UJ	3.2	U	*364*	J	1.1		*34.8*		*8.7*	J	*94500*	J	*141*		*7.1*	*184*	*8100*	11600	J	*52.3*	J	6.9
2.5	Light yellowish-brown silt	11400	J	8.7	UJ	6.1	U	*274*	J	0.85	U	*20.2*		0.56	UJ	32800	J	15.4		10	*23.3*	480	12100	J	11.1	J	14.2
5	Light yellowish-brown silt	11200	J	9.2	UJ	4.8		121	J	0.68		*20.2*		0.6	U	39000	J	14.4		5.2	9.8	500	11900	J	9.5		12.7
7.5	Very pale brown silty gravel	4490	J	7.8	UJ	5.7		47.6	J	0.34		*19.2*		0.51	U	7620	J	*67.7*		*103*	*325*	140	*32900*	J	3.2	U	5.5
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**		**27.0**		**8.7**	**15.2**	**559.2**	**14930.2**		**26.1**		**17.8**

Sample Depth	Sample Description	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium		Zinc		Gross Alpha		Gross Beta	
0.5	Very dark grayish-brown silty sand (backfill)	2740	J	122	J	*0.44*		*11.5*		*79.7*	*62.9*	*9060*	2.5		1.3	J	12.4	U	*139*	J	*314*	J	*60.8*		*37.9*	
2.5	Light yellowish-brown silt	*8900*	J	385	J	0.12	U	1.5	U	*15.9*	*40.1*	657	0.65		0.45	UJ	13.5	U	21.3	J	*56.5*	J	7.8	UJ	19.3	
5	Light yellowish-brown silt	14900	J	320	J	0.1	U	1.6	U	10.7	*44.7*	*921*	1.4	U	0.48	U	14.4	U	23.7		38.8		*35.6*		*33.0*	
7.5	Very pale brown silty gravel	*2910*	J	382	J	0.06	U	*15.7*		*168*	3.9	130	1	U	0.41	U	*21.1*		11.7		*228*		8.32	UJ	14.2	
Representative		**18700.0**		**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**6.5**		**2.0**		**20.4**		**52.6**		**52.4**		**24.7**		**31.4**	

S063B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper	Fluoride	Iron		Lead		Lithium
0	Dark brown sandy gravel	8390		8.1	U	4.1	U	*368*		0.5		11.9	J	*9.5*		26600		*47.9*		5.1		*38.6*	*6200*	14000		*39*		7.9
2.5	Dark brown sandy gravel	7110	J	8.6	U	4		96.4	J	0.66	U	6.6	UJ	*6.9*	J	36600	J	*31.9*	J	*15*	J	*19.2*	*1600*	12900	J	4.5	J	5.9
5	Dark brown sandy gravel	5560	J	8.2	U	3.1		173	J	0.62	U	3.5	UJ	*2*	J	35700	J	16.7	J	7.6	J	*23*	*650*	12100	J	6.6	J	5.5
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**		**27.0**		**8.7**		**15.2**	**559.2**	**14930.2**		**26.1**		**17.8**

Sample Depth	Sample Description	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium		Zinc		Gross Alpha		Gross Beta	
0	Dark brown sandy gravel	4320		216		0.14	U	1.4	U	*23.2*	*850*	*8230*	2.9	U	0.42	UJ	12.6	U	*74.8*		*451*	J	*46.7*		*38.0*	
2.5	Dark brown sandy gravel	6050	J	318	J	0.14	U	1.4	U	*27.9*	*1160*	*10500*	3.4		0.45	U	13.4	U	47.7	J	*136*	J	12.6	UJ	11.9	UJ
5	Dark brown sandy gravel	5280	J	254	J	0.07	U	1.4	U	*20.8*	*846*	*4760*	0.67		0.42	U	12.7	U	20.5	J	*75.9*	J	13.5	UJ	15.2	UJ
Representative		**18700.0**		**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**6.5**		**2.0**		**20.4**		**52.6**		**52.4**		**24.7**		**31.4**	

Sulfuric Acid Plant #2

S064B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt	Copper	Fluoride	Iron		Lead		Lithium
0	Brownish-yellow sandy gravel	5430		7.7	U	4.3	U	*55.2*		0.26		6.7	UJ	0.5	U	17300		9.1		4.3	7.2	200	10500		4.5		6.9
2.5	Brownish-yellow sandy gravel	7070		9.4	U	2.9	U	*554*		0.12	U	4.6	UJ	0.61	U	63600		23.8		1.4	9.3	320	4510		*32*		2.3
5	Brown silt	9560		9.6	U	7.2	U	104		0.53		7.7	UJ	0.62	U	51800		9.6		4.6	7	*580*	10300		3.8	U	11.2
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**		**27.0**		**8.7**	**15.2**	**559.2**	**14930.2**		**26.1**		**17.8**

Sample Depth	Sample Description	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium		Zinc		Gross Alpha		Gross Beta	
0	Brownish-yellow sandy gravel	5610		177		0.06	U	1.3	U	11	*25.6*	407	1.8	U	0.4	UJ	12	U	10.9		25.5	J	7.64	UJ	17.6	
2.5	Brownish-yellow sandy gravel	1770		82.2		*0.49*		1.7		4.8	*117*	230	2.6	U	0.49	UJ	14.7	U	7.4		29.5	J	7.99	UJ	11.3	UJ
5	Brown silt	18100		*635*		0.12	U	1.6	U	12.2	6.5	*729*	2.1	U	0.5	UJ	14.9	U	20.6		36.5	J	11.3	UJ	23.5	UJ
Representative		**18700.0**		**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**6.5**		**2.0**		**20.4**		**52.6**		**52.4**		**24.7**		**31.4**	

Table 4.2.2-10 (Cont'd)

S065B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0.5	Dark yellowish-brown silty gravel	9740	8.5 U	5.5 U	*1930*	0.47	16.4 J	*2.7*	32200	*117*	*8.9*	*73.1*	*1600*	*22800*	22.5	*19*
2.5	Light yellowish-brown silt	14300	9.3 U	6.6 U	193	0.71	15.2 J	0.6 U	57300	14.3	3.8	13.4	*590*	13900	16.2	15.8
5	Dark yellowish-brown silty gravel	12900	13.4	5.1 U	142	0.66	12.2 J	0.64	32500	14.4	5.7	11.4	470	12900	9.6	13.7
7.5	Dark yellowish-brown silty gravel	5350	7.7 U	5.4 U	*504*	0.24	5 UJ	0.5 U	10400	12.6	*13.6*	*47*	170	13700	17.2	6.9
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0.5	Dark yellowish-brown silty gravel	4300	204	*0.31* U	*9.3*	*72.1*	7.7	*3450*	1.8 U	0.44 UJ	13.2 U	51.8	*277* J	20.3	21.6
2.5	Light yellowish-brown silt	14700	399	0.11 U	1.6 U	9.9	*10.8*	604	1.5 U	0.48 UJ	14.5 U	25.2	*59.5* J	4.27 UJ	10.7 UJ
5	Dark yellowish-brown silty gravel	12500	*939*	0.11 U	1.6 U	10.4	2.1	534	1.8 U	0.48 UJ	14.4 U	24.1	*69.8* J	19.7 UJ	21.4
7.5	Dark yellowish-brown silty gravel	2740	186	0.08 U	1.3 U	*20.6*	1.8	148	2 U	0.4 UJ	12.1 U	10.6	*53.8* J	14.9 UJ	15.6
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

S104B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0.5	Silty sandy gravel (fill)	7900	12.1	3.1	190 J	0.84	12.4 J	*6.7* J	51600	*111*	2.3	*18.1* J	*4750*	14800	20.2 J	5.1
5	Silty sandy gravel to gravelly silt (fill)	10400	6.2	4.9	126 J	0.57	9.7 J	0.49 J	*70900*	14.6	5.2	6.2 J	450	11500	8.6 J	11.4
10	Gravelly silt (fill)	3670	8.4	1.9	52.1 J	0.31	3.3 J	0.31 U	6000	10.2	4.3	8.3 J	130	13100	1.8 J	3.7 U
15	Silty sandy gravel	3940	7.0	2.3	49.9 J	0.31	2.6 J	0.31 U	5810	9.2	4.3	12.3 J	143	9390	2.6 J	4.0 U
20	Silty sandy gravel	3590	12.5	4.0	65.8 J	0.28	4.8 J	0.3 U	*7530*	9.1	5.7	112 J	100	13400	4.7 J	4.1 U
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Phosphorus, Total	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
0.5	Silty sandy gravel (fill)	2670	145	0.21	*5.3* U	*19.7*	*468*	*6130*	1640	0.69	0.41 U	13600	0.11 R	*143* J	*137* J
5	Silty sandy gravel to gravelly silt (fill)	17500	305	0.04 U	1.6 U	12.2	*10.8*	624	1990	0.6 U	0.48 U	690	0.21 J	18.7 J	40.1 J
10	Gravelly silt (fill)	1890	158	0.05 U	1.3 U	10.3	5.06	184	845	0.52 U	0.46	140	0.1 R	7.4 J	22.5 J
15	Silty sandy gravel	2660	148	0.03 U	1.3 U	13.4	4.4	45.2	706	0.51 U	0.41 U	70	0.09 R	6.5 J	28.4 J
20	Silty sandy gravel	2460	189	0.04 U	1.3 U	12.1	4.71	122	655	0.49 U	0.79	160	0.09 R	9.1 J	28.6 J
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**-**	**20.4**	**52.6**	**52.4**

Notes:
Results are in mg/kg, except for gross alpha and gross beta, which are in pCi/g.
Depths are in feet.
Above-representative values are in italics.
U - Not detected.
J - Estimated value.

Table 4.2.2-11
Concentrations of Parameters in Soil in the Phosphoric Loading Dock Area

S066B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.2	Dark brown silty gravel (road fill)	9150	8.2 U	4 U	149	0.74	13.6 J	*7.7*	30500	*118*	7.3	*26.4*	*6000*	11500	11.2
2.5	Dark brown silty gravel (road fill)	12100	9.2 U	5.3 U	129	0.58	12.4 J	0.59 U	48800	15.7	7.2	8.1	*730*	12100	7.4
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0.2	Dark brown silty gravel (road fill)	5.1	3410	*224*	0.25	*6.1* U	*48.3*	*422*	*13500*	1.9 U	0.43 UJ	12.8 U	*126*	*229* J	*43.9*	31.1
2.5	Dark brown silty gravel (road fill)	9.5	13600	*550*	0.08	1.5 U	*81.9*	*1080*	*12400*	1.1 U	0.48 UJ	14.3 U	34.2	*54.6* J	14.7 UJ	17.8
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

S067B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.5	Brown silty gravel	8280	8 U	4.1 U	166	0.62	*18.5* J	*5.7*	48500	*93.1*	7.6	*146*	*2700*	9760	7.4
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**66574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	TTL Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0.5	Brown silty gravel	4.7	2280	270	0.11 U	3.9	*54.1*	104	*7940*	2.1 U	0.41 UJ	12.4 U	134	207 J	43	29.1
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

S105B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0.5	Silty sandy gravel (fill)	10100	4.9 U	4.8	*295* J	0.52	14.5 J	1.2 J	42600	17	5.8	8.9 J	470	14200	9.3 J	10
2	Gravelly silt (fill)	13400	10.7	5.1	182 J	0.73	12.8 J	*7.5* J	32100	*29.7*	5.9	12.6 J	*760*	*16300*	11 J	12.7
5	Tan silt (fill)	*17700*	8.6	6.1	*6910* J	1.1	*18.2* J	*6.4* J	29000	*49.8*	5.9	*16.9* J	*1720*	*15400*	*54.8* J	15.9
7.5	Silty sandy gravel	6100	8.3	6.4	86.5 J	0.37	3.3 J	0.31 U	16900	12.4	5	7 J	210	14300	3.6 J	9.8
10	Sandy gravel	2880	7.8	3	45 J	0.25	3.4 J	0.3 U	62600	8	2.7	5.6 J	190	9760	4.2 J	4 U
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**66574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0.5	Silty sandy gravel (fill)	11300	292	0.04 U	1.4 U	13.6	7.78	730	1970	0.55 U	0.44 U	460	0.19 J	21.5 J	*55.1* J	*25*	21.8
2	Gravelly silt (fill)	9550	316	0.04 U	1.4 U	*17.4*	*38.7*	*2100*	3060	0.54 U	0.63	390	0.24 J	39.4 J	*123* J	15.4	25.2
5	Tan silt (fill)	7752	*875*	0.09 U	2 U	*23.1*	*73.3*	*4180*	*4760*	0.58 U	0.79	40	0.12 R	*86.1* J	*205* J	21.6	21.8
7.5	Silty sandy gravel	4040	178	0.03 U	1.3 U	13.5	0.5 U	190	999	0.52 U	0.41 U	50	0.1 R	8.7 J	30.7 J	18.6	23.5
10	Sandy gravel	2170	276	0.03 U	1.3 U	7.4	4.17	231	585	0.51 U	0.4 U	80	0.1 R	3.1 J	21.8 J	12.8	17.2
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**-**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

Notes:

Results are in mg/kg, except for gross alpha and gross beta, which are in pCi/g.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.

Table 4.2.2-12
Results from Soil Samples near the Ammonia Phosphate Plants

I. Ammonium Phosphate Plant Number 1

S030B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0.5	Road base/ sandy gravel	13100	8.2 UJ	3 U	*332*	0.66	*36.5*	*17.4*	*84500* J	*180*	3.2	13.1	*6400*	8910 J	7.8 J	7.2
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
0.5	Road base/ sandy gravel	4040	347 J	0.05 U	1.4 U	*46.7*	*2110*	*20900*	1.8 J	1.3	12.7 U	*206*	*331*
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2**	**20.4**	**52.6**	**52.4**

S031B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0.5	Gray brown sandy gravel	8780	18.3 UJ	8.4	130	0.7	*22.4*	*36.2*	50400 J	*203*	3.5	*25.8*	*7400*	9740 J	*39* J	7
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
0.5	Gray brown sandy gravel	6440	346 J	0.14 U	4.2	*73.1*	*2870*	*17500*	2.4 J	0.54	13 U	*248*	*602*
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2**	**20.4**	**52.6**	**52.4**

S032B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0.5	Road base/ gravel (gypsum)	*22800*	7.7 UJ	1.3 U	*215*	*1.4*	*68.7*	*28*	*256980* J	*241*	1.4	*15.3*	*19200*	1440 J	3.1 UJ	16
2	Red tan silt - moist	10500	9.6 UJ	3.6 U	126	0.12 UJ	16.2	1.2	41000 J	21.5	4.3	8.4	520	10500 J	5.8 J	6.7
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
0.5	Road base/ gravel (gypsum)	3550	143 J	0.05 U	1.7	12.5	*97.6*	*7620*	*7.2* J	*6*	12 U	*222*	*293*
2	Red tan silt - moist	15500	386 J	0.08 U	1.6 U	*114*	*4490*	*21800*	0.38 J	0.5 U	14.9 U	29.4	*54.2*
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2**	**20.4**	**52.6**	**52.4**

S033B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0.5	Tan sandy gravel and road base	12600	8 UJ	4.4 U	140	0.64	*32.5*	*15.5*	*109000* J	*147*	3	13	*6900*	7480 J	*54* J	8.9
2	Brown sandy gravel	8290 J	8.3 UJ	1.7 U	161 J	0.73	*28.8*	*41.9*	51000 J	*99.5* J	2.1	12.2 J	*3700*	9020 J	9.8	6.1
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
0.5	Tan sandy gravel and road base	5220	210 J	0.05 U	2	*33.9*	*1140*	*8560*	3.2 J	1.6	12.5 U	*129*	*589*
2	Brown sandy gravel	3470 J	260 J	0.26 U	4.7 U	*42.3*	*3130* J	*26700*	1.1 U	0.43 U	13 U	*143* J	*621* J
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2**	**20.4**	**52.6**	**52.4**

Table 4.2.2-12 (Cont'd)

S034B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0.5	Tan brown sandy silt with gravel	7860	15.8 UJ	2.4	192	1.2 U	11.4	*7.6*	21800	*63.8*	3.4	13.8	*1790*	11900	6.4 U	5 UJ
2	Brown silty sand with fine gravel	*15800*	17.5 UJ	7.2	144	*1.4* U	14.7	1.1 U	30900	21.6	6.9	10.3	490	*15300*	7.1 U	16.2 J
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
0.5	Tan brown sandy silt with gravel	1490	183 J	0.21	2.7 U	*18.7*	*842*	*10200*	1590	1.8 U	0.82 U	629	*24.7* U	*93.7*	*160*
2	Brown silty sand with fine gravel	6510	467 J	0.14	3 U	12.5	*230*	*1150*	2810	1.7	0.91 U	619	*27.3* U	33.6	51.4
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2**	**970.7**	**20.4**	**52.6**	**52.4**

S035B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0.5	Brown-tan silt with gravel	9090	16.7 J	3.2	*577*	*1.5* U	*20.4*	*35.2*	39000	*141*	3.8	*24.2*	*5170*	10600	*72.8*	5.4 UJ
2	Dark brown-tan silt/sand w/gravel	7780	16 UJ	1.9	*246*	1.1 U	11.4	*11.5*	21600	*51.5*	4.6	*19*	*1980*	10800	*28.3* U	5.3 UJ
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
0.5	Brown-tan silt with gravel	3320	278 J	*0.39*	*5.8*	*40*	*1470*	*23800*	1990	1.3 U	0.83 U	743	*24.8* U	*202*	*653*
2	Dark brown-tan silt/sand w/gravel	2120	187 J	0.21	3.8	*26.8*	*1290*	*17400*	1610	0.79 U	0.83 U	551	*24.9* U	*76*	*254*
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3526.3**	**6.5**	**2**	**970.7**	**20.4**	**52.6**	**52.4**

S036B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0.5	Brown silty sand with fine gravel	8770	16.1 UJ	3.1	134	1.1 U	10	*7.8*	12700	*35.2*	5.8	12.4	*1000*	12600	9.7 U	7.5 UJ
2	Tan silt with gravel	13000	17.8 UJ	5.5	160	1.4 U	14.1	1.2 U	50600	18.3	6	11.9	480	13100	7.5 U	14.9 J
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
0.5	Brown silty sand with fine gravel	2530	186 J	0.23	2.7 U	*21.3*	*1000*	*6720*	1470	0.4 U	0.84 U	543	*25.1* U	*61.2*	*190*
2	Tan silt with gravel	9170	390 J	0.14	3 U	14.3	*200*	*3420*	J 3000	0.76 U	0.93 U	562	*27.8* U	26.8	*55.7*
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3526.3**	**6.5**	**2**	**970.7**	**20.4**	**52.6**	**52.4**

S037B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0.5	Brown silty sand with fine gravel	*15700*	16.1 UJ	1.5	188	*1.6* U	*31.2*	*12.6*	*82100*	*119*	4.7	*15.7*	*4630*	10600	12.5 U	11.5 UJ
2	Tan silt with gravel	12200	16.7 UJ	3.9	148	*1.3* U	*18.8*	1.1 U	58000	18.2	5.7	9.1	*930*	12000	6.7 U	14.2 J
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
0.5	Brown silty sand with fine gravel	6500	278 J	0.11	2.7 U	*30.7*	*363*	*16050*	3510	1.3 U	0.84 U	*1270*	*25.1* U	*131*	*289*
2	Tan silt with gravel	13300	368 J	0.21	2.8 U	12.3	*15.2*	*916*	2770	0.32 U	0.87 U	611	*26.1* U	26.8	47
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2**	**970.7**	**20.4**	**52.6**	**52.4**

Table 4.2.2-12 (Cont'd)

S106B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0.5	Tan silt	*16300*	4.7 UJ	4.8	157	0.8	*21.2*	0.92 J	56900	18.7 J	6.2	11.2	530	14000	8.9	15.3 J
2	Tan silt	*17500*	4.6 UL	4.4	155	0.88	15.2	1.2 J	9530	21.6 J	7.2	14.8	*640*	*16700*	11.4	16.3 J
5	Tan silt	12500	4.6 UJ	6.3	158	0.64	9.5	*2.6* J	28700	21.7 J	5.8	12.4	*670*	12600	12.1	11.5 J
7	Tan silt	3710	4 UJ	4.6	47.8	0.22	3.4	0.31 J	11400	8.5 J	3.6	6.9	140	9960	2.2	3.3 J
10	Sandy gravel	4850	4.1 UJ	6.3	58.8	0.28	2	0.31 U	15900	10.1 J	4.9	10.5	110	13800	4.6	7.2 J
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
S106B000	Tan silt	10700	463	*0.42*	1.6 U	13.9	*276*	*1800*	*3760*	0.78	0.36 U	790	0.11 U	26.6	*55.5* J
S106B002	Tan silt	6940	361	*0.44*	1.5 U	*16.6*	*133*	*1950*	*4680*	0.64	0.36 U	*1200*	0.14	30.8	*73.8* J
S106B005	Tan silt	9420	315	0.28	1.5 U	*17*	*79.4*	*2110*	2980	0.6 U	0.35 U	960	0.16	33	*75.8* J
S106B007	Tan silt	2530	146	*0.34*	1.3 U	10	*128*	*727*	805	0.51 U	0.31 U	*6030*	0.1 U	8.5	31.6 J
S106B010	Sandy gravel	3550	393	0.3	1.4 U	12.6	*37*	*1150*	831	0.51 U	0.31 U		0.1 U	9.8	28.6 J
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2**	**970.7**	**20.4**	**52.6**	**52.4**

S107B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
S107B000	Brown silty sandy gravel	8790	4.2 UJ	4.8	114	0.52	10.8	*1.3* J	25400	16.3 J	3.7	11.9	280	13600	6.3	8.6 J
S107B002	Gravelly silt	*17900*	4.7 UJ	6.2	*220*	0.84	27.4	*4* J	43300	*31.5* J	7.1	14	*1010*	14800	11.3	15.8 J
S107B007	Sandy gravel	11900	4.1 UJ	8.2	87.4	0.33	2	0.31 U	9110	18.3 J	*10.8*	*18.3*	140	*24200*	3.8 J	14.6 J
S107B010	Sandy gravel	4680	4 UJ	4.5	63.2	0.32	2.4	0.3 U	8650	9.7 J	4.8	10.1	130	13300	3.2 J	4.1 J
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
S107B000	Brown silty sandy gravel	7890	265	*0.34*	2.1	*25.4*	*2700*	*22000*	1780	0.54 U	0.33 U	870	0.1 U	23.7	47.3 J
S107B002	Gravelly silt	9710	396	*0.37*	1.6 U	*16.9*	*416*	*4450*	*4240*	1	0.37 U	*1570*	0.21	41.9	*92* J
S107B007	Sandy gravel	6550	289	0.29	1.4 U	*25.6*	*15.6*	182	1450	1	0.31 U		0.1 U	14.4	50.6 J
S107B010	Sandy gravel	2270	241	0.27	1.3 U	12.4	5.4	188	971	0.89	0.3 U		0.1 U	10.1	27.7 J
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2**	**970.7**	**20.4**	**52.6**	**52.4**

Table 4.2.2-12 (Cont'd)

II. Ammonium Phosphate Plant Number 2

S038B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
S038B000	Brown-tan silt	4010	7.9 UJ	2.4 U	72.1	0.64 U	7.4 U	*3.4*	22900 J	*55.2*	4.3	5.8	*1400*	6660 J	3.2 UJ	3.1
S038B002	Tan silty sand	12100	10.2 UJ	6.2	*245*	0.82 U	*21.8*	1.4	*81100* J	17.3	2.2	11.9	*660*	11300	9.7 J	17.7
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
S038B000	Brown-tan silt	1970	145 J	0.05 U	1.3 U	*17.2*	*1130*	*6140*	0.47 J	0.41 U	12.2 U	37	*93.8*
S038B002	Tan silty sand	12800	284 J	0.07 U	1.7 U	11.1	*6080*	*49700*	0.79 J	0.53 U	15.8 U	29.9	50.1
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2**	**20.4**	**52.6**	**52.4**

S040B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
S040B000	Tan sandy gravel	5830	7.7 UJ	2.4 U	94.3	0.63 U	7.4 U	*2.2*	24500 J	*48.9*	3.8	7.3	*1200*	9450 J	5.3 J	4.8
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
S040B000	Tan sandy gravel	2820	188 J	0.05 U	1.3 U	10.9	*775*	*6770*	0.45 J	0.4 U	12.1 U	31.5	47.5
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2**	**20.4**	**52.6**	**52.4**

S041B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
S041B000	Tan sandy gravel	3310	7.8 UJ	3.5 U	76.5	0.57 U	5.4 U	0.68	14600 J	12.6	2.5	5.1	190	7520 J	5.6 J	3.3
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
S041B000	Tan sandy gravel	2320	119 J	0.06 U	1.3 U	7.2	*1570*	*6660*	0.55 J	0.41 U	12.2 U	13.6	22.7
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2**	**20.4**	**52.6**	**52.4**

S042B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
S042B000	Tan sandy gravel	3610	7.6 UJ	0.91 U	83.5	0.58 U	4.6 U	0.5 U	14100 J	*34.4*	4.1	5.1	310	7700 J	10.6 J	3.9
S042B002	Tan sandy gravel	9990	9 UJ	3 U	115	0.72 U	*19.3*	0.74	65400 J	16	2.7	7.2	480	10200 J	6 J	11.7
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
S042B000	Tan sandy gravel	2590	139 J	0.07 U	1.3 U	8.4	*124*	*2290*	0.78 J	0.4 U	11.9 U	11	20.6
S042B002	Tan sandy gravel	11200	257 J	0.08 U	1.5 U	11.2	*3510*	*18900*	0.86 J	0.47 U	14 U	45.6	37
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2**	**20.4**	**52.6**	**52.4**

Table 4.2.2-12 (Cont'd)

S043B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
S043B000	Brown tan sandy gravel	7630	8 UJ	0.54 U	117	0.65 U	14.7	4	45200 J	*55*	3.9	8.9	*3000*	9610 J	7 J	6.3
S043B002	Sandy gravel	9910	9.5 UJ	2.8 U	104	0.77 U	11.5	0.61 U	41800 J	14.5	3.2	8.2	*590*	10100 J	5.9 J	9.9
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
S043B000	Brown tan sandy gravel	2940	266 J	0.07 U	1.9 U	*16.4*	*278*	*9960*	1.5 J	*2.2*	12.5 U	47.3	*83*
S043B002	Sandy gravel	14800	277 J	0.07 U	1.6 U	11	*1720*	*14100*	0.95 J	0.49 U	14.7 U	20.8	34.2
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2**	**20.4**	**52.6**	**52.4**

S044B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
S044B000	Tan sandy gravel	5480	7.8 UJ	3	145	0.63 U	7.8 U	*2.8*	30700 J	*45.2*	4.1	10.5	*1300*	9670 J	3.5 J	4.7
S044B002	Tan sandy gravel	12700	10.9 UJ	0.72 U	*376*	0.88 U	*19.6*	*7.3*	*66300* J	*56.6*	4.5	9.8	*4200*	12000 J	7.2 J	10.6
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
S044B000	Tan sandy gravel	2190	153 J	0.07 U	1.3 U	11.1	*49.2*	*3490*	1 J	0.41 U	12.2 U	35	*56.1*
S044B002	Tan sandy gravel	4460	344 J	0.09 U	3.8 U	*76.9*	*5280*	*30400*	0.82 J	0.57 U	17 U	*95*	*211*
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2**	**20.4**	**52.6**	**52.4**

S045B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
S045B000	Tan sandy gravel	6480 J	7.9 UJ	2.9 U	94.5 J	0.56 U	12	*2.3* J	28600 J	*43.3*	5	7.5	*2500*	8650 J	3.2 J	6.5
S045B002	Tan sandy silt	7540	9.4 UJ	5.6	124	0.76 U	10.5 U	1	*73000* J	10.3	3.7	7.4	*610*	8790 J	7.6 J	11.1
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
S045B000	Tan sandy gravel	3140 J	156 J	0.09 U	1.3 U	10	*13.7*	*4160*	1.2	0.41 UJ	12.2 U	28.5 J	*58.1* J
S045B002	Tan sandy silt	16500	241 J	0.09 U	1.6 U	10.8	*830*	*12100* J	0.61 J	0.49 U	14.7 U	16.6	32.6
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2**	**20.4**	**52.6**	**52.4**

Table 4.2.2-12 (Cont'd)

S108B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
S108B000	Tan silt	10800	4.8 UJ	7.1	169	0.54	15.1	0.51 J	*109000*	12.9 J	4.6	10.4	470	10600	17.9	13.2 J
S108B002	Tan silt	11600	4.8 UJ	6.6	149	0.57	10.3	0.37 U	*74500*	13.9 J	4.9	8.7	520	11100	17.4	12.4 J
S108B005	Sandy gravel	4550	4.2 UJ	6.9	32.2	0.22	2.4	0.32 U	5090	9 J	3.9	7.8	110	12900	5	6 J
S108B007	Sandy gravel	4590	4 UJ	3.6	38.1	0.24	3.8	0.31 U	9840	8.4 J	2.7	7.5	150	8870	3.7 J	4 J
S108B010	Sandy gravel	4230	4 UJ	5.6	41.3	0.31	3.2	0.31 U	3150	*54.2* J	3.7	10.9	100	*20000*	2.7 J	3.5 J
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Tot Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
S108B000	Tan silt	16100	259	*0.42*	1.6 U	12	*74.6*	*7560*	2110	0.62 U	0.37	*1220*	0.2	15.4	42.2 J
S108B002	Tan silt	*20000*	336	*0.44*	1.6 U	11.3	*40.7*	*2150*	2030	0.61 U	0.37 U	*1240*	0.21	24.5	40.8 J
S108B005	Sandy gravel	2280	107	0.28	1.4 U	9.8	*25.9*	244	701	0.66	0.32 U	*7710*	0.1 U	8.2	25.9 J
S108B007	Sandy gravel	1670	52.6	0.22	1.3 U	6.6	*13*	169	929	0.87	0.31 U	*8200*	0.1 U	7	20 J
S108B010	Sandy gravel	1810	128	0.25	*6.8*	10.4	3.4	128	766	0.52 U	0.31 U	*3530*	0.1 U	12.7	28.7 J
Representative		**18700**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2**	**970.7**	**20.4**	**52.6**	**52.4**

Notes:
Depths are in feet.
J - Estimated value.
U - Not detected.
R - Rejected value.
NS - Not sampled.

Table 4.2.2-13
Concentrations of Parameters in Soil in the Road Samples

S082B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium	Cobalt	Copper	Fluoride	Iron		Lead	
0.5	Tan silt	9560	J	8.1	UJ	7.7		138	J	0.78		*19.8*		*1.6*	J	54400	J	18.8	4	11.7	*3200*	9420	J	8	J
2	Brown tan silt	9220	J	8.3	UJ	*10.6*		128	J	0.75	U	*19.1*		*2.6*	J	57500	J	15.4	4.1	*26.4*	*2600*	9440	J	10.3	J
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**		**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**		**26.1**	

Sample Depth	Sample Description	Lithium		Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver		Thallium		Vanadium		Zinc		Gross Alpha	Gross Beta
0.5	Tan silt	13.7		14300	J	292	J	0.1	U	1.4	U	11.5	*78.1*	*2350*	1.4	0.42	UJ	12.7	U	25.5	J	*56.5*	J	*34.3*	22.1
2	Brown tan silt	13.2		13700	J	289	J	0.09	U	1.9		10.9	*73.8*	*918*	0.84	0.43	UJ	12.9	U	23.5	J	*52.7*	J	23.4	21.2
		17.8		**18700.0**		**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**6.5**	**2.0**		**20.4**		**52.6**		**52.4**		**24.7**	**31.4**

S083B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium	Cobalt	Copper	Fluoride	Iron		Lead	
0.5	Tan brown silt	12500	J	8.2	UJ	4.1	U	152	J	0.86	U	*20.5*		0.66	J	52000	J	20.5	4.6	10.5	*780*	10700	J	6.3	J
2	Tan brown silt	11400	J	8.4	UJ	4.8	U	131	J	0.81	U	*19.8*		0.54	UJ	48200	J	16.3	4.9	9.5	530	11200	J	6.7	J
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**		**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**		**26.1**	

Sample Depth	Sample Description	Lithium		Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver		Thallium		Vanadium		Zinc		Gross Alpha	Gross Beta
0.5	Tan brown silt	11.2		14700	J	324	J	0.11	U	1.4	U	10.9	3.8	*990*	0.65	0.43	UJ	12.8	U	27.7	J	42.7	J	20.4	28.6
2	Tan brown silt	10.6		16000	J	348	J	0.06	U	1.4	U	11.6	6.7	1050	0.78	0.44	UJ	13.1	U	24.1	J	44.3	J	14.2	18.1
		17.8		**18700.0**		**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**6.5**	**2.0**		**20.4**		**52.6**		**52.4**		**24.7**	**31.4**

S084B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium	Cobalt	Copper	Fluoride	Iron		Lead	
0.5	Light tan fine silt	*15900*	J	8	UJ	3.1	U	148	J	0.99	U	*26.1*		*2.3*	J	46700	J	*29.6*	5.5	12.9	*2700*	12400	J	9.8	J
2	Light tan fine silt	10200	J	8	UJ	4.2	U	129	J	0.73	U	*20.1*		0.52	UJ	60100	J	12.6	4.3	7.8	490	9890	J	5.5	J
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**		**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**		**26.1**	

Sample Depth	Sample Description	Lithium		Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver		Thallium		Vanadium		Zinc		Gross Alpha	Gross Beta
0.5	Light tan fine silt	13		8460	J	374	J	0.07	U	1.3	U	13.2	1.4	*1470*	1	0.41	UJ	12.4	U	37.4	J	*68*	J	23.5	24.5
2	Light tan fine silt	12.9		16000	J	272	J	0.11	U	1.3	U	9	1.4	665	0.37	0.42	UJ	12.5	U	21.1	J	34	J	14.4	17.6
		17.8		**18700.0**		**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**6.5**	**2.0**		**20.4**		**52.6**		**52.4**		**24.7**	**31.4**

S085B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium	Cobalt	Copper	Fluoride	Iron		Lead	
0	Brown silty sand with gravel	13800	J	8.5	UJ	6.7		*241*	J	1		*26.1*		*10.7*		49600	J	*78.1*	4.5	*19.7*	*4700*	10900	J	21.4	
2	Tan brown silt to silty sandy gravel	8520	J	9.2	UJ	6.3		99.5	J	0.57		13.9	U	0.61		42900	J	15.5	4.3	9.8	410	10300	J	9.3	
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**		**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**		**26.1**	

Sample Depth	Sample Description	Lithium		Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver		Thallium		Vanadium		Zinc		Gross Alpha	Gross Beta
0	Brown silty sand with gravel	10.6		3770	J	217	J	0.27	U	1.9		*19.4*	*150*	*25600*	0.27	UJ	0.44	U	13.3	U	*91.8*	*206*		*42.4*	*37.5*
2	Tan brown silt to silty sandy gravel	10.2		12300	J	274	J	0.12	U	1.5	U	9.9	*20.4*	758	0.7	U	0.48	U	14.3	U	23.9	41.4		6.96	UJ	16.3
		17.8		**18700.0**		**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**6.5**		**2.0**		**20.4**		**52.6**	**52.4**		**24.7**	**31.4**

Table 4.2.2-13 (Cont'd)

S086B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper		Fluoride		Iron		Lead	
0	Tan brown silt with trace gravel	11100	J	8.2	U	4.4		198	J	0.29	U	9.7	UJ	0.53	UJ	22200	J	32.3	J	8.9	J	47.5		1200		12500	J	20.4	J
2	Tan silt	12500	J	8.8	U	4.6		142	J	0.46	U	11.3	UJ	0.57	UJ	54000	J	13.7	J	5.4	J	10.5		450		12000	J	9.1	J
Representative		14638.6		30.9		8.5		203.2		1.2		18.1		1.2		65574.4		27.0		8.7		15.2		559.2		14930.2		26.1	

Sample Depth	Sample Description	Lithium		Magnesium		Manganese		Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium		Zinc		Gross Alpha		Gross Beta
0	Tan brown silt with trace gravel	9.3		5760	J	359	J	0.59		1.4	U	3400		20.5	4850	0.8		0.42	U	12.7	U	44.9	J	175	J	20.4		26.8	
2	Tan silt	12.5		10900	J	324	J	0.07	U	1.5	U	20		1.6	717	0.87	U	0.46	U	13.7	U	21.9	J	45.6	J	11.7	UJ	19.3	
		17.8		18700.0		475.9		0.3		5.2		14.9		8.9	840.2	6.5		2.0		20.4		52.6		52.4		24.7		31.4	

S088B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper		Fluoride		Iron		Lead	
0.5	Red brown sandy silt with gravel	4920	J	8	UJ	1.8	U	99.7	J	0.3		10.8	U	1.2		12200	J	16.8		4.3		8.4		910		10200	J	7.1	
2	Brown silt	8780	J	9.5	UJ	5.8		107	J	0.56		16.6	U	0.61	U	45600	J	13.7		3.6		7.7		610		9500	J	6.9	
Representative		14638.6		30.9		8.5		203.2		1.2		18.1		1.2		65574.4		27.0		8.7		15.2		559.2		14930.2		26.1	

Sample Depth	Sample Description	Lithium		Magnesium		Manganese		Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium		Zinc		Gross Alpha		Gross Beta
0.5	Red brown sandy silt with gravel	6.4		3120	J	148	J	0.19	U	1.4	U	22.1		2050	23300	0.27	UJ	0.42	U	12.5	U	18.9		60.8		19.8		21.3	
2	Brown silt	9.6		13800	J	297	J	0.06	U	1.6	U	16.2		1310	20600	0.32	UJ	0.49	U	14.8	U	24.5		33.7		6.31	UJ	16.8	
		17.8		18700.0		475.9		0.3		5.2		14.9		8.9	840.2	6.5		2.0		20.4		52.6		52.4		24.7		31.4	

S089B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper		Fluoride		Iron		Lead	
0	Red brown sandy silt with gravel	8300	J	8.1	UJ	5.5		151	J	0.54		18.2		5.5	U	23300	J	44.5		3.8		20		2600		9960	J	23.5	
Representative		14638.6		30.9		8.5		203.2		1.2		18.1		1.2		65574.4		27.0		8.7		15.2		559.2		14930.2		26.1	

Sample Depth	Sample Description	Lithium		Magnesium		Manganese		Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium		Zinc		Gross Alpha		Gross Beta
0	Red brown sandy silt with gravel	7.1		3060	J	200	J	0.1	U	3.3		12		69	4220	0.77	U	0.42	U	12.6	U	51.5		164		14.9		23.4	
		17.8		18700.0		475.9		0.3		5.2		14.9		8.9	840.2	6.5		2.0		20.4		52.6		52.4		24.7		31.4	

S090B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper		Fluoride		Iron		Lead	
0.5	Red brown silt with trace gravel	14400	J	8.6	U	4.5		135	J	0.83	U	10.9	UJ	0.76	J	18500	J	18.6	J	6.3	J	13.6		760		14000	J	9.6	J
2	Brown silt	14700	J	9	U	4.7		122	J	1.2	U	14.7	UJ	0.59	UJ	27400	J	15.5	J	6.5	J	12.6		510		14800	J	9.2	J
Representative		14638.6		30.9		8.5		203.2		1.2		18.1		1.2		65574.4		27.0		8.7		15.2		559.2		14930.2		26.1	

Sample Depth	Sample Description	Lithium		Magnesium		Manganese		Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium		Zinc		Gross Alpha		Gross Beta
0.5	Red brown silt with trace gravel	13.8		8070	J	442	J	0.11	U	1.4	U	13.3		7.4	1070	0.49	U	0.45	U	13.4	U	22.9	J	58	J	25.6		27	
2	Brown silt	13.3		8020	J	461	J	0.11	U	1.5	U	12.6		1.3	823	1.7	U	0.47	U	14.1	U	25.1	J	61.2	J	11.9		24.3	
		17.8		18700.0		475.9		0.3		5.2		14.9		8.9	840.2	6.5		2.0		20.4		52.6		52.4		24.7		31.4	

Table 4.2.2-13 (Cont'd)

S093B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper		Fluoride	Iron		Lead	
0	Brown silt with trace gravel	10900	J	8.4	U	4.5		174	J	0.49	U	11.8	UJ	1.2	J	38600	J	21.9	J	4.9	J	*39.3*		*690*	11300	J	7.7	J
2	Tan silt	9040	J	8.3	U	4.7		126	J	0.64	U	7	UJ	0.75	J	38600	J	10.9	J	4.4	J	9.3		530	9980	J	5.9	J
Representative		14638.6		30.9		8.5		203.2		1.2		18.1		1.2		65574.4		27.0		8.7		15.2		559.2	14930.2		26.1	

Sample Depth	Sample Description	Lithium	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium		Zinc		Gross Alpha		Gross Beta
0	Brown silt with trace gravel	10.8	12300	J	329	J	0.1	U	1.4	U	*70.8*	2.1	*924*	0.59	U	0.43	U	13	U	23.5	J	*129*	J	12	UJ	17.8
2	Tan silt	9.5	9810	J	299	J	0.11	U	1.4	U	9.2	2.3	477	0.7	U	0.43	U	13	U	18.6	J	39.2	J	6.23	UJ	19.7
		17.8	18700.0		475.9		0.3		5.2		14.9	8.9	840.2	6.5		2.0		20.4		52.6		52.4		24.7		31.4

S094B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium	Boron	Cadmium	Calcium	Chromium		Cobalt	Copper		Fluoride	Iron	Lead
0.5	Gray gypsum	*22300*	J	7.7	U	4.2	J	*257*		*1.7*	*64.1*	*14*	*214000*	*219*	J	3.7	*35*	J	*16700*	5630	3.8
2	Tan brown silt	13000	J	8.5	U	5.1	J	*218*		0.61	15	*1.8*	49600	18.9	J	5.5	9.4	J	*850*	12800	6.1
Representative		14638.6		30.9		8.5		203.2		1.2	18.1	1.2	65574.4	27.0		8.7	15.2		559.2	14930.2	26.1

Sample Depth	Sample Description	Lithium	Magnesium		Manganese	Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium	Zinc	Gross Alpha		Gross Beta	
0.5	Gray gypsum	14.5	5710	J	253	0.09	UJ	3.3		*28*	J	*11.7*	*10300*	3.9		*3.7*	J	12.1	U	*204*	*192*	*139*	J	*54.2*	J
2	Tan brown silt	11.7	14300	J	367	*0.53*	J	1.4	U	13.3	J	2.1	*1260*	0.29	U	0.44	UJ	13.2	U	30.2	*63.3*	*25.3*	J	22.3	J
		17.8	18700.0		475.9	0.3		5.2		14.9		8.9	840.2	6.5		2.0		20.4		52.6	52.4	24.7		31.4	

S095B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper		Fluoride	Iron		Lead	
0.5	gravel	8010	J	8.4	U	4.4		*823*	J	0.94	U	*33.4*	J	*87.3*	J	*159000*	J	*165*	J	0.44	UJ	*32.2*		*16000*	4220	J	*49.3*	J
2	Tan silt	8680	J	9	UJ	4.5		100	J	0.55		16.5	U	0.58	U	27500	J	9.8		4.6		10.9		460	10900	J	9.8	
Representative		14638.6		30.9		8.5		203.2		1.2		18.1		1.2		65574.4		27.0		8.7		15.2		559.2	14930.2		26.1	

Sample Depth	Sample Description	Lithium	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium		Zinc		Gross Alpha	Gross Beta
0.5	gravel	3.5	2480	J	131	J	0.05	U	3.4		*20.8*	*222*	*26200*	5.3		*16.1*		13.2	U	*219*	J	*2440*	J	*115*	*64.7*
2	Tan silt	12.1	9750	J	289	J	0.12	U	1.5	U	9.2	*32.6*	746	0.31	UJ	0.47	U	14	U	17.2		38.1		12.5	20.9
		17.8	18700.0		475.9		0.3		5.2		14.9	8.9	840.2	6.5		2.0		20.4		52.6		52.4		24.7	31.4

S096B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium	Boron	Cadmium		Calcium		Chromium	Cobalt	Copper		Fluoride	Iron		Lead	
0.5	Tan brown silt	13600	J	8.5	UJ	4.7	U	151	J	1	*21.1*	*2.3*	J	32100	J	*44.1*	5.5	*19.4*		*1300*	13200	J	8.8	J
2	Tan silt	10900	J	8.6	UJ	4.8	U	130	J	0.87	16.8	0.75	J	37800	J	11.9	5	13.4		*630*	11700	J	7.7	J
Representative		14638.6		30.9		8.5		203.2		1.2	18.1	1.2		65574.4		27.0	8.7	15.2		559.2	14930.2		26.1	

Sample Depth	Sample Description	Lithium	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver		Thallium		Vanadium		Zinc		Gross Alpha	Gross Beta
0.5	Tan brown silt	12.5	8660	J	386	J	0.09	U	1.4	U	*17.7*	4.4	*1650*	0.92	0.44	UJ	13.3	U	33.9	J	*72.8*	J	18.4	24.1
2	Tan silt	11.3	10200	J	346	J	0.08	U	1.5	U	11.2	1	832	0.49	0.45	UJ	13.4	U	19.5	J	44	J	21.1	26.2
		17.8	18700.0		475.9		0.3		5.2		14.9	8.9	840.2	6.5	2.0		20.4		52.6		52.4		24.7	31.4

Notes:
Results are in mg/kg, except for gross alpha and gross beta, which are in pCi/g.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
R - Rejected value.
U - Not detected.

Table 4.2.2-16
PCB Concentrations in the Bone Yard (mg/kg)

Phase II Results

S079B

Sample Depth	Aroclor 1016		Aroclor 1221		Aroclor 1232		Aroclor 1242		Aroclor 1248		Aroclor 1254		Aroclor 1260	
0	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.2	R
2	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ

S080B

Sample Depth	Aroclor 1016		Aroclor 1221		Aroclor 1232		Aroclor 1242		Aroclor 1248		Aroclor 1254		Aroclor 1260	
0	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ	1	R	1	UJ
2	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ

Notes:

J - Estimated value.

R - Rejected value.

U - Not detected.

Depths are in feet.

Table 4.2.2-17
Concentrations of Parameters in Soil in the Ammonium Sulfate Plant

S046B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron	Cadmium		Calcium		Chromium	Cobalt	Copper	Fluoride	Iron		Lead	
0.5	Dark brown sandy gravel	*15400*	J	8.2	UJ	3.1	U	*278*	J	*1.5*		*116*	*18.1*	J	*119000*	J	*165*	5.6	*25.2*	*8800*	7230	J	*114*	J
2	Tan sandy gravel	7200	J	8.2	UJ	4.4	U	80.4	J	0.6	U	16.2	*1.4*	J	23400	J	23.5	5.5	13.1	400	11100	J	4.7	J
Representative		14638.6		30.9		8.5		203.2		1.2		18.1	1.2		65574.4		27.0	8.7	15.2	559.2	14930.2		26.1	

Sample Depth	Sample Description	Lithium		Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus		Selenium	Silver		Thallium		Vanadium		Zinc		Gross Alpha	Gross Beta
0.5	Dark brown sandy gravel	11.3		4690	J	252	J	0.09	U	*5.6*		*31.7*	*152*	J	*25000*	1.9	2	UJ	12.8	U	*132*	J	*429*	J	*94.5*	*55.3*
2	Tan sandy gravel	5.9	U	3650	J	194	J	0.08	U	1.4	U	11.9	*39.4*		*2550*	1.2	0.43	UJ	12.8	U	21.6	J	46.9	J	11	17.6
Representative		17.8		18700.0		475.9		0.3		5.2		14.9	8.9		840.2	6.5	2.0		20.4		52.6		52.4		24.7	31.4

S047B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron	Cadmium		Calcium		Chromium	Cobalt	Copper	Fluoride	Iron		Lead	
0.5	Dark brown silty gravel	11900	J	8.2	UJ	6.8		*1340*	J	*1.6*		*71.4*	*43.2*		*163000*	J	*267*	*25.9*	*93.9*	*12800*	8480	J	*100*	
2	Sandy gravel	4900	J	8.1	UJ	5.9		89.7	J	0.51	U	16.5	0.93	J	19100	J	*31.6*	4.9	11.8	440	13300	J	9.6	J
Representative		14638.6		30.9		8.5		203.2		1.2		18.1	1.2		65574.4		27.0	8.7	15.2	559.2	14930.2		26.1	

Sample Depth	Sample Description	Lithium		Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus		Selenium	Silver		Thallium		Vanadium		Zinc		Gross Alpha	Gross Beta
0.5	Dark brown silty gravel	8.6		4780	J	199	J	0.08	U	*10.6*		*51.1*	*127*		*6180*	4.8	*2.5*		12.8	U	*273*		*1010*		*80.7*	*40.9*
2	Sandy gravel	6.1		2590	J	143	J	0.12	U	3.8		10.8	*15.6*		*2430*	6.2	0.42	UJ	12.6	U	12.9	J	*56.2*	J	12.6	16.6
Representative		17.8		18700.0		475.9		0.3		5.2		14.9	8.9		840.2	6.5	2.0		20.4		52.6		52.4		24.7	31.4

S048B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium	
0.5	Dark brown clayey silt with gravel	7760		15.9	UJ	*11.6*		*1080*		*2.1*	U	*75*	*58.3*	*195000*	*285*	2.6	*74.2*	*14400*	8590	*213*	6.7	UJ
2	Dark brown clayey silt with gravel	*22600*		16.7	UJ	3.4		*310*		*1.9*	U	*31.5*	*12*	47600	*91.6*	7.5	*45.4*	*2090*	*18400*	*43.8*	15.2	J
Representative		14638.6		30.9		8.5		203.2		1.2		18.1	1.2	65574.4	27.0	8.7	15.2	559.2	14930.2	26.1	17.8	

Sample Depth	Sample Description	Magnesium	Manganese		Mercury		Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver		Sodium	Thallium		Vanadium	Zinc	Gross Alpha	Gross Beta
0.5	Dark brown clayey silt with gravel	4330	130	J	0.15		*27.4*	*49.2*	*419*	*62230*	2370	*11.1*	*3.2*		*2990*	*24.8*	U	*351*	*1200*	*133*	*55.1*
2	Dark brown clayey silt with gravel	6000	*503*	J	0.13	U	*14.7*	*25.6*	*657*	*15100*	*5490*	0.85	U	0.86	U	*1390*	*25.9*	U	*116*	*403*	16	28.4
Representative		18700.0	475.9		0.3		5.2	14.9	8.9	840.2	3562.3	6.5		2.0		970.7	20.4		52.6	52.4	24.7	31.4

S049B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead		Lithium		Magnesium
0.5	Dark brown clayey silt with gravel	*16400*		17.3	UJ	3.5		186		*1.5*	U	*18.7*	*4.3*	30100	*37.7*	6.9	15.1	*2990*	*16200*	10.6	U	13	UJ	4790
2	Dark brown clayey silt with gravel	*15700*		16.5	UJ	5.5		*221*		*1.6*	U	*25*	*5.5*	34200	*44.5*	6.8	*25.1*	*2140*	*22100*	14.1	U	13.5	J	4870
Representative		14638.6		30.9		8.5		203.2		1.2		18.1	1.2	65574.4	27.0	8.7	15.2	559.2	14930.2	26.1		17.8		18700.0

Sample Depth	Sample Description	Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium	Thallium		Vanadium	Zinc	Gross Alpha	Gross Beta
0.5	Dark brown clayey silt with gravel	416	J	0.22		2.9	U	*16.8*	*77*	*7110*	*3600*	1.1	U	0.9	U	817	*26.9*	U	50.9	*135*	22.5	31.2
2	Dark brown clayey silt with gravel	*856*	J	0.22		4.7		*19.5*	*53.9*	*8380*	4000	0.74	U	0.86	U	*974*	*25.7*	U	*66.3*	*171*	*47.2*	*40.1*
Representative		475.9		0.3		5.2		14.9	8.9	840.2	3562.3	6.5		2.0		970.7	20.4		52.6	52.4	24.7	31.4

Table 4.2.2-17 (Cont'd)

S109B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium	Boron	Cadmium		Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium	Magnesium
0	Silty gravel	8060	4.1	UJ	2.4		82.8	0.5	7.9	5.2		38200	*35.8*	4.4	12.2	*4370*	9070	11.4	7.9	4560
2	Tan silt	9170	4.6	UJ	3.7		110	0.61	9.5	0.84		*79200*	12.9	4.7	7	550	10000	7.2	12	15400
5	Gravelly sand	5340	4.1	UJ	3.3		51.3	0.44	2.8	0.31	U	19100	11.2	4.6	13	180	*15200*	4.5	6.7	3750
10	Sandy gravel	13800	4.3	UJ	3		56.9	1.1	5.7	0.33	U	11400	9.6	4.8	8.6	210	14400	*41.7*	7.3	2700
Representative		14638.6	30.9		8.5		203.2	1.2	18.1	1.2		65574.4	27.0	8.7	15.2	559.2	14930.2	26.1	17.8	18700.0

Sample Depth	Sample Description	Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sulfate	Thallium		Vanadium	Zinc	Gross Alpha	Gross Beta
0	Silty gravel	252	J	0.07	U	1.4	U	*18.3*	0.57	*10300*	1460	1.8	U	0.31	U	10500	0.1	U	38.2	*89.2*	*44.8*	30.7
2	Tan silt	269	J	0.06	U	1.5	U	10.8	0.52	714	2220	0.6	U	0.35	U	1570	0.11	U	14.9	36.8	6.46	17.7
5	Gravelly sand	205	J	0.05	U	1.4	U	12.4	1.27	197	1180	0.52	U	0.31	U	1410	0.1	U	10.8	31.2	5	U 11.6
10	Sandy gravel	139	J	0.06	U	1.4	U	7.9	*10.1*	*261*	1690	0.72	U	0.33	U	6230	0.11	U	11.5	29.7	5.36	18.7
Representative		475.9		0.3		5.2		14.9	8.9	840.2	3562.3	6.5		2.0			20.4		52.6	52.4	24.7	31.4

Notes:

Results are in mg/kg, except for gross alpha and gross beta, which are in pCi/g.

Depths are in feet.

Above-representative values are in italics.

J - Estimated value.

U - Not detected.

Table 4.2.2-18
Concentrations of Parameters in Soil in the Sulfuric Acid Loading Dock Area

S058B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.5	Grayish-brown silty gravel	8850 J	8.4 UJ	1.5 U	124 J	0.48	9	*8.9*	23500 J	*78.6* J	2.4	*340* J	*1300*	11800 J	*29.7*
2.5	Pale brown silt	10500 J	9 UJ	3.4 U	104 J	0.56 U	7	0.68	58000 J	14.2 J	5.2	8.1 J	490	12100 J	7.8
5	Pale brown silt	12000 J	9.2 UJ	5.6 U	127 J	0.7 U	9.3	0.95	46300 J	13.6 J	5.6	10.8 J	*590*	12900 J	7.2
7.5	Pale brown silt	7030 J	9.2 UJ	3.3 U	98.1 J	0.62 U	5.8	0.91	37100 J	8.9 J	4.2	8.1 J	450	9400 J	5.8
Representative	**Groundwater not encountered**	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0.5	Grayish-brown silty gravel	5.6	2210 J	104 J	*1.8*	4 U	*18.1*	*13.7*	*4620*	1.5 U	0.43 U	13 U	*54.6* J	*398* J	24.7	25.9
2.5	Pale brown silt	12.4	16200 J	373 J	0.18 U	1.5 U	14	3.8	636	1.3 U	0.47 U	14 U	20.5 J	46 J	6.45 UJ	24.5
5	Pale brown silt	15.1	14100 J	316 J	0.17 U	1.5 U	11.4	6.3	611	1.2 U	0.48 U	14.3 U	21.9 J	49.4 J	11.7 UJ	23.4
7.5	Pale brown silt	8.8	12200 J	307 J	0.15 U	1.5 U	10.1	4.5	658	1.2 U	0.48 U	14.3 U	15.5 J	38.3 J	15.3	23.9
Representative	**Groundwater not encountered**	**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

S059B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.5	Dark yellowish-brown sandy gravel	10100	8.6 UJ	3.1	127 J	0.49	13	*7.5*	*74100*	*72.7*	4.1	*21.6*	*2400*	10600	*35.2*
2.5	Dark yellowish-brown silt	12100	9 UJ	3.1	148 J	0.5	9.2 U	0.58 U	*70100*	15.7	5.1	8.3	*580*	11500	8.1
5	Dark yellowish-brown silt	14100	9.2 UJ	4	141 J	0.62	10.9 U	0.6 U	46000	18.6	5.9	10.4	530	13200	6.5
7.5	Dark yellowish-brown silt	*22100*	9.2 UJ	4.6	179 J	1	*18.7*	0.6 U	35900	25.2	7.7	15.1	*650*	*18000*	9.2
10	Dark yellowish-brown silt	10700	9.1 UJ	3.3	112 J	0.59	8 U	0.59 U	34300	14.1	4.5	8.4	450	10500	6.5
Representative	**Groundwater not encountered**	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0.5	Dark yellowish-brown sandy gravel	8.5	7310	200	0.16 U	1.5 U	*18.7*	1	*4160*	1.8 U	0.56	13.4 U	*59*	*164*	*44.1*	25.9
2.5	Dark yellowish-brown silt	13.6	15500	328	0.14 U	1.5 U	12.7	5.6	*914*	1.2 U	0.47 U	14 U	22.3	39.8	7.51 UJ	19.6
5	Dark yellowish-brown silt	14.3	14700	395	0.13 U	1.6 U	14.3	6.9	634	1.2 U	1.7	14.3 U	25.6	47.5	15.5	20.7
7.5	Dark yellowish-brown silt	*21.4*	14900	451	0.14 U	1.6 U	*18.5*	*12.1*	604	1.3 U	0.48 U	14.4 U	33.7	*68.3*	10.9	21.2
10	Dark yellowish-brown silt	10.8	12700	330	0.13 U	1.5 U	10.8	*9.5*	603	0.84 U	0.47 U	14.2 U	20	38.4	14.3	17
Representative	**Groundwater not encountered**	**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

S060B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.5	Light brownish-gray silty gravel (backfill)	840 J	7.8 UJ	0.63 U	164 J	0.1 U	4.1	*1.6*	54900 J	*27.3* J	0.41 U	*56.4* J	400	1660 J	*44.7*
2.5	Light yellowish-brown silt	11700 J	9.5 UJ	3.2 U	177 J	0.67	8.8	0.79	57500 J	11.8 J	5.4	9.8 J	*570*	12100 J	5.8
5	Light yellowish-brown silt	*18700* J	8.8 UJ	*9.2* U	*400* J	0.9	14.1	*1.6*	42700 J	21 J	8.3	14.3 J	550	*17700* J	13.3
Representative	**Groundwater not encountered**	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0.5	Light brownish-gray silty gravel (backfill)	0.2 U	135 J	21.8 J	*0.62* U	*7.5* U	3.3	*239*	*1370*	1.2 U	0.64	12.2 U	24.2 J	*59.8* J	*51*	*39*
2.5	Light yellowish-brown silt	14.7	15600 J	*510* J	0.22 U	2.7 U	14.9	*24.3*	766	1 U	0.49 U	14.8 U	20.2 J	46.6 J	11	21
5	Light yellowish-brown silt	*19.9*	13400 J	470 J	0.16 U	1.5 U	*20.3*	*12.8*	593	1 U	0.46 U	13.7 U	35.2 J	*64.1* J	14.4	19.7
Representative	**Groundwater not encountered**	**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

Table 4.2.2-18 (Cont'd)

S061B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.5	Dark grayish-brown silty gravel (fill)	756	8.2 UJ	2.8	136 J	0.11 UJ	4.9 U	*1.3*	12100	*31.6*	0.48	*20.5*	530	1570	*50.2*
2.5	Light yellowish-brown silt	11000	9.6 UJ	4.9	159 J	0.5	8 U	0.62 U	65400	14	5.3	9.3	*570*	11500	6.8
5	Light yellowish-brown silt	*17100*	9.4 UJ	4.9	144 J	0.8	13.2	0.61 U	50700	19.9	7	13.1	*590*	*15600*	10.1
7.5	Yellowish-brown sandy gravel	5930	8.1 UJ	5.7	96.6 J	0.37	4.8 U	0.93	16700	22.6	6.4	14	230	12000	7.5
Representative	**Groundwater not encountered**	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0.5	Dark grayish-brown silty gravel (fill)	0.21 U	321	13.2	*18.5*	2.7	5.3	*14.2*	*1230*	1.3 U	0.43 U	12.8 U	12.9	*55.2*	*100*	*51.1*
2.5	Light yellowish-brown silt	12.7	14300	*489*	*0.44* U	1.6 U	*28.5*	3	*960*	1.7 U	0.5 U	14.9 U	22.2	42.5	13.3 UJ	20.2
5	Light yellowish-brown silt	17.5	15100	*756*	0.22 U	1.6 U	*24.3*	3.8	621	1.8 U	0.49 U	14.7 U	32.9	*58*	22.7	13.2
7.5	Yellowish-brown sandy gravel	6.4	3360	249	0.22 U	1.5	12	5.3	538	0.87 U	0.42 U	12.7 U	20.4	*60.2*	NS	NS
Representative	**Groundwater not encountered**	**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

Notes:
- Results are in mg/kg, except for gross alpha and gross beta, which are in pCi/g.
- Depths are in feet.
- Above-representative values are in italics.
- NS - Not sampled.
- U - Not detected.
- J - Estimated value.

Table 4.2.2-19
Concentrations of Parameters in Soil in the Water Reclaim Area

S072B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0	Dark brown silty gravel	7760	7.7 U	5.1 U	136	0.77	17.1 J	*16.1*	*88600*	*101*	3.6	*38.7*	*11200*	10100	9.2
3	Tan sandy gravel	12900	8.8 U	7.9	147	0.62	12.2 J	0.57 U	41900	15.3	5.3	10.1	*700*	12400	3.5 U
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0	Dark brown silty gravel	6.2	4610	166	0.16 U	3.1	*27.8*	*28.6*	*14200*	5 U	1.1	12.1 U	*175*	*254* J	*38*	26.3
3	Tan sandy gravel	13.5	16800	354	0.1 U	1.5 U	12	2.2	557	2.1 U	0.46 UJ	13.7 U	27.9	44.5 J	7.69 UJ	23.4
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

S073B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0	Dark brown sand with gravel	8860 J	8.4 U	5.1	*581* J	0.9	*26.2* J	*37.3* J	*120000* J	*128* J	1.6 J	*29.2*	*21000*	7350 J	5.5 J
3.5	Tan sandy silt	9350 J	9.2 U	5.8	146 J	0.21 U	*19.4* J	*33.8* J	*111000* J	13.8 J	2 J	9.1	440	7540 J	4.1 J
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**66574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0	Dark brown sand with gravel	5.3	3930 J	135 J	0.24 U	3.5	*36.4*	*567*	*54800*	3.6	*2.5*	13 U	*207* J	*388* J	57.9	40.7
3.5	Tan sandy silt	5.1	4520 J	396 J	0.06 U	1.6 U	*47.3*	*281*	*75300*	3.1	0.68	14.4 U	16.6 J	*540* J	7.02 UJ	14.9
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

S102B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0	Silty sandy gravel	6910	6.5 J	2.5	733 J	1.1	*131* J	*37.7*	*181000*	*193*	0.43 U	*40.4*	*45400*	5810	14.8	3.3
2	Gravelly tan silt	*14800*	4.4 U	6.4	*2690* J	0.98	*21.3* J	*16.4*	38100	*120*	6.3	*19*	*4730*	14400	16.2	10.5
7	Tan silt	10900	4.7 U	4.1	99.9 J	0.6	9.5 J	0.59	41100	16.4	5.2	7.1	400	11500	8.1	11.8
10	Sandy gravel	4030	3.9 U	2.6	52.2 J	0.42	3 U	0.3 U	8290	7.7	8	13.2	130	*15000*	3.8	5
15	Sandy gravel	3490	3.9 U	1.9	51.8 J	0.27	2.7 U	0.37	11000	7.5	2.6	5.3	*830*	7680	3.9	3.7
20	Sandy gravel	6140	4.2 U	5.7	104 J	0.49	3 U	0.32 U	12800	9	5.2	9.5	160	12300	13	7.5
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**66574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Tti Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0	Silty sandy gravel	790	42.6 J	*0.49*	7.1	*18.1*	*363*	*41700*	2430	5.6	1.6	12900	0.83	*314*	*218*	*218*	*86.7*
2	Gravelly tan silt	4610	440 J	0.09 U	2.4	*46.8*	*1600*	*37000*	*5080*	1.1	0.34 U	1590	*0.48* U	*225*	*246*	9.11	11.2
7	Tan silt	15500	342 J	0.06 U	1.6 U	10.4	145	*1090*	2560	0.6 U	0.36 U	600	0.23 U	22.4	42.7	11.1	17.7
10	Sandy gravel	2340	432 J	0.05 U	1.3 U	13.7	32.6	283	1040	0.53 U	0.3 U	110	0.18 U	9.2	29.2	6.54	13.2
15	Sandy gravel	2500	149 J	0.04 U	1.3 U	6.6	*31.2*	612	913	0.51 U	0.3 U	1070	0.09 U	8	19.3	13	23
20	Sandy gravel	4230	296 J	0.05 U	1.4 U	10.7	8.9	175	1290	0.77	0.32 U	220	0.11 U	9	27.4	7.94	14.8
Representative		**16700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**-**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

Notes:
Results are in mg/kg, except for gross alpha and gross beta, which are in pCi/g.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.2-20
Concentrations of Parameters in Soil in the Former Ore Pile

S074B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium	Boron		Cadmium		Calcium	Chromium		Cobalt		Copper		Fluoride	Iron	Lead
0.5	Tan silt with trace fine gravel	9260	J	8.3	U	5.5	J	*278*		1.1	*37.3*		*31.4*		*149000*	*158*	J	2.6		*36.2*	J	*15800*	7880	10.4
2	Tan brown silt	7260	J	8.7	U	5.8	J	85.7		0.44	9.9		0.58		59700	8.3	J	4.2		8.2	J	520	9420	5.3
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**	**18.1**		**1.2**		**65574.4**	**27.0**		**8.7**		**15.2**		**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium		Manganese	Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Selenium	Silver		Thallium		Vanadium	Zinc	Gross Alpha		Gross Beta	
0.5	Tan silt with trace fine gravel	10.7	5990	J	216	*1*	J	5		*46.1*	J	*603*	*28500*	3.7	*2.3*	J	12.9	U	*261*	*390*	*65*	J	*43.6*	J
2	Tan brown silt	10.7	10200	J	254	*0.97*	J	1.5	U	9.2	J	*50.9*	777	0.3	U 0.45	UJ	13.6	U	15.4	36.6	12.9	J	20.3	J
Representative		**17.8**	**18700.0**		**475.9**	**0.3**		**5.2**		**14.9**		**8.9**	**840.2**	**6.5**	**2.0**		**20.4**		**52.6**	**52.4**	**24.7**		**31.4**	

S075B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium	Boron		Cadmium		Calcium	Chromium		Cobalt		Copper		Fluoride	Iron	Lead
0.5	Tan silt with trace fine gravel	9060	J	8	U	4.4	J	*207*		0.6	*20.4*		*7.5*		64400	*74.6*	J	4		*23.2*	J	*14800*	14500	4.5
2	Tan brown silt	11600	J	8.4	U	4.7	J	108		0.54	12.3		0.93		*76800*	18.4	J	5.6		8.4	J	490	12700	3.9
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**	**18.1**		**1.2**		**65574.4**	**27.0**		**8.7**		**15.2**		**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium		Manganese	Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Selenium	Silver		Thallium		Vanadium	Zinc	Gross Alpha		Gross Beta	
0.5	Tan silt with trace fine gravel	6.1	2430	J	269	*0.41*	J	2.1		*20.1*	J	*31*	*14500*	2.6	0.47	J	12.4	U	*83.4*	*99.3*	*61.5*	J	*43.1*	J
2	Tan brown silt	13	13800	J	269	*1.6*	J	1.4	U	11.3	J	*9.4*	*844*	0.44	U 0.44	UJ	13.1	U	30.2	39.7	20	J	22.7	J
Representative		**17.8**	**18700.0**		**475.9**	**0.3**		**5.2**		**14.9**		**8.9**	**840.2**	**6.5**	**2.0**		**20.4**		**52.6**	**52.4**	**24.7**		**31.4**	

S076B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic	Barium		Beryllium	Boron		Cadmium		Calcium		Chromium		Cobalt		Copper	Fluoride	Iron		Lead	
0	Brown silt with trace gravel	8360	J	8.3	U	4.6	176	J	*1.9*	*48*	J	*53.7*	J	*209000*	J	*387*	J	0.43	UJ	*52.5*	*18000*	5570	J	7.5	J
2	Tan brown silt	11200	J	8.8	U	6.2	118	J	0.52	9.4	UJ	0.94	J	56500	J	13.3	J	4.8	J	7.5	540	10700	J	5.7	J
Representative		**14638.6**		**30.9**		**8.5**	**203.2**		**1.2**	**18.1**		**1.2**		**65574.4**		**27.0**		**8.7**		**15.2**	**559.2**	**14930.2**		**26.1**	

Sample Depth	Sample Description	Lithium	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium		Vanadium		Zinc		Gross Alpha		Gross Beta	
0	Brown silt with trace gravel	6.6	2840	J	223	J	*0.31*	U	*13*		*83.1*	*151*	*49100*	2	*3.8*	12.9	U	*758*	J	*743*	J	*123*		*79.7*	
2	Tan brown silt	13.4	14600	J	336	J	0.07	U	1.5	U	11.3	4	573	5	0.46	U 13.7	U	24.4	J	35.6	J	9.65	UJ	19.1	
Representative		**17.8**	**18700.0**		**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**		**52.6**		**52.4**		**24.7**		**31.4**	

S077B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium		Beryllium	Boron		Cadmium		Calcium	Chromium	Cobalt		Copper	Fluoride	Iron	Lead
0	Dark red brown silt with gravel	7030	8	U	*10.3*		*847*		*1.5*	*41.7*	J	*44.2*		*200000*	*275*	0.42	U	*41.8*	*14600*	6720	*26.2*
2	Tan silt	7630	9.5		5.1	U	103		0.44	7	UJ	0.56	U	56800	8.2	4.2		6.9	*910*	9090	3.8
Representative		**14638.6**	**30.9**		**8.5**		**203.2**		**1.2**	**18.1**		**1.2**		**65574.4**	**27.0**	**8.7**		**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver		Thallium		Vanadium	Zinc	Gross Alpha		Gross Beta	
0	Dark red brown silt with gravel	5.4	3170	112	*0.38*		*11.2*		*72.2*	*27.6*	*56000*	*7.5*	*3.5*		12.5	U	*483*	*770*	J	*100*		*61.5*	
2	Tan silt	11	13200	288	0.11	U	1.5	U	9	4.4	648	2	U 0.45	UJ	13.4	U	15	32.9	J	18.1	UJ	16.1	
Representative		**17.8**	**18700.0**	**475.9**	**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**6.5**	**2.0**		**20.4**		**52.6**	**52.4**		**24.7**		**31.4**	

Table 4.2.2-20 (Cont'd)

S078B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper		Fluoride		Iron		Lead	
0	Red brown fine silt	6160		7.9	U	*14*		123		*1.8*		*74.6*	J	*61*		12.2	U	*370*		0.41	U	*53.6*		*19900*		5520		3.2	U
2	Tan silt	11400	J	8.3	U	5		132	J	0.6		14.3	UJ	0.66	J	*68800*		12.9	J	5.1	J	8.6		520		11800	J	6.5	J
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**		**27.0**		**8.7**		**15.2**		**559.2**		**14930.2**		**26.1**	

Sample Depth	Sample Description	Lithium	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver		Thallium		Vanadium		Zinc		Gross Alpha		Gross Beta
0	Red brown fine silt	4.7	2040		60.8		*0.32*	U	*13.1*		*79*	*47*	*34800*	*10.4*	*4.9*		12.3	U	*650*		*877*	J	*143*		*65.1*
2	Tan silt	15.2	16100	J	327	J	0.07	U	1.4	U	11.6	*20.2*	572	1.7	0.43	U	12.9	U	24.2	J	41.4	J	12.9	UJ	14.4
Representative		**17.8**	**18700.0**		**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**6.5**	**2.0**		**20.4**		**52.6**		**52.4**		**24.7**		**31.4**

Notes:
Results are in mg/kg, except for gross alpha and gross beta, which are in pCi/g.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.2-21
Concentrations of Parameters in Soil in the Former Pillow Tank Area

S010B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron	Cadmium		Calcium		Chromium	Cobalt	Copper	Fluoride	Iron		Lead	
10.5	Pale brown silt (loess)	10500	J	7.9	UJ	5		131	J	0.65		*18.3*	0.51	U	49800	J	14.8	5.1	9.9	400	11400	J	10.3	
13	Pale brown silt (loess)	11500	J	8.3	UJ	6.9		150	J	0.66		*21.8*	0.54	U	49800	J	16.6	5	11.3	460	11800	J	11.8	
15.5	Pale brown silt (loess)	11100	J	8.2	UJ	6.2		124	J	0.63		*19.7*	0.53	U	44300	J	15.4	5	10	440	11400	J	9	
18	Pale brown silt (loess)	10200	J	8.2	UJ	4.4		121	J	0.6		17.7	0.53	U	36800	J	14.7	5.3	*24.9*	440	10700	J	9.4	
20.5	Pale brown silt (loess)	8870	J	7.9	UJ	4.9		124	J	0.58		14.8	0.52	U	44600	J	12.5	4.6	9.5	420	10300	J	10.2	
Representative	Groundwater not encountered	14638.6		30.9		8.5		203.2		1.2		18.1	1.2		65574.4		27.0	8.7	15.2	559.2	14930.2		26.1	

Sample Depth	Sample Description	Lithium	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium	Zinc	Gross Alpha		Gross Beta
10.5	Pale brown silt (loess)	10.5	16700	J	357	J	0.05	U	1.3	U	11.2	*12.9*	442	0.37	U	0.41	U	12.3	U	22.4	46.8	10.4	UJ	23.2
13	Pale brown silt (loess)	11.3	16900	J	368	J	0.06	U	1.4	U	11.7	2.6	559	0.27	UJ	0.43	U	12.9	U	24.8	47.7	6.35	UJ	20.3
15.5	Pale brown silt (loess)	10.8	14700	J	339	J	0.05	U	1.4	U	11.4	2.1	707	0.27	UJ	0.43	U	12.8	U	24.3	41.8	17.3		20.9
18	Pale brown silt (loess)	10.3	12300	J	300	J	0.07	U	1.4	U	13.2	5.4	694	0.38	U	0.42	U	12.7	U	22.4	46.7	18.6		23
20.5	Pale brown silt (loess)	9.5	15000	J	325	J	0.06	U	1.3	U	9.7	4.4	758	1.3	U	0.41	U	12.4	U	20.6	40.2	13.6		21
Representative	Groundwater not encountered	17.8	18700.0		475.9		0.3		5.2		14.9	8.9	840.2	6.5		2.0		20.4		52.6	52.4	24.7		31.4

S011B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron	Cadmium		Calcium		Chromium	Cobalt	Copper	Fluoride	Iron		Lead	
9	Pale brown silt (loess)	8920	J	7.8	UJ	3.8	U	173	J	0.71	U	14.8	0.5	UJ	40300	J	12.2	4.1	8.6	460	9920	J	6.5	J
11.5	Pale brown silt (loess)	10100	J	8	UJ	5.2	U	106	J	0.77	U	14.2	0.52	UJ	48500	J	13	4.6	9.7	390	10900	J	9.1	J
14	Pale brown silt (loess)	9420	J	7.9	UJ	4.4	U	152	J	0.72	U	12.2	0.51	UJ	49200	J	14.4	4.7	9.2	520	10700	J	8.8	J
16.5	Pale brown silt (loess)	10400	J	8.2	UJ	6.3		111	J	0.77	U	11.6	0.53	UJ	41000	J	14.2	5.1	9.2	450	11300	J	6.6	J
19	Pale brown silt (loess)	10900	J	7.9	UJ	5.1	U	109	J	0.77	U	14.5	0.52	UJ	38800	J	14.7	5	9.1	390	11400	J	7.3	J
Representative	Groundwater not encountered	14638.6		30.9		8.5		203.2		1.2		18.1	1.2		65574.4		27.0	8.7	15.2	559.2	14930.2		26.1	

Sample Depth	Sample Description	Lithium	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium		Zinc		Gross Alpha	Gross Beta
9	Pale brown silt (loess)	9.4	13900	J	331	J	0.1	U	1.3	U	10.8	*14.3*	775	0.28		0.4	UJ	12.1	U	19.8	J	38.1	J	20.4	19.7
11.5	Pale brown silt (loess)	10.2	16300	J	338	J	0.15	U	1.3	U	10.7	2.5	769	0.59		0.41	UJ	12.4	U	21.8	J	43	J	15.9	21.7
14	Pale brown silt (loess)	9.5	16000	J	335	J	0.14	U	1.3	U	12.8	2.4	760	0.26	U	0.41	UJ	12.4	U	20.4	J	42	J	14	20.6
16.5	Pale brown silt (loess)	10.7	13200	J	333	J	0.08	U	1.4	U	11.3	2.1	788	0.27	U	0.42	UJ	12.7	U	21.8	J	41.5	J	12.7	UJ	22.1
19	Pale brown silt (loess)	10.7	13300	J	322	J	0.09	U	1.3	U	10.1	2.3	742	0.38		0.41	UJ	12.4	U	23	J	41.5	J	18.7	24.1
Representative	Groundwater not encountered	17.8	18700.0		475.9		0.3		5.2		14.9	8.9	840.2	6.5		2.0		20.4		52.6		52.4		24.7	31.4

Notes:

Results are in mg/kg, except for gross alpha and gross beta, which are in pCi/g.

Depths are in feet.

Above-representative values are in italics.

J - Estimated value.

U - Not detected.

Table 4.2.2-22
Concentrations of Parameters in Soil in the Former Water Treatment Settling Pond and Dewatering Pit

Former Water Treatment Settling Pond

S007B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium	Boron	Cadmium		Calcium		Chromium	Cobalt	Copper	Fluoride	Iron		Lead	
0	Light yellowish-brown silty gravel and boulders	11400	J	7.5	UJ	4.4		157	J	0.6	10.2	*5.1*		27900	J	*37.5*	4.8	12.9	*1600*	12500	J	8.9	
15	Brown silty sand and boulders	8720	J	8	UJ	1.3	U	83.5	J	0.37	4.8	*2.7*		19800	J	*97*	5.7	11.5	*1500*	12000	J	6.3	
25	Gravel	4290	J	7.5	UJ	1	U	20.9	J	0.27	2.8	0.49	U	6650	J	12.5	6.7	8.8	150	14000	J	3.9	
Representative	**Groundwater not encountered**	**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**	**18.1**	**1.2**		**65574.4**		**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**		**26.1**	

Sample Depth	Sample Description	Lithium		Magnesium		Manganese		Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium	Zinc	Gross Alpha		Gross Beta	
0	Light yellowish-brown silty gravel and boulders	13.7		5880	J	278	J	0.07	U	1.3	U	*15.9*		*33.8*	*3230*	0.83	UJ	0.39	U	11.7	U	41.5	*85.3*	17.3		21	
15	Brown silty sand and boulders	6.4	U	4070	J	121	J	0.06	U	2.7	U	*17*		*85.9*	*1950*	0.93	UJ	0.42	U	12.5	U	37.3	*81.7*	18		19.5	
25	Gravel	2.7	U	5150	J	140	J	0.05	U	1.3	U	*17.6*		*10.9*	459	0.67	UJ	0.39	U	11.6	U	18.2	46.7	5.94	UJ	6.62	UJ
Representative	**Groundwater not encountered**	**17.8**		**18700.0**		**475.9**		**0.3**		**5.2**		**14.9**		**8.9**	**840.2**	**6.5**		**2.0**		**20.4**		**52.6**	**52.4**	**24.7**		**31.4**	

Dewatering Pit

S008B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium	Boron	Cadmium		Calcium		Chromium	Cobalt	Copper	Fluoride	Iron		Lead	
0	Pond sediment (fill)	*22700*	J	8.4	UJ	*15*		*646*	J	*5.2*	*38.2*	*131*		*149000*	J	*2710*	3.8	*116*	*30000*	*20200*	J	*81.6*	
2.5	Coarse grained sand with pea gravel	4550	J	8.1	UJ	3.3	U	64.3	J	0.23	2.3	0.54		17400	J	16.3	3	6.4	*710*	9100	J	4.6	
10	Light yellowish-brown silty sandy gravel	5930	J	7.6	UJ	2.8	U	40.4	J	0.19	4.3	0.49	U	12500	J	*30.9*	5	8.6	550	13500	J	3.5	
20	Light yellowish-brown silty sandy gravel	4970	J	7.8	UJ	2.3	U	46.1	J	0.13	4	0.5	U	21800	J	*31.1*	4.3	10.8	320	11100	J	6.4	
26	Gravel	5660	J	7.6	UJ	0.55	U	38	J	0.12	2.5	0.49	U	6780	J	8.9	8.1	10.2	140	*16400*	J	3.1	U
Representative	**Groundwater not encountered**	**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**	**18.1**	**1.2**		**65574.4**		**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**		**26.1**	

Sample Depth	Sample Description	Lithium		Magnesium		Manganese		Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium	Zinc	Gross Alpha		Gross Beta	
0	Pond sediment (fill)	7.1	U	16200	J	377	J	0.05	U	*21.6*		*154*		300	*51300*	*9.6*	J	*3.1*		13.1	U	*1290*	*3510*	*406*		*138*	
2.5	Coarse grained sand with pea gravel	6	U	2910	J	126	J	0.05	U	1.3	U	9.6		*22.6*	544	0.37	UJ	0.4	U	11.9	U	12.7	35.8	14.5		20.9	
10	Light yellowish-brown silty sandy gravel	4.1	U	3850	J	124	J	0.05	U	*7.1*	U	*34.4*		8.4	501	0.26	U	0.39	U	11.8	U	20	37.2	5	UJ	6.01	UJ
20	Light yellowish-brown silty sandy gravel	3.8	U	2870	J	149	J	0.05	U	*5.5*	U	*37.6*		5.7	301	0.68	UJ	2		12.1	U	15.3	24.8	11.1		13.7	
26	Gravel	3.2	U	6370	J	238	J	0.05	U	1.3	U	*19*		5.4	407	0.68	UJ	0.4	U	11.9	U	13.4	25.3	5.1	UJ	13	
Representative	**Groundwater not encountered**	**17.8**		**18700.0**		**475.9**		**0.3**		**5.2**		**14.9**		**8.9**	**840.2**	**6.5**		**2.0**		**20.4**		**52.6**	**52.4**	**24.7**		**31.4**	

Notes:

Results are in mg/kg, except for gross alpha and gross beta, which are in pCi/g.

Depths are in feet.

Above-representative values are in italics.

J - Estimated value.

R - Rejected value.

U - Not detected.

Table 4.2.2-23
Concentrations of Parameters in Soil Near the Former East Overflow Pond

S099B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium	Magnesium
0	Gypsum fill	1310	5.4 U	0.95 U	73.2 J	0.24	*26.4* J	*7.1* J	*247,000*	*50.1*	0.56 U	7	*9250*	397	5.5	0.56 U	117
10	Sandy gravel	4460	4 U	1.6 U	*396*	0.26	17.4 J	0.81	5500	22	1.7	9.1	*7030*	7860	5.2	1.6 U	485
30	Sandy gravel	9960	4 U	1.6	83.9 J	0.39	7 J	1.2	14000	*37.5*	2	7.3	*9480*	9790	5.8	2.3 U	816
50	Gravel	6010	4 U	1.8	59.9 J	0.44	4.6 UJ	*2.9*	16000	10.8	4.1	8.5	*4310*	8450	3.1	3.5	2160
Representative	**Groundwater encountered at 54 feet**	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**	**18700.0**

Sample Depth	Sample Description	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	ph	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0	Gypsum fill	5.1 J	*1.2*	1.8 U	5.3	*477*	4.04	*3960*	355	5.6	1.9	15300	0.14 U	11.1	38.1	*49.8*	9.82
10	Sandy gravel	62.4 J	0.09 U	1.3 U	4	*42.2*	5.57	*1360*	1410	0.5 U	0.4	640	0.1 U	35.4	24.3	12.9	13.7
30	Sandy gravel	66.6	0.07 U	1.3 U	4.1	*167*	4.95	*4230*	3460	0.52 U	0.31 U	610	0.24 U	39.7	36.3	NS	NS
50	Gravel	204 J	0.07 U	1.3 U	7.3 U	*41.8*	5.62	*2780*	1340	0.69	0.31	420	0.1	32.5	*64.8*	13	11.8
Representative	**Groundwater encountered at 54 feet**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**		**840.2**	**3562.3**	**6.5**	**2.0**		**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

Notes:

Results are in mg/kg.

Depths are in feet.

Above representative values are in italics.

J - Estimated value.

N/A - Not analyzed.

U - Not detected.

NS - Not sampled.

Table 4.2.2-24
Concentrations of Parameters in Soil in the Upper Gypsum Stack

S003B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium	Boron		Cadmium		Calcium		Chromium	Cobalt	Copper	Fluoride	Iron		Lead
70	Brownish-yellow silt	11900	J	9.3	UJ	8.4		79.9	J	0.85	*22.3*		0.61	U	24700	J	15.2	8.7	8.8	540	*15200*	J	10.5
80	Brownish-yellow silt	7470	J	9.5	UJ	6.5		67	J	0.63	14	U	0.62	U	29700	J	8.9	4.3	8.7	500	9810	J	7.4
90	Yellowish-brown silt	11600	J	9.4	UJ	7.3		152	J	0.71	17.7	U	0.61	U	52600	J	12.9	5.8	8.4	510	11600	J	9.6
115	Silty sand	*15800*	J	9.1	UJ	3.4	U	*494*	J	*2*	18.1		0.59	U	1970	J	1.8	4.8	8.2	*560*	*19700*	J	*85*
135	Clayey sand	*26200*	J	9.5	UJ	4.1		34.5	J	*4*	*20.5*		0.61	U	3500	J	3.8	6.5	12.5	*1100*	*26800*	J	16.7
145	Clayey sand	*25200*	J	11.2	UJ	4.6	U	39.2	J	*3.9*	*28.6*		0.73	U	3300	J	5	7.3	*16*	*1000*	*31700*	J	21
Representative	**Groundwater at 160.0 ft bgs**	**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**	**18.1**		**1.2**		**65574.4**		**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**		**26.1**

Sample Depth	Sample Description	Lithium	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus		Selenium		Silver		Thallium		Vanadium	Zinc	Gross Alpha		Gross Beta
70	Brownish-yellow silt	10.6	4500	J	421	J	0.06	U	1.6	U	*41.8*	*1190*	*34300*	J	0.35	U	0.48	U	14.5	U	22.7	44.5	10.8		18.8
80	Brownish-yellow silt	11	9430	J	378	J	0.07	U	1.6	U	*25.9*	*445*	*1720*		0.31	UJ	0.5	U	14.9	U	16	34.1	15.3		20.1
90	Yellowish-brown silt	12.8	9880	J	*730*	J	0.06	U	1.6	U	*65.5*	*445*	*1710*		0.36	U	0.49	U	14.7	U	22.3	36.9	9.6	UJ	23.8
115	Silty sand	14.4	4400	J	*1540*	J	0.06	U	1.5	U	5.2	*393*	*1390*		0.31	U	0.47	U	14.1	U	9.2	*52.8*	NS		NS
135	Clayey sand	*29.7*	8710	J	466	J	0.06	U	1.6	U	3.1	*431*	*2660*		0.31	UJ	0.49	U	14.7	U	17.2	*80.8*	*26.4*		*33.9*
145	Clayey sand	*31*	8770	J	*509*	J	0.09	U	1.9	U	6.2	*475*	486		0.76	U	0.58	U	17.5	U	18	*101*	*34*		*32.9*
	Groundwater at 160.0 ft bgs	**17.8**	**18700.0**		**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**		**6.5**		**2.0**		**20.4**		**52.6**	**52.4**	**24.7**		**31.4**

S004B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium	Boron		Cadmium		Calcium		Chromium		Cobalt	Copper	Fluoride	Iron		Lead	
53	Pale brown silt	*28600*		9.6	U	*13.2*	J	*265*		*3.6*	*42*	J	*85.1*		*117000*		*300*	J	1.1	*454*	*103000*	10600		3.9	UJ
60	Pale brown silt	11000		8.2	UJ	7.5	UJ	92.9		0.53	8.7	J	0.53	U	48500		14.6	J	4.2	7.1	550	10700		3.5	
70	Pale brown silt	11500		8.1	UJ	5	UJ	108		0.55	10.7	J	0.52	U	47400		17.4	J	5.1	9.6	450	11600		5.6	
80	Pale brown silt	13800		8.3	U	6.9	UJ	129		0.65	12.5	J	0.54	U	39800		18.5	J	5.4	10.4	520	13000		4.1	
90	Pale brown silt	14300		8.6	U	6.8	UJ	138		0.63	12.2	J	0.6		31400		14.2	J	4.9	8.2	490	12100		6.4	
100	Pale brown silt	13200		9.2	U	7.6	UJ	148		0.73	10.5	J	0.62	U	26400		17.3	J	5.6	11.4	550	13100		6.4	
110	Pale brown silt	10200		8.9	U	7.7	UJ	136		0.57	7.8	J	0.58	U	*76900*		11.1	J	4.5	8.1	460	10900		5.9	
120	Light gray tuff	5630		9.7	U	4	UJ	86.7		0.4	2.7	J	0.63	U	3440		5.1	J	3.5	5	290	8840		6.3	
130	Very pale brown silty sand	*30400*		10.6	U	7	UJ	157		*2.6*	14.4	J	0.88	U	2240		*10.5*	J	8.2	*53.8*	*610*	*21300*		16.2	
140	Very pale brown silty sand	*15600*		9	U	8	UJ	73.1		0.6	10.5	J	0.58	U	1730		9.4	J	6.7	12.1	*1140*	14200		6.7	
150	Very pale brown silt	*16000*	J	9.5	U	2	UJ	85.3		*1.9*	4.7		0.62	U	2670		14.2	J	4	12.8	J	480	*16800*		11.6	
160	Very pale brown silt	*19700*	J	9.6	U	5.9	J	*229*		*2.3*	7.5		0.62	U	2640		9	J	7.9	12.3	J	*1350*	*17100*		17.9	
Representative	**Groundwater at 160.0 ft bgs**	**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**	**18.1**		**1.2**		**65574.4**		**27.0**		**8.7**	**15.2**	**559.2**	**14930.2**		**26.1**	

Sample Depth	Sample Description	Lithium	Magnesium	Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium	Zinc	Gross Alpha		Gross Beta	
53	Pale brown silt	2.6	2170	226	J	*0.97*		*19.2*		10.2	*1830*	*29200*	*27.8*	J	0.5	U	15	U	*1360*	*551*	J	11.3	UJ	27.7	
60	Pale brown silt	11.6	14000	344	J	0.24	U	1.4	U	11.8	*250*	*1190*	2	UJ	0.43	U	12.8	U	23.2	37	J	11.5	UJ	12.9	
70	Pale brown silt	12.2	15800	360	J	*0.5*	U	1.4	U	13.3	*143*	*1280*	1.4	UJ	0.42	U	12.6	U	25.5	39.6	J	*52.5*		*60.1*	
80	Pale brown silt	15.1	13000	370	J	*0.54*	U	1.4	U	14.2	*147*	*1210*	1.6	UJ	0.43	U	13	U	28.3	43.9	J	*34.2*		*48.9*	
90	Pale brown silt	15.6	7880	353	J	*0.9*		1.4	U	10.9	*99.9*	*1050*	2.2	UJ	0.44	U	13.3	U	25.4	39.1	J	10.2	UJ	14.4	
100	Pale brown silt	14.8	11700	365	J	*0.34*	U	1.8		14.8	*102*	*963*	2.2	UJ	0.48	U	14.3	U	27	45.8	J	5	UJ	13	
110	Pale brown silt	13.6	9170	319	J	0.27	U	1.5	U	9.7	*78.5*	*976*	2.9	UJ	0.46	U	13.9	U	19.5	36.8	J	15.2		*47.4*	
120	Light gray tuff	4.7	1390	98.3	J	*0.42*	U	1.6	U	3.9	*11.7*	153	2.1	UJ	0.51	U	15.2	U	9.4	51.5	J	*55.7*		*46.4*	
130	Very pale brown silty sand	*32.4*	4890	245	J	*0.57*	U	1.8	U	12.2	*97.7*	291	1.7	UJ	0.55	U	16.5	U	21.1	*155*	J	9.25	UJ	17.8	
140	Very pale brown silty sand	*21.7*	5090	349	J	*0.54*	U	1.5	U	*20.7*	*37.1*	286	1.4	UJ	0.47	U	14	U	15.8	35.6	J	19.4		21.1	
150	Very pale brown silt	17.7	6300	67.4		*0.45*	J	1.6	U	*15.4*	J	4.3	78.5		0.44	U	0.49	UJ	14.8	U	9.5	49.6		17.1	J	27.1	J
160	Very pale brown silt	*22.2*	5310	374		0.29	UJ	1.6	U	*16.3*	J	*148*	409		0.33	U	0.5	UJ	15	U	16.4	48.2		17.9	J	24	J
	Groundwater at 160.0 ft bgs	**17.8**	**18700.0**	**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**6.5**		**2.0**		**20.4**		**52.6**	**52.4**		**24.7**		**31.4**	

Table 4.2.2-24 (Cont'd)

S005B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt	Copper		Fluoride	Iron		Lead	
40	Pale yellowish-brown silt	7850		8.2	UJ	6.4		108		0.11	UJ	8.9	U	*92.5*		51600	J	12.1		4.3	9.8		*1600*	9890	J	6.5	J
50	Pale yellowish-brown silt	6800		8.3	UJ	6.3		119		0.11	UJ	6.1	U	0.54	U	42100	J	10		4.1	8.3		460	9530	J	6.5	J
60	Pale yellowish-brown silt	7970		8.3	UJ	6.7		120		0.16		5.7	U	0.54	U	38700	J	11.6		4.9	9.2		450	10500	J	6.4	J
70	Pale yellowish-brown silt	6440		8.2	UJ	6		155		0.11	UJ	5.6	U	0.53	U	43700	J	8.4		3.9	7.6		440	8880	J	6	J
80	Pale yellowish-brown silt	9590	J	8.3	UJ	5.5	U	127	J	0.53		8		0.94		52500	J	14.6	J	4.8	9.1	J	390	10800	J	7.4	
90	Pale yellowish-brown silt	10700	J	8.2	UJ	5.2	U	75.7	J	0.56		8.8		0.88		31700	J	14.8	J	5	8.6	J	420	11400	J	9.9	
100	Pale yellowish-brown silt	11700	J	8.6	UJ	6.6	U	118	J	0.62		8.2		1.2		47100	J	16.3	J	5.7	9.5	J	480	12500	J	9.7	
110	Pale yellowish-brown silt	9330	J	8.5	UJ	2.7	U	138	J	0.59		5.5		0.84		9100	J	12.9	J	*10.2*	9.1	J	370	*16200*	J	9.7	
120	Pale yellowish-brown silt	13900	J	8.5	UJ	3.6	U	161	J	0.66		11.8		0.93		36900	J	18.9	J	6.1	11.5	J	470	13800	J	6.7	
130	Yellowish-brown sandy silt	*20400*	J	8.7	UJ	3.7	U	104	J	0.93		*19.1*		1		38300	J	22.8	J	7.9	14.2	J	450	*18000*	J	10	
140	Yellowish-brown sandy silt	*15800*	J	8.6	UJ	2.4	U	112	J	0.73		14		0.81		49500	J	20.6	J	6.6	10.8	J	420	13800	J	12.4	
150	Yellowish-brown sandy silt	*17100*	J	8.6	UJ	2.7	U	160	J	0.78		14.7		1.1		52400	J	22.8	J	6.8	12.5	J	440	*15400*	J	11	
160	Yellowish-brown sandy silt	*15000*	J	8.8	UJ	1.3	U	203	J	0.76		8.4		0.94		40100	J	18.6	J	6.1	10.5	J	470	13500	J	11.2	
170	Yellowish-brown sandy silt	*16500*		9	UJ	4.5		157	J	0.67		10.8	U	0.58	U	15000		17.8		6.9	13		520	*15700*		9.9	
180	Yellowish-brown sandy gravelly silt	9160		8.6	UJ	4		106	J	0.46		6.2	U	0.56	U	31500		14		5.2	10.2		*660*	12700		4.1	
190	Yellowish-brown sandy silt	9200		8.5	UJ	4.4		129	J	0.43		8	U	*1.7*		37100		13.2		4.9	11.5		340	11800		6.5	
200	Yellowish-brown sandy silt	10800		8.6	UJ	3.3		108	J	0.62		8.7	U	0.57		29500		14.2		5	11.5		430	12900		5.2	
220	Pale yellowish-brown silty sand	7450		9.6	UJ	2.3		53.2	J	0.42		4.3	U	0.62	U	5850		5		3	3.6	U	260	10000		3.9	U
Representative	Groundwater at 211.8 ft bgs	14638.6		30.9		8.5		203.2		1.2		18.1		1.2		65574.4		27.0		8.7	15.2		559.2	14930.2		26.1	

Sample Depth	Sample Description	Lithium	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus		Selenium		Silver		Thallium		Vanadium	Zinc	Gross Alpha		Gross Beta	
40	Pale yellowish-brown silt	6.7	12700		334	J	0.05	U	1.4	U	*30.8*	*808*	*14100*	J	1.2	J	0.43	U	12.8	U	18.7	*481*	9.64	UJ	17.8	
50	Pale yellowish-brown silt	9.1	13500		314	J	0.05	U	1.4	U	9.9	*179*	*8070*		0.59	J	0.43	U	13	U	16	37.2	6.33	UJ	20.9	
60	Pale yellowish-brown silt	11	12100		334	J	0.05	U	1.4	U	10.9	*106*	*880*		0.28	U	*2.4*		13	U	18.1	37.9	16	UJ	18.8	
70	Pale yellowish-brown silt	9.5	12200		339	J	0.05	U	1.4	U	7.4	*60.9*	803		0.52	J	0.42	U	12.7	U	15.7	32.3	8.88	UJ	26.2	
80	Pale yellowish-brown silt	11.7	15800	J	340	J	0.18	U	1.4	U	11.5	*182*	714		0.91	U	0.43	U	12.9	U	21.5	J 38.3	J 8.8		20	
90	Pale yellowish-brown silt	13.5	10300	J	356	J	0.18	U	1.4	U	11.9	*25.6*	698		0.61	U	0.43	U	12.8	U	21.4	J 40.2	J NS		NS	
100	Pale yellowish-brown silt	14.3	14400	J	347	J	0.18	U	1.5	U	13.6	6	630		1.1	U	0.45	U	13.5	U	22.8	J 43.2	J NS		NS	
110	Pale yellowish-brown silt	10.9	5130	J	*520*	J	0.06	U	1.4	U	11.6	*262*	189		1.3	U	0.44	U	13.3	U	23.8	J 45.7	J NS		NS	
120	Pale yellowish-brown silt	16.4	13500	J	468	J	0.06	U	1.4	U	*15.8*	*31.7*	260		1.3	U	0.44	U	13.2	U	27.6	J 48.5	J NS		NS	
130	Yellowish-brown sandy silt	*19.8*	7270	J	*556*	J	0.05	U	1.5	U	*15.6*	*13.5*	259		1.6	U	0.45	U	13.6	U	35.1	J *63.2*	J 11.2	UJ	21.4	
140	Yellowish-brown sandy silt	15.8	12000	J	377	J	0.06	U	1.5	U	14.7	7	671		1.8	U	0.45	U	13.4	U	27.7	J 45.2	J 12.9		18.9	
150	Yellowish-brown sandy silt	17	11900	J	408	J	0.05	U	1.9	U	*16.4*	8.3	*870*		1.4	U	0.45	U	13.4	U	31.2	J *57*	J 12.1	UJ	29.6	
160	Yellowish-brown sandy silt	13.4	13600	J	392	J	0.05	U	1.5	U	*15.5*	3	752		1.4	U	0.46	U	13.7	U	24.9	J 47.8	J 9.88	UJ	20.9	
170	Yellowish-brown sandy silt	17.5	9160		436		0.18	U	1.5	U	*15.2*	2.4	728		2.3	U	1.4		14	U	27.2	50.5	12.8		24.7	
180	Yellowish-brown sandy gravelly silt	9.9	8350		302		0.13	U	1.5	U	12.1	*9.7*	455		1.9	U	0.45	U	13.4	U	22.8	47.8	8.36	UJ	21.5	
190	Yellowish-brown sandy silt	10.3	10400		308		0.11	U	1.4	U	13.3	*45.6*	*1060*		2.3	U	0.44	U	13.3	U	21.1	*54*	14.3		33.1	
200	Yellowish-brown sandy silt	10.8	8400		300		0.12	U	1.4	U	11	*46*	749		1.7	U	0.45	U	13.4	U	22.6	*54*	8.47	UJ	19.9	
220	Pale yellowish-brown silty sand	4.8	2520		130		0.19	U	1.6	U	4.2	*63.1*	713		2	U	0.5	U	15	U	11.7	29.5	13.3		32.7	
	Groundwater at 211.8 ft bgs	17.8	16700.0		475.9		0.3		5.2		14.9	8.9	840.2		6.5		2.0		20.4		52.6	52.4	24.7		31.4	

Table 4.2.2-24 (Cont'd)

S006B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium	Boron	Cadmium		Calcium		Chromium	Cobalt		Copper	Fluoride	Iron		Lead
44.6	Dark brown silty sandy gravel	8620		8.9	UJ	3.7	UJ	116		0.5	8.2	*25.8*		39200	J	11.9	8.1	J	6.5	310	10600	J	6.8
55	Dark brown silty sandy gravel	7970		8.3	UJ	3.7	UJ	104		0.47	11.2	*17.8*		38600	J	19.1	5	J	*18.1*	*4000*	10800	J	10
65	Dark brown silty sandy gravel	2920		7.9	UJ	2.6	UJ	51.6		0.3	4.9	0.51	U	9770	J	5.2	3.2	J	4.3	290	10100	J	8
70	Dark brown silty sandy gravel	7940		8.8	UJ	4.7	UJ	110		0.56	5.4	0.57	U	39700	J	11.6	4.5	J	8.6	460	10400	J	8.9
85	Yellowish-brown silty sandy gravel	4450		8	UJ	2.8	UJ	93.6		0.45	3.2	0.52	U	7030	J	7.7	6.1	J	5.4	220	17400	J	6.4
105	Yellowish-brown silt	8310		8.3	UJ	4.9	UJ	108		0.57	5.8	0.54	U	7870	J	14.8	4.4	J	7.6	350	11300	J	6.8
115	Yellowish-brown silt	9260		9.2	UJ	4.7	UJ	159		0.51	8.3	0.6	U	*122000*	J	10.9	4.1	J	7.9	450	8920	J	5.8
125	Yellowish-brown silty sandy gravel	3870		7.9	UJ	2.8	UJ	70.3		0.39	2.8	0.51	U	3260	J	6.3	4.7	J	4.2	170	13700	J	6.5
135	Yellowish-brown silty sandy gravel	8180		8.6	UJ	5.2	UJ	138		0.59	5.9	0.56	U	38000	J	11.6	5.9	J	7.1	340	14300	J	5.5
145	Yellowish-brown silty sandy gravel	7130		8.3	UJ	2.6	UJ	85.6		0.51	5.4	0.54	U	20700	J	11	3.9	J	7.7	380	11100	J	6.8
165	Dark red sand	12200	J	9.4	UJ	*12.3*		97.9	J	1.1	5.2	0.61	U	3300	J	12	7.6		6.8	390	*17100*	J	10.9
169	Dark red sand	11300	J	11.6	UJ	6.5		89.1	J	0.77	10	0.75	U	1270	J	9.3	5.9		6.6	330	11400	J	7.6
Representative	**Groundwater at 169 ft bgs**	**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**	**18.1**	**1.2**		**65574.4**		**27.0**	**8.7**		**15.2**	**559.2**	**14930.2**		**26.1**

Sample Depth	Sample Description	Lithium		Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium	Zinc	Gross Alpha	Gross Beta
44.6	Dark brown silty sandy gravel	7.8	J	6370		280	J	0.12		1.5	U	*34.1*	*952*	*16300*	2.4	U	0.46	U	13.8	U	17.2	*52.5*	23.9	23.9
55	Dark brown silty sandy gravel	6.9	J	5110		336	J	*0.33*		1.9	U	*29.8*	*446*	*5540*	2.3	U	0.43	U	13	U	*27.6*	*150*	*69.4*	*44.4*
65	Dark brown silty sandy gravel	4.1	J	3540		260	J	0.07		2.1	U	4.9	*148*	650	1.3	U	0.41	U	12.3	U	8.4	36.9	*24.9*	27.7
70	Dark brown silty sandy gravel	10.3	J	11600		360	J	0.05		1.5	U	11.8	*115*	*1180*	0.97	U	0.46	U	13.7	U	17.5	35.9	15.6	22.1
85	Yellowish-brown silty sandy gravel	6	J	3030		412	J	0.05	UJ	1.3	U	5.7	*34.1*	438	1.3	U	0.41	U	12.4	U	16.2	50.5	*40.2*	*40.2*
105	Yellowish-brown silt	9.2	J	6190		350	J	0.05	UJ	1.4	U	9.7	*40.2*	621	0.28	U	0.43	U	12.9	U	21.2	33.4	17.1	*33.8*
115	Yellowish-brown silt	11.5	J	8420		225	J	0.06	UJ	1.6	U	8.3	*80.2*	*908*	2	U	0.9		14.4	U	15.3	29.6	11.7	17.8
125	Yellowish-brown silty sandy gravel	4.5	J	1760		282	J	0.05	UJ	1.4		4	2.7	240	1.9	U	0.41	U	12.3	U	12.7	40.5	24.6	*35.1*
135	Yellowish-brown silty sandy gravel	9.4	J	4970		359	J	0.05	UJ	1.5	U	8.1	*20.1*	504	0.5	U	0.45	U	13.4	U	21.2	42.4	*25.3*	28
145	Yellowish-brown silty sandy gravel	8.2	J	5900		283	J	0.06	UJ	1.4	U	9.8	5.5	383	0.27	U	0.43	U	12.9	U	13.7	38.4	*26*	*50.3*
165	Dark red sand	13.3		4590	J	205	J	0.1	U	1.6	U	9	*272*	*2300*	0.54	UJ	0.49	U	14.6	U	27.6	40.6	13.1	29.9
169	Dark red sand	14.4		4200	J	139	J	0.2	U	2	U	9.4	*297*	839	1.7	UJ	0.6	U	18	U	15.3	34.3	*25.4*	*39.4*
	Groundwater at 169 ft bgs	**17.8**		**18700.0**		**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**6.5**		**2.0**		**20.4**		**52.6**	**52.4**	**24.7**	**31.4**

Notes:

Depths are in feet.

Above-representative values are in italics.

bgs - below ground surface.

J - Estimated value.

U - Not detected.

NS - not sampled.

Table 4.2.2-25
Concentrations of Parameters in Soil Beneath the Lower Gypsum Stack

S001B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium		Beryllium	Boron		Cadmium		Calcium	Chromium	Cobalt		Copper	Fluoride	Iron	Lead		Lithium	
65	Very dark grayish-brown silt	3070	11.2	UJ	2.3	U	*249*	J	0.46	*28.8*	J	*14.8*	J	*209000*	*286*	0.58	U	*111*	*13180*	605	9.7	U	1.3	U
75	Pale brown silt	8340	9	UJ	5.7		157	J	0.56	8.5	UJ	0.59	UJ	51200	9.4	*13.8*		7.9	*580*	10000	8.8	U	9.6	
95	Light brownish-gray sandy gravel	2660	7.7	UJ	5.1		53.3	J	0.31	2.7	UJ	0.69	J	11300	5.7	7.1		10.7	100	*16900*	14.6	U	4	U
105	Light brownish-gray sandy gravel	3370	7.6	UJ	5.4		55.4	J	0.29	4.1	UJ	0.49	UJ	7560	6.9	5.2		9.9	110	*17300*	11.9	U	3.7	U
115	Pale brown silt	*16700*	9	UJ	3.6	U	113	J	0.9	16.5	J	0.58	UJ	19900	19.5	6.7		8.2	*1500*	*14800*	13.6	U	15.4	
125	Pale brown silt	13200	9.1	UJ	2.6	U	184	J	0.73	9.1	UJ	0.59	UJ	37500	15.7	5.9		7.7	*600*	12300	13.5	U	12.2	
135	Pale brown silt with sandy gravel	5630	8.4	U	4.9	UJ	45		0.45	7.7	J	0.55	U	6830	20.4	J	4.9	8.3	200	10800	3.8		4.8	
145	Very dark grayish brown sand and gravel	8280	9.8	U	2	UJ	68.6		0.71	8.6	J	0.64	U	2410	13.5	J	4.6	6.5	230	13500	5		12.7	
Representative	Groundwater at 138.0 feet bgs	14638.6	30.9		8.5		203.2		1.2	18.2		1.2		65574.4	27.0	8.7		15.2	559.2	14930.2	26.1		17.8	

Sample Depth	Sample Description	Magnesium	Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium	Thallium		Vanadium	Zinc	Gross Alpha		Gross Beta
65	Very dark grayish-brown silt	344	6.5		*26.6*		*5.2*	U	11.3	*1010*	*4000*	1340	*8.9*	J	*6.4*		*987*	17.4	U	*314*	*73*	*68.8*		*43.4*
75	Pale brown silt	10200	*591*		0.28	U	1.5	U	*50.6*	*701*	*7450*	2690	2.3	UJ	0.47	U	728	14.1	U	17.2	40.2	9.25	UJ	21.8
85	Light brownish-gray sandy gravel	2110	256		0.18	U	1.3	U	11.4	*32.5*	303	813	2.1	UJ	0.4	U	281	18.1		10.4	34.4	10.2		20.7
105	Light brownish-gray sandy gravel	2810	258		0.17	U	1.3	U	11.7	*16.9*	216	889	2	UJ	0.4	U	401	11.9	U	10.6	31	5	UJ	18.1
115	Pale brown silt	10400	305		0.18	U	1.5	U	11.9	*22.7*	718	*4010*	2.7	UJ	0.47	U	*985*	14	U	32	*58.4*	7.61	UJ	17.5
125	Pale brown silt	13800	249		0.19	U	1.5	U	12	*12.8*	800	3050	2.3	UJ	0.47	U	737	14.2	U	24.1	40.3	11.2		22.1
135	Pale brown silt with sandy gravel	1880	134	J	*0.37*	U	2.7		*38.7*	2.9	280	NA	1.5	UJ	0.44	U	NA	13.1	U	10.6	26.4	J	24.7		18.5
145	Very dark grayish brown sand and gravel	2080	136	J	*0.6*	U	1.7	U	12.3	*17*	347	NA	1.4	UJ	0.51	U	NA	15.3	U	9.2	*62.7*	J	14.6	UJ	20.9
Representative	Groundwater at 138.0 feet bgs	18700.0	475.9		0.3		5.2		14.9	8.9	840.2	3562.3	6.5		2.0		970.7	20.4		52.6	52.4	24.7		31.4

S002B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium		Beryllium	Boron		Cadmium		Calcium	Chromium	Cobalt		Copper	Fluoride	Iron	Lead		Lithium	
65	Pinkish gray silt (fill)	1710	*21.8*	UJ	0.77	UJ	*680*		0.93	L	*33.3*		*6.5*		*223000*	*207*	1.1	U	*95.9*	*6920*	790	8.8	U	1	UJ
75	Dark brown silt	624	*22.5*	UJ	0.77	UJ	161		1.1	L	4.4	U	*6.4*		*265000*	45	1.2	U	12.9	*2470*	*274*	9	U	0.58	UJ
85	Dark brown silt	5580	*15.8*	UJ	3		55.1		*1.5*	L	6.7		*1.7*		13600	16	4.4		11.9	220	11600	6.3	U	7.2	UJ
95	Pinkish-gray silty gravel	3410	*16.9*	UJ	2.9		75.8		*1.4*	L	3.3	U	1.1	U	16500	24.3	6.3		*15.4*	130	*15600*	6.8	U	6	UJ
105	Pinkish-gray sandy gravel	3510	*15.1*	J	5.8		78.6		*1.3*	L	3.4		*1.5*		19200	15.5	7.8		15	160	*19100*	9.1	U	7.2	UJ
115	Pinkish-gray sandy gravel	9400	9.5	UJ	4.3		108	J	0.63		5.6	UJ	*4.1*	J	48400	10.2	5.7		5.8	230	11500	12.1		10.6	
125	Light yellowish-brown sand	2040	7.9	UJ	4.6		30.2	J	0.24		2.7	J	0.54	J	25800	13.5	3.1		7.3	190	8680	9.3	U	3.4	U
135	Yellowish-brown sandy gravel	11500	10	UJ	6.4		167	J	0.72		5.1	UJ	0.86	J	9850	22.3	8.4		12.1	500	*16100*	14.4		10.6	U
Representative	Groundwater at 136.0 feet bgs	14638.6	30.9		8.5		203.2		1.2		18.2		1.2		65574.4	27.0	8.7		15.2	559.2	14930.2	26.1		17.8	

Sample Depth	Sample Description	Magnesium	Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium	Thallium		Vanadium	Zinc	Gross Alpha		Gross Beta
65	Pinkish gray silt (fill)	296	9.1	J	*6.2*		3.9		5.7	L	*629*	*3410*	767	*21.1*		*6*		*1020*	*34*	U	*234*	32.6	*150*		*31.5*
75	Dark brown silt	149	7.3	J	*606*		3.8	U	5.8	L	*825*	*4150*	J	304	1.9	U	*3.2*		865	*35*	U	*59.6*	13.5	20.1		11.5
85	Dark brown silt	2980	421	J	0.3	U	3.6		*33.1*		*443*	*2650*		1570	0.71	U	0.82	U	655	*24.6*	U	13.1	*66.3*	5.73		13.8
95	Pinkish-gray silty gravel	2690	268	J	0.23	U	5.1		*19.3*		*244*	*1300*		954	0.44	U	0.88	U	575	*26.3*	U	12.9	45.1	9.65		16.9
105	Pinkish-gray sandy gravel	2710	253	J	0.19	U	7		*15.3*		*45.6*	549		760	0.77	U	0.78	U	539	*23.4*	U	16.8	37.5	10.6		23.4
115	Pinkish-gray sandy gravel	11200	411		0.14	U	1.6	U	12.4		*35.9*	*1080*		2120	3.6	J	0.49	U	887	14.8	U	16.6	40.1	13.2		20.5
125	Light yellowish-brown sand	1670	179		0.18	U	2.5	U	8		5	253		415	1.9	UJ	0.41	U	304	12.4	U	5.6	30.8	6.94	UJ	18.6
135	Yellowish-brown sandy gravel	4540	*524*		*0.72*	U	2.2	U	*17.1*		*14.7*	*895*		1860	2.2	UJ	0.52	U	735	15.6	U	18.9	*105*	12.3		22.2
Representative	Groundwater at 136.0 feet bgs	18700.0	475.9		0.3		5.2		14.9		8.9	840.2		3562.3	6.5		2.0		970.7	20.4		52.6	52.4	24.7		31.4

Notes:
Results in mg/kg, except for gross alpha and gross beta, which are in pCi/g.
Depths are in feet.
Above-representative values are in italics.
bgs - below ground surface.
J - Estimated value.
NA - Not available.
U - Not detected.

Table 4.2.2-26
Concentrations of Parameters in Soil in the Former Cooling Pond

S070B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0	Light yellowish-brown sandy gravel	12500	9.1 UJ	5.9 UJ	*825*	*1.4*	*152* J	*28.1*	*169000*	*291* J	0.47 U	*59.5*	*8220*	5880	7.7
2.5	Light yellowish-brown sandy gravel	6770	8 UJ	3.1 UJ	95.5	0.17	15.9 J	0.52 U	13400	14.2 J	3	5.7	320	6280	5.2
5	Weak red silty sand	*29100*	9.2 UJ	4.3 UJ	*249*	*2.9*	*79.7* J	*53.5*	*69600*	*96.1* J	4.2 J	*81.9*	*42000*	*16000*	6.8
7.5	Weak red silty sand	9360	8.4 UJ	2.9 UJ	*316*	0.49	*81.5* J	*1.4*	34600	*396* J	0.93	7.5	*33000*	*16500*	10.7
10	Yellowish-brown silt	10500	9.2 UJ	5.2 UJ	98.2	0.57	15.8 J	*44.1*	42000	17.8 J	3.6	8.4	*850*	*19800*	6.7
Representative	Groundwater not encountered	14638.6	30.9	8.5	203.2	1.2	18.1	1.2	65574.4	27.0	8.7	15.2	559.2	14930.2	26.1

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0	Light yellowish-brown sandy gravel	5.1	2910	54.9 J	*0.86*	*9.1*	*28.1*	*11200*	*49000*	*16.3* UJ	*4.5*	14.2 U	*455*	*273* J	NS	NS
2.5	Light yellowish-brown sandy gravel	0.87	436	28.8 J	*1.1*	1.3 U	6	*312*	324	1.6 UJ	0.42 U	12.5 U	12.1	15.3 J	11.8 UJ	21.8
5	Weak red silty sand	4.6	5280	322 J	*0.39* U	*5.3*	*21.8*	*639*	*38500*	2.1 UJ	0.48 U	14.4 U	*453*	*2860* J	NS	NS
7.5	Weak red silty sand	0.28 U	324	20.1 J	*0.53* U	*11.3*	2.2 U	*735*	*11300*	0.88 UJ	0.44 U	13.1 U	*147*	23 J	*50.1*	*34.2*
10	Yellowish-brown silt	6.1	10300	369 J	*0.52* U	1.5 U	*18.8*	*1180*	*20600*	0.34 UJ	0.48 U	14.3 U	28.7	*1420* J	*32.1*	*35*
Representative	Groundwater not encountered	17.8	18700.0	475.9	0.3	5.2	14.9	8.9	840.2	6.5	2.0	20.4	52.6	52.4	24.7	31.4

S071B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0	Black silt (fill)	12700	9.8 UJ	4.4 UJ	*290*	0.47	*151* J	*8.7*	*85900*	*165* J	0.51 U	*25.8*	*123000*	4420	6.4
2.5	Black silt (fill)	*18100* J	25.1	2.4 J	*460*	0.23 U	*156*	*5.2*	*96800*	*43.9* J	0.93 U	14.2 J	*177000*	1220	12.5
5	Light yellowish-brown sandy gravel	*16100* J	16 U	1.5 J	*478*	0.21 U	*142*	*4.7*	*86500*	*48.1* J	0.83 U	*18.9* J	*173000*	1420	10.8
7.5	Weak red silty sand	10700 J	9.6 U	2.2 UJ	*365*	0.13 U	*155*	*1.4*	42700	16.1 J	0.9	2.9 J	*88600*	2530	12.8
10	Weak red silty sand	10200 J	11 U	2.9 UJ	*303*	0.14 U	*92.6*	*1.3*	29200	*27.1* J	2	4.2 J	*47200*	4630	6.6
Representative	Groundwater not encountered	14638.6	30.9	8.5	203.2	1.2	18.1	1.2	65574.4	27.0	8.7	15.2	559.2	14930.2	26.1

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0	Black silt (fill)	1.5	635	14.9 J	0.27 U	*5.3*	13.7	*5280*	*13200*	*11.1* UJ	2	15.3 U	*165*	*110* J	NS	NS
2.5	Black silt (fill)	0.46 U	372 J	10.4	*5.4* J	3 U	11.1 J	*6580*	*35500*	*26.4*	*5.5* J	*27.9* U	39.5	*73.3*	*364*	*111*
5	Light yellowish-brown sandy gravel	0.42 U	297 J	10.1	*9.7* J	3.1	8.3 J	*6050*	*5150*	*38.9*	*7.9* J	*24.9* U	39.6	*60.3*	*160* J	*71.7* J
7.5	Weak red silty sand	0.25 U	210 J	13.9	*0.47* J	1.6 U	2.5 UJ	*955*	*1490*	0.38 U	0.5 UJ	15 U	15.4	17	16.2 J	13.6 J
10	Weak red silty sand	0.29 U	288 J	23.5	*0.62* J	1.9 U	3.2 J	*1290*	*1720*	1.5 U	0.57 UJ	17.2 U	23.8	19.2	*NS*	*NS*
Representative	Groundwater not encountered	17.8	18700.0	475.9	0.3	5.2	14.9	8.9	840.2	6.5	2.0	20.4	52.6	52.4	24.7	31.4

Table 4.2.2-26 (cont'd)

S100B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0	Gravelly sandy silt	14300	4.2 UJ	3.4	143	0.43	*30.5*	*2.5* J	24200	*34.7* J	7.6	11.6	*14400*	14300	4.6	6.9 J
2	Tan silt		7.1 UJ	1.5	*358*	0.18 U	12.8	*1.9* J	5090	25.4 J	0.73 U	9.9	*4820*	300	4.1 J	0.73 UJ
5	Fill (sandstone)	*20000*	6.3 UJ	1.9	*465*	0.16 U	*436*	*2.7* J	*106000*	23.5 J	0.65 U	5.7	*200000*	631	15.5	0.65 UJ
7	Fill (sandstone)	7810	5.4 UJ	1.9	*435*	0.14 U	*156*	*2* J	38000	9.6 J	0.55 U	2.6	*49900*	1640	18.8	0.55 UJ
10	Fill (sandstone)	*40800*	7.8 J	3.7	*338* J	0.39	*227* J	*1.7*	58000	*306*	1.7	6.6	*134000*	11600	10.9	1.4
12	Fill (sandstone)	*16000*	5.3 J	3.8	*240* J	0.57	*91.7* J	*1.7*	34300	*198*	2.5	6.9	*68700*	*18000*	13.1	1.2
15	Sandy gravel	*21500*	6.3 J	5.8	96.4 J	*2.2*	*31.7* J	*143*	16200	23	2.7	*56.4*	*21400*	*20100*	7.7	5
25	Gravel	7990	4.1 U	4.9	87.3 J	0.21	*28.6* J	0.55	9380	*91.4*	2	6.6	*13100*	14000	5.4	1.4
45	Gravel	4240	4 U	2.6	68.7 J	0.13	*25* J	0.31 U	7500	*38.3*	0.95	2.3	*17400*	6500	3	0.61
55	Yellowish-brown silt	13000	4.7 U	3.4	86.5 J	0.88	7.6 UJ	0.36 U	45200	16.9	6.8	9.8	*980*	12900	10.2	13.7
65	Sandy gravel	1960	3.9 U	0.96 U	18.4 J	0.19	2.2 U	0.3 U	15600	11	2.1	7.7	160	6060	1.7	2.5
80	Clayey silt	*18500*	4.9 U	4.8	136 J	*1.2*	6.8 U	0.37 U	14400	*22.7*	*9.9*	13.6	540	*21800*	14.2	*20.1*
Representative	**Groundwater encountered at 75 feet bgs**	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**66574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

mple Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Tti Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0	Gravelly sandy silt	5500	323	0.25	1.4 U	*22.6*	*41.7*	344	3160	0.61	0.32 U	880	0.12	37.2	49.7	*133*	*66.8*
2	Tan silt	931	32.4	*0.94*	2.4 U	13.6	*1450*	*1650*	195	*35.8*	*4.5*	3910	0.17 U	14.4	38.2 J	*178*	*57.3*
5	Fill (sandstone)	705	27.5	*0.41*	2.1 U	8	*2110*	*2590*	483	*15*	*3.7*	3090	0.16 U	6.8	40.1 J	*155*	*53.9*
7	Fill (sandstone)	421	22.3	*0.35*	1.8 U	3.7	*1900*	*2340*	607	3.4	0.41 U	1550	0.13 U	4.6	27.5 J	*60.5*	*37.9*
10	Fill (sandstone)	587	24 J	0.04 U	*5.6*	4.8	*3920*	*14300*	*12800*	1.2	0.38 U	6120	0.91	*119*	24.1	*90.1*	*43.1*
12	Fill (sandstone)	887	24 J	0.08 U	*6.5*	3.1	*1680*	*17200*	*8280*	0.8	0.39 U	2110	1	*54.5*	25.1	16.6	18.7
15	Sandy gravel	1610	149 J	0.06 U	1.4 U	8	*818*	*23100*	*5190*	0.52 U	0.31 U	1960	0.17 U	*114*	*1130*	11.1	14.6
25	Gravel	406 J	76.2	0.08 U	4.6	4.9	*315*	*5060*	2510	0.53 U	0.32 U	20400	0.22 U	17.6	16.8	15.5	21.6
45	Gravel	302	87.2 J	0.06 U	3.2	3.2	*71.6*	*1980*	1360	0.49 U	0.31 U	160	0.21 U	6.1	9.3	8.54	16.6
55	Yellowish-brown silt	15900	*605* J	0.07 U	1.6 U	*61.7*	*1180*	*23700*	3240	0.6 U	0.36 U	380	0.31 U	18.6	50	*7.27*	17.2
65	Sandy gravel	1980	93.5 J	0.06 U	1.3 U	4.2	*49.9*	395	518	0.49 U	0.3 U	20 U	0.1 U	*4.1*	*12.1*	*9.41*	16.6
80	Clayey silt	8760	406 J	0.09 U	1.6 U	*22.1*	7.5	718	3270	0.64 U	0.37 U	2930	0.28 U	23	*67.8*	15.9	26.8
Representative	**Groundwater encountered at 75 feet bgs**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**–**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

Notes:
Results are in mg/kg, except for gross alpha and gross beta, which are in pCi/g.
Above-representative values are in italics.
Depths are in feet.
J - Estimated value.
U - Not detected.
NS - Not sampled.

Table 4.2.2-27
Concentrations of Parameters in Soil in the Cooling Tower Area

S068B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0	Pale brown sandy silt	13500 J	8.9 U	8.1 J	*211*	0.89	*92.9*	*23.4*	*121000*	*174* J	0.64	*38.8* J	*80000*	5330	9.8
2.5	Dark brown silty gravel	9700 J	7.9 U	4.5 J	109	0.52	12.8	*6.4*	30400	*53.2* J	6	*41.1* J	*20000*	13600	10.8
5	Silty gravel	6120	8.2 U	4.8	161	0.33	9.6 J	*8.3*	30800	*37.8*	4.1	10.1	*11800*	7600	6.7
7.5	Pinkish gray silty sand	3750	7.9 U	3.9	47	0.18	2.1 UJ	0.51 U	22200	9	3	9	460	8870	6.3
Representative	Groundwater not encountered	14638.6	30.9	8.5	203.2	1.2	18.1	1.2	65574.4	27.0	8.7	15.2	559.2	14930.2	26.1

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0	Pale brown sandy silt	4	1930 J	58.4	*1* J	*6.8*	*17.6* J	*1854*	*14300*	*7.8*	*2.2* J	13.8 U	*238*	*174*	*146* J	*55.9* J
2.5	Dark brown silty gravel	3.6	1980 J	140	*1.2* J	*9.5*	*15.7* J	*57.6*	*4730*	0.54 U	0.41 UJ	12.4 U	*58.1*	*119*	NS	NS
5	Silty gravel	4.6	2470	168	0.22	1.4 U	13.8	*613*	*9910*	3 U	0.42 UJ	12.7 U	51.7	*107* J	*42.5* J	30.8 J
7.5	Pinkish gray silty sand	6.2	5400	181	0.09	1.3 U	*30.6*	*849*	*8730*	1.1	0.41 UJ	12.2 U	9.4	28.9 J	13 J	15.7 J
Representative	Groundwater not encountered	17.8	18700.0	475.9	0.3	5.2	14.9	8.9	840.2	6.5	2.0	20.4	52.6	52.4	24.7	31.4

S069B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0	Light gray gravel (backfill)	*15200*	8.7 U	7 U	*263*	*1.3*	*122* J	*28.2*	*158000*	*225*	1	*39.7*	*76000*	4580	10.6
0.5	Light gray gravel (backfill)	*22700*	7.9 U	1.9 U	197	*1.8*	*70.3* J	*13.7*	12.2 U	*269*	1.9	*23.7*	*36100*	3290	3.2 U
Representative	Groundwater not encountered	14638.6	30.9	8.5	203.2	1.2	18.1	1.2	65574.4	27.0	8.7	15.2	559.2	14930.2	26.1

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0	Light gray gravel (backfill)	6.7	2570	120	0.1	*6.4* U	*23.8*	*4240*	*11500*	*8.8*	*2.8*	13.6 U	*257*	*230* J	*160* J	*67.7* J
0.5	Light gray gravel (backfill)	13.1	3350	266	0.05	3.2 U	*19.6*	*50.9*	*4980*	5.4	*3.8*	12.3 U	*230*	*242* J	*205* J	*77* J
Representative	Groundwater not encountered	17.8	18700.0	475.9	0.3	5.2	14.9	8.9	840.2	6.5	2.0	20.4	52.6	52.4	24.7	31.4

S101B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0	Sandy gravel	*23300*	4.1 UJ	2.5	*248*	*1.7*	*128*	*11.5* J	*192000*	*239* J	0.7	*19.3*	*62000*	4460	16.2	8.9 J
2	Gravelly silt	*20000*	4.7 UJ	3.1	*330* J	*1.6*	*121*	*18.5* J	*168000*	R *169* J	1.4	*28.7*	*55600*	8170	7.2	8.2
5	Silty sandy gravel	8390	4.2 UJ	4.3	122 J	0.48	*7.6* U	*1.3* J	35700	13.2 J	5.2	9.5	*1330*	11300	7.9	9.9
7	Silty sandy gravel	4570	4 UJ	2.1	59.1 J	0.36	6.1 U	0.34 J	11100	9.4 J	3.7	7.9	280	10700	2.4	6.3
10	Yellowish-brown silt	6960	4.3 UJ	*5.2*	90.8 J	0.5	6.3 U	2 J	18900	11.3 J	6.7	8.6	*620*	14700	6.6	7
12	Sandy gravel	4530	4.1 UJ	3.1	39.1 J	0.47	2.8 U	0.31 U	1860	12	6.2	*24.9*	490	*19600*	5.2	3.6
15	Silty sandy gravel	4580	4 UJ	2.8	34.1 J	0.46	2.8 U	0.31 U	7690	10.8 J	4.1	10.2	520	*15300*	3.3	4.3
17	Silty sandy gravel	4620	3.9 U	1.7	67.4 J	0.42	3.9 U	0.3 U	4980	9.5 J	3.4	6.5	300	9500	4.2	3.8
Representative	Groundwater not encountered	14638.6	30.9	8.5	203.2	1.2	18.1	1.2	66574.4	27.0	8.7	15.2	559.2	14930.2	26.1	17.8

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Ttl Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0	Sandy gravel	2820	163	*0.03* U	4.2	14.1	*10.1*	*33700*	*6570*	*3.3*	*3.6*	660	0.4	*232*	*158* J	*74.6*	*37*
2	Gravelly silt	6020	181	0.03 U	3.5	*17.5*	*42.2*	*21700*	*6350*	2	1.7	730	0.43 J	*239* J	*227* J	72.2	43.2
5	Silty sandy gravel	9860	304	0.22	1.4 U	*20.6*	*1110*	*3690*	1730	0.73	0.32 U	60	0.17 J	17 J	*117* J	NS	NS
7	Silty sandy gravel	3340	197	0.03 U	1.3 U	13.1	*109*	*965*	909	0.5 U	0.31 U	20 U	0.1 UJ	8 J	*27.9* J	11	24.4
10	Yellowish-brown silt	5310	*476*	0.04 U	1.4 U	*33.7*	*479*	*2560*	1660	0.54 U	0.33 U	220	0.12 J	16.8 J	*155* J	14.3	27.1
12	Sandy gravel	2060	238	0.03 U	1.4 U	*16.8*	*218*	*888*	1060	0.51 U	0.31 U	20 U	0.1 UJ	18.1 J	*69.4* J	16.2	26.3
15	Silty sandy gravel	2450	153	0.19	1.3 U	14	*195*	*925*	967	0.51 U	0.31 U	20 U	0.1 J	10.7 J	*55.5* J	14.3	21.6
17	Silty sandy gravel	1950	164	0.04	1.3 U	7.3	*171*	706	1120	0.5 U	0.3 U	20	0.1 UJ	9.4 J	55.9 J	NS	NS
Representative	Groundwater not encountered	18700.0	475.9	0.3	5.2	14.9	8.9	840.2	3562.3	6.5	2.0	-	20.4	52.6	52.4	24.7	31.4

Notes:
Results are in mg/kg, except for gross alpha and gross beta, which are in pCi/g.
Above-representative values are in italics.
Depths are in feet.
J - Estimated value.
U - Not detected.
R - Rejected value.
NS - Not sampled.

Table 4.2.2-28
Concentrations of Parameters in Soils Near the Unlined Ditch to Water Treatment Ponds

S097B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium	Magnesium
0	Silty gravel	4290	3.9 UJ	4.9	*643*	0.43	4.1	*1.9*	20100	16.6	3.4	7.9	320	11400	4.9	4.9	2560
2	Sandy gravel	1060	3.9 UJ	0.7	96.6	0.16 U	4.5	0.3 U	516	1.7	0.4 U	1.2	100	929	3.9	0.4 U	147 J
7	Sandy gravel	2850	4.1 UJ	3.8	55.1	0.26 U	4.5	0.32 U	2590	25.4	1.9	3.9	110	8370	2.8	2.2	759
10	Silty sandy gravel	2650	4.4 UJ	0.96	79.1	0.23 U	5.0	0.34 U	1040	12.5	1.0	3.3	110	3600	5.2	1.2	434
15	Silty gravel	13000	4.0 UJ	4.6	58.2	0.87	3.7	0.31 U	6100	24.8	*9.2*	18.7	240	*19100*	5.2	10.7	5140
20	Sandy gravel	6100	4.1 UJ	5.2	45.1	0.52 U	2.0	0.32 U	11500	10.6	6.4	11.4	160	13200	4.9	7.2	3340
25	Gravel	9150	3.8 UJ	5.0	83.9	0.63	4.1	0.46	15500	14.3	8.3	13	250	*16000*	5.9	8.5	5030
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**	**18700.0**

Sample Depth	Sample Description	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0	Silty gravel	165 J	*17.4*	1.3 U	9.4	*99.3*	*1230*	863	3.2	0.3 U	130	0.1 U	18.9	42.4	18.8	20.6
2	Sandy gravel	3.9	*4.0*	1.3	1.2	*26.6*	33.8	637	0.51 U	1.0	20	0.11	2.2	13.2	7.08	23.1
7	Sandy gravel	114 J	0.15 U	3.6	4.9	8.03	65.7	850	0.52 U	0.51	60	0.1 U	5.5	11.1	-	-
10	Silty sandy gravel	14.3 J	0.2 U	2.1	2.0	4.34	36	891	0.59 U	0.34 U	210	0.12 U	3.4	5.6	5.0 U	12.6
15	Silty gravel	189 J	0.19	1.6	*21.7*	0.46	815	1200	0.52 U	0.31 U	4600	0.1 U	19.1	*87.3*	9.37	17
20	Sandy gravel	332 J	0.07	1.4 U	13.4	*8.91*	209	1050	0.53 U	0.63	30	0.11	9.7	36.4	5.0 U	*35.7*
25	Gravel	398	*0.35*	1.3 U	*18.2*	4.6	421	1440	0.5 U	0.29 U	70	0.16	14.2	45.4	11.1	19.7
Representative		**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**NR**	**20.4**	**52.6**	**52.4**	**24.7**	**31.4**

Notes:

Results are in mg/kg, except for gross alpha and gross beta, which are in pCi/g.
Depths are in feet.
Above-representative values are in italics.
J = Estimated value.
U = Not detected.
NR = No representative value.

Table 4.2.3-1
Concentrations of Parameters in FMC Feedstock, Byproduct, and Waste Samples

PARAMETER	FOSFPO01		FSDCPW01		FSDIWW01		FSDIWW02		FSDIWW03		FSDIWW04		FSDIWW05		FSDIWW06		FSDRRS01		FWSCSP01		FWSFSA01		FWSFSA02	
Aluminum	12400		11400		12800		18200		13800		10700		12900		9320		21800		718		1650		1430	
Antimony	16.8	UJ	59.2	J	82.8	UJ	53.3	UJ	39.6	UJ	29.3	UJ	37.6	UJ	25.3	UJ	43.7	UJ	13.9	U	61.4	J	42.3	J
Arsenic	14.6	J	6.7	UJ	38	J	17.5	J	25	J	9.2	J	20.8	J	13.3	J	21.1	J	0.49	UJ	0.52	UJ	1.8	UJ
Barium	105		94.6		886		591		650		645		1530		467		333		25.5		23.6		14.5	
Beryllium	1.9		1.3		1.6	U	1.4	U	1.4	U	0.71	U	1.3	U	0.65		2.7		0.18	U	4.1		1.7	
Boron	74.3		2640		50.1		44.5		50		27.9		52.1		36.2		108		11.7	J	4.8		7.6	
Cadmium	77.8	J	426	J	267	J	139	J	245	J	112	J	569	J	234	J	318	J	2.6		0.98	UJ	0.99	UJ
Calcium	232000		284000		121000		161000		76900		72800		114000		107000		391000		3930		17000		16900	
Chromium	822		531		582		377		418		218		677		275		737		8.2		6320		2550	
Cobalt	0.87	U	1.7	U	57		34.6		52.6		34.3		62.2		56.9		4.6		0.9		29.1		14.7	
Copper	104		58.9		1920		890		1430		687		2440		1050		168		7.3	J	851		453	
Fluoride	13200		191000		7460		8560		6320		5880		11400		9140		29500		228		1790		1890	
Iron	8910	J	5440	J	19300	J	14600	J	14300	J	10300	J	18200	J	10100	J	11400	J	2570		84500	J	38500	J
Lead	12.1	UJ	30.9	UJ	96.3	UJ	46.9	UJ	82	UJ	38.9	UJ	137	J	50.8	UJ	26.7	UJ	5.7	J	6.1	U	6.1	U
Lithium	11.8	UJ	23.1	UJ	13.1	UJ	15.7	UJ	11.8	UJ	9.6	UJ	11.9	UJ	8.2	UJ	17.4	UJ	9.1	U	1.2	UJ	1.1	UJ
Magnesium	2000		4730		10500		10900		9030		7770		6780		6230		6470		371		474		262	
Manganese	122		91.8		1220		1190		1260		4400		3950		1500		253		49.6		307		264	
Mercury	0.36	UJ	0.31	UJ	4	J	4.5	J	6	J	1.2	J	2.8	J	2.1	J	0.96	UJ	0.24		0.11	UJ	0.08	UJ
Molybdenum	15	U	32.5	U	14	U	9	U	8.5	U	4.9	U	13.8	U	10.3	U	18.5	U	3.6	U	151		93.2	
Nickel	126		79		99.6		88.3		72.6		62		121		68.1		126		9.1	U	1150		727	
Orthophosphate	3460		13200		1490		1040		915		391		1560		289		1760		15.9		37.5		13.7	
Total Phosphorus	65900		91000		42600		38200		28100		22700		45300		40400		123000		306		1510		902	
Potassium	3540		79800		3180		4310		3340		2510		3340		2190		6700		192		549		410	
Selenium	6.1	J	3.8	UJ	28.4	J	14.7	J	11	J	7.1	UJ	17.6	J	12.7	J	13.8	J	1.4	U	2.6	UJ	0.24	UJ
Silver	5.1		25.1		58.1		14.7		37.4		12.6		72.8		22.8		9.4		0.72	U	47		27	
Sodium	3400		20300		3990		3200		2070		1570		2910		1840		7140		565	J	553		583	
Sulfate	NA		NA		NA		NA		NA		NA		NA		NA		NA		764		NA		NA	
Thallium	26.2	R	50.35	R	129.1	R	83	R	61.7	R	45.6	R	58.6	R	39.4	R	68	R	0.1	UJ	23.6	R	23.8	R
Vanadium	996		607		423		366		317		185		460		276		1000		7.1		6330		2610	
Zinc	991	J	6000	J	6780	J	2930	J	4380	J	1980	J	8230	J	2730	J	2770	J	67.4		97.3	J	70.3	J

Table 4.2.3-1 (Cont'd)

PARAMETER	FWSFSA03		FWSP1101		FWSP1201		FWSP5S01		FWSP8S01		FWSP9E01		FWSSSA01		FWSSSA02		FWSSSA03		FWSSSA04		FWSSSA05		FWSSSA06	
Aluminum	2330		4030		3940		2600		1350		4620		23600		25800		26900		24400		25700		24500	
Antimony	28.5	J	37.2	J	47	J	54.4	J	189	J	54.6	J	14.9	UJ	14.5	UJ	14.2	UJ	14.6	UJ	14.1	UJ	14	UJ
Arsenic	3.7	UJ	36.1	J	20.4	J	90.9	J	256	J	17.1	J	0.51	UJ	0.48	UJ	0.52	UJ	0.5	UJ	0.48	UJ	0.58	UJ
Barium	23.4		48.2		48.8		30.6		18.7		50.8		223		229		254		214		251		233	
Beryllium	1.8		0.29		0.35		0.2	U	0.19	U	0.37		1.9		2.1		2		1.8		1.9		1.9	
Boron	6.1		55.9	J	79.6	J	34.9	J	30.4	J	136	J	97.8		67.5		88.9		68.6		88		83.9	
Cadmium	2.8	UJ	2040		2030		1100		1360		2410		2.8	UJ	1.2	UJ	13	J	32.4	J	10.3	J	4.3	UJ
Calcium	24300		27000		26500		21900		13200		33200		274000		283000		291000		255000		286000		290000	
Chromium	2370		107		133		116		71.6		192		238		230		290		172		280		273	
Cobalt	12.6		3.1		1.8		0.79	U	0.74	U	6.6		1.2	U	1.6	U	1.6	U	1.6	U	1.4		1.6	
Copper	404		68	J	74.9	J	42.2	J	41.7	J	75.4	J	15.8		10.9		17.9		11.9		17.7		17	
Fluoride	3370		17100		15900		8850		8600		16100		14400		17800		17300		12400		16500		16200	
Iron	32800	J	1520		1630		1360		877		1980		1150	J	772	J	1160	J	1970	J	1530	J	1410	J
Lead	6	U	332	J	386	J	185	J	201	J	338	J	6	U	5.8	U	5.7	U	5.9	U	5.7	U	5.6	U
Lithium	2.2	UJ	9.5	U	8.7	U	9.9	U	9.3	U	9	U	16.5	UJ	17.2	UJ	19.5	UJ	17.9	UJ	18.9	UJ	18	UJ
Magnesium	710		1280		1100		704		549		951		3200		3200		3580		5510		3610		3690	
Manganese	190		80.8		49.4		53.2		37.9		52		114		127		169		205		168		126	
Mercury	0.24	UJ	0.24		0.46		0.23		0.74		0.82		0.17	UJ	0.05	UJ	0.12	UJ	0.05	UJ	0.05	UJ	0.39	UJ
Molybdenum	90.6		7.1		6.7		4.5		3.7	U	6.6		2.5	U	2.5	U	2.4	U	2.5	U	2.4	U	2.4	U
Nickel	535		16.2		16.4		17.6		16.2		26.5		8.8		3.8	U	8.8		6.5		11.9		7.9	
Orthophosphate	31.1		7910		10100		10100		9710		4030		46.1		44.6		91.1		57.2		30.3		104	
Total Phosphorus	1070		28000		25100		24200		21300		33500		1900		1610		4580		3800		3930		5680	J
Potassium	663		20100		19100		11400		7910		31300		6780		7130		8160		7700		8220		7360	
Selenium	1.1	UJ	49.6		16.5		13.3		10.8		45.3		4.5	J	4.6	J	2.8	UJ	4.3	J	6.9	J	4.9	J
Silver	26.7		199		198		106		116		218		2.6		2.3		4.8		4.9		3.7		4.3	
Sodium	593		2750	J	2670	J	2070	J	1630	J	4580	J	4200		4110		3970		3730		4210		4180	
Sulfate	NA		210		20	U	20	U	20	U	20		NA		NA		NA		NA		NA		NA	
Thallium	23.1	R	26		9.4	J	16.63	J	22.9		39.4		23.2	R	22.6	R	22.2	R	22.8	R	22	R	21.8	R
Vanadium	2630		68.5		93.4		84.1		42.9		169		215		183		243		150		249		250	
Zinc	169	J	26600		20200		11400		10400		21400		52.5	J	36.4	J	194	J	450	J	136	J	85.5	J

Concentrations in mg/kg
NA - Not Analyzed
U - Not Detected
J - Estimated Value
R - Rejected Value

Table 4.2.3-2
Radionuclide Activities for Potential Source Materials

Sample Source	Sample Type	Sample ID	Gross alpha		Gross beta		Lead-210		Potassium-40		Uranium-238	
FMC Ore	PSS	FOSFPO01	254		101		5	U	10.9		24.2	
Coke Settling Sediment Pond	PSS	FWSCSP01	5	UJ	5	UJ	5	U	2	UJ	5	U
Ferrophos	PSS	FWSFSA01	24.8		22.5		5	U	2.3		5	UJ
Ferrophos	PSS	FWSFSA02	50		36.1		5	U	2	UJ	9.69	
Ferrophos	PSS	FWSFSA03	70.4		55.4		5	U	2.04		12.3	
Sediments from Pond 11S	PSS	FWSP1101	289		771		352		25.9		5	U
Sediments from Pond 12S	PSS	FWSP1201	227		783		465		27.4		5	U
Sediments from Pond 15S	PSS	FWSP5S01	163		388		204		22		5	UJ
Sediments from Pond 8S	PSS	FWSP8S01	71.1		254		230		13.1		5	UJ
Sediments from Pond 9E	PSS	FWSP9E01	120		579		5	U	50.7		8.36	
FMC Slag	PSS	FWSSSA01	228		86.7		5	U	8.48		24.4	
FMC Slag	PSS	FWSSSA02	238		74.7		5	U	7.38		28.1	
FMC Slag	PSS	FWSSSA03	211		76.1		5	U	8.09		26.3	
FMC Slag	PSS	FWSSSA04	179		83.2		5	U	9.22		22.1	
FMC Slag	PSS	FWSSSA05	194		102		5	U	10.9		30.7	
FMC Slag	PSS	FWSSSA06	240		88.7		5	U	9.05		26.5	

Notes:
Results are in pCi/g.
J = Estimated value.
U = Not detected.

Table 4.2.3-3
Constituents in Wastewater and Sediments

Sample Source	Sample ID	Sample type	Alkalinity, bicarbonate (mg/l)	Alkalinity, carbonate (mg/l)		Aluminum (mg/l)		Ammonia (NH3 as N) (mg/l)		Antimony (mg/l)		Arsenic (mg/l)		Barium (mg/l)		Beryllium (mg/l)		Boron (mg/l)		Cadmium (mg/l)		Calcium (mg/l)		Chloride (mg/l)		Chromium (mg/l)		Cobalt (mg/l)		Copper (mg/l)		Fluoride (mg/l)		Gross alpha (pCi/g)		Gross beta (pCi/g)	
Calciner Pond Influent	FSWCPW01	PSL	541	1	U	9.24	J	268		1.92	J	3.977	J	0.26		0.001	UJ	2.89		0.818		154	J	3750		0.133	J	0.038	U	0.223		134		642		17700	
IWW Ditch	FSWIWW01	PSL	324	1	U	7.66	J	288		1.28	UJ	1.759	J	0.27		0.001	UJ	4.53		0.0341	J	141	J	1620		0.02	UJ	0.027	U	0.163		61.6		155		6890	
Discharge to Pond 8E	FSWPS88E	PSL	4420	1	U	715	J	39.6		7.12	J	0.04863	J	9.45		0.114		0.19		1.66		114	J	740		2.03	J	0.09		13.39		1510		668		6480	
Discharge to Phase IV Ponds	FSWPWSIV	PSL	1640	1	U	2.36	J	29.7		0.94	UJ	0.1454	J	0.04		0.001	UJ	0.18		0.02364	J	30.4	J	307		0.413	J	0.034	U	0.032		436		21.8		2420	
Phossy Water Discharge to Pond 8S	FWWP8S01	PSL										0.6168	J																						
Railroad Swale composite	FWWRRS01	PSL	143	1	U	9.83	J	1.3		0.06	UJ	0.00832	U	0.22		0.001	UJ	0.41		0.15206		73.6	J	274		0.02863	J	0.044	U	0.139		4.2		48.3		30.1	
Calciner Pond Sediment	FSDCPW01	PSS				11400				59.2	J	6.7	UJ	94.6		1.3		2640		426	J	284000				531		1.7	U	58.9		191000		225	J	111	
IWW Ditch Sediments	FSDIWW01	PSS				12800				82.8	UJ	38	J	886		1.6	U	50.1		267	J	121000				582		57		1920		7460		116	J	73.4	
IWW Ditch Sediments	FSDIWW02	PSS				18200				53.3	UJ	17.5	J	591		1.4	U	44.5		139	J	161000				377		34.6		890		8560		131	J	81.1	
IWW Ditch Sediments	FSDIWW03	PSS				13800				39.6	UJ	25	J	650		1.4	U	50		245	J	76900				418		52.6		1430		6320		202	J	134	
IWW Ditch Sediments	FSDIWW04	PSS				10700				29.3	UJ	9.2	J	645		0.71	U	27.9		112	J	72800				218		34.3		687		5880		149	J	99	
IWW Ditch Sediments	FSDIWW05	PSS				12900				37.6	UJ	20.8	J	1530		1.3	U	52.1		569	J	114000				677		62.2		2440		11400		299	J	129	
IWW Ditch Sediments	FSDIWW06	PSS				9320				25.3	UJ	13.3	J	467		0.65		36.2		234	J	107000				275		56.9		1050		9140		222	J	105	
Railroad Swale Sediments	FSDRRS01	PSS				21800				43.7	UJ	21.1	J	333		2.7		108		318	J	391000				737		4.6		168		29500		155	J	72	
Coke Settling Pond Sediments	FWSCSP01	PSS				718				13.9	U	0.49	UJ	25.5		0.18	U	11.7	J	2.6		3930		219		8.2		0.9		7.3	J	228		5	UJ	5	UJ

Sample Source	Sample ID	Sample type	Iron (mg/l)		Lead (mg/l)		Lead-210 (pCi/g)		Lithium (mg/l)		Magnesium (mg/l)		Manganese (mg/l)		Mercury (mg/l)		Molybdenum (mg/l)		Nickel (mg/l)		Nitrate (mg/l)		Orthophosphate (mg/l)		pH	Phosphorus (mg/l)		Potassium (mg/l)		Potassium-40 (pCi/g)		Radium-226 (pCi/g)		Radium-228 (pCi/g)		Selenium (mg/l)	
Calciner Pond Influent	FSWCPW01	PSL	7.06	J	0.3258	J			2.216		14.7	J	0.211		0.0001	UJ	0.31		0.339		27.9		3930		4.67	5340		19330	J			1	UJ	1	U	2.785	J
IWW Ditch	FSWIWW01	PSL	4.99	J	0.001	UJ			1.599		22	J	0.187		0.0001	UJ	0.19		0.17		18.4		2210		7.12	2590		7470	J			1	UJ	1	U	4.217	J
Discharge to Pond 8E	FSWPS88E	PSL	197.1	J	0.5472	J			1.664		19.6	J	11.63		0.00027		0.27		2.454		0.39		1360		10.47	7680		9890	J			103		1	U	0.2069	J
Discharge to Phase IV Ponds	FSWPWSIV	PSL	2.156	J	0.001	UJ			0.537		13.3	J	0.204		0.0001	UJ	0.017	U	0.007	U	0.6		782		7.99	1370		2890	J			1.9	J	1	U	0.2292	J
Phossy Water Discharge to Pond 8S	FWWP8S01	PSL																																		
Railroad Swale composite	FWWRRS01	PSL	8.44	J	0.00599	UJ			0.057		14.8	J	0.16		0.0001	UJ	0.03	U	0.066		1.2		4.24		10.16	21.3		19.6	J			1.59		1	U	0.01041	J
Calciner Pond Sediment	FSDCPW01	PSS	5440	J	30.9	UJ	5	U	23.1	UJ	4730		91.8		0.31	UJ	32.5	U	79				13200		5.02	91000		79800		70.4						3.8	UJ
IWW Ditch Sediments	FSDCPW01	PSS	19300	J	96.3	UJ			13.1	UJ	10500		1220		4	J	14	U	99.6				1490		7.68	42600		3180								28.4	J
IWW Ditch Sediments	FSDCPW01	PSS	14600	J	46.9	UJ			15.7	UJ	10900		1190		4.5	J	9	U	88.3				1040		8.15	38200		4310								14.7	J
IWW Ditch Sediments	FSDCPW01	PSS	14300	J	82	UJ			11.8	UJ	9030		1260		6	J	8.5	U	72.6				915		7.55	28100		3340								11	J
IWW Ditch Sediments	FSDCPW01	PSS	10300	J	38.9	UJ			9.6	UJ	7770		4400		1.2	J	4.9	U	62				391		8.13	22700		2510								7.1	UJ
IWW Ditch Sediments	FSDCPW01	PSS	18200	J	137	J			11.9	UJ	6780		3950		2.8	J	13.8	U	121				1560		7.87	45300		3340								17.6	J
IWW Ditch Sediments	FSDCPW01	PSS	10100	J	50.8	UJ			8.2	UJ	6230		1500		2.1	J	10.3	U	68.1				289		8.65	40400		2190								12.7	J
Railroad Swale Sediments	FSDCPW01	PSS	11400	J	26.7	UJ			17.4	UJ	6470		253		0.96	UJ	18.5	U	126				1760		8.94	123000		6700								13.8	J
Coke Settling Pond Sediments	FSDCPW01	PSS	2570		5.7	J	5	U	9.1	U	371		49.6		0.24		3.6	U	9.1	U	0.94		15.9		9.4	306		192		2	UJ					1.4	U

Sample Source	Sample ID	Sample type	Silver (mg/l)		Sodium (mg/l)		Conductance (mohms/cm)		Sulfate (mg/l)		Temperature (°C)		Thallium (mg/l)		Total dissolved solids (mg/l)		Uranium-238 (pCi/g)		Vanadium (mg/l)		Zinc (mg/l)	
Calciner Pond Influent	FSWCPW01	PSL	0.058		3990	J	3500		19800		37.78		0.176	J	64000				1.14		10.13	
IWW Ditch	FSWIWW01	PSL	0.035		1450	J	130		8400		25.33		0.318	J	7460				0.83		5.25	
Discharge to Pond 8E	FSWPS88E	PSL	2.45		1449	J	1206		33		19.83		0.001	UJ	22100				15.62		5210	
Discharge to Phase IV Ponds	FSWPWSIV	PSL	0.007	U	598	J	375		2	U	23.06		0.001	UJ	10100				0.37		41.8	
Phossy Water Discharge to Pond 8S	FWWP8S01	PSL																				
Railroad Swale composite	FWWRRS01	PSL	0.01	U	179	J	1900		79		19.89		0.001	UJ	1070				0.77		1.58	
Calciner Pond Sediment	FSDCPW01	PSS	25.1		20300								50.35				17.5		607		6000	J
IWW Ditch Sediments	FSDCPW01	PSS	58.1		3990								129.1						423		6780	J
IWW Ditch Sediments	FSDCPW01	PSS	14.7		3200								83						366		2930	J
IWW Ditch Sediments	FSDCPW01	PSS	37.4		2070								61.7						317		4380	J
IWW Ditch Sediments	FSDCPW01	PSS	12.6		1570								45.6						185		1980	J
IWW Ditch Sediments	FSDCPW01	PSS	72.8		2910								58.6						460		8230	J
IWW Ditch Sediments	FSDCPW01	PSS	22.8		1840								39.4						276		2730	J
Railroad Swale Sediments	FSDCPW01	PSS	9.4		7140								68						1000		2770	J
Coke Settling Pond Sediments	FSDCPW01	PSS	0.72	U	565	J			764				0.1	UJ			5	U	7.1		67.4	

Notes:
U = Not detected.
J = Estimated value.

Table 4.2.3-4
Concentrations of Parameters in Soil in Former Calciner Ponds 1C and 2C

F023B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium	Boron		Cadmium		Calcium		Chromium		Cobalt	Copper	Fluoride	Iron		Lead		Lithium	
0	Light brown sandy silt	13500	J	7.6	U	*12.1*	J	146	J	0.76	*23.4*	J	*36.2*	J	63400	J	*141*	J	4	*20.2*	*28400*	9520	J	14.8		11.5	J
10	Dark yellowish-brown clayey silt	9770	J	8.5	U	7.1	J	115	J	0.63	*24.3*	J	*36.9*	J	37100	J	16.8	J	*10.2*	8.2	*2040*	10600	J	10	U	9.5	J
20	Dark yellowish-brown clayey silt	8660	J	9.4		6.4	UJ	82.4	J	0.55	17.1	UJ	*15.1*	J	40400	J	12.8	J	4.4	9.7	*1070*	9680	J	9.3	U	10.2	J
30	Dark yellowish-brown clayey silt	8310	J	8.1	U	5.4	UJ	114	J	0.51	*19.4*	UJ	*1.3*	J	26900	J	11.4	J	5	7.9	*690*	10700	J	8.5	U	10	J
40	Dark yellowish-brown sandy gravel	4830	J	8.2	U	5.5	UJ	79.8	J	0.45	12.6	UJ	0.53	UJ	23100	J	8.5	J	5.1	7.1	400	11100	J	6.5	U	6.4	J
50	Dark yellowish-brown sandy gravel	5160	J	8	U	5.4	UJ	77.7	J	0.48	14.1	UJ	0.52	UJ	4680	J	9.7	J	5.7	9.8	370	14400	J	6.3	U	6.3	J
60	Dark yellowish-brown sandy gravel	5200	J	7.8	U	3.6	UJ	81.7	J	0.48	6.4	UJ	0.51	UJ	5610	J	8.7	J	6	6.6	210	*15500*	J	6.6	U	6.2	J
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**	**18.1**		**1.2**		**65574.4**		**27.0**		**8.7**	**15.2**	**559.2**	**14930.2**		**26.1**		**17.8**	

Sample Depth	Sample Description	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium		Selenium		Silver		Sodium		Thallium		Vanadium		Zinc	
0	Light brown sandy silt	10000	J	220	J	*1.8*		4.9		*24.8*	*22.7*	*13800*	*5590*	J	*47.5*		*3.4*		964	J	11.9	U	*146*	J	*328*	J
10	Dark yellowish-brown clayey silt	13800	J	209	J	0.17	U	1.4	U	*27.1*	*220*	*2460*	2910	J	4.9		0.44	U	458	J	13.3	U	21.4	J	*566*	J
20	Dark yellowish-brown clayey silt	12200	J	323	J	0.09	U	1.4	U	*36.6*	*163*	*1570*	1920	J	2.8		0.44	U	447	J	13.2	U	19.5	J	32.5	J
30	Dark yellowish-brown clayey silt	8400	J	393	J	0.12	U	1.4	U	*27*	*183*	*1410*	1670	J	1.4		0.42	U	441	J	12.7	U	19.2	J	33.9	J
40	Dark yellowish-brown sandy gravel	5940	J	326	J	0.05	U	1.4	U	*22.1*	*133*	*891*	988	J	1.6		0.43	U	359	J	12.8	U	15.3	J	36.3	J
50	Dark yellowish-brown sandy gravel	2440	J	329	J	0.08	U	1.3	U	13.2	*145*	705	903	J	1.6		0.42	U	463	J	12.5	U	15.9	J	40.7	J
60	Dark yellowish-brown sandy gravel	2160	J	363	J	0.15	U	1.3	U	8.1	*129*	681	938	J	0.94		0.41	U	455	J	12.2	U	15.8	J	48.2	J
Representative		**18700.0**		**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**3562.3**		**6.5**		**2.0**		**970.7**		**20.4**		**52.6**		**52.4**	

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.3-5
Concentrations of Parameters in Soil in the PCB Storage Shed

F043B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium		Boron		Cadmium		Calcium	Chromium	Cobalt	Copper		Fluoride	Iron	Lead		Lithium	
17	Dark yellowish-brown silt	13900	16	UJ	4.6	J	*223*	0.24		17.9	U	1	U	43400	20.5	6.3	9.4	U	490	14300	21.3		12.7	UJ
19.5	Dark yellowish-brown silt	13700	16.2	UJ	4.8	J	148	0.22		13.5	U	1.1	U	43300	20.6	5.9	7.9	U	460	14800	11		11.8	UJ
22	Dark yellowish-brown silt	11700	16.5	UJ	4.1	J	146	0.21	UJ	12.5	U	1.1	U	39200	17.8	5.4	7.5	U	430	13300	6.6	U	9.8	UJ
24.5	Dark yellowish-brown silt	*14900*	17.2	UJ	5.3	J	137	0.23		*28.4*	U	1.1	U	40400	19.5	5.9	8	U	410	13600	7.2		11.7	UJ
27	Dark yellowish-brown silt	13200	16.5	UJ	5.1	J	119	0.21	UJ	*25*	U	1.1	U	34300	22.4	6.2	8	U	480	*15200*	6.6	U	10.3	UJ
Representative		**14638.6**	**30.9**		**8.5**		**203.2**	**1.2**		**18.1**		**1.2**		**65574.4**	**27.0**	**8.7**	**15.2**		**559.2**	**14930.2**	**26.1**		**17.8**	

Sample Depth	Sample Description	Magnesium	Manganese	Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium	Thallium		Vanadium	Zinc
17	Dark yellowish-brown silt	14300	409	0.05	U	2.7	U	12.8	3.3	663	3310	1.5	UJ	0.83	U	705	*24.9*	R	28.7	*71*
19.5	Dark yellowish-brown silt	13900	404	0.06	U	2.7	U	13.5	8.6	775	3050	1.6	UJ	0.84	U	782	*25.2*	R	33.7	*55.6*
22	Dark yellowish-brown silt	12800	381	*0.79*		2.8	U	11.9	4.2	726	2520	1.4	UJ	0.86	U	*1000*	*25.7*	R	28.7	43.6
24.5	Dark yellowish-brown silt	13000	415	0.2		2.9	U	12.4	5.6	775	3200	1.5	UJ	0.89	U	*1550*	*26.8*	R	29.5	47.5
27	Dark yellowish-brown silt	12900	386	0.06	U	2.8	U	12.8	5.4	745	2810	1.4	UJ	0.86	U	*1450*	*25.7*	R	35	47.9
Representative		**18700.0**	**475.9**	**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**		**970.7**	**20.4**		**52.6**	**52.4**

F044B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium	Boron		Cadmium		Calcium	Chromium	Cobalt	Copper		Fluoride	Iron	Lead		Lithium	
2	Very dark grayish brown silt	12900	22.1	UJ	*69.7*	J	123	*2*	*65.1*	U	*229*		*231000*	*834*	1.3	*88.7*		*19200*	9030	*209*		8.1	UJ
4.5	Very dark grayish brown silt	12100	28.7	UJ	*61.2*	J	131	*2*	*74.8*	U	*184*		*229000*	*746*	0.84	U	*84.8*		*19800*	8530	*48.7*		7.1	UJ
7	Very dark grayish brown silt	13800	21.5	UJ	*23*	J	130	*1.4*	*53.3*	U	*135*		*179000*	*479*	2.2		*59.9*		*13500*	9720	*90.6*		10	UJ
9.5	Yellowish-brown silt	13300	16.8	UJ	2.5	UJ	121	0.23	15.1	U	1.1	U	48300	17.8	5.9		9.2	U	480	13200	6.8	U	13.7	UJ
12	Yellowish-brown silt	12600	16.4	UJ	3.9	J	123	0.22	14.4	U	*2.1*	U	47400	21.9	5.2		9.5	U	*630*	12800	10.4		11.8	UJ
Representative		**14638.6**	**30.9**		**8.5**		**203.2**	**1.2**	**18.1**		**1.2**		**65574.4**	**27.0**	**8.7**		**15.2**		**559.2**	**14930.2**	**26.1**		**17.8**	

Sample Depth	Sample Description	Magnesium	Manganese	Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium	Thallium		Vanadium	Zinc
2	Very dark grayish brown silt	3750	242	0.06		*12.9*	U	*162*	*72.4*	*65700*	*5040*	*12*	J	*6.4*		*2580*	*26.2*	R	*881*	*1610*
4.5	Very dark grayish brown silt	3210	285	0.09		*15.1*	U	*154*	*38.3*	*84000*	*4380*	*12.2*	J	*5.8*		*2610*	*25.3*	R	*864*	*1420*
7	Very dark grayish brown silt	6660	291	0.06	U	*10.8*	U	*99.6*	*46*	*14400*	*4570*	*7.2*	J	*5.4*		*2070*	*26*	R	*557*	*1170*
9.5	Yellowish-brown silt	14400	379	0.06	U	2.8	U	12.4	2.2	703	3320	1.4	UJ	0.87	U	741	*26.2*	R	29.2	45.7
12	Yellowish-brown silt	13500	350	0.06	U	2.8	U	13.1	3.3	*1400*	3300	1.6	UJ	0.85	U	721	*25.5*	R	32.9	*60.9*
Representative		**18700.0**	**475.9**	**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**		**970.7**	**20.4**		**52.6**	**52.4**

Table 4.2.3-5 (Cont'd)

F045B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium		Beryllium	Boron		Cadmium		Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead		Lithium
3	Yellowish-brown silt (fill)	13200	17	UJ	5.3	UJ	140	J	0.63	*46.5*		*1.5*		46100	15.5	5.9	11.4	530	12400	18.4	J	14
5.5	Yellowish-brown silt (fill)	11700	17.1	UJ	5.1	UJ	97.4	J	0.57	13.5	U	*2*		49000	17	5.5	10.6	470	11700	12.7	J	13.1
8	Yellowish-brown silt (fill)	14500	17.1	UJ	2.8	UJ	154	J	0.77	*55.7*		*3.8*		46700	22.1	6.4	12.6	*680*	13600	12.6	J	15.4
10.5	Yellowish-brown silt (fill)	12600	17.1	UJ	4.1	UJ	137	J	0.61	*28*	U	*1.7*		39100	17.8	5.6	10.7	530	12000	12.3	J	13.5
13	Yellowish-brown silt (fill)	10900	15.8	UJ	4.6	UJ	134	J	0.58	*23.5*	U	1	U	41400	16.3	5.4	8.9	410	11500	8.4	J	11.1
Representative		**14638.6**	**30.9**		**8.5**		**203.2**		**1.2**	**18.1**		**1.2**		**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**		**17.8**

Sample Depth	Sample Description	Magnesium	Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium	Thallium		Vanadium	Zinc	
3	Yellowish-brown silt (fill)	11900	351	J	0.06	U	2.9	U	13	*244*	*1740*	*6000*	1.3	UJ	0.88	U	873	*26.4*	U	25.6	50.6	J
5.5	Yellowish-brown silt (fill)	14100	330	J	0.06	U	2.9	U	13.4	*27.1*	821	*4000*	1	UJ	0.89	U	822	*26.6*	U	26.7	*72.1*	J
8	Yellowish-brown silt (fill)	14400	419	J	0.06	U	2.9	U	14.7	*47.3*	*1410*	*5050*	1.1	UJ	0.89	U	*984*	*26.7*	U	32.4	*112*	J
10.5	Yellowish-brown silt (fill)	13100	363	J	0.06	U	2.9	U	11.9	*9.8*	756	*3800*	1.3	UJ	0.89	U	794	*26.6*	U	27.3	*68.5*	J
13	Yellowish-brown silt (fill)	12400	381	J	0.05	U	2.7	U	12.6	2.9	697	2670	1	UJ	0.82	U	742	*24.6*	U	25.1	42.8	J
Representative		**18700.0**	**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**		**970.7**	**20.4**		**52.6**	**52.4**	

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
R - Rejected value.
U - Not detected.

Table 4.2.3-6
Gross Alpha and Gross Beta in Soil Samples

Old Ponds 1C and 2C

F023B

Sample Depth	0	10	20	30	40	50	60
Gross alpha	53.12 ± 11.86	14.07 ± 5.44	15.61 ± 6.2	15.03 ± 6.06	26.17 ± 7.78	40.76 ± 12.8	34.76 ± 8.94
Gross beta	38.77 ± 6.08	20.32 ± 4.54	27.27 ± 5.78	20.85 ± 4.62	31.86 ± 5.52	33.13 ± 5.62	42.49 ± 6.54

Representative Subsurface Levels

Gross Alpha 24.7 pCi/g
Gross Beta 31.4 pCi/g

Pond 4E

F024B

Sample Depth	0	10	20	30	40	50	60	70	75
Gross alpha	95.3 ± 22.2	16.1 ± 9.44	18.5 ± 9.64	13.7 ± 8.44	13.1 ± 10.12	17.2 ± 10.4	28.9 ± 11.98	24.1 ± 12.62	11.7 ± 6.98
Gross beta	113 ± 13.32	25 ± 7.24	26.2 ± 7.02	21.1 ± 6.82	20.2 ± 7.2	23.9 ± 7.38	34.1 ± 7.66	31.5 ± 8.42	20.1 ± 6.54

Old Pond 5E

F025B

Sample Depth	5	10	20	30	60	70
Gross alpha	111.12 ± 10.94	302.95 ± 17.78	26.39 ± 5.94	10.15 ± 3.7	17.57 ± 4.72	15.24 ± 4.58
Gross beta	113.78 ± 9.4	265 ± 14.44	27.69 ± 5.1	16.95 ± 3.86	25.89 ± 4.6	26.73 ± 5.08

Old Pond 6E

F026B

Sample Depth	0	10	60
Gross alpha	22.29 ± 5.52	16.78 ± 4.42	19.41 ± 4.8
Gross beta	21.45 ± 4.64	23.3 ± 4.9	25.89 ± 5.06

Landfill

F027B

Sample Depth	0	10	20	30	40	50	60	70	80	90	100	110	120
Gross alpha	21.1 ± 10.7	15.61 ± 4.32	18.61 ± 4.8	12.64 ± 8.96	11.64 ± 8.68	26.87 ± 12.32	15 ± 8.2	14.34 ± 8.68	12.21 ± 8.84	18.81 ± 9.86	16.47 ± 9.56	21.21 ± 10.52	14.16 ± 9.02
Gross beta	20.02 ± 7.44	19.35 ± 4.3	26.42 ± 4.98	29.36 ± 9.14	24.02 ± 8.48	31.06 ± 8.04	19.61 ± 6.84	20.9 ± 7.12	21.74 ± 7.88	21.48 ± 7.02	20.9 ± 6.78	24.13 ± 8	20.29 ± 7.56

Table 4.2.3-6 (Cont'd)

Chemical Lab Drain Pit

F028B

Sample Depth	0	10	20	30	70
Gross alpha	78.21 ± 9.72	17.57 ± 5	17.02 ± 4.82	18.34 ± 4.88	18.53 ± 4.96
Gross beta	45.82 ± 6.52	26.08 ± 5.28	25.12 ± 5.14	21.84 ± 4.76	24.88 ± 5.24

F029B

Sample Depth	1	20	30	60	70
Gross alpha	33.09 ± 6.72	20.66 ± 5.48	16.48 ± 4.62	15.99 ± 5.06	9.07 ± 7.86
Gross beta	33.5 ± 6.08	24.67 ± 5.32	19.04 ± 4.32	21.23 ± 4.6	21.16 ± 7.52

Representative Subsurface Levels

Gross Alpha 24.7 pCi/g
Gross Beta 31.4 pCi/g

IWW Basin Ditch

F030B

Sample Depth	0	10	20	30	40	50	65	75
Gross alpha	171.19 ± 24.6	13.91 ± 5.68	13.63 ± 5.44	96.96 ± 12.5	16.16 ± 5.82	15.55 ± 6.26	25.23 ± 7.44	20.44 ± 7.18
Gross beta	67.26 ± 7.8	21.22 ± 5.14	22.63 ± 4.9	18.36 ± 4.32	27.01 ± 5.26	26.26 ± 5.54	35.08 ± 5.6	23.93 ± 5.46

Pond 1E

F033B

Sample Depth	4.5	9.5	14.5	19.5
Gross alpha	23.9 ± 10.04	19.8 ± 8.88	114 ± 22.4	20 ± 9.86
Gross beta	34.6 ± 7.74	37.5 ± 8.54	152 ± 15.2	30.9 ± 7.52

Area 9S

F034B

Sample Depth	5	10	15	20
Gross alpha	32.1 ± 11.54	11.6 ± 11.54	31.8 ± 10.52	7.72 ± 5.52
Gross beta	47.3 ± 9.36	25 ± 9.36	42.9 ± 8.96	18 ± 6.52

Transformer Salvage Area

	F035B					F036B				
Sample Depth	2	4.5	7	9.5	12	1	3.5	6	8.5	11
Gross alpha	311 ± 50	15.6 ± 10.86	19.3 ± 11.86	16.2 ± 8.72	11.5 ± 7.02	31.7 ± 10.9	13.2 ± 7.74	20.4 ± 9.92	13 ± 7.74	5.37 ± 4.88
Gross beta	187 ± 17.2	28.8 ± 9.08	25.2 ± 6.9	30.5 ± 7.84	18 ± 5.8	39.3 ± 8.34	23.3 ± 7	26.2 ± 6.84	22.8 ± 6.76	14 ± 5.96

Table 4.2.3-6 (Cont'd)

Representative Subsurface Levels

Gross Alpha 24.7 pCi/g
Gross Beta 31.4 pCi/g

Waste Storage Area

	F037B
Sample Depth	20
Gross alpha	32.6 ± 14.96
Gross beta	62.7 ± 10.12

Railroad Swale

	F039B					F040B	F041B			F042B		
Sample Depth	0	2.5	5	7.5	10	14	7.5	10	12.5	7.5	10	12.5
Gross alpha	216 ± 45.2	280 ± 57	16.6 ± 7.84	21.6 ± 9.82	17.7 ± 9.32	18.5 ± 9.18	96.91 ± 22	7.23 ± 5.76	10.94 ± 6.94	7.3 ± 6.34	12.59 ± 8.74	12 ± 7.32
Gross beta	76.1 ± 12.44	82.2 ± 12.92	22.2 ± 6.56	28.5 ± 7.36	24.8 ± 7.04	22.5 ± 6.66	62.62 ± 11.7	17.62 ± 6.32	20.87 ± 7	20.88 ± 7.28	29.3 ± 8.1	19.24 ± 6.88

	F131B		
Sample Depth	40	60	70
Gross alpha	5.71 ± 2.76	16 ± 5.02	17.9 ± 8.61
Gross beta	13.2 ± 3.51	23.7 ± 4.28	21.6 ± 4.41

PCB Storage Shed

	F043B					F044B				
Sample Depth	17	19.5	22	24.5	27	2	4.5	7	9.5	12
Gross alpha	11.6 ± 7.12	19.4 ± 10.2	19.5 ± 9.68	16.9 ± 10.08	25.3 ± 10.76	236 ± 47.4	287 ± 49.6	103 ± 27.2	81.6 ± 23.4	19.9 ± 10.72
Gross beta	25.2 ± 6.94	25.3 ± 7.6	27.8 ± 7.5	19.7 ± 7.12	25.7 ± 6.9	79.5 ± 12.36	130 ± 16.7	53 ± 10.08	45 ± 10.1	26.1 ± 8.34

	F045B				
Sample Depth	3	5.5	8	10.5	13
Gross alpha	24.1 ± 13.34	22.5 ± 10.22	17.9 ± 11.98	20.4 ± 10.7	14.6 ± 9.72
Gross beta	26.7 ± 8.16	32.6 ± 8.52	25.3 ± 7.82	25.6 ± 8.28	19.7 ± 7.76

Septic Drainfield Area

	F046B			F047B					F048B				
Sample Depth	0	7.5	10	0	2.5	5	7.5	10	0	2.5	5	7.5	10
Gross alpha	18.5 ± 9.54	17.8 ± 9.58	13.9 ± 7.94	22.1 ± 9.52	18.4 ± 9.38	14.5 ± 7.74	12.8 ± 8.28	10.3 ± 7.1	85.8 ± 25.6	18.6 ± 9.76	19.8 ± 10.36	18.7 ± 9.3	17.2 ± 9.48
Gross beta	30.5 ± 7.98	23.1 ± 6.36	23.8 ± 6.82	26.4 ± 7.1	28.1 ± 6.9	25.6 ± 7.42	28.3 ± 7.48	30.4 ± 7.46	36.5 ± 8.26	24 ± 6.92	23.5 ± 7.1	29.9 ± 8.28	28.2 ± 7.62

	F049B				
Sample Depth	1.5	4	6.5	9	11.5
Gross alpha	54.8 ± 19.38	11.1 ± 7.24	21.3 ± 10.64	14.9 ± 9.02	15.5 ± 10.46
Gross beta	37 ± 8.3	21.8 ± 7.22	25.6 ± 7.82	25.8 ± 7.48	26.2 ± 7.82

Table 4.2.3-6 (Cont'd)

Calciner Fines

Sample Depth	F050B 0	2	4	6	10
Gross alpha	137 ± 45	232 ± 61	352 ± 79.8	241 ± 61.4	186 ± 52
Gross beta	133 ± 21	170 ± 23.6	199 ± 25.4	157 ± 28	131 ± 25.8

Representative Subsurface Levels

Gross Alpha 24.7 pCi/g
Gross Beta 31.4 pCi/g

Calciner Fines

Sample Depth	F051B 5	7	9	11	14	F127B 0	5	15	25	35
Gross alpha	185 ± 58.4	115 ± 37.6	22.3 ± 14.62	39.5 ± 19.3	62.6 ± 27	84.2 ± 13.1	5 ± 2.37	17.4 ± 5.95	11.9 ± 5.15	20.7 ± 6.14
Gross beta	94.9 ± 23.2	56.1 ± 14.64	29.3 ± 11.54	42.4 ± 12.84	41.1 ± 12.92	81.5 ± 6.36	5 ± 2.49	20.7 ± 3.93	20.6 ± 3.92	21.1 ± 3.95

Sample Depth	F128B 0	10	20	30	40	50	60	70	80
Gross alpha	63.9 ± 11.4	13.7 ± 5.29	17.3 ± 6	20.4 ± 6.68	15.9 ± 5.98	16 ± 5.69	23.3 ± 6.92	26.1 ± 6.77	11.4 ± 5.54
Gross beta	61.7 ± 6.12	33.2 ± 4.66	27 ± 4.33	25.8 ± 4.26	20.6 ± 3.9	24.1 ± 4.15	36.2 ± 4.88	26.9 ± 4.32	17.9 ± 3.76

Secondary Condenser

Sample Depth	F052B 10	12.5	15	17.5	20	F053B 10	12.5	15	17.5	20
Gross alpha	32 ± 13.14	48.1 ± 16.08	18.6 ± 9.9	9.08 ± 6.68	12.3 ± 9.06	43.4 ± 15.68	28.2 ± 11.18	15.9 ± 9.66	25.8 ± 11.78	20.4 ± 10.64
Gross beta	27.4 ± 7.5	35.4 ± 8.96	31.4 ± 8.4	20.8 ± 6.58	21.1 ± 6.9	43.5 ± 9.74	26.5 ± 7.52	24.9 ± 7.7	26.2 ± 7.78	23.7 ± 7.62

Under Silica Pile

Sample Depth	F054B 40	42.5	45	47.5	50	F130B 0	10	20	40	50	70	90
Gross alpha	15.9 ± 8.56	14.5 ± 7.98	12.6 ± 7.52	29.3 ± 15.32	15.9 ± 8.82	126 ± 19.6	22.3 ± 6.01	7.35 ± 3.27	5 ± 2.64	5 ± 2.66	12.9 ± 3.92	11.6 ± 4
Gross beta	26 ± 7.32	26.4 ± 7.16	21 ± 6.7	41 ± 11.6	22.2 ± 6.58	59.5 ± 8.36	23.1 ± 4.21	13.6 ± 3.62	10 ± 3.25	16.2 ± 3.74	21.3 ± 4.1	22.1 ± 4.2

Old Pond 7S - Tree-Line Area

Sample Depth	F055B 3	5	F056B 5	7	F057B 5	7
Gross alpha	16.6 ± 12.7	46 ± 19	25.4 ± 16.08	1530 ± 199.8	31.4 ± 17.28	47.4 ± 31
Gross beta	22.6 ± 10.4	42 ± 11.56	32.5 ± 11.66	1070 ± 77	28.1 ± 10.94	34.9 ± 17.04

Table 4.2.3-6 (Cont'd)

Old Pond 6S Area

	F058B		F059B
Sample Depth	7	9	10
Gross alpha	161 ± 57.2	143 ± 49.2	1660 ± 149
Gross beta	546 ± 50.6	81.7 ± 21.6	1220 ± 59.6

Representative Subsurface Levels

Gross Alpha 24.7 pCi/g
Gross Beta 31.4 pCi/g

Area West of Mobile Shop

	F060B		F061B	
Sample Depth	1	2	1	2
Gross alpha	130 ± 30.2	135 ± 35	159 ± 32.6	192 ± 41.2
Gross beta	59.7 ± 11.54	79.1 ± 13.48	116 ± 16.08	145 ± 19.5

Long-Term Phosphorus Storage Area

	F062B		F063B	
Sample Depth	1	3	5	7
Gross alpha	17.7 ± 13.94	17.3 ± 15.66	22.2 ± 14.98	40.4 ± 19.9
Gross beta	27.6 ± 11.44	29.2 ± 13.36	22.2 ± 10.42	29.3 ± 8.98

Phos Dock Area

F064B

Sample Depth	2.5	4.5
Gross alpha	13.9 ± 10.5	38.8 ± 15.04
Gross beta	30.4 ± 10.36	31.4 ± 7.94

Paved Area North of Furnace Building

	F066B		F067B		F068B		F069B	
Sample Depth	3	5	5	9	3	5	3	5
Gross alpha	16.9 ± 13.16	23.2 ± 15.14	32 ± 11.12	17.1 ± 8.3	14.2 ± 12.16	24.6 ± 15.66	16.4 ± 12.94	24.1 ± 13.94
Gross beta	23.1 ± 10.78	27.8 ± 11.26	36.6 ± 7.64	25.7 ± 6.54	19.3 ± 9.8	27.6 ± 11.18	24.9 ± 10.44	32.1 ± 10.62

Phossy Waste/Precipitator Slurry Pipeline Cleanout Areas

	F070B		F071B		F072B		F073B		F074B		F075B	
Sample Depth	3	5	5	7	8	10	14	16	10	12	5	7
Gross alpha	27.3 ± 19.04	31.9 ± 18.28	19.5 ± 9.18	17.5 ± 8.36	33.3 ± 11.52	17.9 ± 7.64	16.7 ± 8.52	11.3 ± 7.24	14 ± 8.2	71.8 ± 16.04	14.7 ± 10.3	31.1 ± 17.56
Gross beta	28 ± 13.04	36.5 ± 12.44	27.9 ± 6.94	25.6 ± 6.66	33.7 ± 7.36	26.2 ± 6.6	28.1 ± 6.96	25.6 ± 6.52	31.2 ± 7.18	77.8 ± 10.2	23.6 ± 8.28	30.1 ± 11.54

Table 4.2.3-6 (Cont'd)

	F076B				F077B				F078B				F079B			
Sample Depth	15		17		5		14		25		27		5		7	
Gross alpha	16.5 ± 13.64		9.26 ± 11.1		94.1 ± 32.2		18.5 ± 13.9		14.3 ± 12.48		14 ± 12.24		42.6 ± 20		57.3 ± 22.8	
Gross beta	29 ± 11.52		27.9 ± 11.12		53 ± 14.42		28.5 ± 11.24		21.2 ± 10.26		20.7 ± 10.14		40 ± 12.78		69 ± 15.96	

Representative Subsurface Levels

Gross Alpha 24.7 pCi/g
Gross Beta 31.4 pCi/g

Bannock Paving Area

	F080B		F081B		F082B	
Sample Depth	5	7	4	7	5	9
Gross alpha	14.6 ± 10.18	9.31 ± 9.66	21.5 ± 15.24	21.8 ± 14.56	12.1 ± 9.46	12.4 ± 12.42
Gross beta	23 ± 8.2	19.8 ± 8.76	25.2 ± 11	19.9 ± 10.1	21.4 ± 8.08	18.5 ± 9.76

Rail Car Loading and Unloading Area at Bannock Paving Company

	F083B		F084B	
Sample Depth	5	9	5	7
Gross alpha	12.6 ± 10.48	18.6 ± 13.9	14.8 ± 12.22	20.9 ± 14.46
Gross beta	30.5 ± 9.92	20.4 ± 10.4	23.3 ± 10.6	21.9 ± 10.5

Shale Ore Handling Area

	F090B		F091B		F092B		F093B		F094B	
Sample Depth	3	5	0	2	0	2	3	5	6	8
Gross alpha	207 ± 40.8	262 ± 58.4	186 ± 40.6	23.3 ± 10.4	35.9 ± 12.26	22.1 ± 10.44	222 ± 61	95.7 ± 32.8	20.3 ± 13.54	42.2 ± 19.4
Gross beta	84 ± 12.32	75.3 ± 11.7	65.1 ± 11.18	30.8 ± 8.02	28.7 ± 7.12	31 ± 7.92	92.4 ± 19.16	46 ± 13.18	25.3 ± 10.82	38.4 ± 12.42

	F132B				
Sample Depth	0	2	5	7	10
Gross alpha	113 ± 14.2	91.8 ± 12.6	24 ± 4.98	12.8 ± 3.62	7.43 ± 2.89
Gross beta	69.6 ± 6.15	56.8 ± 5.52	23.9 ± 3.46	13.9 ± 2.8	16.2 ± 2.97

Road Samples

	F101B		F101R		F102B		F103B		F104R		F105B	
Sample Depth	5	7	0.5	1.5	3	5	3	5	0.5	1.5	1	3
Gross alpha	94.1 ± 27	22.8 ± 14.3	88.8 ± 33.2	182 ± 65	17.4 ± 10.68	13.3 ± 10.86	19.6 ± 11.66	17.1 ± 10.42	177 ± 63	102 ± 55.4	281 ± 52.2	206 ± 37.2
Gross beta	47.5 ± 11.86	26 ± 10.74	77.1 ± 18.74	81 ± 19.52	23.3 ± 8.2	21.2 ± 8.76	24.9 ± 8.64	26.5 ± 8.56	82.4 ± 24.8	79.9 ± 29.4	108 ± 13.88	99.3 ± 13.32

	F106B		F107R		F108B		F109B		F110B		F111R	
Sample Depth	1	3	0.5	1.5	0.5	2.5	0.5	2.5	0.5	2.5	0.5	2
Gross alpha	15.5 ± 11.18	10.3 ± 8.26	234 ± 71.6	99.9 ± 37.8	41 ± 16.1	57.2 ± 18.2	30.2 ± 11.44	19.3 ± 10.12	28.5 ± 14.36	90.3 ± 22.8	334 ± 94.2	162 ± 31.2
Gross beta	23 ± 8.86	23.3 ± 7.92	88.4 ± 25.6	53.1 ± 16.5	27.8 ± 7.78	38.5 ± 9.14	32.4 ± 8.08	20.8 ± 6.62	28.4 ± 10.54	53.3 ± 10.62	125 ± 26.2	79.9 ± 10.98

Table 4.2.3-6 (Cont'd)

	F112R		F113R		F114R		F115R		F119R		F121R	
Sample Depth	0.5	2	0.5	2	0.5	2	0.5	2	0.5	2	0.5	2
Gross alpha	149 ± 28.8	188 ± 33.4	145 ± 27.8	28.6 ± 19.26	177 ± 31.4	17.4 ± 8.88	151 ± 27	27.6 ± 16.14	226 ± 77.8	153 ± 89	129 ± 26.6	126 ± 22.8
Gross beta	76.8 ± 10.2	107 ± 12.92	79.8 ± 10.52	33.5 ± 13.8	78.8 ± 10.24	37.8 ± 7.72	81.4 ± 10.72	25.2 ± 10.88	96 ± 26.6	85.1 ± 38.4	65.6 ± 9.78	69.6 ± 9.82

	F122R		F123B		F124B		F125B		F126B	
Sample Depth	0	2	2	4	10	12	1	3	0	2
Gross alpha	38.2 ± 17.34	9.38 ± 8.14	25.8 ± 15.78	22.9 ± 14.9	61.8 ± 28	26.2 ± 17.04	29.9 ± 19.34	16 ± 14.76	19.2 ± 14.58	22.9 ± 15.06
Gross beta	34.1 ± 10.28	25.1 ± 8.32	27.1 ± 11.26	25.7 ± 10.9	37.8 ± 14.56	32.4 ± 11.9	23.9 ± 12.5	18.7 ± 11.68	33.2 ± 11.42	29.8 ± 11

Representative Subsurface Levels

Gross Alpha 24.7 pCi/g
Gross Beta 31.4 pCi/g

Slag Pit Haul Road

	F129B					
Sample Depth	0	5	10	15	20	25
Gross alpha	62.4 ± 11.6	10.9 ± 4.09	18.7 ± 5.56	11.4 ± 4.18	15.9 ± 4.63	14 ± 4.92
Gross beta	35.3 ± 5.29	23.4 ± 4.32	20.2 ± 4.17	19.4 ± 4.07	25.8 ± 4.49	23 ± 4.34

Up-gradient of Pond 8S

	F158B
Sample Depth	93
Gross alpha	11.6 ± 5.88
Gross beta	20.7 ± 5.24

Down-gradient of Pond 8S

	F159B
Sample Depth	96
Gross alpha	13.3 ± 4.57
Gross beta	19.8 ± 4.17

Note: All results are in pCi/g.

Table 4.2.3-7
Concentrations of Parameters in Soil in the Phossy Waste/Precipitator Slurry Pipeline Cleanout Areas

F070B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
3	Brown silt	*14900*	15.9 UJ	1.9 U	145	0.81	17 UJ	*8.3*	45800	24.8 J	6.6	13.7 J	*1090*	14600	6.4	15.1 U
5	Brown tan silt	12400	16.7 UJ	4.2 U	136	0.22 U	15.9 UJ	*1.9*	43600	17.1 J	5.9	9.6 J	*720*	12900	8.6	11.6 U
Representative		14638.6	30.9	8.5	203.2	1.2	18.1	1.2	65574.4	27.0	8.7	15.2	559.2	14930.2	26.1	17.8

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
3	Brown silt	13400	410	0.18 U	2.9 U	13.8 J	*309*	*2020*	NA	2.7 U	1.1	NA	*24.8* U	37.3 J	*209*
5	Brown tan silt	13200	373	0.13 U	2.8 U	11.3 J	*20.7*	*1030*	NA	3.2 U	0.87 U	NA	*26* U	29.8 J	*88.8*
Representative		16700.0	475.9	0.3	5.2	14.9	8.9	840.2	3562.3	6.5	2.0	970.7	20.4	52.6	52.4

F071B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
5	Brown silt with trace slag	12800	17.5 U	5.2	129	0.48	*20.6* J	*2.3*	42800	18.5	5.9	10.7	*750*	12300	12	15.6
7	Gray gravel/silt	11700	16.7 U	6.4	119	0.48	14.8 UJ	1.1	33700	16.6	6	9.8	460	12100	8	12 U
Representative		14638.6	30.9	8.5	203.2	1.2	18.1	1.2	65574.4	27.0	8.7	15.2	559.2	14930.2	26.1	17.8

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
5	Brown silt with trace slag	11400	341	*0.4*	3 UJ	10.7	*72.1*	*1700*	NA	1.9 UJ	0.91 U	NA	*27.2* U	26.4	*85*
7	Gray gravel/silt	10900	334	0.16	2.8 UJ	10	*111*	*1140*	NA	2.2 UJ	0.87 U	NA	*26* U	26.1	*58.2*
Representative		16700.0	475.9	0.3	5.2	14.9	8.9	840.2	3562.3	6.5	2.0	970.7	20.4	52.6	52.4

F072B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
8	Brown silt with trace slag	13900	16.7 U	4.3	131	0.4	*21.2* J	*4.1*	*68800*	*43.5*	4.6	13.8	*2450*	10700	6.7 U	12.3 U
10	Brown silt	13500	17.2 U	5.2	141	0.45	13.1 UJ	*1.5*	36600	21.2	6.7	12.5	*840*	13300	8.4	14.1 U
Representative		14638.6	30.9	8.5	203.2	1.2	18.1	1.2	65574.4	27.0	8.7	15.2	559.2	14930.2	26.1	17.8

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
8	Brown silt with trace slag	8650	293	0.3	2.8 UJ	11.4	2.9	*1020*	NA	1.9 UJ	0.87 U	NA	*26* U	48.4	*199*
10	Brown silt	11200	427	0.14	2.9 UJ	11.4	1.4	*1150*	NA	2.5 UJ	0.9 U	NA	*26.9* U	28.5	*71.3*
Representative		16700.0	475.9	0.3	5.2	14.9	8.9	840.2	3562.3	6.5	2.0	970.7	20.4	52.6	52.4

Table 4.2.3-7 (Cont'd)

F073B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
14	Slag to brown silt	8320	17.4 U	5.2	146	0.52	11.2 UJ	*11.6*	33700	20.2	5.1	11.6	*740*	10700	8.3	10.5 U
16	Brown silt	8100	19.6	6.3	115	0.48	10.3 UJ	1.1 U	43600	11.7	5.5	9.4	520	10300	7.2	10 U

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
14	Slag to brown silt	10400	357	0.21 U	2.9 UJ	13.5	*558*	*2620*	NA	2.6 UJ	1.8	NA	*27.1* U	24.3	*316*
16	Brown silt	12600	327	*0.44*	2.8 UJ	9	*416*	*2160*	NA	2.1 UJ	0.87 U	NA	*26.2* U	18.3	39.8
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F074B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
10	Gravel/slag fill	13300	16.6 U	5.5	130	0.44	*20.5* J	*32.3*	49800	*41.4*	5.9	14.9	*2690*	11900	*84.5*	12.8 U
12	Brown silt	13700	16.9 U	6.3	115	0.5	*20.5* J	1.1 U	31800	17.1	6.1	11.2	490	13000	9.1	13.7 U
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
10	Gravel/slag fill	11500	339	*0.33*	3.7 U	14.5	*418*	*12000*	NA	2.6 UJ	*20* U	NA	*25.9* U	*52.9*	*3750*
12	Brown silt	12200	396	0.24 U	2.8 UJ	10.7 U	*575*	*2320*	NA	1.4 UJ	0.88 U	NA	*26.3* U	*27*	*59.4*
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F075B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
5	Brown silt with trace gravel	13300	16.7 UJ	3.8 U	129	0.48	13.1 UJ	1.1 U	45500	16	4.9	9.8	550	12600	11.8	14.9
7	Brown silt	11800	17 UJ	3.5 U	110	0.4	16.4 UJ	1.1 U	24800	13.1	3.8	9	440	10900	6.8 U	11.6
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
5	Brown silt with trace gravel	13500	346	0.17 U	2.8 U	12.3	4.8	717	NA	1.3 U	0.87 U	NA	*26* U	27.6	*65*
7	Brown silt	8860	285	*0.38* U	2.9 U	8.7	5.7	528	NA	1.6 U	0.88 U	NA	*26.5* U	22.7	51.1
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F076B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
15	Brown silt	11700	8.1 UJ	5.6 U	118	0.59	*23.1*	0.53 U	39400	17.2	5.6	6.4	470	12400 J	12.4 J	14.7 J
17	Brown silt	12900	8.2 UJ	5.4 U	137	0.66	*26.1*	*3.3*	42200	16.9	5.6	7.7	*820*	12400 J	15.7 J	16 J
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
15	Brown silt	12700	362 J	0.13 U	1.4 U	11.3	*353*	*1470*	*7400*	0.93 U	0.42 U	629	12.7 U	28.6 J	41.5
17	Brown silt	12400	385 J	*0.34* U	1.4 U	11.2	*515*	*4760*	*8400*	1 U	0.43 U	616	12.9 U	*27* J	*139*
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

Table 4.2.3-7 (Cont'd)

F077B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron		Lead		Lithium	
5	Brown sandy silt with gravel	*22500*	7.8	UJ	1.9	U	202	*1.7*	*47.4*	*14.2*	*196000*	*124*	2.9	13.9	*12600*	4710	J	12.3	J	*18.2*	J
14	Brown silt to gravel	*15500*	9.2	J	3.7	U	141	1.1	*26.9*	*98.2*	*83100*	*208*	5	*37.9*	*2660*	10200	J	*106*	J	13.7	J
Representative		**14638.6**	**30.9**		**8.5**		**203.2**	**1.2**	**16.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**		**26.1**		**17.8**	

Sample Depth	Sample Description	Magnesium	Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver	Sodium	Thallium		Vanadium		Zinc
5	Brown sandy silt with gravel	7200	289	J	*0.33*	U	2.8	U	10	*16.7*	*5840*	*7620*	4.1		*3.8*	*2580*	12.2	U	*114*	J	*302*
14	Brown silt to gravel	8750	384	J	0.25	U	*7.6*	U	*48.2*	*138*	*9960*	*7270*	2.4	U	*32.4*	*1180*	13	U	*211*	J	*5080*
Representative		**16700.0**	**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**	**970.7**	**20.4**		**52.6**		**52.4**

F078B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium	Boron		Cadmium		Calcium	Chromium	Cobalt	Copper	Fluoride	Iron		Lead		Lithium	
25	Tan silt	11100	8.2	UJ	3.9	U	148	0.63	11	U	0.53		40300	13.9	5.3	7.1	*800*	11000	J	11.9	J	13.1	J
27	Brown silt	11100	8.5	UJ	3.5	U	150	0.62	10.7	U	0.55	U	31400	13.2	5.6	8.1	550	11800	J	12.2	J	11.8	J
Representative		**14638.6**	**30.9**		**8.5**		**203.2**	**1.2**	**16.1**		**1.2**		**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**		**26.1**		**17.8**	

Sample Depth	Sample Description	Magnesium	Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium	Thallium		Vanadium		Zinc
25	Tan silt	12700	351	J	*0.63*		1.4	U	10	*20.2*	*1140*	2440	1.1	U	0.42	U	567	12.7	U	21.8	J	48.8
27	Brown silt	11800	377	J	0.19	U	1.6	U	11.2	3.5	760	2550	1.3	U	0.44	U	537	13.2	U	21.9	J	45.4
Representative		**16700.0**	**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**		**970.7**	**20.4**		**52.6**		**52.4**

F079B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium	Boron		Cadmium		Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
5	Red brown clayey silt	*15100*	16.8	UJ	4.7		147	0.85	*18.8*	U	*121*		45200	24.6	6.4	14.5	*1730*	12900	*28.8*	14.3
7	Red brown silt	*17500*	17	UJ	7.9		148	1.1	*35.4*	U	*231*		60900	*50.5*	5.3	*20.9*	*3650*	11800	*84.1*	14.6
Representative		**14638.6**	**30.9**		**8.5**		**203.2**	**1.2**	**16.1**		**1.2**		**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium		Vanadium	Zinc
5	Red brown clayey silt	13200	453		*0.33*	J	2.8	U	*16.2*	*1400*	*13000*	N/A	*17*	*5.8*	N/A	*26.2*	U	36	*1960*
7	Red brown silt	11400	370		*3*	J	2.9	U	*20.4*	*1430*	*25100*	N/A	4.3	*25.3*	N/A	*26.5*	U	*55.4*	*6960*
Representative		**16700.0**	**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**		**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
NA - Not analyzed.
U - Not detected.

Table 4.2.3-8
Concentrations of Parameters in Soil in the Septic Drainfields

F046B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0	Dark brown topsoil (fill)	*15100*	18.7 UJ	5.1 UJ	151	0.82	16 UJ	1.2 U	58300	19.2	5.7	12.8	*640*	13100	7.5 U	15 U
7.5	Slag gravel	11000	17.9 UJ	6.2 UJ	128	0.68	7.6 UJ	*1.5*	36800	15.2	5.7	10	*1160*	11800	8.1	11.8 U
10	Dark yellowish-brown silt	11200	18.7 UJ	5.2 UJ	126	0.67	8.5 UJ	1.2 U	33300	14.8	6	10.3	490	12200	7.5 U	11.1 U
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
0	Dark brown topsoil (fill)	11600	363	0.06 U	3.2 U	*17*	2.4	*844*	*4290*	3 UJ	0.97 U	939	*29.1* U	29.6	*59.2*
7.5	Slag gravel	12100	204	0.06 U	3 U	12	8.2	*867*	2460	2.5 UJ	0.93 U	743	*27.9* U	22.4	*52.8*
10	Dark yellowish-brown silt	11000	286	0.06 U	3.2 U	12.4	*9.4*	764	2470	2.1 UJ	0.97 U	844	*29.1* U	23.9	51.6
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F047B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0	Dark brown topsoil	*18700*	17.8 UJ	4.4 UJ	189	1	*22* UJ	*2.7*	13300	26.8	8.3	*20.1*	*700*	*16800*	12	*19.2*
2.5	Dark yellowish brown silt	10600	17.9 UJ	4.3 UJ	165	0.62	9.4 UJ	1.2 U	38100	11.4	5.4	9.8	*610*	11200	7.2 U	12.9 U
5	Dark yellowish brown silt	9430	17.9 UJ	6.1 UJ	132	0.62	7.6 UJ	1.2 U	39700	11.3	4.5	9.8	470	10500	7.2 U	11.4 U
7.5	Dark brown silt	10600	18 UJ	4.8 UJ	137	0.69	14 UJ	*4.4*	34500	19	5.4	13	*800*	11400	7.3 U	12.4 U
10	Dark brown silt	11200	19.8 UJ	5.7 UJ	191	0.73	7.9 UJ	*1.3* U	35500	15.2	6	11.6	550	12900	9.5	11.5 U
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
0	Dark brown topsoil	5660	*557*	0.06 U	3 U	*17*	*17.8*	*1200*	*5270*	2 UJ	0.93 U	875	*27.8* U	32.2	*90.4*
2.5	Dark yellowish brown silt	11400	244	0.06 U	3 U	10.8	3.7	784	2820	1.6 UJ	0.93 U	705	*27.9* U	20.1	45.3
5	Dark yellowish brown silt	11200	208	0.06 U	3 U	10.8	7.2	706	2620	1.7 UJ	0.93 U	696	*27.9* U	18.8	42.6
7.5	Dark brown silt	9890	378	0.06 U	3 U	14.3	*13.3*	*1320*	3030	2.2 UJ	0.94 U	753	*28.1* U	25.6	*89.8*
10	Dark brown silt	12300	*717*	0.07 U	3.3 U	13.5	*9.8*	*873*	2540	2 UJ	1 U	704	*30.9* U	22.9	50.6
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F048B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0	Dark brown topsoil (fill)	11400	16.8 UJ	2.2	116	0.77	16.7 J	1.1 U	36900	22.8	5.5	8.6	*1690*	14000	10.1 J	12.1
2.5	Yellowish-brown silt	*16000*	17.6 UJ	3.7	156	0.85	17.4 J	1.1 U	50100	21.4	6.5	11.8	550	*15300*	17 J	16.1
5	Yellowish-brown silt	*16000*	18.1 UJ	2.8	168	0.88	*27.2* J	1.2 U	45800	20.1	6.7	11.4	*600*	*15100*	13.6 J	17.3
7.5	Yellowish-brown silt	11800	15.5 UJ	2.1	153	0.74	14.9 J	1 U	33000	15.2	5	8.4	470	11900	10.2 J	13.2
10	Yellowish-brown silt	12700	17.4 UJ	4	124	0.88	9 J	1.1 U	37100	18.6	6.2	10.5	530	14500	14.4 J	13.6
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
0	Dark brown topsoil (fill)	8270	383	0.08 U	2.8 U	12.4	4	*1350*	2810	2.1 J	0.87 U	825	*26.2* U	33	*65.3*
2.5	Yellowish-brown silt	11700	395	0.09 U	3 U	14.1	2	725	*3930*	1.2 UJ	0.91 U	842	*27.4* U	31.2	51.9
5	Yellowish-brown silt	12300	412	0.08 U	3.1 U	14.6	0.8	732	*4160*	1.1 UJ	0.94 U	935	*28.2* U	30.2	52.3
7.5	Yellowish-brown silt	10200	327	0.07 U	2.6 U	11.3	0.9	565	2810	0.59 UJ	0.81 U	773	*24.2* U	22.8	40.3
10	Yellowish-brown silt	11700	419	0.09 U	2.9 U	14.4	1.5	739	2930	1.2 UJ	0.9 U	795	*27.1* U	26	51.3
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

Table 4.2.3-8 (Cont'd)

F049B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium		Boron		Cadmium		Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead		Lithium
1.5	Yellowish-brown silt	13700	17.2	UJ	3.5	J	154	0.43	U	*18.4*	UJ	1.1	U	31300	20.7	6	11	*650*	13600	11		13.5
4	Yellowish-brown silt	*15400*	17.8	UJ	3.4	J	156	*1.3*	U	13.3	UJ	1.2	U	47900	18.4	6.1	12	*600*	13400	7.2	U	14.8
6.5	Light yellowish-brown silt	11900	16.3	UJ	4.3	J	131	1.2	U	16.1	UJ	1.1	U	36600	17.9	5.4	9.4	510	11800	6.5	U	13.2
9	Light yellowish-brown silt	13700	17.4	UJ	2.5	J	136	*1.3*	U	*22.8*	UJ	1.1	U	37300	20	5.5	11.1	*1240*	13200	7	U	14.2
11.5	Light yellowish-brown silt	11100	16.1	UJ	3.5	J	167	1.2	U	10.4	UJ	1	U	31200	20	5.6	9.9	*930*	12800	6.5	U	11.6
Representative		**14638.6**	**30.9**		**8.5**		**203.2**	**1.2**		**18.1**		**1.2**		**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**		**17.8**

Sample Depth	Sample Description	Magnesium	Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium	Thallium		Vanadium	Zinc
1.5	Yellowish-brown silt	9740	446	J	*2*	J	2.9	U	10.5	6.8	*881*	*3610*	1.1	U	0.89	U	931	*26.8*	U	34.3	48.7
4	Yellowish-brown silt	9470	347	J	*0.48*	J	3	U	14.2	4.3	598	*4080*	1.3	U	0.92	U	788	*27.7*	U	27.6	45.1
6.5	Light yellowish-brown silt	10300	333	J	0.3	J	2.7	U	*15.1*	2.9	641	3000	1.3	U	0.84	U	676	*25.3*	U	24.1	39.2
9	Light yellowish-brown silt	11000	381	J	*0.41*	J	2.9	U	13.7	4.4	732	*3580*	1.1	U	0.9	U	881	*27.1*	U	28.9	49.5
11.5	Light yellowish-brown silt	10800	387	J	0.28	J	2.7	U	*15.8*	6	734	2710	1	U	0.84	U	630	*25.1*	U	24.7	45.6
Representative		**18700.0**	**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**		**970.7**	**20.4**		**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.3-9
Concentrations of Parameters in Soil in the Railroad Swale

F039B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper		Fluoride		Iron		Lead		Lithium	
0	Dark yellowish-brown silty gravel (fill)	10300		16.1	UJ	*12.2*		85.8		*2.9*		*95*	J	*104*		*243000*		*720*		1.1		*95.8*		*17500*		8780		17.4	J	9	
2.5	Dark yellowish-brown silty gravel (fill)	10400		16.5	UJ	*20.2*		87.3		*2.9*		*78.3*	J	*103*		*221000*		*647*		1.6		*93.3*		*15400*		7930		7.3	J	10.5	U
5	Dark yellowish-brown silty gravel (fill)	5170		16	UJ	3.9		58.2		0.4		4.4	J	1	U	14800		*71.8*		4.9		13.2		360		*20300*		6.5	UJ	6	U
7.5	Grayish-brown silt	12000	J	17.4	UJ	3.6		136		0.75		13.5	J	*3.4*		48600		*37.5*		5.3		14.4		*1900*		11500		8	J	14.1	U
10	Grayish-brown silt	*14800*		16.7	UJ	2.4	J	157		0.44	U	*19.9*	UJ	*2.6*		45200		*38.2*		5.4		14.8		*890*		12300		9.6		13.7	
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**		**27.0**		**8.7**		**15.2**		**559.2**		**14930.2**		**26.1**		**17.8**	

Sample Depth	Sample Description	Magnesium	Manganese	Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium		Thallium		Vanadium	Zinc
0	Dark yellowish-brown silty gravel (fill)	2650	221	*0.42*	U	*27.8*		*163*	*35.2*	*81400*	3230	*8.7*	J	*5.9*		*3020*		*25*	U	*980*	*1270*
2.5	Dark yellowish-brown silty gravel (fill)	3310	173	*0.4*	U	*27.7*		*155*	*46.9*	*76000*	3180	*9.9*	J	*4.7*		*2790*		*25.7*	U	*875*	*1260*
5	Dark yellowish-brown silty gravel (fill)	2940	180	0.07	U	*10.4*		13.4	*19*	*1860*	1370	2.1	UJ	0.83	U	629		*25*	U	20.9	46.5
7.5	Grayish-brown silt	10900	340	0.12	U	2.9	U	*19.6*	4.4	*3930*	3400	3.9	J	0.9	U	866	J	*27.1*	U	*53.4*	*105*
10	Grayish-brown silt	11000	333	*1*	J	2.8	U	*19.6*	*14.2*	*2730*	*3670*	1.1	U	0.87	U	*1200*		*26*	U	50	*102*
Representative		**18700.0**	**475.9**	**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**		**970.7**		**20.4**		**52.6**	**52.4**

F040B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper		Fluoride		Iron		Lead		Lithium	
14	Yellowish-brown silt	9340		17.8	UJ	7.5	UJ	87.1		0.58		9.5	UJ	1.2	U	41900		12.1		4.7		9.3		480		10600		10		10	U
16.5	Yellowish-brown silt	11100		17.9	UJ	4.1	UJ	120		0.68		17.1	UJ	*13.4*		50300		*35.2*		7.7		12		*1260*		10400		10.6		10.1	U
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**		**27.0**		**8.7**		**15.2**		**559.2**		**14930.2**		**26.1**		**17.8**	

Sample Depth	Sample Description	Magnesium	Manganese	Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium		Thallium		Vanadium	Zinc
14	Yellowish-brown silt	14000	341	0.06	U	3	U	11.8	*12.8*	*1450*	2670	2.7	UJ	0.93	U	*862*		*27.8*	U	20.2	44
16.5	Yellowish-brown silt	11100	301	0.06	U	3	U	*15.5*	*24.1*	*2450*	3070	1.6	UJ	1.2		*991*		*27.8*	U	43.3	*232*
Representative		**18700.0**	**475.9**	**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**		**970.7**		**20.4**		**52.6**	**52.4**

F041B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper		Fluoride		Iron		Lead		Lithium	
7.5	Slag (fill)	*16500*		*36.8*	J	*21.1*		196	J	*3.5*		*121*	U	*282*		*156000*		*988*		6.7		*125*		*13300*		12600		*42.1*	U	13.2	UJ
10	Black silt (fill)	10200		18.4	UJ	3.5	U	122	J	*1.5*	U	8.7	U	1.2	U	42200		17.7		5		10		*600*		12300		13.6	U	10.3	UJ
12.5	Black silt (fill)	11000		20.5	UJ	5.8	U	172	J	*2.1*	U	12.6	U	*1.3*	U	50500		16		8.1		10.8		510		13500		23.5	U	14.4	UJ
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**		**27.0**		**8.7**		**15.2**		**559.2**		**14930.2**		**26.1**		**17.8**	

Sample Depth	Sample Description	Magnesium	Manganese	Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium		Thallium		Vanadium	Zinc
7.5	Slag (fill)	4320	*272*	*0.93*		*28.6*	U	*188*	*111*	*53600*	*4840*	*17.5*	J	*17.7*		*2870*		*41.3*	UJ	*1290*	*4210*
10	Black silt (fill)	11000	245	0.07		3.1	U	12	3	*1080*	3040	2.5	UJ	0.96	U	899		*28.7*	UJ	24	*58.6*
12.5	Black silt (fill)	15700	280	0.08		*5.4*	U	*17.3*	3.5	682	3540	1.1	UJ	1.1	U	*1120*		*32*	UJ	26	*53.1*
Representative		**18700.0**	**475.9**	**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**		**970.7**		**20.4**		**52.6**	**52.4**

Table 4.2.3-9 (Cont'd)

F042B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead		Lithium	
7.5	Brown silt	13000		17.3	UJ	4.5	U	136	J	*1.6*		10.9	U	1.1	U	33300	*46.8*	5.9	12.9	*690*	14100	7.9	U	12	UJ
10	Brown silt	9490		18.7	UJ	6.1		155	J	*1.5*		8.1	U	1.2	U	49800	12.9	5.4	11.5	*620*	12000	15.8	U	10	UJ
12.5	Brown silt	9600		19.5	UJ	5	U	152	J	*1.5*		*18.3*	U	*1.3*	U	40400	15.1	5.1	7.5	U 460	11700	19.5	U	9.7	UJ
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**		**17.8**	

Sample Depth	Sample Description	Magnesium		Manganese		Mercury		Molybdenum		Nickel		Orthophosphate		Total Phosphorus		Potassium	Selenium		Silver		Sodium	Thallium		Vanadium		Zinc
7.5	Brown silt	10400		421		0.07		2.9	U	*18.4*	U	3.1		*1450*		*4260*	0.98	UJ	0.9	U	671	*26.9*	UJ	*53.1*		*52.9*
10	Brown silt	11400		371		0.1		3.2	U	*15.8*	U	2.7		*1200*		3060	0.61	UJ	0.97	U	696	*29.2*	UJ	19.8		50.9
12.5	Brown silt	13600		358		0.08		3.3	U	13.2	U	2.7		623		2930	1	UJ	1	U	723	*30.5*	UJ	21.3		42.6
Representative		**18700.0**		**475.9**		**0.3**		**5.2**		**14.9**		**8.9**		**840.2**		**3562.3**	**6.5**		**2.0**		**970.7**	**20.4**		**52.6**		**52.4**

F131B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium	Beryllium	Boron		Cadmium		Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
40	Sand	3210		6.1	J	4.3		60.3	0.3	2.3	U	0.29	U	8910	7.6	4.7	8.7	128	12600	4.5	5
60	Moderate yellowish-brown clayey silt	12700	UJ	4.7		3.2		108	0.72	7.7		0.8		33200	16.7	6	8.9	461	13500	9.3	13.3
70	Pale olive gray clay	*14800*		5.9	UJ	1.3		110	0.66	13		*1.9*		*107000*	17.7	6.8	7.7	*648*	*15100*	7.8	16.4
80	sandy gravel	2950		4.6	UJ	7.8		26.1	0.22	2.6	UJ	0.75		29800	14.7	3	*28.9*	290	10800	3.1	4.3
Representative		**14638.6**		**8.5**		**8.5**		**203.2**	**1.2**	**18.1**		**1.2**		**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sulfate		Thallium		Vanadium	Zinc
40	Sand	2580	260	*0.72*		1.3	U	8.5	*14.4*	*1780*	623	0.5	U	0.29	U	20	U	0.09	UJ	8.5	21.7
60	Moderate yellowish-brown clayey silt	11600	341	0.09	U	1.6	U	11.5	*11.5*	*880*	2740	0.59	U	0.36	U	20		0.23	J	22.2	44.9
70	Pale olive gray clay	16700	447	*4.8*		2	U	13.6	*11.7*	811	2770	0.8	U	0.46	U	20		0.2	J	20.6	48.3
80	sandy gravel	4700	189	0.05	U	1.5	U	12.4	6.2	578	588	0.6	U	0.35	U	20	U	0.1	U	10.1	30.2
Representative		**18700.0**	**475.9**	**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**				**20.4**		**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.3-10
Concentrations of Parameters in Soil in Former Pond 7S - Tree-Line Area

F055B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
3	Brown silt	*17800*	15.4 UJ	4.5	178	1.2	*28.6* U	*154*	*83400*	*139*	6.2	*27.9*	*4720*	12000	*30.8*
5	Brown silt	*15100*	17.1 UJ	3.6	143	0.82	*18.9* U	*32.2*	40800	21.1	6.8	12.9	490	13800	14.8
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
3	Brown silt	15.9	11100	374	0.06 UJ	5.1	*31.4*	*72.5*	*8240*	3 U	*17.2*	*24.1* U	*153*	*2940*
5	Brown silt	16.3	13200	438	0.06 UJ	2.9 U	*17*	*1440*	*8940*	1.7 U	1.1	*26.7* U	29.6	*801*
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**

F056B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
5	Tan brown silt	*15600*	16 UJ	6.6	157	1.1	*41.4*	*33.7*	*80700*	*114*	5.2	*21.3*	*2630*	11700	9.4
7	Tan silt to black	*16000*	*161* J	*27.7*	150	*1.9*	*124*	*5610*	*93100*	*242*	*19.3*	*221*	*44800*	3690	*1300*
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
5	Tan brown silt	14.1	14400	410	*1.1* J	2.7 U	*31.6*	4.4	*9530*	2.3 U	1.7	*24.9* U	*148*	*437*
7	Tan silt to black	9.2 U	3260	*1240*	*2.3* J	*26.9*	*38.1*	*11900*	*51400*	*24.4*	*786*	*87.7* U	*149*	*499000* J
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**

F057B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
5	Tan fine silt	13500	15.8 UJ	3.6	141	0.74	*21.5* U	*27.1*	53700	*33.7*	5.7	12.5	*890*	12500	13.8
7	Tan sand/silt with gray clay	*14900*	16.4 UJ	5.6	141	0.91	*20.3* U	*235*	63900	*109*	6	*28.3*	*3330*	11900	*56.9*
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
5	Tan fine silt	13.7	16700	359	*1.9* J	2.7 U	*15.2*	*104*	*2230*	4.3 U	*2.1*	*24.6* U	43	*485*
7	Tan sand/silt with gray clay	13.6	14600	344	*0.32* J	4.7	*29.4*	*386*	*12700*	*9.1*	*30*	*25.5* U	*117*	*3860*
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.3-11
Concentrations of Parameters in Soil in the Long-Term Phosphorous Storage Area

F062B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium	Beryllium		Boron		Cadmium		Calcium	Chromium		Cobalt	Copper		Fluoride	Iron	Lead	
1	Tan brown silt	*15200*		16.9	UJ	3	U	137	0.22	U	*24.7*	J	1.1	U	47600	18.7	J	6.4	11	J	*1500*	14000	6.8	U
3	Tan brown silt	14200		17.1	UJ	4.3	U	181	0.22	U	*18.4*	UJ	1.1	U	49000	14.7	J	6	10.7	J	*1010*	14500	6.9	U
Representative		**14638.6**		**30.9**		**8.5**		**203.2**	**1.2**		**18.1**		**1.2**		**65574.4**	**27.0**		**8.7**	**15.2**		**559.2**	**14930.2**	**26.1**	

Sample Depth	Sample Description	Lithium		Magnesium	Manganese	Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium		Zinc
1	Tan brown silt	14.2	U	11400	420	0.14	U	2.9	U	12.3	J	*472*	*8880*	2.9	U	0.88	U	*26.3*	U	30.3	J	*58.9*
3	Tan brown silt	15.7	U	14300	427	0.2	U	2.9	U	13.2	J	*18.5*	*3070*	3.5	U	0.89	U	*26.6*	U	25.8	J	*55.9*
Representative		**17.8**		**18700.0**	**475.9**	**0.3**		**5.2**		**14.9**		**8.9**	**840.2**	**6.5**		**2.0**		**20.4**		**52.6**		**52.4**

F063B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium	Beryllium		Boron		Cadmium		Calcium	Chromium		Cobalt	Copper		Fluoride	Iron	Lead	
5	Brown silt	*16900*		18.2	UJ	4.3	U	132	0.42		*22*	UJ	1.2	U	39700	*47.2*	J	7.4	15.1	J	*600*	*16900*	7.3	U
7	Brown silt	13800		18.5	UJ	8.4		179	0.88		*27*	J	1.2	U	41200	*126*	J	7.7	*23.3*	J	540	*17000*	12.3	U
Representative		**14638.6**		**30.9**		**8.5**		**203.2**	**1.2**		**18.1**		**1.2**		**65574.4**	**27.0**		**8.7**	**15.2**		**559.2**	**14930.2**	**26.1**	

Sample Depth	Sample Description	Lithium		Magnesium	Manganese	Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium		Zinc
5	Brown silt	*19*	U	12600	*476*	0.17	U	3.3	U	*18.8*	J	6.5	*855*	2.9	U	0.95	U	*28.4*	U	*59.2*	J	*59*
7	Brown silt	16	U	12800	*483*	0.17	U	3.1	U	*36.1*	J	4.1	801	2.3		1.3		*28.8*	U	*131*	J	*57.3*
Representative		**17.8**		**18700.0**	**475.9**	**0.3**		**5.2**		**14.9**		**8.9**	**840.2**	**6.5**		**2.0**		**20.4**		**52.6**		**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.3-12
Concentrations of Parameters in Soil in the Railcar-Loading and -Unloading Area at Bannock Paving Company

F083B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
5	Brown tan silt	*15900*	16.5 UJ	4.7 U	177	0.96	*20.7* UJ	1.1 U	42400	17.3	6.5	11.4	500	*15000*	8.9	15.4
9	Brown silt	13700	16.3 U	3.3	174	0.68	14.9 U	*1.3*	51500	17.8	6.1	10.6	500	12200	11.8 UJ	13.3 U
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
5	Brown tan silt	13900	437	0.22 U	2.8 U	14.8	1	662	NA	4.5	0.86 U	NA	*25.7* U	30.3	*54.4*
9	Brown silt	12700	345	*0.57* J	2.8 U	12.1	2.9	776	3160	2.3 U	0.85 U	622	*25.4* U	26.3	44.5
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F084B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
5	Tan brown silt with gravel (slag)	*16600*	16.7 U	3.7	145	0.7	16.8 U	*3.1*	24700	18.8	5.4	13.2	*1680*	14500	11.1 J	15.1
7	Brown silt	*15400*	16.9 U	1.3 U	145	0.71	15.9 U	1.1	31300	17.3	5	14.4	*1200*	13500	7.3 J	14.3
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
5	Tan brown silt with gravel (slag)	9660	312	*0.38* J	2.8 U	12.5	*104*	*1900*	*5080*	2.5 U	0.87 U	722	*26* U	32.7	*207*
7	Brown silt	8900	391	*0.42* J	2.9 U	10.6	*86.4*	*1500*	*4580*	2 U	0.88 U	710	*26.4* U	26.7	*60.8*
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
NA - Not analyzed.
U - Not detected.

Table 4.2.3-13
Concentrations of Parameters in Soil in the Secondary Condenser Area

F052B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium		Boron		Cadmium		Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead		Lithium
10	Yellowish-brown silt	12300	17	UJ	2.3	J	122	*1.3*	U	12.8	UJ	*1.7*		37200	21.2	4.2	9	*1390*	12000	7.5		12.6
12.5	Yellowish-brown silt	11000	16.5	UJ	3.8	J	123	1.2	U	8.9	UJ	*1.6*		34700	16.4	4	8	*1140*	11900	7.6		11.6
15	Yellowish-brown silt - trace gravel	10400	16.7	UJ	2.8	J	113	*1.3*	U	9.7	UJ	1.1	U	28400	15.4	3.9	10.8	510	12100	7.5		11.2
17.5	Yellowish-brown silt	9890	16.6	UJ	3.8	J	111	*1.3*	U	8.2	UJ	*1.7*		29100	18.3	3.4	8.9	*800*	11000	9.4		10.6
20	Yellowish-brown silt	8610	17.2	UJ	3.7	J	97.1	*1.3*	U	5.3	UJ	1.1	U	29100	13.6	4.6	*27.4*	500	11200	6.9	U	10.3
Representative		**14638.6**	**30.9**		**8.5**		**203.2**	**1.2**		**18.1**		**1.2**		**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**		**17.8**

Sample Depth	Sample Description	Magnesium	Manganese		Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium	Thallium		Vanadium	Zinc
10	Yellowish-brown silt	10500	321	J	*0.86*	J	2.9	U	11.3		3.7	*896*	2960	1.6	U	0.88	U	765	*26.5*	U	30.9	47.9
12.5	Yellowish-brown silt	11400	339	J	*0.87*	J	2.8	U	10.5	U	3.7	*914*	2650	1.7	U	0.86	U	825	*25.7*	U	26.9	*53*
15	Yellowish-brown silt - trace gravel	9820	427	J	0.29	J	3.8	U	11.9		5.1	718	2600	1.8	U	0.87	U	934	*26*	U	23.6	*55.7*
17.5	Yellowish-brown silt	9180	332	J	0.16	J	2.8	U	12.4		5.7	710	2250	1.7	U	0.86	U	698	*25.8*	U	24.5	45.8
20	Yellowish-brown silt	10400	449	J	*0.33*	J	2.9	U	*16.2*		*9.9*	*883*	1980	1.6	U	0.89	U	669	*26.8*	U	19.5	43.3
Representative		**18700.0**	**475.9**		**0.3**		**5.2**		**14.9**		**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**		**970.7**	**20.4**		**52.6**	**52.4**

F053B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium		Boron		Cadmium		Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead		Lithium
10	Dark brown silt	8580	15.9	UJ	3.2	J	113	1.2	U	6.4	UJ	1	U	35200	16.7	4.3	8.4	520	10800	8.4		10.3
12.5	Dark brown silt	*17400*	15.9	UJ	1.9	J	173	1.2	U	*35.9*	J	*4.6*		*120000*	*91.9*	2.7	9.7	*6530*	7170	6.4	U	13.7
15	Dark brown silt	11500	16.8	UJ	3.2	J	148	*1.3*	U	9.8	UJ	1.1	U	29300	18.1	4.9	14.3	*570*	12800	12.3		11.7
17.5	Dark brown silt	12700	16.3	UJ	4.3	J	133	1.2	U	15.6	UJ	1.1	U	31600	U 21.9	4.7	13.2	*1390*	12500	6.6	U	12.1
20	Dark brown silt	13900	17.2	UJ	3.7	J	114	*1.3*	U	14.6	UJ	1.1	U	23400	19	5.4	12.3	510	14000	6.9	U	12
Representative		**14638.6**	**30.9**		**8.5**		**203.2**	**1.2**		**18.1**		**1.2**		**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**		**17.8**

Sample Depth	Sample Description	Magnesium	Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium	Thallium		Vanadium	Zinc
10	Dark brown silt	10100	430	J	*0.95*	J	2.7	U	14.3	4.8	695	1860	1.4	U	0.83	U	650	*24.8*	U	18.9	39.8
12.5	Dark brown silt	7110	268	J	0.25	J	2.7	U	9.9	3.7	*1760*	*4190*	2.2	U	0.96		*1710*	*24.8*	U	*84.6*	*79.1*
15	Dark brown silt	10000	*496*	J	0.25	J	2.8	U	13.4	5.1	771	2610	1.2	U	0.87	U	745	*26.2*	U	26.5	52.1
17.5	Dark brown silt	9770	446	J	0.18	J	2.8	U	12.5	5	708	2890	1.2	U	0.85	U	752	*25.4*	U	31	46.2
20	Dark brown silt	9330	398	J	*0.35*	J	2.9	U	11.1	*12.3*	*923*	3140	1.2	U	0.89	U	738	*26.7*	U	28.5	*53.5*
Representative		**18700.0**	**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**		**970.7**	**20.4**		**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.3-14
Concentrations of Parameters in Soil in the Former Transformer Salvage Area

F035B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
2	Slag (fill)	14300	17 UJ	5.7 UJ	130 J	0.85	*50.1*	*135*	24300	23.1	2.3	10.6	*1330*	12600	10.1 J	6.1 U
4.5	Reddish-yellow silt	14500	17.2 UJ	5.6 UJ	139 J	0.94	*23.1* U	*81.7*	*68800*	*94.6*	6	*26.3*	*3620*	11300	*98.7* J	11.8
7	Reddish-yellow silt	11700	15.6 UJ	3.8 UJ	118 J	0.67	*20.2* U	1 U	38000	15.2	5.6	9.9	380	12100	8.4 J	12.4
9.5	Reddish-yellow silt	11600	16.9 UJ	4.1 UJ	130 J	0.68	11.7 U	1.1 U	41800	15.4	5.9	12.4	430	12400	13.6 J	12.8
12	Reddish-yellow silt	11800	16.3 UJ	4.3 UJ	150 J	0.66	*28.2* U	1.1 U	39300	14.7	5.3	11	440	12300	9.1 J	13
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
2	Slag (fill)	3550	239 J	0.06 U	4.5	10	*1530* J	*33400*	*13600*	1.3 UJ	0.88 U	856	*26.4* U	30.7	*19300* J
4.5	Reddish-yellow silt	9970	*651* J	0.06 U	3.3	*45.4*	*2280*	*49900*	*8670*	3 UJ	*26.8* U	*1040*	*26.8* U	*90.8*	*4250* J
7	Reddish-yellow silt	12200	356 J	0.05 U	2.6 U	12.6	*750* J	*2500*	*4510*	1.4 UJ	0.81 U	712	*24.4* U	23.4	46.7 J
9.5	Reddish-yellow silt	13100	402 J	0.06 U	2.9 U	13	*295*	*1920*	*4710*	1.5 UJ	0.88 U	685	*26.4* U	22.4	*54.7* J
12	Reddish-yellow silt	15000	399 J	0.06 U	2.7 U	13.3	*452*	*2320*	*5050*	1.5 UJ	0.84 U	853	*25.3* U	23.1	50.7 J
Representative		**16700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F036B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
1	Light brown silt	13200	16.5 UJ	3.7 UJ	128 J	0.71	16.1 U	*8.4*	29800	18.8	5.6	17	*1580*	12700	13.5 J	13.2
3.5	Light brown silt	12500	15.6 UJ	4.1 UJ	137 J	0.69	12.7 U	*1.8*	46400	18.5	6.4	11.3	480	13500	9.4 J	13.2
6	Light brown silt	13100	16.1 UJ	5.5 UJ	131 J	0.8	17.1 U	*118*	54400	*47.3*	5.6	*25.2*	*2700*	11300	*69.7* J	12.1
8.5	Light brown silt	13900	16.2 UJ	4.3 UJ	150 J	0.75	*27.1* U	*3.6*	33700	17.1	6.1	12.9	550	13400	14.7 J	14.9
11	Light brown silt	12000	16.6 UJ	3.7 UJ	123 J	0.63	11.7 U	1.1 U	46900	15.1	5.6	12.1	490	12300	12.5 J	13
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
1	Light brown silt	8280	*487* J	0.05 U	2.8 U	*25.8*	*950*	*8850*	*5640*	1.8 UJ	0.86 U	659	*25.7* U	32	*1400* J
3.5	Light brown silt	13800	401 J	0.05 U	2.6 U	13.9	*46.5*	816	*4550*	1.2 UJ	0.81 U	626	*24.3* U	27.2	*93.9* J
6	Light brown silt	11000	347 J	0.05 U	2.7 U	*19.5*	*147*	*7160*	*5710*	2.6 UJ	*21*	825	*25* U	*59.3*	*2740* J
8.5	Light brown silt	12200	410 J	0.06 U	2.7 U	14.7	*54.8*	*1150*	*5640*	1.4 UJ	0.84 U	721	*25.2* U	27.7	*116* J
11	Light brown silt	13500	365 J	0.06 U	2.8 U	12.1	*48.5*	*851*	*4980*	1.4 UJ	0.86 U	621	*25.9* U	24.4	48.4 J
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.3-15
Concentrations of Parameters in Soil in the Bannock Paving Area

F080B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
5	Tan brown silt	*19100*	17 UJ	6.3 U	183	1.1	*19.1* UJ	1.1 U	58200	20.3	7.3	13.9	*560*	*16100*	8.8	*18*
7	Tan brown silt	*18000*	17.6 UJ	5.6 U	181	1	*20* UJ	1.1 U	55000	*33.9*	6.5	14	*760*	*15500*	13.5	16.7
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
5	Tan brown silt	11600	421	0.19 U	2.9 U	14.3	1.1	657	N/A	1.6 U	0.88 U	N/A	*26.5* U	32	*60.2*
7	Tan brown silt	12900	418	*0.35* U	3 U	*15*	0.9	*934*	N/A	1.7 U	0.91 U	N/A	*27.4* U	46.6	*61.6*
Representative		**16700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

S081B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
4	Tan brown silt	14200	16.2 U	4.3	139	0.67	*19* U	1.1	43700	23	6.3	12.8	*670*	13200	9.5 J	13.3
7	Tan brown silt	11100	16 U	3.2	91.3	0.67	11.1 U	1.1	46900	17.5	5.1	8.9	530	11300	6.4 UJ	10.2
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
4	Tan brown silt	10100	372	0.26 J	2.7 U	13.4	*9.7*	684	*4520*	2.6 U	0.84 U	799	*25.2* U	30.1	51.2
7	Tan brown silt	12300	327	0.17 J	2.7 U	12.1	7.5	745	2340	2.1 U	0.83 U	632	*24.9* U	26.8	41.5
Representative		**16700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

S082B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
5	Tan brown sandy silt	*15100*	16.4 UJ	6 U	189	0.9	15.4 UJ	1.1 U	49800	18.9	5.9	11.5	*580*	14300	8.2	15
9	Brown silt with sand	*14900*	16.5 UJ	6 U	133	0.89	*18.8* UJ	1.1 U	42900	21.4	5.6	11.1	460	13700	10.1	13.8
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
5	Tan brown sandy silt	14400	398	0.27 U	2.8 U	11.8	1.1	722	N/A	1.2 U	0.85 U	N/A	*25.5* U	31.3	50.4
9	Brown silt with sand	13400	372	0.16 U	2.8 U	*15.5*	2.2	624	N/A	1.2 U	0.86 U	N/A	*25.8* U	33.8	48.7
Representative		**16700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
NA - Not analyzed.
U - Not detected.

Table 4.2.3-16
Concentrations of Parameters in the Chemical Laboratory Drain Pit

F028B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0	Reddish-brown silt	*17000*	7.8 U	5.4 UJ	152	1.3	*44.6* J	1.3	*149000*	*95.7* J	3.8	17 J	10300	5460	3.1 U	14.7
10	Reddish-brown silt	9630	8.4 U	6.1 UJ	125	0.64	7.8 UJ	0.55 U	34200	*12.9* J	5.3	9.1 J	430	11700	10.1	11.7
20	Reddish-brown silt	8560	8.2 U	5.4 UJ	82.9	0.52	5.4 UJ	0.53 U	19000	12.9 J	4.7	7.3 J	350	11000	9	8.8
30	Reddish-brown silt with medium grain sand	9480	8.9 U	5.5 UJ	118	0.54	6 UJ	0.58 U	41100	12.8 J	5.1	9.1 J	390	11200	7	10.2
70	Brown clayey silt	14600	10.6 U	4.1 UJ	125	0.84	8.6 UJ	0.69 U	47700	18.4 J	6.9	11.7 J	490	*15200*	8.4	17.7
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
0	Reddish-brown silt	5350	192 J	0.05 U	2.1 U	12.9	1.1	*3810*	*5650*	1.4	*2.3*	*2300*	0.4 U	*99.5*	51.9
10	Reddish-brown silt	10500	360 J	0.1	1.4 U	12.3	4.4	724	2290	0.28 UJ	0.44 U	448	0.44 U	20.9	40.8
20	Reddish-brown silt	8110	342 J	0.1	1.4 U	10.6	4.8	*952*	1830	0.27 UJ	0.43 U	409	0.43 U	20.9	39.6
30	Reddish-brown silt with medium grain sand	13700	350 J	0.11	1.5 U	12.3	2.4	825	1870	0.29 UJ	1.8	439	0.46 U	21.4	42.9
70	Brown clayey silt	14300	347 J	0.14	1.8 U	*15.6*	0.7	542	3230	0.34 UJ	0.55 U	564	0.55 U	28.6	51.6
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F029B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
1	Yellowish-brown gravelly silt	10100	8.9 U	5.2 UJ	129	0.63	7.1 UJ	*7.3*	38200	*30.7* J	4.7	14.6 J	*1560*	10900	*56.4*	11.2
20	Brown silt	9810	9.6 U	6.2 UJ	110	0.74	5.3 UJ	0.63 U	19600	12.2 J	6.3	12.1 J	520	13500	11.4	11.1
30	Brown silt	5950	9.1 U	5 UJ	95.1	0.41	3.5 UJ	0.59 U	36900	8.6 J	4.1	7.4 J	450	8840	6.3	7.9
60	Brown coarse grained sand	3690	8 U	*13.3* J	78.5	0.33	1.6 UJ	0.52 U	7060	6.2 J	4	8.2 J	130	11000	4.8	5.7
70	Brown silt	12400	18.6 UJ	4.7 U	120 J	*1.6*	9.5 U	1.2 U	41900	16.8	5.7	9.1	430	13100	9.2 U	13
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
1	Yellowish-brown gravelly silt	9380	325 J	0.15	1.5 U	14.9	*212*	*5460*	*3710*	0.29 UJ	*9.8*	492	0.46 U	35.2	*1390*
20	Brown silt	8450	470 J	0.21	1.9 U	*15.3*	*12.3*	*1100*	2220	0.33 UJ	0.5 U	464	0.5 U	20.3	*57.3*
30	Brown silt	11500	299 J	0.19	1.5 U	9.1	2.1	730	1340	0.3 UJ	0.47 U	345	0.47 U	14.9	34.6
60	Brown coarse grained sand	2180	140 J	0.14	1.4 U	11.2	1.9	141	765	0.26 UJ	0.42 U	274	0.42 U	7.6	22.1
70	Brown silt	13400	285	0.09	3.1 U	12.1 U	2.4	630	2550	0.84 UJ	0.97 U	790	*29* UJ	23.7	44.1
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.3-17
Concentrations of Parameters in Soil Beneath the Paved Area North of Furnace Building

F066B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium	Boron		Cadmium		Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
3	Tan brown silt/sand	11100	15.4	UJ	0.53	UJ	180	0.59	*19.9*	U	1	U	27900	18.9	8.6	8.7	270	*15500*	9.9	11.3
5	Tan brown silt/sand with slag	7570	16.1	UJ	2.2	U	147	0.51	9.2	U	1	U	44000	16.7	5.7	7.7	520	12600	10.7	9.1
Representative		14638.6	30.9		8.5		203.2	1.2	18.1		1.2		65574.4	27.0	8.7	15.2	559.2	14930.2	26.1	17.8

Sample Depth	Sample Description	Magnesium	Manganese	Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium	Thallium		Vanadium	Zinc
3	Tan brown silt/sand	9700	*514*	*0.75*	J	2.6	U	11.1	3.8	598	N/A	1.1	U	0.8	U	N/A	*24.1*	U	31.1	46.1
5	Tan brown silt/sand with slag	5700	309	*1.1*	J	2.7	U	7.3	1.6	*860*	N/A	1.2	U	0.84	U	N/A	*25.1*	U	23.7	*56.1*
Representative		18700.0	475.9	0.3		5.2		14.9	8.9	840.2	3562.3	6.5		2.0		970.7	20.4		52.6	52.4

F067B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic	Barium	Beryllium	Boron		Cadmium		Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
5	Tan brown silt with gravel (slag)	*15400*	16.2	U	5.1	155	0.95	*32.4*	J	*8.5*		*85400*	*48.9*	4.8	11.6	*4300*	9790	10.9	13.3
9	Tan brown silt with gravel (slag)	12400	16.3	U	5.3	123	0.43	16	UJ	1.1	U	33400	17.1	5.9	9.1	530	12200	7.1	11.4
Representative		14638.6	30.9		8.5	203.2	1.2	18.1		1.2		65574.4	27.0	8.7	15.2	559.2	14930.2	26.1	17.8

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium	Thallium		Vanadium	Zinc
5	Tan brown silt with gravel (slag)	9030	259	*1.1*	2.7	UJ	11.6	7	*1440*	N/A	2.1	UJ	1.1	U	N/A	*25.3*	U	*54.6*	*199*
9	Tan brown silt with gravel (slag)	11400	366	0.16	2.8	UJ	11.1	3.8	569	N/A	2.6	UJ	0.85	U	N/A	*25.4*	U	26.2	46.8
Representative		18700.0	475.9	0.3	5.2		14.9	8.9	840.2	3562.3	6.5		2.0		970.7	20.4		52.6	52.4

F068B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium	Boron		Cadmium		Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
3	Red brown silt	*16100*	17.6	UJ	2.7		148	0.95	13.2	U	1.1	U	54400	18.9	5.8	12.2	450	13700	7.6	14
5	Tan brown silt	*15600*	17.3	UJ	1.3	U	175	0.91	11.7	U	1.1	U	43000	18.8	6.7	11.9	480	14800	10.8	17.3
Representative		14638.6	30.9		8.5		203.2	1.2	18.1		1.2		65574.4	27.0	8.7	15.2	559.2	14930.2	26.1	17.8

Sample Depth	Sample Description	Magnesium	Manganese	Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium	Thallium		Vanadium	Zinc
3	Red brown silt	11300	348	*0.39*	J	3	U	13.2	0.7	649	N/A	1.9	U	0.91	U	N/A	*27.4*	U	28.8	43.5
5	Tan brown silt	13100	430	*0.37*	J	2.9	U	12.5	1.3	643	N/A	1.7	U	0.9	U	N/A	*27*	U	29.5	51.7
Representative		18700.0	475.9	0.3		5.2		14.9	8.9	840.2	3562.3	6.5		2.0		970.7	20.4		52.6	52.4

F069B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic	Barium	Beryllium	Boron		Cadmium		Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
3	Brown silt	14300	16	UJ	3.1	152	0.72	*19.3*	U	1	U	49100	18.2	6	9.8	510	12700	9.6	14
5	Tan brown fine silt	14400	16.8	UJ	3.5	120	0.87	13.9	U	1.1	U	38400	17.2	5.8	12.2	510	13600	8.2	15.3
Representative		14638.6	30.9		8.5	203.2	1.2	18.1		1.2		65574.4	27.0	8.7	15.2	559.2	14930.2	26.1	17.8

Sample Depth	Sample Description	Magnesium	Manganese	Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium	Thallium		Vanadium	Zinc
3	Brown silt	11400	329	0.23	J	2.7	U	11.5	1	737	N/A	2.2	U	0.83	U	N/A	*25*	U	28.2	43.7
5	Tan brown fine silt	12800	382	0.19	J	2.8	U	14.7	1.6	711	N/A	1.8	U	0.87	U	N/A	*26.2*	U	29.3	46.6
Representative		18700.0	475.9	0.3		5.2		14.9	8.9	840.2	3562.3	6.5		2.0		970.7	20.4		52.6	52.4

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
NA - Not analyzed.
U - Not detected.

Table 4.2.3-18
Concentrations of Parameters in Soil in the Area West of the Mobile Shop

F060B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium	Boron		Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
1	Dark brown silt with gravel	*15900*	16.1	UJ	3	U	151	*1.3*	*49*	J	*21.4*	*151000*	*180*	2.6	*204*	*10690*	7580	*74.4*	15
2	Dark brown/black sandy silt with gravel	*19900*	16.2	UJ	2.6	U	187	*1.5*	*53.9*	J	*82.1*	*167000*	*281*	3.8	*39.6*	*12210*	8630	*122*	15.3
Representative		**14638.6**	**30.9**		**8.5**		**203.2**	**1.2**	**18.1**		**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury		Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver	Sodium	Thallium		Vanadium	Zinc
1	Dark brown silt with gravel	4870	451	*0.8*		*64.7*	*34.5*	*20.7*	*7130*	N/A	2.5	U	*4.9*	N/A	*25*	U	*170*	*410*
2	Dark brown/black sandy silt with gravel	6230	384	*0.39*	U	*8.9*	*47.9*	*41.6*	*9770*	N/A	3.4	U	*28.8*	N/A	*25.2*	U	*242*	*4690*
Representative		**16700.0**	**475.9**	**0.3**		**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**	**970.7**	**20.4**		**52.6**	**52.4**

F061B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium	Boron		Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
1	Dark brown sandy silt with gravel	*18800*	21.9	J	2.6	U	191	*1.4*	*61.2*	J	*125*	*159000*	*241*	2.8	*33*	*8920*	7060	*153*	15.8
2	Gray/black silty sand with gravel	*15400*	23.3	J	5.5	U	147	0.84	*52.1*	J	*446*	*82200*	*129*	4.9	*51.4*	*9280*	11100	*420*	13.2
Representative		**14638.6**	**30.9**		**8.5**		**203.2**	**1.2**	**18.1**		**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury		Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver	Sodium	Thallium		Vanadium	Zinc
1	Dark brown sandy silt with gravel	6350	395	0.25	U	4.5	*35.5*	*151*	*17100*	N/A	3	U	*45.9*	N/A	*25.6*	U	*232*	*7970*
2	Gray/black silty sand with gravel	*7720*	330	*0.51*	U	*6*	*28.7*	*874*	*34300*	N/A	4.9	U	*124*	N/A	*28.3*	U	*131*	*20400*
Representative		**16700.0**	**475.9**	**0.3**		**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**	**970.7**	**20.4**		**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
NA - Not analyzed.
U - Not detected.

Table 4.2.3-19
Concentrations of Parameters in Soil in the Phos Dock Area

F064B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
2.5	Brown sandy silt with trace gravel (slag)	14000	17.4 UJ	4.5 J	137	0.46 U	*35.8* UJ	1.1 U	51900	*29.8*	3.1	9.6	*2520*	12200	9.3	12.6
4.5	Brown silt with trace gravel	12900	17.8 UJ	2.1 J	127	0.41 U	*18.4* UJ	*1.8*	53400	*31.5*	3.7	11.3	*3860*	13000	15.4	12.2
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
2.5	Brown sandy silt with trace gravel (slag)	7290	375 J	*0.72* J	2.9 U	11.8	*95.9*	*17100*	*4350*	1.8	0.9 U	*1660*	*27.1* U	36	*150*
4.5	Brown silt with trace gravel	7130	373 J	*1.4* J	3 U	12.1	*254*	*15600*	*4750*	1.6	0.93 U	*1400*	*27.8* U	38	*157*
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.3-20
Concentrations of Parameters in Soil in the Shale Ore Handling Area

F090B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
3	Dark brown silt with trace gravel	11300	16.1 UJ	*8.9*	113	*2.9*	*54.2* J	*94.6*	*228000*	*781*	0.84 U	*106*	*18000*	9340	12.3 J	11.4
5	Dark brown silt	13000	16.1 UJ	*9.1*	125	*3.1*	*60.1* J	*108*	*212000*	*871*	1.1	*119*	*17300*	10100	13 J	13.9
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
3	Dark brown silt with trace gravel	2790	153	*0.54*	*23.9*	*151*	8.2	*83700*	3450	*10.2* J	*6*	*2990*	*25.1* U	*993*	*1140*
5	Dark brown silt	2780	170	*0.36* U	*17.4*	*143*	*23.9*	*71500*	*3680*	*7.6* J	*6.8*	*2820*	*25.1* U	*1070*	*1010*
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F091B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0	Tan/red brown silt with gravel	7290	15.2 UJ	4.4	93.2	0.81	5.8 J	*7.1*	34800	*66.1*	4.1	*16.3*	*1060*	12300	10 J	8 U
2	Brown silt with gravel	13900	16.2 UJ	2.9	137	1	14.4 J	*3*	48100	*36.9*	5.8	11.2	*1030*	13700	14.3 J	13.3
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
0	Tan/red brown silt with gravel	4540	216	0.08 U	2.9	*24.5*	*30.8*	*5080*	1860	2.4 J	0.79 U	807	*23.7* U	*86.3*	*123*
2	Brown silt with gravel	10300	346	0.09 U	2.7 U	14.4	2.2	*2770*	3370	1.2 UJ	0.84 U	924	*25.3* U	52.6	*73.9*
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F092B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0	Red brown to light tan silty sand	9830	16 UJ	*15.2*	121	*2.7*	*68.1* J	*83.3*	*212000*	*689*	1.6	*109*	*18500*	10800	*32.2* J	*36.9*
2	Brown silt with gravel	14100	17.5 UJ	4.1	151	1	12.6 J	1.1 U	44700	20.4	6.4	10.9	530	14800	15.3 J	*19*
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
0	Red brown to light tan silty sand	5170	244	*0.38* U	*22.5*	*156*	6.3	*68700*	3110	*6.9* J	*5.7*	*2820*	*24.9* U	*848*	*1220*
2	Brown silt with gravel	12600	419	0.08 U	2.9 U	13.8 U	1.5	804	*3570*	1.3 UJ	0.91 U	784	*27.2* U	28.4	*55*
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F093B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
3	Brown/red brown silt (shale)	*17200*	16.3 UJ	5.3	147	0.86	15.4 U	*2.4*	42700	*29.5*	6.9	13.6	*2070*	14600	6.7	15.9
5	Red brown silt	*17100*	15.9 UJ	2.8	166	0.75	*20.2* U	1 U	52000	24.8	7.1	11.5	510	14800	7.7	16.6
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
3	Brown/red brown silt (shale)	10200	398	*2.5* J	2.8 U	14.8	7.4	*5160*	N/A	2.2 U	0.85 U	N/A	*25.4* U	*45.2*	*76.7*
5	Red brown silt	14300	379	*0.89* J	2.7 U	*16.2*	1.5	685	N/A	1.3 U	0.82 U	N/A	*24.7* U	38.7	*56.9*
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

Table 4.2.3-20 (Cont'd)

F094B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
6	Dark brown to tan silt/sand	13300	16 UJ	2.7	145	0.79	14.1 U	1 U	31200	17.2	5.8	10.6	480	13200	6.4 U	16
8	Dark brown silt	13300	16.7 UJ	0.55 UJ	127	0.78	16.8 U	1.1 U	37200	18.2	6.7	11.1	420	14300	9.6	15
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
6	Dark brown to tan silt/sand	11100	396	0.06 UJ	2.7 U	11.5	*317*	*1570*	N/A	1.6 U	0.83 U	N/A	*24.9* U	26	51.6
8	Dark brown silt	11500	391	*1.1* J	2.8 U	11.1	*21.4*	636	N/A	1.3 U	0.87 U	N/A	*26* U	30	*56.1*
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F132B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0	Grayish-brown gravelly silt	10900	6 J	*11.1*	99.6 J	2	64	124	N/A	670	0.33	102	19700	7890	16.4 J	7.9 J
2.5	Grayish-brown gravelly silt	10100	4.8 UJ	*25.7*	90.5 J	2	*51.4*	104	N/A	709	0.32	111	17300	8140	14.7	8.2
5	Grayish-brown gravelly silt	11500	4.7 UJ	3.5	121 J	0.63	10.1 U	1.2	N/A	17.5	5.3	8.8	560	12000	7.3	10.7
7.5	Pale yellowish-brown silt	10800	4.8 UJ	3.4	121 J	0.62	6.5 U	0.32 U	N/A	14.3	5.3	8.4	470	12300	7.4	10.3
10	Pale yellowish-brown silt	11500	4.7 UJ	4	113 J	0.61	9.8 U	0.5 U	N/A	15.4	5.4	8.5	430	12600	7.3	10.2
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
0	Grayish-brown gravelly silt	N/A	159	0.39	17	146	62.8	69000	2970	7.3	8	300	3.2	1000	1290
2.5	Grayish-brown gravelly silt	N/A	109	0.45	28.4	160	43.4	59300	3520	9.1	9.7	20	2.9	1010	1310
5	Grayish-brown gravelly silt	N/A	357 U	0.08	1.4 U	12.3	3.11	899	3180	1.4	0.42 U	20	0.1 U	25.6	53.2
7.5	Pale yellowish-brown silt	N/A	359 U	0.09	1.4 U	11.7	1.95	612	2670	0.52 U	0.42 U	190	0.22	20.5	44
10	Pale yellowish-brown silt	N/A	375 U	0.07 J	1.4 U	12.3	1.6	723	2470	0.53 U	0.42 U	140	0.18	21.8	47.7
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**		**20.4**	**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
NA - Not analyzed.
U - Not detected.

Table 4.2.3-21
Concentrations of Parameters in Soil Beneath the Roads

F101B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
5	Brown silt with slag gravel	14500	17 UJ	5.1	137	0.75	*32.2* U	1.1 U	43200	21.8	6	10.2	*600*	13400	7.5
7	Brown silt	*15000*	15.8 UJ	3.5	104	0.79	13.4 U	1 U	34200	20.4	6.7	11.2	490	14100	8.6
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
5	Brown silt with slag gravel	15.3	13700	367	*0.9* J	2.9 U	11.8	*35.1*	832	2.1 U	0.88 U	*26.5* U	34.2	49.5
7	Brown silt	14.9	13000	426	*1.3* J	2.7 U	13.4	3.9	675	1.6 U	0.82 U	*24.5* U	31	*53.5*
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**

F101R

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.5	Dark brown silty sand with trace gravel	*19300*	17 UJ	3.2 U	166	1.2	*42.5* J	*340*	*76600*	*108* J	5.9	*22* J	*12380*	12000	*69.9*
1.5	Gray sandy silt with trace gravel	*20700*	16.4 UJ	3.3 U	181	*1.4*	*69.5* J	*204*	*117000*	*141* J	4.4	*19.7* J	*12890*	9850	*41* U
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
0.5	Dark brown silty sand with trace gravel	*22.6* U	9800	289	0.3	4.3 U	*22.6* J	*86.4*	*11800*	6.4	*35.2*	*26.6* U	*105* J	*8020*
1.5	Gray sandy silt with trace gravel	*21.9* U	8770	280	0.05 U	3.8 U	*17.5* J	*52.1*	*6850*	4.4	*22.4*	*25.5* U	*134* J	*5180*
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**

F102B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
3	Tan brown silt	*16500*	16.9 UJ	6.1 U	145	1	*20.3* UJ	*2.2*	54300	*38.6*	6	12.8	*970*	13700	8.4
5	Tan brown silt	*14700*	17.6 UJ	5.4 U	153	0.95	13 UJ	1.1 U	52400	15.7	6.1	10.8	520	14700	7.1 U
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
3	Tan brown silt	15.3	10300	404	*0.32* U	2.9 U	*16*	1.3	405	1.9 U	0.88 U	*26.3* U	48.3	*79.5*
5	Tan brown silt	15.2	13400	425	*0.35* U	3 U	14.6	0.9	719	0.9 U	0.92 U	*27.5* U	*27.7*	*53.4*
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**

F103B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
3	Tan brown silt	14300	17.5 UJ	4.1 U	153	0.65	12.9 UJ	1.1 U	50100	16.9	6	11.7	*600*	14300	8.2
5	Tan brown silt	11200	16.7 UJ	4.8 U	194	0.75	9.4 UJ	1.1 U	37900	14.8	5.2	9.9	520	12500	9.7
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
3	Tan brown silt	15.1	14000	417	*1.1*	3 U	12.1	*9.7*	*855*	1.4 U	0.91 U	*27.3* U	26.5	*55.9*
5	Tan brown silt	11.4	12400	388	0.16 U	2.8 U	10.3	7.1	775	1.4 U	0.87 U	*26* U	24.7	47.8
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**

Table 4.2.3-21 (Cont'd)

F104R

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.5	Gray slag	*25400*	15 UJ	1.7 U	*215*	*2.6*	*76.7* J	*12.6*	*253000*	*820* J	5	*84.3* J	*17260*	9980	6 U
1.5	Gray slag	*18600*	15.4 UJ	3.1 U	153	*3.3*	*74.2* J	*5.5*	*192000*	*2830* J	*16.8*	*348* J	*14540*	*39100*	6.2 U
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
0.5	Gray slag	16.3 U	3750	333	0.05 U	*17.4* U	*139* J	5.1	*3490*	2.8 U	*6*	*23.3* U	*757* J	*200*
1.5	Gray slag	12.7 U	3850	*483*	0.05 U	*75.6*	*641* J	6	*4100*	1.5 U	*17.8*	*23.9* U	*2620* J	*452*
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**

F105B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
1	Dark grayish brown silt (fill)	10000	16.7 UJ	*54.2* J	113 J	*1.9*	*44.6*	*159*	*223000*	*622*	1.5	*86*	*19700*	6990	*44* J	7.7 U
3	Dark grayish brown silt (fill)	*19400*	15.3 UJ	*13.7* J	182 J	*1.7*	*57.2*	*106*	*192000*	*269*	3	*37.9*	*14100*	7410	*51* J	14.6
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
1	Dark grayish brown silt (fill)	2880	212 J	0.06 U	*13.8*	*134*	*312*	*103000*	*4840*	*9.1* J	*6.4*	*2550*	*26.1* U	*724*	*1400* J
3	Dark grayish brown silt (fill)	5560	*479* J	0.05 U	4.6	*50.3*	*54*	*35800*	*8430*	5.3 J	*11.7*	*2730*	*23.9* U	*311*	*1290* J
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F106B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
1	Tan brown silt	*15300*	16.5 UJ	4.9 U	156	0.96	*21.4* UJ	*5.4*	64100	*36.2*	5.4	11.3	*2050*	12600	13.3
3	Tan silt	10400	19.5 J	4.4 U	104	0.7	14.2 UJ	1.1 U	44900	13.7	4.9	10	440	11900	9.8
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
1	Tan brown silt	*18.4*	14200	350	0.28 U	2.8 U	*16.8*	2.8	*772*	2.2 U	0.86 U	*25.8* U	48.3	*93.6*
3	Tan silt	11	15100	355	0.19 U	2.8 U	12.6	1.5	657	1.1 U	0.86 U	*25.7* U	23.8	44.4
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**

F107R

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.5	Slag gravel	*28600*	15.1 UJ	2.9 U	*232*	*2.5*	*94.1* J	*7.2*	*289000*	*428* J	3.1	*31.9* J	*16750*	3670	6.1 U
1.5	Slag/gravel/brown silt	*21900*	15.1 UJ	3.7 U	184	*1.3*	*40.1* J	*13.6*	*109000*	*239* J	5.9	*28.6* J	*7230*	12700	*43.3*
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
0.5	Slag gravel	*18* U	4230	288	0.06	4.7 U	*45.8* J	3.4	*2430*	2.7	*5*	*23.5* U	*370* J	*127*
1.5	Slag/gravel/brown silt	16.6 U	6910	455	0.05 U	*7.1* U	*52.1* J	8.3	*6910*	2.3 U	*4.9*	*23.6* U	*279* J	*503*
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**

Table 4.2.3-21 (Cont'd)

F108B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0.5	Tan silt with gravel	*17400*	16.5 UJ	4.5	162	*1.5*	*25.1* J	*8.8*	*91800*	*108*	5.5	*19.5*	*3890*	12200	13.7 J	*19.1*
2.5	Dark tan silt	*15000*	15.5 UJ	4.3	147	1.2	*25.3* J	*12.6*	*85300*	*72*	4.7	12.3	*6370*	11200	13.5 J	16.6
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
0.5	Tan silt with gravel	11700	369	0.1 U	3.5	*22.3*	1.7	*3230*	*4530*	1.8 UJ	0.92	*1300*	*25.7* U	*112*	*135*
2.5	Dark tan silt	13100	295	0.1 U	2.6 U	*17.3*	1.8	*4220*	*3810*	3 UJ	0.81 U	*985*	*24.2* U	*83.7*	*91.3*
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F109B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0.5	Road surface - gypsum/slag/gravel	*18000*	16.6 UJ	3.5	152	1.1	15.3 J	3	27800	*27.1*	7.1	14.8	*1240*	*16800*	12.1 J	15.2
2.5	Tan silt	*20700*	16.2 UJ	4.6	168	*1.3*	*64.9* J	*24.4*	39100	*62.1*	6.8	*15.5*	*6520*	*16000*	16 J	17.6
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
0.5	gypsum/slag/gravel	8240	444	0.06 U	2.8 U	*16.5*	2.9	*1270*	*4430*	2.1 UJ	0.86 U	864	*25.9* U	37.8	*81.1*
2.5	Tan silt	8380	432	*0.31* U	2.7 U	*19.8*	4.6	*4850*	*6400*	*15.3* J	0.84 U	*1290*	*25.3* U	*74.6*	*284*
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F110B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0.5	Dark brown/black silt with gravel	*20600*	16.5 UJ	6 J	201	*1.5* U	*55.7* J	*32.8*	*132000*	*182*	5.5	*48.8*	*4420*	9390	6.6 U	*30*
2.5	Brown/black silt with trace gravel	*16300*	18.4 UJ	3.1 J	155	0.46 U	16.5 UJ	*3.3*	42500	26.8	6.1	13.1	*1460*	14400	10.1	16.1
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
0.5	Dark brown/black silt with gravel	10600	*490* J	*1.1* J	*5.7* U	*28.5*	*9.8*	*3370*	*6020*	1.2	*3.3*	*1910*	*25.7* U	*183*	*400*
2.5	gravel	11300	398 J	*0.41* J	3.1 U	*15.8*	8.1	*2030*	*4080*	1.7	0.96 U	922	*28.7* U	36.7	*67.4*
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F111R

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.5	Gray silt with slag (gravel)	*22700*	14.9 UJ	2.7 U	203	*2*	*96.3* J	*55.4*	*250000*	*292* J	2.3	*22.9* J	*19020*	3230	6 U
2	Gray silt with slag (gravel)	*26500*	18.5 U	4.6	*230*	*2.1*	*113* J	*64*	*297000*	*335*	3	*29.3*	*18900*	3180	7.5 U
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
0.5	Gray silt with slag (gravel)	*37.6*	7410	195	0.05 U	3.6 U	*23.9* J	0.6	*5080*	*5.3*	*7.7*	*23.2* U	*266* J	*706*
2	Gray silt with slag (gravel)	*39.3*	10200	242	0.06 U	5 U	*27.8*	0.5 U	*3070*	*6.6* J	*11.5*	*28.9* U	*317*	*866*
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**

Table 4.2.3-21 (Cont'd)

F112R

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium	Chromium		Cobalt	Copper		Fluoride	Iron	Lead	
0.5	Gray silt with slag	*23400*		15.1	U	3.4		*221*		*1.7*		*82*	J	*17.7*		*239000*	*188*		2.2	*15.8*		*12100*	2320	6.1	U
2	Gray silt with trace slag	*19800*		15	U	3.9		187		*1.7*		*71.1*	J	*43.8*		*221000*	*179*		2.3	*24.8*		*17500*	2960	*60.5*	
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**	**27.0**		**8.7**	**15.2**		**559.2**	**14930.2**	**26.1**	

Sample Depth	Sample Description	Lithium		Magnesium		Manganese	Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium		Silver	Thallium		Vanadium	Zinc
0.5	Gray silt with slag	15.5	U	4460		246	0.05	U	2.5	UJ	9.2	2[illegible]	*6210*	4.7	UJ	*4.5*	*23.5*	U	*175*	*272*
2	Gray silt with trace slag	14.5	U	5330		167	0.05	U	*5.8*	U	*25.2*	*11.4*	*13500*	3.5	UJ	*20.4*	*23.4*	U	*192*	*3730*
Representative		**17.8**		**16700.0**		**475.9**	**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**6.5**		**2.0**	**20.4**		**52.6**	**52.4**

F113R

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium	Chromium		Cobalt	Copper		Fluoride	Iron	Lead	
0.5	gravel	*19700*		15.8	U	5.4		179		*1.8*		*84.1*	J	*35.9*		*198000*	*243*		2.1	*25*		*13100*	3740	6.4	U
2	Tan brown sandy silt	10900		16.3	UJ	2.8	U	112		0.21	U	*27.5*	J	*2.6*		44500	*39.7*	J	5.4	9.6	J	*2620*	13600	6.6	U
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**	**27.0**		**8.7**	**15.2**		**559.2**	**14930.2**	**26.1**	

Sample Depth	Sample Description	Lithium		Magnesium		Manganese	Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium		Silver	Thallium		Vanadium	Zinc
0.5	gravel	14	U	5010		186	0.22	U	4.4	U	*25.3*	3	*14500*	J	5.2	UJ	*4.3*	*24.6*	U	*253*	*476*
2	Tan brown sandy silt	9.9	U	7340		334	0.05	U	2.7	U	11.4	J	6.8	*3250*		1.4	U	0.85	U	*25.4*	U	50.2	J	*87.8*
Representative		**17.8**		**16700.0**		**475.9**	**0.3**		**5.2**		**14.9**		**8.9**	**840.2**		**6.5**		**2.0**		**20.4**		**52.6**		**52.4**

F114R

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium	Chromium		Cobalt	Copper		Fluoride	Iron	Lead
0.5	gravel	*16600*		15.9	U	*10.8*		159		*1.7*		*91.5*	J	*64*		*199000*	*298*		2.2	*38.4*		*14600*	4540	8.7
2	Brown sandy silt	10100		16.3	U	*13*		101		0.37		*20.5*	J	*87.1*		34700	*99.6*		5.1	*19.3*		*8020*	11500	15.3
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**	**27.0**		**8.7**	**15.2**		**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium		Magnesium		Manganese	Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium		Silver	Thallium		Vanadium	Zinc
0.5	gravel	12.3	U	3830		225	0.06	U	*6.6*	U	*45.7*	7.6	*13800*	*8.3*	J	*3.8*	*24.8*	U	*338*	*405*
2	Brown sandy silt	8.2	U	5620		260	*0.56*		2.7	UJ	*20.5*	*17.9*	*6180*	*10.5*	J	0.85	U	*25.4*	U	*131*	*396*
Representative		**17.8**		**16700.0**		**475.9**	**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**6.5**		**2.0**	**20.4**		**52.6**	**52.4**

F115R

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium	Chromium		Cobalt	Copper		Fluoride	Iron	Lead	
0.5	Dark brown sandy silt	12300		15.6	U	*25.6*		107		*2*		*64.8*	J	*194*		*180000*	*588*		2.5	*74*		*12000*	8410	7.5	
2	Tan brown silt	13000		16.5	UJ	4.6	U	127		0.21	U	*20.2*	UJ	*2.7*		42900	26.2	J	6.4	10.8	J	*620*	14200	6.6	U
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**	**27.0**		**8.7**	**15.2**		**559.2**	**14930.2**	**26.1**	

Sample Depth	Sample Description	Lithium		Magnesium		Manganese	Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium		Silver	Thallium		Vanadium	Zinc
0.5	Dark brown sandy silt	8.5	U	3190		184	*0.53*		*21*		*118*	*22.2*	*34800*	*8.3*	J	*5.2*	*24.4*	U	*720*	*907*
2	Tan brown silt	12.6	U	9270		361	*0.68*		2.8	U	11.1	J	6	*1650*		2.3	U	0.86	U	*25.7*	U	38.2	J	*71.8*
Representative		**17.8**		**16700.0**		**475.9**	**0.3**		**5.2**		**14.9**		**8.9**	**840.2**		**6.5**		**2.0**		**20.4**		**52.6**		**52.4**

Table 4.2.3-21 (Cont'd)

F119R

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.5	Red brown fine silt (shale ore)	11300	15.8 UJ	*10.5*	109	*2.7*	*62.7* J	*98.9*	*226000*	*728* J	1.4	*101* J	*15660*	9230	8.2 U
2	Dark red brown silt (shale ore)	11100	16.2 U	*35*	110	*2.7*	*88.4* J	*94.2*	*219000*	*744*	2.2	*106*	*20000*	8720	9.4
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
0.5	Red brown fine silt (shale ore)	10.7 U	2180	121	*0.52*	*19.9* U	*128* J	*14.6*	*52500*	*10.1*	*6.7*	*24.7* U	*917* J	*1040*
2	Dark red brown silt (shale ore)	10 U	2230	148	*0.46*	*25.8*	*153*	*22.3*	*35600*	*15.2* J	*6.8*	*25.2* U	*1000*	*1190*
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**

F121R

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0.5	Gray silt/slag	*22800*	15.4 U	5.4	*212*	*2.3*	*84.6* J	*50.8*	*247000*	*315*	2.5	*29.2*	*14000*	2890	6.2 U
2	Gray silt (slag) with gravel	*16600*	15.4 U	4.8	152	*1.5*	*47.3* J	*29*	*158000*	*209*	3.2	*23.2*	*9850*	3590	6.2 U
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
0.5	Gray silt/slag	16 U	3870	168	0.05 U	5.2 U	*29.3*	4	*5140*	6.4 J	*5.5*	*24.1* U	*325*	*396*
2	Gray silt (slag) with gravel	11.8 U	2950	142	0.13 U	*24.9*	*25.8*	2.4	*8400*	4.1 UJ	*3.1*	*24* U	*207*	*267*
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**

F122R

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
0	Clean fill - brown silt	*15500*	16.4 UJ	5.7 U	139	0.82	*20* UJ	*6*	48300	*42.6*	4.9	14	*1250*	13100	13
2	Clean fill - brown silt	13900	15.9 UJ	4.3 U	140	0.88	13.7 UJ	*1.3*	11000	*22.9*	5.6	13	*620*	14900	9.6
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
0	Clean fill - brown silt	16	6380	393	0.22 U	2.8 U	14.6	5.1	*4320*	1.4 U	0.85 U	*25.6* U	*54.3*	*169*
2	Clean fill - brown silt	14.8	6950	*537*	0.29 U	2.7 U	14.3	*10.2*	*876*	1.4 U	0.83 U	*24.9* U	34.7	*81.6*
Representative		**17.8**	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**

F123B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
2	gravel	13400	16.8 U	3.6	112	0.7	*19* U	1.1 U	38200	18.1	5.6	10	*590*	12000	7.4 J	15.2
4	Brown silt	11400	16.5 U	4	95.5	0.69	*25.4* U	1.1 U	31100	15.5	5.5	8.8	*900*	12000	8.8 J	11.9 U
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
2	gravel	10400	353	*0.6* J	2.8 U	9.2	*143*	696	*3990*	2.9 U	0.87 U	792	*26.2* U	28.1	46.4
4	Brown silt	12300	364	0.22 J	2.8 U	12.7	4.7	*871*	3100	*7*	0.86 U	673	*25.7* U	25	42.3
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

Table 4.2.3-21 (Cont'd)

F124B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium	Chromium		Cobalt	Copper		Fluoride	Iron	Lead
10	Slag/gravel	*19400*		17.7	UJ	3.2	U	174		*1.3*		*50.4*	J	*51.9*		*122000*	*131*	J	4.7	*18*	J	*7080*	9620	*26.9*
12	Tan brown silt/sandstone	*15900*		23.5	J	*9.9*		121		1.1		*39.4*	J	*1300*		38800	*43.6*	J	6.5	11.6	J	*2700*	12700	11.4
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**	**27.0**		**8.7**	**15.2**		**559.2**	**14930.2**	**26.1**

Sample Depth	Sample Description	Lithium		Magnesium	Manganese	Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Selenium	Silver		Thallium		Vanadium		Zinc
10	Slag/gravel	14	U	6910	*476*	0.06	U	*5.7*	U	*19.2*	J	*434*	*8010*	4.8	*9.1*		*27.6*	U	*124*	J	*1160*
12	Tan brown silt/sandstone	4	U	7210	435	0.17	U	*7*	U	8.4	J	*2860*	*52400*	2.9	0.88	U	*26.4*	U	*54.9*	J	*25100*
Representative		**17.8**		**16700.0**	**475.9**	**0.3**		**5.2**		**14.9**		**8.9**	**840.2**	**6.5**	**2.0**		**20.4**		**52.6**		**52.4**

F125B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium	Chromium		Cobalt	Copper		Fluoride	Iron	Lead	
1	Tan fine silt	14200		17.2	UJ	4.3	U	143		0.76		14.6	UJ	*2.6*		34700	22.6	J	6.8	11.9	J	*2180*	14800	8.5	
3	Brown silt	*16600*		16.7	UJ	3.4	U	150		0.85		*23.2*	J	*3.2*		34100	*30.6*	J	6.6	12.6	J	*2580*	14900	6.7	U
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**	**27.0**		**8.7**	**15.2**		**559.2**	**14930.2**	**26.1**	

Sample Depth	Sample Description	Lithium		Magnesium	Manganese	Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Selenium	Silver		Thallium		Vanadium		Zinc
1	Tan fine silt	14.5	U	11000	465	0.17	U	2.9	U	11.9	J	*92.1*	*1340*	2.6	0.89	U	*26.8*	U	33.8	J	*113*
3	Brown silt	16.8	U	10100	*482*	0.25	U	2.8	U	12.5	J	*18.3*	*1150*	3.3	0.87	U	*26*	U	42.8	J	*97.2*
Representative		**17.8**		**16700.0**	**475.9**	**0.3**		**5.2**		**14.9**		**8.9**	**840.2**	**6.5**	**2.0**		**20.4**		**52.6**		**52.4**

F126B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron	Cadmium		Calcium	Chromium		Cobalt	Copper	Fluoride	Iron		Lead
0	Tan silt with gravel	12800	J	7.9	UJ	7	UJ	134	J	0.93		*36*	*13.8*		46700	J	*174*	J	6.2	*44.1*	*1300*	*15000*	J	8.7
2	Tan silt with gravel	*15400*	J	8.6	UJ	4.4	UJ	151	J	0.78		*22.7*	*18.5*		39200	J	9	J	4.8	12.7	*2190*	13600	J	12.5
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**	**1.2**		**65574.4**		**27.0**		**8.7**	**15.2**	**559.2**	**14930.2**		**26.1**

Sample Depth	Sample Description	Lithium	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Selenium		Silver	Thallium		Vanadium		Zinc	
0	Tan silt with gravel	14.1	14100	J	395	J	0.05	U	2.4		*71*	*189*	*4090*	1.7	U	1.8	12.4	U	*276*	J	*223*	J
2	Tan silt with gravel	15.4	11900	J	329	J	0.06	U	1.4	U	*15.8*	*647*	*3570*	2.2	U	0.45	13.4	U	47.3	J	*884*	J
Representative		**17.8**	**16700.0**		**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**6.5**		**2.0**	**20.4**		**52.6**		**52.4**	

Table 4.2.3-21 (Cont'd)

F129B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0	Gravelly sand (fill)	*22300*	3.8	UJ	0.91		*208*	*1.8*	*55.6*	*10.6*	*213000*	*236*	2	*18.2*	*13500*	3250	4.9	15
5	sand	13500	4	UJ	3.5		143	0.69	11.7	0.64	291000	16.6	5.6	8.8	440	12400	7.9	12.8
10	sand	11500	4	UJ	6.2		132	0.66	9.6	0.36	26600	14.5	5.1	8.9	410	12000	8.3	10.9
15	sand	12300	4	UJ	2.8		96.9	0.67	10.5	0.73	34800	17.1	5.9	9.4	409	12800	8.6	11
20	sand	10700	4	UJ	3.7		121	0.61	8.6	0.42	21100	14.7	5.3	7.9	373	11600	9.6	9.4
25	sand	11800	4.2	UJ	4.9		140	0.65	7.6	0.93	37000	16.5	6.1	10	441	13200	8.6	9.9
Representative		**14638.6**	**30.9**		**8.5**		**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.6**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potssium	Selenium		Silver		Sulfate		Thallium		Vanadium	Zinc
0	Gravelly sand (fill)	3990	235	*0.45*		2.1	U	*19.2*	3.1	*4390*	*6520*	3.1		4.8		700		0.34	J	*190*	*137*
5	sand	11000	372	*0.59*		1.3	U	10.8	4.1	727	3470	0.53	U	0.31	U	30		0.2	J	24.3	42.42.5
10	sand	11300	373	0.08	U	1.3	U	10.2	6.7	*879*	2500	0.52	U	0.31	U	20	U	0.1	UJ	21.3	46.9
15	sand	12400	395	0.23	U	1.3	U	11.3	3.4	808	2400	0.54	U	0.31	U	450		0.14	J	23.7	45.9
20	sand	8350	371	0.08	U	1.3	U	9	2.8	771	2190	0.51	U	0.31	U	980		0.1	UJ	21.3	39.4
25	sand	12100	407	0.12	U	1.4	U	13.1	3.8	763	2150	0.55	U	0.32	U	750		0.16	J	24	*54.6*
Representative		**16700.0**	**475.9**	**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**				**20.4**		**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.3-22
Concentrations of Parameters in Soil in the Waste Oil Storage Area

F037B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
20	White silt (possible fill)	13100	16.1 UJ	4.5 UJ	151 J	0.67	*33.9* U	1 U	30800	18.1	3.9	7.2	*1550*	12700	11.3 J	*19.2*
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
20	White silt (possible fill)	11600	179 J	0.06 U	2.7 U	10.8	*96.1*	*8020*	*9490*	1.4 UJ	0.84	968	*25.1* U	23.1	*449* J
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.3-23
Concentrations of Parameters in Soil in the 9S Storage Area

F034B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
5	Pale brown silt	10700	16.4 UJ	5.2 UJ	166	0.55	*28.7* UJ	*25.1*	43800	15.9	3.6	6.6	*1980*	10900	10.7	*18*
10	Pale brown silt	12300	16.5 UJ	4 UJ	98.6	0.72	*32.6* UJ	1.1 U	41000	16.4	3.6	7.1	*2120*	10500	7.2	17.1 U
15	Reddish-yellow sandy gravel	4150	15.4 UJ	4.8 UJ	62.3	0.27	*26.6* UJ	*13*	11200	10.8	2.9	7.8	460	10800	9.6	4.6 U
20	Reddish-yellow sandy gravel	2920	14.7 UJ	*10* J	33.9	0.24	7.5 UJ	*1.3*	4940	13.1	5.9	7.4	180	8770	5.9 U	2.8 U
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
5	Pale brown silt	14500	307	0.05 U	2.8 U	11.1	*430*	*2730*	*7870*	1.5 J	1.2	924	*25.5* U	21.9	*366*
10	Pale brown silt	14100	352	0.06 U	2.8 U	10.2	*279*	*1870*	*8080*	1.5 UJ	0.86 U	855	*25.7* U	26.4	*146*
15	Reddish-yellow sandy gravel	2210	192	0.05 U	2.6 U	6.5	*61.5*	767	2640	1.1 UJ	0.83	635	*24* U	9.3	*210*
20	Reddish-yellow sandy gravel	1360	115	0.05 U	2.5 U	10.9	*53.1*	477	2090	1.3 UJ	0.76 U	512	*22.9* U	5.9	32.9
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

B-2

Sample Depth	Sample Description	Arsenic	Barium	Cadmium	Calcium	Chromium	Copper	Fluoride	Iron	Lead	Magnesium
0.5		<42	107 B	4150	77500	216	141	57 J+	2840	574	2650 B
6.5		<8.4	127	<0.6	43600 J	15.6 J	7	189	11400 J	8.2	14100
11.5		<8.4	152	<0.6	42500 J	15.3 J	7.2	129	11300 J	11.3	13200
Representative		**8.5**	**203.2**	**1.2**	**65574.4**	**27.0**	**15.2**	**559.2**	**14930.2**	**26.1**	**18700.0**

Sample Depth	Sample Description	Manganese	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Vanadium	Zinc
0.5		214	10400 J	74100 J	50800	73.4 J	69.9	7990	183	52600
6.5		349 J-	233	1970	7110	<10.8	0.95 B	<764	24.9	180
11.5		341 J-	129	1810	7000	<10.8	0.81 B	<464	25.7	67.2
Representative		**475.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
B - The reported value is less than the contract required detection limit (CRDL) but is greater than or equal to the IDL.
J - Estimated value.
J+ - A (+) symbol with the "J" qualifier indicates that the value listed is most likely greater than (+) the true value.
J- - A (-) symbol with the "J" qualifier indicates that the value listed is most likely less than (-) the true value.
U - Not detected.

Table 4.2.3-24
Concentrations of Parameters in Soil in the Active Landfill

F027B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0	Light brown silt	14000	15 UJ	4 U	132 J	0.7	13.7 U	0.97 U	46200	17.9	5.6	8.4	410	13100	9.8 U	12.2 UJ
10	Brownish-yellow silt	12900	8.4 U	6.5 UJ	175	0.63	9 UJ	0.54 U	55400	17.4 J	5.8	9.9 J	450	12800	10	14.8
20	Brownish-yellow silt	9140	8.6 U	5 UJ	95.1	0.6	5.8 UJ	0.56 U	36700	14.4 J	6.8	8.1 J	400	*15200*	7.8	11.4
30	Brownish-yellow silt	*16300*	16.9 UJ	4.6 U	146 J	0.79	*21.5* U	1.1 U	41900	20.4	6.1	8.8 U	450	14600	6.8 U	15.1 UJ
40	Brownish-yellow silt	*14900*	17 UJ	4.4 U	158 J	0.66	18 U	1.1 U	63800	18.9	6.1	9	500	13600	10.9 U	14.9 UJ
50	Brownish-yellow silt	14200	16.7 UJ	3.6 U	120 J	0.58	13.7 U	1.1 U	49700	17.5	6.4	8.7	450	14100	10.2 U	12.8 UJ
60	Yellowish-brown gravelly silt	10600	16 UJ	2.3 U	86 J	0.59	16.5 U	1 U	47900	13.8	4.8	6.4 U	310	12900	7.3 U	10.7 UJ
70	Yellowish-brown silt	*15400*	17 UJ	4.5 U	123 J	0.79	17.6 U	1.1 U	57100	20.5	6	8.4 U	490	13700	11.3 U	15 UJ
80	Yellowish-brown silt	11800	16.7 UJ	3.5 U	109 J	*1.4*	9.6 U	1.1 U	47000	14.5	5.6	7.3	430	11300	12.1 U	12.9 UJ
90	Yellowish-brown silt	14100	16.9 UJ	4 U	126 J	*1.5*	10.8 U	1.1 U	41400	17.1	6.1	9.9	500	13600	8 U	13.9 UJ
100	Yellowish-brown silt	*14800*	16.4 UJ	3.1 U	106 J	*1.6*	10.8 U	1.1 U	46200	19	5.7	9.7	480	13200	11.9 U	13 UJ
110	Yellowish-brown silt	*15500*	16.3 UJ	4.2 U	107 J	0.79	15.4 U	1.1 U	46500	18.1	6.3	9.8	470	13900	6.6 U	15.1 UJ
120	Yellowish-brown silt	*17600*	17.6 UJ	5 U	120 J	0.79	12.8 U	1.1 U	33200	18.2	7	11.2	490	*15100*	10.8 U	15.1 UJ
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
0	Light brown silt	13400	378	0.06	2.5 U	11.9 U	2	769	3160	0.92 UJ	0.78 U	826	*23.3* UJ	29.5	*53.4*
10	Brownish-yellow silt	14700	383 J	0.06 U	1.4 U	13.5	*39.6*	779	2810	0.28 UJ	0.44 U	927	0.44 U	27.3	43.2
20	Brownish-yellow silt	10200	378 J	0.06	1.5 U	10.9	2.8	838	1890	0.28 UJ	0.45 U	779	0.45 U	28.3	45.7
30	Brownish-yellow silt	14100	424	0.06 UJ	2.9 U	11.6 U	1.7	649	*3760*	0.64 UJ	0.88 U	*1010*	*26.4* UJ	32.7	50.7
40	Brownish-yellow silt	16300	390	0.06 UJ	2.9 U	12.5 U	0.5 U	575	3130	0.95 UJ	0.88 U	855	*26.5* UJ	29.6	48.1
50	Brownish-yellow silt	10300	422	0.06 UJ	2.8 U	12.7 U	0.6	584	2890	0.92 U	0.87 U	807	*26* UJ	29.8	47.6
60	Yellowish-brown gravelly silt	7220	259	0.05 UJ	2.7 U	9.9 U	0.5 U	384	2140	0.63 UJ	0.83 U	696	*25* UJ	23.2	43.1
70	Yellowish-brown silt	13100	366	0.06 UJ	2.9 U	*18.7* U	0.5 U	689	3020	0.95 UJ	0.88 U	724	*26.5* UJ	29.8	44.8
80	Yellowish-brown silt	10700	306	0.06 UJ	2.8 U	14.1 U	0.5 U	602	2470	1 UJ	0.87 U	942	*26* UJ	20.9	41
90	Yellowish-brown silt	14200	427	0.05 UJ	2.9 U	*16.6* U	0.8	721	2720	1.3 UJ	0.88 U	640	*26.3* UJ	25.8	49.3
100	Yellowish-brown silt	13300	391	0.17	2.8 U	*15* U	0.6	766	3140	0.94 UJ	0.85 U	685	*25.6* UJ	25.2	48.6
110	Yellowish-brown silt	13500	427	0.17	2.8 U	*15.9* U	0.8	789	3180	0.82 UJ	0.85 U	705	*25.5* UJ	28.5	*55.2*
120	Yellowish-brown silt	10600	423	0.18	3 U	*15.5* U	0.5 U	759	3410	0.3 UJ	*66.8*	837	*27.5* UJ	28.2	51.5
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.3-25
Concentrations of Parameters in Soil at the Pond 8S Recovery Process Area

F058B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead		Lithium
7	Black/gray gravel/slag/sludge	9120	*140*	J	*68.9*		69.2	0.7	*277*	*3280*	43700	*151*	7	*109*	*30200*	2130	*569*	J	13
9	Black/gray sludge to dark brown silt	10800	17.1	U	*66.9*		108	0.85	*55.3*	*202*	*201000*	*730*	3.2	*82.3*	*16800*	7870	*56.8*	J	13.5
Representative		**14638.6**	**30.9**		**8.5**		**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**		**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury		Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium		Vanadium	Zinc
7	Black/gray gravel/slag/sludge	2380	325	0.17	J	*10.5*	*40.8*	*133000*	*59700*	*38000*	*16.4*	*307*	*4700*	*36.8*		*115*	*48700*
9	Black/gray sludge to dark brown silt	6420	416	*0.31*	J	*15*	*229*	*9440*	*53100*	*4130*	*11*	*7.2*	*3200*	*26.7*	U	*842*	*1790*
Representative		**18700.0**	**475.9**	**0.3**		**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**		**52.6**	**52.4**

F059B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt		Copper	Fluoride	Iron	Lead		Lithium	
10	Black/gray slag	11500	*88.3*	J	*27.9*		65.4	0.91	*207*	*486*	51800	*116*	1.6	U	*130*	*52200*	1920	*763*	J	2.9	U
Representative		**14638.6**	**30.9**		**8.5**		**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**		**15.2**	**559.2**	**14930.2**	**26.1**		**17.8**	

Sample Depth	Sample Description	Magnesium	Manganese	Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium		Vanadium	Zinc
10	Black/gray slag	1080	55.1	*0.35*	J	5.2	U	8	U	*11800*	*40900*	*21700*	*29.3*	*1000*	*3340*	*47.8*	U	*105*	*9800*
Representative		**18700.0**	**475.9**	**0.3**		**5.2**		**14.9**		**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**		**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.3-34
Concentrations of Parameters in Soil in the Former Kiln Scrubber Overflow Pond

F054B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
40	Reddish-yellow silt	*18600*	18.7 UJ	*13.7* J	144	*1.7*	*19.2* UJ	*286*	42200	22.2	*9.5*	11.7	*2700*	14700	7.5 U	15 U
42.5	Reddish-yellow silt	11700	16.5 UJ	7.7 UJ	127	*1.4*	13.3 UJ	*355*	43200	16.8	6.7	8.1	*1720*	10900	6.6 U	9.6 U
45	Reddish-yellow silt	9780	15.9 UJ	5.9 UJ	79.5	0.84	9.4 UJ	*123*	39600	14.1	7.5	7.8	*1280*	10500	6.4 U	9.2 U
47.5	Reddish-yellow silt	7540	16.3 UJ	*12.5* J	92.1	0.62	10 UJ	*89*	26600	11.1	6.4	7.4	*840*	11000	6.6 U	7.4 U
50	Reddish-yellow silt	12900	16.4 UJ	5.3	115	0.91	15.7 J	*111*	43500	19.2	7.1	8.3	*920*	12600	11.6 J	12.3
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
40	Reddish-yellow silt	13400	407	0.06 U	3.2 U	*26*	*36.7*	*2580*	*4020*	4.8 UJ	0.97 U	835	*29.2* U	*174*	*889*
42.5	Reddish-yellow silt	12400	357	0.06 U	2.8 U	*17.5*	*29.5*	*2660*	2520	*21.8* J	0.86 U	680	*25.7* U	*107*	*1100*
45	Reddish-yellow silt	13300	312	0.06 U	2.7 U	*17.4*	*23.6*	*1570*	1960	5.4 J	0.82 U	683	*24.7* U	*79.3*	*512*
47.5	Reddish-yellow silt	9510	387	0.09 U	2.8 U	13.6	*28.3*	*1380*	1710	*16.7* J	0.85 U	703	*25.5* U	39.9	*399*
50	Reddish-yellow silt	14300	385	0.09 U	2.8 U	*17.8*	*31.9*	*1330*	2910	4.7 J	0.85 U	673	*25.5* U	*62.6*	*565*
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F130B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0	Dark yellow silt	5760	3.9 UJ	1.9	97.7	*1.3*	*217*	*77.7*	*264000*	*304*	0.4 U	*77.7*	*37400*	3830	12.3	5.4
10	Moderate yellowish-brown silt	*16900*	4.5 UJ	*11.3*	159	*1.5*	12.1	*281*	36800	22.8	*9*	10.8	*3380*	13700	9.9	12.1
20	Moderate yellowish-brown silt	9560	4.6 UJ	*11.5*	139	1.1	5.3 UJ	*176*	49100	13.1	8.1	11.1	*1390*	10900	9.7	9.6
30	Sandy gravel	3080	4 UJ	2.4	59.1	0.3	3.2 U	*76*	6530	22.7	2.4	5.7	349	9280	3.7	2.4
40	Sandy gravel	1720	3.8 UJ	4.5	38.3	0.17	2.4 U	*18.3*	4900	5.7	3.4	6.1	108	9470	2.5	2
50	Sandy gravel	1810	3.8 UJ	*12.4*	30.8	0.31	2.1 U	*16*	1960	8.9	4.9	14.2	244	*18500*	4.9	1.4
60	Dark gray silty sandy gravel	2290	8.2 J	3	72.5	0.38	1.8 U	1	6380	5.7	3.9	14.2	232	13600	4.4	4.3
70	Moderate yellowish-brown sandy silt	*15200*	4.8 UJ	7.4	139	1	7.2 U	0.41	4820	20.5	8	10.3	*540*	*17200*	10.2	15.6
80	Dark yellowish-brown sandy gravel with silt	8840	4.5 UJ	3.7	185	0.7	9.7	1.1	19000	18.9	7.7	*38.3*	325	*19400*	7.3	9
100	Dark yellowish-brown sandy gravel with silt	8820	4.7 UJ	3.1	116	0.66	5.1 U	0.36 U	26400	12.8	6.1	6.9	378	12800	6.8	8.9
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
0	Dark yellow silt	1130	394	*1*	*7.5* U	*75.4*	*22.1*	*69300*	2470	4.9	*7*	150	5.1 J	*281*	*605*
10	Moderate yellowish-brown silt	12100	329	*0.45* U	1.5 U	*22*	*61.1*	*3150*	3370	*11.6*	0.34 U	280	12.8 J	*155*	*823*
20	Moderate yellowish-brown silt	14600	448	0.06 U	1.5 U	*20.4*	*67.3*	*1730*	1930	*8.6*	0.36 U	200	0.3	*84.2*	*869*
30	Sandy gravel	1590	323	0.19	4.1 U	14.4	*35.2*	*920*	819	5.4	0.31 U	20	0.1 UJ	12.1	*1070*
40	Sandy gravel	926	460	*0.57*	1.3 U	10.9	3	45.6	363	1.6	0.3 U	20	0.09 UJ	6.8	*135*
50	Sandy gravel	607	247	*0.35*	1.3 U	14.6	*11.5*	325	585	2.1	0.3 U	40	0.1 UJ	11.2	*149*
60	Dark gray silty sandy gravel	1150	383	*0.51*	4.1 U	10.3	2.1	472	664	2.2	0.3 U	20 U	0.1 UJ	8.9	48.3
70	Moderate yellowish-brown sandy silt	6960	*551*	0.2	1.6 U	*18.3*	2.6	817	3080	2.9	0.37 U	80	0.15 J	28.3	*53.9*
80	Dark yellowish-brown sandy gravel with silt	4250	421	*0.57*	2.6 U	13.5	*42*	*853*	1700	1.8	0.35 U	200	0.11 UJ	23.7	*57.3*
100	Dark yellowish-brown sandy gravel with silt	5320	358	*1.2*	1.6 U	7.6	78.5	788	1790	2.2	0.36 U	320	0.13 J	18.7	37.2
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
- Estimated value.
J - Not detected.

Table 4.2.3-33
Concentrations of Parameters in Soil in the Calciner Pond Sediment Storage Area B

F051B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium	Boron		Cadmium		Calcium	Chromium	Cobalt		Copper	Fluoride	Iron	Lead		Lithium	
5	Red-brown to tan silty sand	5460	17.1	U	*13.3*		84.5	0.48	*568*		*261*		*280000*	*328*	0.89	U	*76.1*	*54400*	3870	13.8	UJ	4	U
7	Red-brown to tan silty sand	11800	16.7	U	*8.6*		114	0.7	*20.5*	U	*3.3*		33500	*29.1*	7		11.1	*830*	12100	6.7	UJ	10.3	U
9	Red-brown to tan silty sand	10600	15.9	U	*9.2*		171	0.66	*48.2*		*31.3*		32400	*133*	3.4		*18.6*	*28900*	13100	10.9	UJ	3.2	U
11	Red-brown to tan silty sand	*14900*	17.1	U	8.4		*216*	0.71	*52*		*36.6*		51700	*173*	3.1		*27.8*	*40900*	13400	8.1	UJ	3.5	U
14	Red-brown to tan silty sand	*15400*	16.2	U	8		158	0.33	*43.5*		*52.9*		51600	*153*	3.7		*25.3*	*30300*	13800	6.7	UJ	5.2	U
Representative		**14638.6**	**30.9**		**8.5**		**203.2**	**1.2**	**18.1**		**1.2**		**65574.4**	**27.0**	**8.7**		**15.2**	**559.2**	**14930.2**	**26.1**		**17.8**	

Sample Depth	Sample Description	Magnesium	Manganese	Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver		Sodium	Thallium		Vanadium	Zinc
5	Red-brown to tan silty sand	1190	50.4	*1*	J	*16.1*	U	*120*	*1190*	*85800*	*8810*	*805*	*9.5*		*4870*	*26.7*	U	*390*	*1250*
7	Red-brown to tan silty sand	9680	383	0.25	J	2.8	U	*15.1*	*72.3*	*2000*	*5320*	4.5	U	0.87	U	*992*	*26*	U	44.1	*73.2*
9	Red-brown to tan silty sand	2060	120	*3*	J	*9*	U	14.7	*131*	*6750*	*5040*	*187*	1.2		*1300*	*24.8*	U	*110*	*437*
11	Red-brown to tan silty sand	2710	91.1	*5.4*	J	*13.2*	U	*20.9*	*140*	*10500*	*7010*	*61.2*	*2.4*		*1980*	*26.7*	U	*163*	*480*
14	Red-brown to tan silty sand	3570	135	*1.6*	J	*8.8*	U	*23.1*	*147*	J	*16100*	*6600*	*40.8*	0.84	U	*1700*	*25.2*	U	*169*	*538*
Representative		**18700.0**	**475.9**	**0.3**		**5.2**		**14.9**	**8.9**	**640.2**	**3562.3**	**6.5**	**2.0**		**970.7**	**20.4**		**52.6**	**52.4**

F127B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium	Boron	Cadmium		Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0	Grayish-brown sludge	14300	*32.8*	J	*27.1*		107	*1.8*	*4380*	*616*		*264000*	*674*	7	*72.1*	*221000*	6410	*54.3*	13.5
5	Moderate yellowish-brown silt	8250	10.2	J	2.9		119	0.56	15.2	0.73	U	48000	13	5.2	9.5	500	11100	9.1	10.4
15	Moderate yellowish-brown silt	9030	4.3	UJ	8.3		199	0.55	11.3	0.42	U	52400	14.7	5.4	9.4	470	11700	9.2	10.7
25	Moderate yellowish-brown silt	10300	4.2	UJ	3.8		118	0.57	10.6	0.51	U	54000	15.4	4.9	8.8	530	11600	8	13.2
35	Moderate yellowish-brown silt (wet)	12900	8.1	J	3.7		129	0.68	12.3	0.97	U	36500	17.2	5.8	10.6	420	13200	8.3	15.1
Representative		**14638.6**	**30.9**		**8.5**		**203.2**	**1.2**	**18.1**	**1.2**		**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury		Molybdenum		Nickel	Orthophosphate		Total Phosphorus	Potassium	Selenium		Silver		Sulfate	Thallium		Vanadium	Zinc
0	Grayish-brown sludge	*5760*	107	*7.7*		*39*		*107*	*12800*	J	*64800*	*42200*	*376*		*57.6*		8080	*26.6*		*673*	*8010*
5	Moderate yellowish-brown silt	16100	383	0.07	U	1.4	U	11.1	*348*	J	*1850*	*4790*	0.71		0.33	U	180	1.8		16.8	*63.5*
15	Moderate yellowish-brown silt	17400	370	0.06	U	1.4	U	12.1	*61.2*	J	695	*4840*	0.28	U	0.33	U	1920	0.11	U	17.9	46.4
25	Moderate yellowish-brown silt	16400	361	0.06	U	1.4	U	13	2.2	J	611	2260	0.28	U	0.33	U	2300	0.11	U	20.1	40.9
35	Moderate yellowish-brown silt (wet)	11400	389	0.06	U	1.6	U	13	3.5	J	608	2730	0.31	U	0.37	U	1140	0.13	U	23.8	*54*
Representative		**18700.0**	**475.9**	**0.3**		**5.2**		**14.9**	**8.9**		**640.2**	**3562.3**	**6.5**		**2.0**		**970.7**	**20.4**		**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.3-32
Concentrations of Parameters in the Calciner Pond Sediment Storage Area A

F050B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0	Red-brown clay with silt	*20400*	19.1 U	*15.8*	*234*	0.49	*1550*	*184*	*169000*	*763*	1.4	*72.6*	*155000*	10200	*50.2* J	5.1 U
2	Red-brown clay with silt	*20700*	22.1 U	*16.8*	202	0.53	*2450*	*334*	*166000*	*1010*	1.6	*111*	*254000*	8790	*106* J	5.1 U
5	Red-brown clay with silt	*21700*	21.2 U	*15.2*	*215*	0.88	*2380*	*327*	*236000*	*1130*	1.1 U	*109*	*269000*	7400	*133* J	8 U
7	Red-brown clay with silt	*16600*	28 J	*14*	201	0.35	*549*	*320*	*176000*	*614*	1.6	*73.2*	*157000*	8150	*52.6* J	4.3 U
10	Red-brown clay with silt	*16300*	21.2 J	*18.1*	*207*	0.46	*296*	*343*	*159000*	*665*	1.9	*83.7*	*128000*	8530	*71.7* J	4.3 U
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
0	Red-brown clay with silt	2380	46.1	*15.6* J	*36.3*	*41.1*	*1850*	*19700*	*38400*	*680*	*49.7*	*4730*	*29.7* U	*632*	*1070*
2	Red-brown clay with silt	1750	30.1	*24* J	*35.5*	*53.1*	*2320*	*35400*	*69800*	*748*	*110*	*5300*	*34.4* U	*794*	*1640*
5	Red-brown clay with silt	4080	35.2	*22.3* J	*39*	*36.4*	*1860*	*32800*	*13300*	*744*	*107*	*5150*	*33.1* U	*954*	*1780*
7	Red-brown clay with silt	2130	56	*10.4* J	*25.1*	*47.5*	*2070*	*38600*	*19800*	*618*	*37.1*	*3600*	*29.3* U	*596*	*2080*
10	Red-brown clay with silt	2030	75.8	*9.9* J	*23.5*	*58.2*	*2590*	*37900*	*27700*	*751*	*59.4*	*3200*	*29.4* U	*586*	*2920*
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

F128B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0	Grayish-brown gravelly silt	*18200*	8.4 J	7.2	*336*	0.68	*131*	*68.1*	*71300*	*334*	3.9	*35.2*	*62600*	*17500*	19.6	3.4
10	Moderate yellowish-brown silt	*21600*	5.9 J	6.3	185	0.76	*43.2*	*83.5*	15400	*71.4*	4.9	15.2	*25000*	*16400*	9.6	8.4
20	Moderate yellowish-brown silt	13900	8.7 J	3.5	85	0.76	15.5	*53.7*	44600	18.1	6.1	9.8	*2880*	12500	9.1	11.4
30	Moderate yellowish-brown silt	10400	8.5 J	1.8	187	*1.3*	9.3	*82.4*	44200	12.2	6.8	8.3	*2090*	12700	6.2	10.5
40	Moderate yellowish-brown sandy gravelly silt	*15100*	4.4 UJ	3.1	156	0.73	14.9	0.71 U	*71300*	22	6	9.5	*3030*	13200	9	15.1
50	Moderate yellowish-brown sandy gravelly silt	6810	4.1 UJ	1.4	148	0.72	4.8 U	0.44 U	16000	9.7	6.4	8.5	340	*16300*	6.1	7.5
60	Sandy gravel with silt	8200	6.7 J	3.1	135	0.57	6.4 U	0.38 U	20700	15.3	8.7	9.5	190	*19000*	5.2	8.4
70	Dark gray sandy gravel	6070	4.6 J	2	91.6	0.54	6.3 U	0.48 U	4260	7.9	5.6	6.9	180	*16500*	4.9	6.4
80	Dark gray sandy gravel	4160	4.1 UJ	1.3	74.4	0.51	3.8 U	0.89 U	12800	7.1	3.7	9.3	600	12500	5.3	5
100	Moderate yellowish-brown silt	13400	5.1 J	1.9	153	0.71	10.7	0.53 U	*78500*	18.4	6.5	12	*890*	12700	8.3	14
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
0	Grayish-brown gravelly silt	1560	73.9	*9.1*	*32.2*	*21.3*	*326* J	*15100* J	*18400*	*73.9*	*5.5* U	20 U	15.7	*249*	*389*
10	Moderate yellowish-brown silt	4020	110	0.27 U	1.5	*15.3*	*138* J	*5760* J	*12200*	*7.6*	0.34 U	20 U	14.9	*139*	*1050*
20	Moderate yellowish-brown silt	15100	274	0.12 U	1.5 U	*24.8*	*112* J	*2640*	*4660*	1.2	0.34 U	80	2.9	28.9	*1220*
30	Moderate yellowish-brown silt	5970	441	0.15 U	1.5 U	*34*	*117* J	*2510*	3430	4.2	0.32 U	80	0.11 U	17.5	*851*
40	Moderate yellowish-brown sandy gravelly silt	15700	*1030*	0.08 U	1.5 U	*66.8*	*103* J	*8470*	*4280*	*17.1*	0.34 U	100	0.12 UJ	28.1	44.8
50	Moderate yellowish-brown sandy gravelly silt	3600	*562*	0.08 U	1.7 U	*20.4*	*598* J	*4500*	1940	3.2	0.31 U	80	0.1 U	18.2	51.2
60	Sandy gravel with silt	4830	393	0.08 U	1.4 U	10.7	*56.4* J	426	1880	1.1	0.32 U	20 U	0.1 U	25.3	*54.6*
70	Dark gray sandy gravel	2780	265	0.07 U	1.5 U	6.1	*28.6* J	340	1750	1.6	0.3 U	20 U	0.1 U	15.3	*52.6*
80	Dark gray sandy gravel	1970	250	0.07 U	2.4 U	5	*47.4* J	735	1130	1.1	0.31 U	20 U	0.1 U	10.5	43.3
100	Moderate yellowish-brown silt	13100	437	0.08 U	1.6 U	*15.9*	*243* J	*31800*	*3870*	*13.5*	0.37 U	200	0.12 U	21	45.4
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.3-31
Concentrations of Parameters in IWW Basin and Ditch

F030B

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium	Boron		Cadmium		Calcium		Chromium		Cobalt	Copper	Fluoride	Iron		Lead		Lithium	
0	Sandy gravel	*18400*	J	7.8		*9*	J	175	J	*1.7*	*73.6*	J	*87.7*	J	*165000*	J	*295*	J	4	*48.1*	*11700*	6350	J	14	U	13.1	J
10	Brown clayey silt	14200	J	8.5	U	6.2	UJ	168	J	0.74	17.8	UJ	0.65	J	35100	J	15.6	J	5.9	11.1	440	13100	J	7.9	U	15	J
20	Brown sandy silt	12200	J	8.9	U	6.4	UJ	126	J	0.66	11.2	UJ	0.7	J	44300	J	18	J	5.7	8.6	420	12600	J	9.2	U	12	J
30	Yellowish-brown gravel and sandy silt	5690	J	8	U	7.5	J	71.5	J	0.37	4.1	UJ	0.52	UJ	7960	J	12.9	J	4.3	8.7	200	13200	J	8.2	U	5.6	J
40	Yellowish-brown gravel and sandy silt	2910	J	8	U	*9.5*	J	41	J	0.27	3.6	UJ	0.52	UJ	5780	J	*34.4*	J	4.2	13	170	*15300*	J	7.4	U	3.2	UJ
50	Brown silty sand	11800	J	8.9	U	6.5	UJ	188	J	0.69	10.1	UJ	0.58	UJ	31200	J	12.8	J	6.1	12.1	430	12900	J	7.3	U	15.1	J
65	Dark brown silty sand	7920	J	8.9	U	4.4	UJ	123	J	0.44	6.8	UJ	0.58	UJ	8330	J	11.5	J	6	10.1	300	11700	J	4.6	U	8.6	J
75	Dark brown sandy silty gravel	4220	J	12.8		4.7	UJ	106	J	0.42	10.7	UJ	0.56	UJ	*76000*	J	6.4	J	3.1	5.9	200	8870	J	3.5	U	6.3	J
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**	**18.1**		**1.2**		**65574.4**		**27.0**		**8.7**	**15.2**	**559.2**	**14930.2**		**28.1**		**17.8**	

Sample Depth	Sample Description	Magnesium		Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium		Selenium		Silver		Sodium		Thallium		Vanadium		Zinc	
0	Sandy gravel	5400	J	319	J	0.08	U	*7.3*		*54.2*	*41.6*	*20200*	*5680*	J	6.2		*6.5*		*2070*	J	12	U	*299*	J	*644*	J
10	Brown clayey silt	11400	J	370	J	*0.71*	U	1.4	U	11.7	6.8	747	*3640*	J	0.29	UJ	0.44	U	705	J	13.2	U	26	J	45.6	J
20	Brown sandy silt	14000	J	359	J	*1.7*		1.5	U	11.8	3.1	744	2510	J	0.29	UJ	0.46	UJ	519	J	13.9	U	28	J	44.1	J
30	Yellowish-brown gravel and sandy silt	2950	J	238	J	*1*		1.3	U	10.3	1.8	146	1220	J	0.27	U	0.42	U	266	J	12.5	U	11.8	J	22.8	J
40	Yellowish-brown gravel and sandy silt	1350	J	260	J	0.11	U	4.8		8.6	2	268	870	J	0.25	UJ	0.83		275	J	12.4	U	9.3	J	27	J
50	Brown silty sand	9110	J	369	J	*1.1*		1.5	U	12.6	2.8	685	2770	J	0.3	UJ	0.46	U	716	J	13.9	U	23.3	J	41.9	J
65	Dark brown silty sand	4990	J	340	J	*0.71*	U	1.5	U	12.5	1.9	404	1700	J	0.29	UJ	0.46	U	*1280*	J	13.8	U	17.6	J	32.4	J
75	Dark brown sandy silty gravel	3650	J	247	J	0.12	U	1.4	U	4.5	*45.2*	840	902	J	0.28	UJ	0.45	U	586	J	13.4	U	10.3	J	28.8	J
Representative		**16700.0**		**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**3562.3**		**6.5**		**2.0**		**970.7**		**20.4**		**52.6**		**52.4**	

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.3-30
Concentrations of Parameters in Soil in Former Pond 6E

F026B

Sample Depth	Sample Description	Aluminum	Antimony		Arsenic		Barium	Beryllium	Boron		Cadmium		Calcium	Chromium		Cobalt	Copper		Fluoride	Iron	Lead	Lithium
0	Light yellowish-brown silt	11400	8.1	U	5.9	UJ	121	0.7	8.8	UJ	0.71		43600	16.3	J	5	8.6	J	*1610*	12300	6.8	13.2
10	Light yellowish-brown silt	9340	10.7		5.7	UJ	107	0.54	6.9	UJ	0.62	U	36200	12.7	J	4.8	8	J	*1570*	10600	7.7	10.7
60	Light yellowish-brown gravelly silt	12500	9.5	U	6.5	UJ	102	0.88	18.1	J	0.62	U	41300	15.1	J	5.7	9.6	J	*2540*	12700	5.8	15.4
Representative		**14638.6**	**30.9**		**8.5**		**203.2**	**1.2**	**18.1**		**1.2**		**65574.4**	**27.0**		**8.7**	**15.2**		**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese		Mercury	Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium	Thallium		Vanadium	Zinc
0	Light yellowish-brown silt	13400	340	J	0.14	1.4	U	11.7	*203*	*1400*	*3820*	0.25	UJ	1.4		354	0.42	U	24.3	*53.8*
10	Light yellowish-brown silt	12200	325	J	0.12	1.6	U	13.2	*435*	*1640*	*4430*	0.31	UJ	0.5	U	523	0.5	U	20.5	37.7
60	Light yellowish-brown gravelly silt	8060	395	J	0.12	1.6	U	11.8	*50.1*	*13900*	*7530*	0.31	UJ	0.49	U	808	0.49	U	21.9	42.4
Representative		**18700.0**	**475.9**		**0.3**	**5.2**		**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**		**970.7**	**20.4**		**52.6**	**52.4**

B130

Sample Depth	Sample Description	Arsenic	Barium	Cadmium		Calcium	Chromium	Copper	Fluoride	Iron	Lead	Magnesium
16		<8.4	115	<0.6		5690	13.3	12.6	330	12000	<6	4680
41		<8.4	114	<0.6		44900	10	8.1	210	10100	<6	13200
71		8.5	122	0.87	B	65900	7	13.9	240	7480	6.4	7960
Representative		**8.5**	**203.2**	**1.2**		**65574.4**	**27.0**	**15.2**	**559.2**	**14930.2**	**26.1**	**18700.0**

Sample Depth	Sample Description	Manganese	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium		Vanadium	Zinc	
16		449	210	1700	6250	<10.8	<0.8	470	B	20	66.5	J
41		329	150	1600	4430	<10.8	<0.8	<464		18.7	45.7	J
71		449	260	1300	5260	<10.8	<0.8	<464		12	35	J
Representative		**475.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**		**52.6**	**52.4**	

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
B - The reported value is less than the contract required detection limit (CRDL) but is greater than or equal to the IDL.
J - Estimated value.
U - Not detected.

Table 4.2.3-29
Concentrations of Parameters in Soil in Former Pond 5E

F025B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
5	Dark olive gray silt	*16300*	15.4	7.8 J	143	1	*28.4* J	*532*	34100	*48.2* J	6.3	*25* J	*7670*	12200	*106*	15.7
10	Dark olive gray silt	*19400*	*32*	*9.3* J	181	*2.2*	*67.9* J	*2080*	*69700*	*108* J	*10.2*	*57.3* J	*35000*	9950	*360*	14.7
20	Yellowish-brown silt	12600	9.1 U	6.6 UJ	165	0.68	12.5 UJ	0.59 U	44900	15.9 J	5.8	8.5 J	*1120*	12700	6.2	15.2
30	Light brown sandy gravel	3970	7.8 U	6 UJ	*62.2*	0.29	4.9 UJ	0.55	9590	8 J	4.4	7.2 J	360	11900	4.2	5.2 U
60	Brown gravelly silt	12100	8.9 U	6.7 UJ	100	0.67	10.9 UJ	0.58 U	39600	16.3 J	6.2	8.1 J	*920*	12700	6.3	13.8
70	Brown gravelly silt	12100	9.8 U	6.3 UJ	90	0.72	13 UJ	0.63 U	46600	13 J	6.3	8.9 J	*700*	12300	7.8	15.1
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
5	Dark olive gray silt	9420	*277* J	0.2	1.6 U	*15.5*	*820*	*12300*	*11900*	5.6	*61*	*1050*	0.48 U	48	*11600*
10	Dark olive gray silt	10700	442 J	0.25	*8.5* U	*24.9*	*2390*	*33600*	*23700*	*18.6*	*152*	*2710*	18.7	*78*	*200000* J
20	Yellowish-brown silt	15000	374 J	0.07	1.5 U	14	*516*	*1630*	*5790*	0.3 UJ	0.47 U	596	0.47 U	25.6	47
30	Light brown sandy gravel	3580	315 J	0.05 U	1.3 U	11.5	*194*	356	1960	0.27 UJ	0.4 U	267	0.4 U	9.2	37.5
60	Brown gravelly silt	9980	*476* J	0.06 U	1.5 U	13.5	*312*	*2510*	*6870*	0.28 UJ	0.46 U	546	0.46 U	25.5	42.3
70	Brown gravelly silt	7260	*476* J	0.06 U	1.6 U	10.3	*333*	*1380*	*6250*	0.31 UJ	0.51 U	715	0.51 U	22.3	36
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

B114

Sample Depth	Sample Description	Arsenic	Barium	Cadmium	Calcium	Chromium	Copper	Fluoride	Iron	Lead	Magnesium
5.5		<8.4	114	21.7	27600	14.3	13.4	350	10000	7.3	9010
21		<8.4	94	<0.6	49100	6.6	6.7	320	7700	<6	12100
51		<8.4	65.9	<0.6	48700	9.1	7.7	470	10000	<6	14200
71		<8.4	111	<0.6	15200	6.7	10	87	8210	<6	4720
96		<8.4	98.6	<0.6	57100	7	30.1	2	7390	<6	8360
141		<8.4	77.8	<0.6	36800	6.6	10.7	<2	6980	<6	8800
Representative		**8.5**	**203.2**	**1.2**	**65574.4**	**27.0**	**15.2**	**559.2**	**14930.2**	**26.1**	**18700.0**

Sample Depth	Sample Description	Manganese	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Vanadium	Zinc	
5.5		217	200	3400	6170	<10.8	2.5	<464	18.7	1720	J
21		244	270	1300	4090	<10.8	<0.8	<464	13	43.2	J
51		284	220	1600	5050	<10.8	<0.8	<464	16.4	45.1	J
71		209	250	1000	4740	<10.8	<0.8	<464	12.2	35.9	J
96		492	18	730	1780	<10.8	<0.8	<464	12.7	42.4	J
141		306	9	720	1320	<10.8	<0.8	<464	11.8	31.8	J
Representative		**475.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**52.6**	**52.4**	

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
U - Not detected.

Table 4.2.3-28
Concentrations of Parameters in Soil in Former Pond 4E

F024B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0	Slag fill	*17500*	18.4 UJ	*9.4* J	154	0.3	*54.6* U	*918*	37200	*55.9*	7.1	*41.4*	*8030*	13400	*157*	17.5 UJ
10	Brown silt (fill)	*15300*	17 UJ	4.4 J	165	0.22 UJ	*20.2* U	1.1 U	46800	16.9	5.5	8.9 U	*1510*	13400	6.9	15.1 UJ
20	Brown silt	13400	15.8 UJ	5.2 J	140	0.21	14.4 U	1 U	48700	17	5.1	6.3 U	*810*	12900	6.8	11.4 UJ
30	Brown silt	*15800*	20.4 UJ	3.8 UJ	177	0.26	*28.3* U	1 U	48700	19.5	5.3	8.9 U	*930*	14200	10.1	13.2 UJ
40	Brown silt	*19200*	18.5 UJ	3.4 UJ	165	0.3	*21.2* U	1.2 U	*66200*	21.4	6	11 U	*1330*	*17100*	9.4	16.8 UJ
50	Brown silt	*19900*	20.5 UJ	6.7 J	*220*	0.41	*28.1* U	*1.3* U	57600	24.2	7.2	*18* U	*700*	*18600*	7.9 U	17.1 UJ
60	Silty gravel	11900	16.2 UJ	4.8 J	146	0.21 UJ	11.4 U	1.1 U	24500	21.9	*13.1*	7.4 U	390	*27300*	8.7	8.9 UJ
70	Brown sandy gravel	12500	15.9 UJ	6.4 J	179	0.21 UJ	14 U	1 U	40500	18.4	*9.4*	7.8 U	410	*20200*	6.9	10.9 UJ
75	Light yellowish-brown silt	*15200*	18.4 UJ	5.7 J	114	0.33	13.7 U	1.2 U	*94100*	19.2	5.8	9.3 U	480	13000	19.5	13.7 UJ
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
0	Slag fill	9570	242	0.06 U	*6.5* U	*18*	*370*	*25700*	*15700*	*11.3* J	*87.1*	*1940*	*28.7* R	*55*	*15200*
10	Brown silt (fill)	12400	393	0.05 U	2.9 U	13.7	*192*	*1640*	*8000*	2.1 UJ	0.88 U	856	*26.4* R	26.8	*85.3*
20	Brown silt	15200	371	0.07	2.7 U	12.4	*248*	*1160*	*5900*	2.2 UJ	0.82 U	825	*24.6* R	27.4	46
30	Brown silt	14700	377	0.06 U	2.7 U	12.4	*369*	*1560*	6900	1.4 UJ	0.82 U	833	*24.6* R	30.4	52.3
40	Brown silt	16400	521	*0.43*	3.1 U	*15.4*	*41.1*	*4280*	*8480*	1.7 UJ	0.96 U	*989*	*28.8* R	32.8	*60.4*
50	Brown silt	17800	393	0.06 U	3.3 U	*15.4*	*166*	*1160*	*8250*	1.7 UJ	1 U	*1040*	*30.7* R	36.8	*64.1*
60	Silty gravel	8280	427	0.06	2.7 U	*17.2*	*95*	*895*	*3700*	1.2 UJ	0.84 U	*1200*	*25.2* R	41.9	*71.2*
70	Brown sandy gravel	8080	*485*	0.06 U	2.7 U	*15*	*18.5*	*900*	2800	1.4 UJ	0.83 U	*1150*	*24.8* R	33.7	*57.3*
75	Light yellowish-brown silt	10600	296	0.06 U	3.1 U	13.9	*23.1*	*1060*	2970	1.4 UJ	0.96 U	*1470*	*28.7* R	26.1	43.1
Representative		**16700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**6.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
J - Estimated value.
R - Rejected value.
U - Not detected.

Table 4.2.3-27
Concentrations of Parameters in Soil in Former Pond 1E

F033B

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
4.5	Brownish-yellow silt	*15300*	16 UJ	5 UJ	138 J	0.82	*50.6*	*485* U	39000	*51.8*	5.6	*22.9*	*4130*	12000	*79.6* J	17.7
9.5	Brownish-yellow silt	12600	16.1 UJ	5.5 UJ	109 J	0.77	*25.6* U	*3.9* U	31500	16.5	4.6	8.8	*1460*	12300	7.8 J	15
14.5	Brownish-yellow silt	*15100*	17.8 UJ	5.3 J	139	0.82	*23.6* UJ	*3.9*	10200	19.9	5.6	9.6	*1560*	14300	9.2	14.1 U
19.5	Brownish-yellow silt	10700	15.7 UJ	3.4 UJ	103	0.54	12.2 UJ	1 U	44400	16.6	4.1	7.3	*1210*	10900	8.9	10.7 U
Representative		**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
4.5	Brownish-yellow silt	10600	315 J	0.05 U	2.7 U	*16*	*1010*	*6410*	*15900*	1.9 UJ	*46.1* U	*1550*	*24.9* U	*55*	*7320* J
9.5	Brownish-yellow silt	12000	444 J	0.06 U	2.7 U	12.2	*714*	*2380*	*7740*	1.3 UJ	0.84 U	*1050*	*25.1* U	23.9	*295* J
14.5	Brownish-yellow silt	6290	459	0.06 U	3 U	*17.6*	*367*	*1900*	*6800*	3.1 UJ	0.92 U	*988*	*27.7* U	29.3	*174*
19.5	Brownish-yellow silt	15400	342	0.05 U	2.7 U	11.9	*236*	*1630*	*4740*	1.6 UJ	0.82 U	718	*24.5* U	25.6	*75.7*
Representative		**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**20.4**	**52.6**	**52.4**

B-1

Sample Depth	Sample Description	Arsenic	Barium	Cadmium	Calcium	Chromium	Copper	Fluoride	Iron	Lead	Magnesium
0.5		<42	99.2 B	5110	62700	278	155	106 J+	3490	683	2450 B
6.5		<8.4	150	0.78 B	48900 J	16.6 J	10.4	156	10800 J	11.8	11400
11.5		<8.4	168	0.74 B	42000 J	17.5 J	10.2	189	11600 J	7.2	12500
31		<8.4	177	<.6	457000 J	13.1 J	8	220	11000 J	10.3	13400
Representative		**8.5**	**203.2**	**1.2**	**65574.4**	**27.0**	**15.2**	**559.2**	**14930.2**	**26.1**	**18700.0**

Sample Depth	Sample Description	Manganese	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Vanadium	Zinc
0.5		159	7720 J	86000 J	66300	77.6 J	79.6	13000	234	69800
6.5		207 J-	269	5770	9295	<10.8	1.1 B	<464	17.2	1590
11.5		266 J-	287	2820	7190	<10.8	0.8 B	<464	22.5	1070
31		392 J-	371	2320	7340	<10.8	1.1 B	<464	22.1	182
Representative		**475.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**970.7**	**52.6**	**52.4**

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
B - The reported value is less than the contract required detection limit (CRDL) but is greater than or equal to the IDL.
J - Estimated value.
J+ - A (+) symbol with the "J" qualifier indicates that the value listed is most likely greater than (+) the true value.
J- - A (-) symbol with the "J" qualifier indicates that the value listed is most likely less than (-) the true value.
U - Not detected.

Table 4.2.3-26 (cont'd)

F150

Sample Depth	Sample Description	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper	Fluoride	Iron		Lead		Lithium	
1						3.17	K							0.5	UK								285						
2						2.45	K							0.5	UK								116						
10		23300		15.7	U	2.1	J	215		2		63.6	J	13.5		211000		178		3.8		13.9	11400	5110		6.3	J	15.9	
20		13800	J	17.4	U	5.7		139	J	0.67		15.8	UJ	0.9	U	39100	J	18.5	J	5.4		17.8	422	13200	J	6.3	J	15.2	
30		12300	J	16.6	U	4.4	U	122	J	0.58		17	UJ	0.86	U	34500	J	15.7	J	5.3		18.3	349	13600	J	10		12.3	
40		10600	J	16.6	U	4.3	U	131	J	0.52		13.2	UJ	0.86	U	40100	J	22	J	5.6		57.8	394	13900	J	6	J	10.8	U
50		11000	J	16.7	U	4.3	U	113	J	0.52		10.7	UJ	0.87	U	37300	J	14.4	J	4.4		30.7	368	11100	J	8.1		10.8	U
60		9980	J	16.8	U	4.2	U	98.3	J	0.46		9	UJ	0.87	U	42500	J	14.1	J	4.2		20.9	370	10700	J	7.7	J	10.9	U
70		9990	J	16.5	U	3.9	U	116	J	0.52		9.8	UJ	0.86	U	42800	J	17	J	4.6		18.9	319	11800	J	9.4	J	10.7	U
80		12900	J	16.8	U	4	U	117	J	0.65		9.5	UJ	0.87	U	41500	J	15.9	J	4.9		37.5	389	12300	J	2.3	U	11.9	
90		13800	J	17.1	U	45	U	142	J	0.56		12.9	UJ	0.89	U	49300	J	16.5	J	5.7		59.3	376	13100	J	12.3	J	14.4	
Representative		**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**		**27.0**		**8.7**		**15.2**	**559.2**	**14930.2**		**26.1**		**17.8**	

Sample Depth	Sample Description	Magnesium		Manganese		Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sodium	Thallium		Vanadium	Zinc	Gross Alpha	Gross Beta
1												1	954		0.79	K								
2												21.9	612		0.5	UK								
10		5920		272		0.11	U	4.1	U	10.2	U	9.9	4080	6880	2.3	U	0.81	U	2810	0.1	UJ	157	239	172	84
20		12600	J	357	J	0.06	U	4.5	U	12.3		118	1630	4550	1.2	UJ	0.9	U	824	0.44	UJ	26	64.3	8.73	18.7
30		12500	J	395	J	0.05	U	4.3	U	12.6		7.5	821	2420	1.3	UJ	0.86	U	853	0.46		24	63	13.7	23.9
40		13800	J	355	J	0.06	U	4.3	U	13.1		3	857	2040	1	UJ	0.86	U	940	0.44	U	31.6	125	10.1	17.6
50		13100	J	333	J	0.07	U	4.3	U	11.3		2.2	856	2290	0.85	UJ	0.87	U	902	0.42		22.6	54.9	8.46	17
60		13800	J	323	J	0.08	U	4.4	U	10.9	U	1.5	810	2030	0.83	UJ	0.87	U	800	0.42		20.7	87.6	9.79	17.9
70		13500	J	367	J	0.09	U	4.3	U	10.7	U	1.6	800	2040	1	UJ	0.86	U	842	0.044	U	24	159	9.14	16.7
80		12600	J	336	J	0.08	U	4.4	U	13.4		0.8	830	2980	0.85	UJ	0.87	U	1080	0.45	U	22.6	77.1	7.29	16.7
90		14000	J	352	5	0.07	U	4.4	U	15.5		0.5	U 691	3170	1.4	UJ	0.89	U	1140	0.55		23.9	83.6	9.06	17.2
Representative		**18700.0**		**475.9**		**0.3**		**5.2**		**14.9**		**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**		**970.7**	**20.4**		**52.6**	**52.4**		

Notes:
Results are in mg/kg.
Depths are in feet.
Above-representative values are in italics.
B - The reported value is less than the contract required detection limit (CRDL) but is greater than or equal to the IDL.
J - Estimated value.
J+ - A (+) symbol with the "J" qualifier indicates that the value listed is most likely greater than (+) the true value.
J- - A (-) symbol with the "J" qualifier indicates that the value listed is most likely less than (-) the true value.
U - Not detected.

Table 4.2.3-26
Concentrations of Parameters in Soil in Pond 8S

B-12

Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0				2.32 K				2.14 K					215			
10		14300	17.3 U	4.4 J	138	1.1	39.3 J	535	83900	154	7.2	40.8	7030	11400	137 J	12.4
20		13900 J	17.1 U	3.3 U	109 J	0.6	17.8 UJ	0.89 U	36200 J	16.5 J	4.2	11.5	784	13500 J	9.4 J	13.2
30		12000 J	17.1 U	5.4 U	115 J	0.56	11.9 UJ	0.89 U	45300 J	16.5 J	6	10.6	312	13400 J	10.6 J	11.2
40		11600 J	16.8 U	3.8 U	117 J	0.55	12.9 UJ	2.2 U	43200 J	16.6 J	5.5	15.6	349	12900 J	10.5 J	11.3
50		11100 J	17.7 U	4	125 J	0.49	12.6 UJ	0.92 U	50700 J	14 J	5.3	12.8	350	11900 J	14 J	11.5 U
60		6500 J	15.9 U	3.4	87.8 J	0.29	6.3 UJ	4 U	34100 J	12.7 J	4	70.4	235	10400 J	8 J	10.3 U
70		8510 J	25.4 U	4.8	93.1 J	0.74	10 UJ	1.3 U	34800 J	11.3 J	5.6	25.8	490	11000 J	15.5 J	11.4
80		10000 J	19.4 U	6.9	136 J	0.73	10.6 UJ	1.3 U	48500 J	13.3 J	7	28.3	393	14600 J	15.1 J	12.9
90		9720	18.9 U	4.4 J	212	0.67	8.7 U	2.3 U	38100	11.7	7.6	7.7	441	15900	0.32 U	12.6
Representative		14638.6	30.9	8.5	203.2	1.2	18.1	1.2	65574.4	27.0	8.7	15.2	559.2	14930.2	26.1	17.8

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0							8.5	774		1.22 K							
10		8790	408	0.07 U	4.5 U	35.7	126	9980	9790	6.7	56	1830	8 J	138	10800	143	117
20		13800 J	407 J	0.06 U	4.4 U	13.4	349	1610	6410	1.1 U	0.89 U	869	0.44	24.7	96	8.27	20
30		14600 J	393 J	0.06 U	4.4 U	15.7	17.9	803	2500	1 UJ	0.89 U	1040	0.44 U	24.6	64.5	13.4	20
40		14300 J	399 J	0.05 U	4.4 U	14.6	9.2	771	2530	1 UJ	0.87 U	907	0.44 U	25.1	96.9	9.76	15
50		15600 J	366 J	0.06 U	4.6 U	15.8	2.3	773	2190	0.85 UJ	0.92 U	864	0.44 UJ	21.4	59.5	8.73	18
60		7110 J	293 J	0.05 U	4.1 U	10.3 U	22	636	2290	0.55 UJ	0.83 U	724	0.39 UJ	16.2	242	16.1	16
70		10500 J	244 J	0.07 U	4.4 U	11 U	96.3	1260	4330	0.97 UJ	0.88 U	689	0.43 U	17.2	110	10.6	22.9
80		9430 J	457 J	0.11 U	5 U	12.6 U	10.7	877	4600	1.1 UJ	1 U	782	0.48 UJ	22.1	117	22.6	25.6
90		8120	506	0.08 U	4.6 U	11.5 U	9.5	1290	2190	1.6 U	0.92 U	1120	0.12 UJ	23.9	82.4	21.9	17.9
Representative		18700.0	475.9	0.3	5.2	14.9	8.9	840.2	3562.3	6.5	2.0	970.7	20.4	52.6	52.4		

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Sample Depth	Sample Description	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
0				4.21 K				1.4 K					178			
10		8990 J	17.9 U	4.6	134 J	0.64	11.4 UJ	15.2	37900 J	11.9 J	5.6	13.8	430	11100 J	6.6 J	11.6 U
20		8450 J	16.5 U	6.9	122 J	0.59	9.8 UJ	0.86 U	39800 J	12.7 J	5.3	13.6	386	11200 J	6.4 J	10.7 U
30		9240 J	16.7 U	4.8	118 J	0.63	9.6 UJ	1.5 U	26000 J	14.1 J	5.5	32.2	395	12400 J	6.6 J	11.4
40		10400 J	17.1 U	4.2	356 J	0.55	9.7 UJ	0.89 U	44800 J	14 J	5.9	12.2	372	12300 J	5.5 J	11.1 U
50		9130	8.8	4.5 J	121	0.56	6.8 U	0.38 U	39900	11.9	4.7	17.4	402	10500	8.8 J	9.7
60		7730 J	17.1 U	3.3	138 J	0.48	6.9 U	0.88 U	46700 J	13.7 J	5.6	10.6	337	13300 J	5.4 J	11 U
70		9100	17.8 U	4.6 J	152	0.64	7.8 U	0.92 U	33400	11.6	6.6	14.2	286	12000	0.27 U	11.6 U
80		13000	17.4 U	4.2 J	148	0.92	12.7 U	0.9 U	60900	16.5	7.3	16.2	411	14500	18.7 J	12.9
90		9390	17.5 U	4.2 J	102	0.69	7.4 U	0.91 U	58100	20.8	5.9	11.9	475	14300	7.4 J	11.3 U
100		13200	17.8 U	4.3 J	149	0.91	12.3 U	0.92 U	51500	18.1	6.6	9.3	460	14600	17 J	13
Representative		14638.6	30.9	8.5	203.2	1.2	18.1	1.2	65574.4	27.0	8.7	15.2	559.2	14930.2	26.1	17.8

Sample Depth	Sample Description	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Gross Alpha	Gross Beta
0							2.02	669		0.95 K							
10		11100 J	382 J	0.1 U	4.7 U	11.6 U	123	3250	3070	1.1 UJ	0.93 U	751	0.44 UJ	18.7	637	6.85	14.8
20		11900 J	348 J	0.07 U	4.3 U	10.7 U	70.3	992	3230	0.9 UJ	0.86 U	679	0.43 UJ	19.8	52.7	11.3	20.2
30		10600 J	400 J	0.06 U	4.3 U	11.2	9.6	797	1820	0.6 UJ	0.87 U	1160	0.45 UJ	19.4	111	6.75	16.5
40		13800 J	366 J	0.06 U	4.4 U	11.1 U	5.2	775	2060	0.83 UJ	0.89 U	1080	0.43 UJ	21.8	50.9	14.5	18.4
50		13000	338	0.06 U	1.3 U	11	4.6	817	1730	1 U	0.11 U	940	0.16	19.9	63.9	13.4	17.5
60		10900 J	435 J	0.07 U	4.4 U	11 U	4.3	826	1510	0.84 UJ	0.88 U	1110	0.45 UJ	23.4	52.1	7.79	20
70		7770	332	0.11 U	4.6 U	11.6 U	1.2	418	1750	1.3	0.92 U	1090	0.11 UJ	16.9	137	10.1	13.7
80		14600	426	0.09 U	4.5 U	15.3	0.5 U	670	2840	1.9	0.9 U	1240	0.11 UJ	25.2	187	13.5	17.7
90		17000	398	0.11 U	4.5 U	12.6	0.5 U	834	2070	1 U	0.91 U	1040	0.11 UJ	29.8	96.7	10.2	16.6
100		13900	407	0.11 U	4.6 U	11.6	4.6	778	2980	1.5 U	0.92 U	1110	0.12 U	27.2	57.4	11.8	18.3
Representative		18700.0	475.9	0.3	5.2	14.9	8.9	840.2	3562.3	6.5	2.0	970.7	20.4	52.6	52.4		

Tables for Section 4.3

Table 4.3-1
Analytical Results for Offsite Soil Samples - Northeastern Quadrant

Sample Id	Aluminium		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper		Fluoride	Iron		Lead		Lithium	
SS0001AA	12800	J	*11.7*	UJ	3.3		137	J	1.4		1.3	U	*45.3*		NA		*80.5*	J	3.3		*21.6*		*3450*	13100	J	33.9	V	11.7	
SS0001B	10800		6.1	UJ	3.8	U	87.8		0.81		2.9		*12.9*	J	NA		*99.4*	J	4.4	UJ	15.9	J	*1490*	13400	J	24.1	J	11.4	
SS0001C	11900		4.6	UJ	*7.4*		150		0.72		15.6		*24.6*	J	33900	J	*68.4*		5.7		*61.9*		*2340*	13600	J	*68.1*		11.8	
SS0001D	9190		6.1	UJ	5.8		154	J	0.3		3.43		*13.1*		NA		28.8		6.4		14.8		*940*	10400		20.8		12.3	
SS0002A	10100		*11.2*	J	3		154		0.56		8.3		*12*		NA		35.7		5.6		*17.5*		*1290*	13200		17.2	J	13.9	J
SS0002B	14500		4.4	U	5.4		161		0.88	J	2.5		2.1		NA		26.5		*8.7*		13.9		575	14800	J	12.3	J	*20.1*	J
SS0002C	11700		4.2	UJ	3.2		192	J	0.63	U	1.76		1.3		NA		19.2		5	U	13.2		458	16000		21.5		18.4	
SS0003A	12700		4	U	1.8	U	140		0.67	J	3.8		1.4	U	NA		21.3		7.8	U	13.9		438	14300	J	21.6	J	15.4	J
SS0003B	11100		5.1	U	*8.8*		129		0.84	J	5.6		0.93	U	NA		19.4		*8.9*	U	12.3		305	12400	J	26	J	15.3	J
Representative	**15961.5**		**10.4**		**6.7**		**205.7**		**1.4**		**17.3**		**4.9**		**NC**		**53.0**		**7.8**		**17.2**		**656.3**	**17137.5**		**35.8**		**19.3**	

Sample Id	Magnesium	Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sulfate	Thallium		Vanadium		Zinc	
SS0001AA	NA	367	J	0.11		*5.5*	U	*29.3*	5	*12200*	NA	*2.1*		*3.2*		NA	0.3		*151*		*321*	J
SS0001B	NA	361	J	0.1	U	*9.1*		*45.5*	2.8	*3050*	NA	*1.7*	U	0.71	U	NA	*0.41*	J	28.8	J	*128*	J
SS0001C	6740	367	J	*0.48*	U	*5.6*	U	*21*	20	*6010*	NA	1.2		0.91	U	NA	*7.2*	U	*83.6*		*331*	J
SS0001D	NA	463		0.16	U	*3*		13.4	12	*3980*	NA	0.85		0.41	J	NA	*0.44*		20.3		*114*	
SS0002A	NA	650	J	0.1		1.2	U	14.3	10	*3400*	NA	0.56		*1.6*		NA	0.23		*54.7*		*134*	
SS0002B	NA	425		0.1		1.2	U	13.3	6.6	955	NA	*2.5*	U	1		NA	0.06	U	31.6		81.6	
SS0002C	NA	447		0.08	U	1.2	U	11.1	U 13	737	NA	1		*1.1*	J	NA	0.11	U	28.8		69.6	
SS0003A	NA	417		0.08		*2.7*	U	12.6	12.7	782	NA	*2.2*	U	0.8		NA	0.16		22.7		65.8	
SS0003B	NA	469		0.2		*5.1*	U	9.9	5.9	458	NA	*5.2*		0.42		NA	0.11		27		58.5	
Representative	**8722.5**	**909.0**		**0.2**		**2.1**		**18.6**	**21.8**	**1512.4**	**4934.2**	**1.2**		**1.0**		**NC**	**0.3**		**35.5**		**89.7**	

Sample Id	Aluminium		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper		Fluoride	Iron		Lead		Lithium	
BS0001A	10500	J	11.9	UJ	6.4		143	J	0.56		3.6		*1.7*		NA		14.5	J	3.4		9.4		385	14400	J	9.4	J	14	
BS0001B	7960		6.6	UJ	1.8	U	123		0.88		1.6		0.31	UJ	NA		14.7	J	4.2	UJ	9.3	J	470	12000	J	12.1	J	12.7	
BS0001C	11700		4.2	UJ	6.2		145		0.64		3.9		0.99	J	NA		19.9		5.7		10.4		403	12300		11.9	J	14.8	
BS0002AA	8460		12.9	J	3.4		121		0.34		15.4		*1.4*		NA		15.6		3.9		12.6		445	13200		*29.3*	J	*17.9*	J
BS0002B	13500		4.7	U	6.7		164		0.86	J	1.3		0.38		NA		21.8		8.4		11.8		408	*15500*	J	20.5	J	*20.2*	J
BS0002C	7840		4	UJ	2.4		137	J	0.47	U	0.79		0.28		NA		14.1		4.1	U	9		455	10700		9.8	J	13.5	
BS0003A	10900		4.8	U	4.2	U	167		0.57	UJ	2.4		0.55		NA		20.2		8.2	U	12.5		383	14200	J	17.2	J	15	J
BS0003B	7810		4.8	U	4.3	U	126		0.65	UJ	2.8		0.31		NA		15.3		8	U	8.7		360	9990	J	16.6	J	11.6	J
Representative	**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**		**27.0**		**8.7**		**15.2**		**559.2**	**14930.2**		**26.1**		**17.8**	

Sample Id	Magnesium	Manganese		Mercury		Molybdenum		Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sulfate	Thallium		Vanadium		Zinc	
BS0001A	NA	369	J	0.09		2.1	U	10.4	1	*928*	NA	0.27	U	0.35		NA	0.08		30.8		48.4	J
BS0001B	NA	299	J	0.08	U	1.9	U	9.5	0.6	667	NA	2.1	U	0.22	U	NA	0.17	UJ	*66.1*	J	39.7	J
BS0001C	NA	465		0.26		1.2	UJ	12	4.9	648	NA	2.2		0.99	J	NA	0.29	J	26.9		45.9	
BS0002AA	NA	*501*	J	0.13		4.1		10.8	5.3	*1260*	NA	0.4		1.2		NA	0.16	J	30.6		49.2	
BS0002B	NA	457		0.15		2.3	U	9.4	0.8	404	NA	3.1		0.63		NA	0.15		25		52	
BS0002C	NA	298		0.27	U	1.1	U	9.3	U 0.05	U 460	NA	0.3		1.1	J	NA	0.1	UJ	26.8		34.1	
BS0003A	NA	342		0.1		4.8	U	13.1	2	491	NA	2.7		0.89		NA	0.1		31.5		45.8	
BS0003B	NA	299		0.09		3.2	U	9.8	1	431	NA	3.1		1		NA	0.1		25.8		36.2	
Representative	**18700.0**	**475.9**		**0.3**		**5.2**		**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**		**NC**	**20.4**		**52.6**		**52.4**	

Sample Id	Aluminium		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chromium		Cobalt		Copper		Fluoride	Iron		Lead		Lithium	
SS0231A	12900	J	*13.1*	UJ	5		186	J	0.52		5.8		*36.6*		NA		*73.9*	J	2.2		*19.9*		*3420*	11300	J	23.2	J	11.2	
SS0231B	8770	J	*14.6*	UJ	4.7		95.6	J	0.86		3.2		*43.5*		NA		*87.5*	J	2.5		16.4		*2500*	9530	J	32.3	J	7	
SS0231C	1150		4.1	UJ	5.9		375	J	0.68	U	2.47		*16.9*		NA		48.9		4.8	U	*18.5*		*1590*	14400		19.3		15.3	
SS0231D	13600		6.6	U	*7.4*		166		0.79	J	4.1		*9.7*		NA		34.4		5.5		14.2		*1280*	14300	J	30.7	J	15.4	J
SS0232A	12100		4.1	UJ	6.3		157		0.34		7.3		4.9		NA		26		4.2		*33.6*		528	*20000*		*39.9*	J	10.8	J
SS0232B	13600		4	U	4.3	U	145		0.8	J	2.8		4.5		NA		30.7		6.3		13.4		*708*	13300	J	25.9	J	17.8	J
SS0232C	11400		*15.4*	J	6.1		181		0.63		7.3		2.4		NA		19		4.2		13.7		468	13700		17.5	J	12.3	J
SS0233A	9910		4.8	U	5.1		130		0.4	UJ	3.8		0.64	U	NA		17		7.6	U	13		368	10500	J	20.5	J	13.2	J
SS0233BA	9270		4.2	U	2.6		153		0.07	UJ	6.4		0.49		NA		13.3		7.2	U	10.8		448	11400	J	19.3	J	12.4	J
Representative	**15961.5**		**10.4**		**6.7**		**205.7**		**1.4**		**17.3**		**4.9**		**NC**		**53.0**		**7.8**		**17.2**		**656.3**	**17137.5**		**35.8**		**19.3**	

Table 4.3-1 (Cont'd)

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
SS0231A	NA	350 J	0.08	*5.9* U	*22.9*	6.7	*11700*	NA	1.1	*2.7*	NA	0.26	*133*	*267* J
SS0231B	NA	295 J	0.09	*5.3* U	*19.2*	8	*11400*	NA	*2.6*	*2.5*	NA	*0.42*	*124*	*307* J
SS0231C	NA	439	0.15 U	*2.7* U	17.2	10.3	*5110*	NA	0.59	*1.5* J	NA	*0.31*	*68.1*	*148*
SS0231D	NA	433	0.07	2 U	14.3	12.3	*2640*	NA	*3.1*	*1.3*	NA	0.2 J	*45.2*	*117*
SS0232A	NA	400	0.1	1.2 UJ	12.6	*39.6*	*1910*	NA	0.99	*1.2* J	NA	0.15	*27.4*	*135*
SS0232B	NA	301	0.07	1.3 U	11.8	10.6	*1840*	NA	*1.7* U	0.9	NA	0.2	*38.1*	*91.3*
SS0232C	NA	413	0.1	1.2 UJ	12.8	6.2	1120	NA	0.87	*1.4* J	NA	0.15	23.8	72.6
SS0233A	NA	416	0.15	1.4 U	11	19.2	782	NA	1.2 U	0.64	NA	0.1	24.9	57.9
SS0233BA	NA	370	0.09	1.2 U	9.8	9	*745*	NA	*3.2*	*1.5*	NA	0.13	22.5	50.3
Representative	**8722.5**	**909.0**	**0.2**	**2.1**	**18.6**	**21.8**	**1512.4**	**4934.2**	**1.2**	**1.0**	**NC**	**0.3**	**35.5**	**89.7**

Sample Id	Aluminium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
BS0231A	11400 J	12.3 UJ	5	148 J	0.58	8.9	*2*	NA	12.4 J	3.5	10.2	*600*	12400 J	7.5 J	12.9
BS0231B	8770 J	21.5 UJ	3.4	124 J	0.48	2.4	0.83	NA	9.7 R	3.5	8.1	375	11200 J	4.9 J	10.2
BS0232A	8560	8.1 J	*8.7*	188	0.29	3.9	1.2	NA	16	3.7	8.3	380	11600	6.4 J	10.3 J
BS0232B	9900	4.2 U	4.5 U	150	0.7 J	1.9	0.39	NA	18.3	6.3 U	8.7	463	10160 J	14.6 J	13.9 J
BS0232C	9140	12.2 J	5.8	121	0.31	3.7	0.99	NA	15.6	4.1	8.5	363	12000	11.5 J	10.4 J
BS0233A	8150	4.8 U	9	123	0.32 UJ	4	0.28	NA	15	8.3 U	11	390	13300 J	14.3 J	12.5 J
BS0233B	8500	4.3 U	1.2	114	0.07 UJ	3.5	0.27	NA	15.1	7.6	9.3	510	11600 J	11 J	9.8 J
Representative	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
BS0231A	NA	385 J	0.09	4.3 U	8.9	1.8	*944*	NA	0.29 U	0.65	NA	0.11	34.7	*54.2* J
BS0231B	NA	326 J	0.06	3.5 U	9.1	2.3	543	NA	0.25 U	0.35	NA	0.09	27.7	39.2 J
BS0232A	NA	330	0.11	1.2 UJ	12.5	0.8	607	NA	0.86	1.9 J	NA	0.13	27.8	34.1
BS0232B	NA	318	0.08	4.9 U	9.8	0.5	539	NA	4.6	1.1	NA	0.1	24	34.5
BS0232C	NA	354	0.11	1.3 UJ	12.1	3.7	584	NA	1.5	1.2 J	NA	0.16	23.7	36
BS0233A	NA	398	0.16	1.4 U	10.2	1.1	464	NA	0.84 U	0.96	NA	0.07	25.7	41.7
BS0233B	NA	354	0.11	1.2 U	11.1	0.5	496	NA	0.3 U	0.78	NA	0.05 UJ	27.1	39.2
Representative	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**6.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**NC**	**20.4**	**52.6**	**52.4**

Sample Id	Aluminium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
SS0451A	13200 J	*13.2* UJ	*9.3*	*325* J	*1.6*	2.9	*112*	NA	*243* J	3.5	*47.7*	*9880*	12200 J	*95* J	9.8
SS0451A1	13600	4.1 U	*9.8*	151	0.93	*29.7*	*65.6*	80300	*190*	4.4	*29.4* J	*6020*	10700	*45.1*	12.8
SS0451A2	14900	4.1 U	*13.6*	*770*	1.3	*51.3*	*108*	113000	*404*	2.8	*56.9* J	*12600*	11500	*69.5*	10.1
SS0451A3	13400	4 U	*16.7*	*224*	1.4	*38.4*	*163*	141000	*443*	1.9	*64.7* J	*16900*	8720	*57.3*	9.3
SS0451A4	13100	4.2 UJ	*8.4*	189	0.76	*17.9* J	*62.8*	84100	*136*	4.2	*26.5*	*5350*	10900	29.3	11.3
SS0451B	12400 J	*12.8* UJ	5.4	144 J	NA	2	*38.7*	NA	*96.8* J	2.6	*22.5*	*3130*	10200 J	27.6 J	11.7
SS0451CA	10400	4.6 UJ	5.2	178	0.66	15.8	*20.2* J	51800 J	*57.3*	4.4	*17.9*	*2820*	10400 J	17.1	13.4
SS0451D	9300	5.2 J	3.1	131	0.39	3.8	*6*	NA	27.6	5.7	12.5	*765*	11400	*62.7* J	12.1 J
SS0452A	13700	5.3 U	1.3 U	160	0.79 J	5.9	*12.7*	NA	51.6	6.5	16.3	*1300*	*18100* J	31.4 J	19.2 J
SS0452B	13200	3.8 U	3.6 U	145	0.95 J	4.6	2.3	NA	26.2	6.3	13.1	510	12200 J	16.5 J	15.6 J
SS0452C	13800	4 U	2.8	157	0.94	6.5	*10.2*	NA	35.8	6	15.5	*793*	13900	20.2 J	13.8 J
SS0453A	*17100*	4.3 UJ	3	185 J	0.5 U	1.47	2.8	NA	26.8	6.2 U	15.7	510	16800	*59.5* J	*20.7*
SS0453B	10900	4.1 UJ	2.7	173 J	0.68 U	1.8	1.5	NA	25.8	5.7 U	13.5	475	14100	*64.4*	16.8
Representative	**15961.5**	**10.4**	**6.7**	**205.7**	**1.4**	**17.3**	**4.9**	**NC**	**53.0**	**7.8**	**17.2**	**656.3**	**17137.5**	**35.8**	**19.3**

Table 4.3-1 (Cont'd)

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
SS0451A	NA	288 J	0.07	*12.5* U	*72.3*	*65.1*	*40400*	NA	*4.1*	*6.8*	NA	*0.77*	*425*	*735* J
SS0451A1	*9590*	287 J	0.18 U	*5.1* U	*45.2*	1.11	*15900*	3530	*3.4*	*2.9*	9730	*1* J	*222*	*497*
SS0451A2	5020	251 J	*0.33* U	*11.5*	*81.9*	*75.4*	*40000*	4370	*6.6*	*5.3*	20 U	*1.93* J	*463*	*906*
SS0451A3	4020	279 J	*1.2*	*14.8*	*96.3*	21	*52600*	4180	*6.6*	*8.1*	160	*3* J	*559*	*1220*
SS0451A4	*9690*	314	0.19 U	*2.8*	*41*	10.4	*16900*	3240	*2*	*3* U	20 U	*1*	*180*	*452*
SS0451B	NA	302 J	0.08	*6.7* U	*28.7*	10.2	*19100*	NA	*2.5*	*3*	NA	*0.42*	*167*	*263* J
SS0451CA	*9040*	292 J	*0.33* U	2.1 U	*19.8*	9.8	*10100*	NA	*1.6*	0.95 U	NA	*7.2* U	*82*	*180* J
SS0451D	NA	399 J	0.08	2	14.2	4.5	*1660*	NA	1	*1.4*	NA	0.19 J	*38.7*	81.1
SS0452A	NA	277	0.12	*3.3* U	16.2	9.9	*2960*	NA	*2.6* U	*1.5*	NA	0.23	*53.4*	*137*
SS0452B	NA	381	0.12	1.1 U	11.2	11.6	1010	NA	*2.5* U	*1.1*	NA	0.09	32.3	78.6
SS0452C	NA	571 J	0.11	1.1 U	14.5	11	*2030*	NA	0.5	*1.1*	NA	0.12 J	*54.3*	*113*
SS0453A	NA	409	0.15 U	1.2 U	12.8	12.3	1000	NA	0.27 U	0.57 J	NA	0.1 U	32.6	82
SS0453B	NA	422	*0.22* U	1.2 U	11.8 U	12.2	778	NA	0.26 U	0.14 UJ	NA	0.1 U	29.1	*90.7*
Representative	**8722.5**	**909.0**	**0.2**	**2.1**	**18.6**	**21.8**	**1512.4**	**4934.2**	**1.2**	**1.0**	**NC**	**0.3**	**35.5**	**89.7**

Sample Id	Aluminium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
BS0451A	9670 J	11.3 UJ	7	162 J	0.4	0.78	0.8	NA	11 J	2	9.2	533	12400 J	8.1 J	11.7
BS0451A1	10900	4.5 U	5	140	0.58	8.6 U	0.61	46700	15.4	5.3	7.8 J	470	11900	7.73	10.7
BS0451A2	12300	4.5 U	5.1	168	0.64	14.4 U	*2*	*88400*	19.7	5.7	10.5 J	*610*	12000	8.2	13
BS0451A3	*17300*	4.4 U	4.9	154	0.87	*32.2*	*4.3*	35000	*29.2*	6.8	*15.5* J	*990*	*15400*	11.3	*18.2*
BS0451A4	6690	4.3 UJ	5.8	87.4	0.43	8.8 J	0.39	32600	9.8	4	7.2	470	8620	6.4	8.8
BS0451B	12800 J	13.9 UJ	4.6	193 J	0.88	5.5	*2.6*	NA	16.6 J	4.4	11.3	458	13500 J	7.5 J	15.7
BS0452A	11900	4.3 U	7.5	175	0.57 UJ	2.8	0.5	NA	19.4	6.6	10.8	448	12200 J	13.9 J	17.1 J
BS0452B	9110	4.4 U	0.79 U	157	0.81 J	3.8	0.34	NA	16.9	7.2	9.1	358	14700 J	12.7 J	11.8 J
BS0453A	12300	4.4 UJ	3.6	186 J	0.59 U	1.19	0.74	NA	17.9	5.8 U	12	413	14200	*55.1* J	15.5
BS0453B	9300	4.9 U	2.8 U	164	0.73 J	4.2	0.36 U	NA	16	8.2 U	11.8	395	9430 J	14.8 J	14.3 J
Representative	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
BS0451A	NA	366 J	0.07	4 U	10.6	2.7	622	NA	1.3	0.88	NA	0.05 U	41	47.2 J
BS0451A1	16600	360 J	0.05 U	1.5 U	12	0.7	598	2180	0.73 U	0.35 UJ	3320	0.81 J	21.3	46.2
BS0451A2	12700	296 J	0.11 U	1.5 U	12.5	*20.2*	779	3020	0.7 U	0.34 U	240	0.35 J	23.8	*57.9*
BS0451A3	11000	418 J	0.08 U	1.5 U	16.2	3.4	*1950*	4450	1.3 U	0.34 UJ	1390	0.53 J	41.1	*88.4*
BS0451A4	10800	250	0.07 U	1.4 U	9.3	2.1	570	1510	0.57 U	0.33 U	20 U	0.21	14.7	31.3
BS0451B	NA	401 J	0.1	5.1 U	10.4	4.7	*1040*	NA	0.28 U	0.58	NA	0.09	35.1	*60.2* J
BS0452A	NA	311	0.11	3.6 U	11.9	0.6	464	NA	1.5 U	1.8	NA	0.1 J	27.9	41.1
BS0452B	NA	469	0.14	2.2 U	8.8	0.7	447	NA	1.6 U	1.5	NA	0.1 J	25.6	36.3
BS0453A	NA	389	0.2 U	1.3 U	11.6 U	0.5 U	454	NA	0.29 U	0.89 J	NA	0.11 U	26.6	50.1
BS0453B	NA	236	0.15	1.6 U	10	0.5	474	NA	1 U	1.5	NA	0.11	26.7	38.1
Representative	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**NC**	**20.4**	**52.6**	**52.4**

Sample Id	Aluminium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
SS0681A	*16900*	6.1 UJ	*7.8*	*288*	1.3	3.9	*29.4* J	NA	*141* J	3.9 UJ	*25.7* J	*4780*	15900 J	29.2 J	14.2
SS0681B	12000 J	*19.1* UJ	3.3	157 J	0.89	4.6	*59.3*	NA	*195* J	2.2	31.3	*6730*	11600 J	*61.3* J	9.1
SS0681C	10800 J	*21.2* UJ	3.9	155 J	0.08 U	8.8	*10*	NA	20.2 J	1.9	13.2	*1040*	10700 J	10.9 J	10.9
SS0681D	9860	14 J	4	*247*	0.41	5.1	*8.3*	NA	*54.8*	4.4	14.4	*1180*	12800	*39.4* J	13.5 J
SS0682A	11300	*17.4* J	3.8	160	0.68	6.9	*7.2*	NA	32.6	5.2	15.3	*913*	13300	18.7 J	12.9 J
SS0682B	14600	4.2 UJ	3.3	184	0.49	5.5	*5.2*	NA	38.9	4.9	14.3	*685*	15100	17.7 J	14.6
SS0682C	12600	14 J	2.3	159	1.2	6.6	3.9	NA	28	6.5	14.9	490	13900	23.7 J	16.9 J
SS0683A	11600	3.9 UJ	3.1	186 J	0.46 U	3.65	2.9	NA	23.9	6.2 U	14.7	*670*	15900	*56.7* J	16.1
SS0683B	13100	4 UJ	3.5	161	0.54	6.7	4	NA	31.7	4.5	16.3	618	15000	24.4 J	13.3
Representative	**15961.5**	**10.4**	**6.7**	**205.7**	**1.4**	**17.3**	**4.9**	**NC**	**53.0**	**7.8**	**17.2**	**656.3**	**17137.5**	**35.8**	**19.3**

Table 4.3-1 (Cont'd)

Sample Id	Magnesium	Manganese		Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sulfate	Thallium		Vanadium		Zinc	
SS0681A	NA	391	J	*0.24*	U	1.7	U	*25.6*		*24.9*	*17600*	NA	*3.1*	U	*2*	U	NA	*0.63*		*163*	J	*329*	J
SS0681B	NA	213	J	0.06		*8.2*	U	*38.4*		*39.4*	*28100*	NA	*2.6*		*4.3*		NA	*0.37*		*257*		*538*	J
SS0681C	NA	322	J	0.1		*5.9*	U	12.4		*35.3*	*3970*	NA	0.35	U	*1.1*		NA	0.15		*65.4*		*123*	J
SS0681D	NA	337	J	0.12		*4.9*		18.1		11.6	*3260*	NA	0.71		*2.1*		NA	0.23	J	25.4		*114*	
SS0682A	NA	504	J	0.14		*3.8*		16.3		8.7	*2560*	NA	0.36		*1.5*		NA	*0.33*	J	*51.3*		*112*	
SS0682B	NA	499		0.05	U	1.2	UJ	18		10	*2300*	NA	*1.6*	U	*1.4*	U	NA	0.18		*38.3*		*101*	J
SS0682C	NA	598	J	0.14		1.3	U	14.9		2.1	1320	NA	*0.8*		*1.2*		NA	0.12	UJ	*47.4*		*91.3*	
SS0683A	NA	438		0.14	U	1.1	U	12	U	*25.2*	1420	NA	*1.5*		0.92	J	NA	0.1	UJ	32.7		*94.9*	
SS0683B	NA	484		0.05	U	1.1	UJ	14.5		18.8	*1930*	NA	*1.7*	U	*1.3*	U	NA	0.15		*27.5*		*104*	J
Representative	**8722.5**	**909.0**		**0.2**		**2.1**		**18.6**		**21.8**	**1512.4**	**4934.2**	**1.2**		**1.0**		**NC**	**0.3**		**35.5**		**89.7**	

Sample Id	Aluminium	Antimony		Arsenic		Barium		Beryllium		Boron	Cadmium		Calcium	Chromium		Cobalt		Copper		Fluoride	Iron		Lead		Lithium	
BS0681A	13900	13.4	UJ	3.2	U	128		1		4.3	*4.4*	J	NA	49	J	3.6	UJ	*15.4*	J	*953*	14100	J	23.4	J	14.2	
BS0681B	8700	7.2	UJ	3.7		86.4	J	0.36		2.4	0.5		NA	8.2	J	4.5		10		405	12500	J	8.1	J	*20.3*	
BS0681C	7290	18.5	UJ	4		*287*	J	0.11	U	4	*1.5*		NA	6.3	J	0.98	U	11.4		310	7980	J	3.9	J	9.5	
BS0681D	8540	9.8	J	3.5		153		0.38		3.6	0.38	J	NA	16.2		4.6		7.5		470	11400		*32.4*	J	14.4	J
BS0682A	10200	12.1	J	2.3		166		0.75		5.4	0.38	J	NA	16.2		5.3		13.7		388	12800		20.8	J	12.5	J
BS0682B	10100	4.8	UJ	3.6		161		0.32		2.5	0.42	J	NA	20.8		3.5		9		363	11800		5	J	10.7	
BS0682C	9140	14.3	J	2.4		151		0.82		4.2	0.34	J	NA	13.1		4.3		8.8		237	11000		10.1	J	11.3	J
BS0683A	10400	4.5	UJ	3.9		200	J	0.61	U	1.18	0.4		NA	17.5		5.5	U	11.2		360	13200		19.1		14.6	
BS0683B	11100	4.2	UJ	4.7		160		0.49		3.5	0.48	J	NA	21.3		4.5		8.8		393	12400		8.3	J	12.7	
Representative	**14636.6**	**30.9**		**6.5**		**203.2**		**1.2**		**18.1**	**1.2**		**65574.4**	**27.0**		**8.7**		**15.2**		**559.2**	**14930.2**		**26.1**		**17.8**	

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Sample Id	Magnesium	Manganese		Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sulfate	Thallium		Vanadium		Zinc	
BS0881A	NA	398	J	0.21	U	2.1	U	*16.7*		5.2	*2320*	NA	1.8	U	0.21	U	NA	0.32	J	44.2	J	*95.7*	J
BS0881B	NA	343	J	0.07		4.3	U	8.8		3	610	NA	0.76		0.12	U	NA	0.06	U	23.7		48	J
BS0681C	NA	267	J	0.13		*5.4*	U	5.2		1.3	*907*	NA	0.41	U	0.98		NA	0.06	U	26.1		43.1	J
BS0681D	NA	420	J	0.1		4.5		12.8		0.5	U 505	NA	1		1.6		NA	0.19	J	1.1	U	35	
BS0682A	NA	391	J	0.17		4.5		*15.1*		2.8	580	NA	0.94		1.4		NA	0.25		29.4		51.8	
BS0682B	NA	303		0.18		1.4	UJ	11.7		0.8	507	NA	3		1.6	U	NA	0.11	U	24.1		35.2	J
BS0682C	NA	385	J	0.11		1.2	U	10.3		1.7	361	NA	0.86		1.2		NA	0.1	UJ	33.3		35.2	
BS0683A	NA	403		0.18	U	1.3	U	11	U	0.5	431	NA	2.4		1.4	J	NA	0.12	UJ	27.2		43.3	
BS0683B	NA	349		0.07	U	1.2	UJ	12.4		0.5	625	NA	0.92	U	*2.1*		NA	0.13	J	21		41.3	J
Representative	**18700.0**	**475.9**		**0.3**		**5.2**		**14.9**		**8.9**	**840.2**	**3562.3**	**6.5**		**2.0**		**NC**	**20.4**		**52.6**		**52.4**	

Sample Id	Aluminium	Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium	Chromium		Cobalt		Copper		Fluoride	Iron		Lead		Lithium	
SS0901B	8710	4.1	U	*9.1*		*296*		*1.8*	J	2.4	UJ	*78.4*		NA	*342*	J	6.5	J	*67.9*		*20400*	6040		*142*		6.1	
SS0901B1	*10400*	4.5	U	5.2		120		0.64		*11.4*	U	*7.8*		57900	41.4		5		15.7	J	*2100*	13300		10.6		11.1	
SS0901B2	7660	4.2	U	*12.2*		*242*		1.4		*27*	U	*78.5*		203000	*365*		0.43	U	*84.4*	J	*26800*	6130		*69.3*		6.2	
SS0901B3	8030	3.8	UJ	*15.3*		139		*1.6*		*77.4*		*87.4*		0.49	U *471*		0.39	U	*80.2*	J	*27200*	6110		*47.6*		6.8	
SS0901B4	9570	4.1	U	*9.8*		*340*		1.4		*36.3*		*72.5*		179000	*369*		0.42	U	*65.3*	J	*19600*	7000		31.4		7.2	
SS0901B5	15500	5.1	UJ	4.1	J	171		0.96		*25.2*		*14.5*		97100	*93.3*		4.3		16.5		*4040*	10400		19.1		13.6	
SS0901C	13500	6.8		4.5		*559*		1.3		4.1	J	*29*		NA	22.4	J	3.1	J	*29.9*		*5720*	10800		50	J	7.4	
SS0901C5	9990	8.4	U	3.7	J	160		0.57		11.6		4.5		18400	26.1		4.8		12.6		*1000*	13000		12		11.1	
SS0901D	13200	4.1	U	2.8		153		0.96	J	8.3	J	*5.5*		NA	34	J	*9.5*	J	14.2		*1460*	10800		5.7	J	8.8	
SS0902A	11000	*11.2*	J	3.2		*235*		0.4		6.4		*9.8*		NA	40.8		5.3		15.4		448	14100		*63.3*	J	12.9	J
SS0902B	*18900*	4	UJ	4.6		*224*		0.67		4.6		3.3		NA	36.3		6.1		17.8		575	16100		16.2	J	16.4	
SS0902C	14000	4	UJ	5		174		0.54		5		2.1		NA	29.6		4.9		12.3		495	14100		8.5	J	14.1	
SS0903A	14600	4.1	UJ	4.2		179		0.69		5.8		0.92		NA	26.3		4.6		12.1		405	15200		9.6	J	15.4	
SS0903B	15100	4.3	UJ	4.3		175		0.64		4.5		4.3	J	NA	28.8		5.3		13.3		468	15100		15.2	J	16.9	
Representative	**15961.5**	**10.4**		**6.7**		**205.7**		**1.4**		**17.3**		**4.9**		**NC**	**53.0**		**7.8**		**17.2**		**656.3**	**17137.5**		**35.8**		**19.3**	

Table 4.3-1 (Cont'd)

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
SS0901B	NA	125	*0.45*	*11.6*	*67.8*	*154*	*52400*	NA	*10.5*	*8*	NA	*1* J	*580* J	*827* J
SS0901B1	*11600*	353 J	0.1 U	1.5 U	17.2	8.5	*6510*	2470	*1.6*	0.35 U	290	*0.38* J	*63.9*	*120*
SS0901B2	4910	145 J	*0.68*	*12.8*	*71.4*	*34.7*	*76600*	2380	*10.3*	*6.5*	3620	*1.7* J	*491*	*858*
SS0901B3	3810	144 J	*0.43* U	*14.3*	*99.4*	20.4	*84900*	2770	*16.3*	*7.1*	200	*2.6* J	*729*	*1100*
SS0901B4	3600	169 J	*0.45* U	*9.9* U	*72.8*	15.6	*72200*	3060	*6.5*	*5.2*	100	*1.4* J	*525*	*938*
SS0901B5	7760	294	*0.3* U	1.7 U	*21.8*	13.5	*9590*	4060 J	*2.2*	*2*	20 U	0.28 J	*113*	*207*
SS0901C	NA	355	0.14	*3.8*	*33.2*	*33.4*	*20400*	NA	*2.4*	*3*	NA	*0.5* J	*232* J	*357.4* J
SS0901C5	6310	345	*0.23* U	1.3 U	13.3	11.8	*2760*	3040 J	0.73	0.42	20 U	0.17 J	28	81.5
SS0901D	NA	328	0.09	2.1	12.7	12.6	*4560*	NA	*2.3*	*1.8*	NA	0.13	*56.8* J	78.7 J
SS0902A	NA	484 J	0.11	*4*	16.5	4.9	*3190*	NA	0.73	*1.6*	NA	*0.34*	23.1 J	*124*
SS0902B	NA	895	0.11	1.1 UJ	16.1	10	1260	NA	0.6	*1.7*	NA	0.17	*37.4*	*95.9* J
SS0902C	NA	438	0.1	1.1 UJ	12.9	13	1140	NA	0.84	*1.4*	NA	0.1 U	33.5	64.7 J
SS0903A	NA	446	0.1	1.2 UJ	13.2	6.6	819	NA	0.67	*1.2*	NA	0.13 J	25.5	58.7 J
SS0903B	NA	481	0.05 U	1.2 UJ	14.5	*24*	896	NA	1.1 U	1 U	NA	0.21 J	28.5	71.2 J
Representative	**8722.5**	**909.0**	**0.2**	**2.1**	**18.6**	**21.8**	**1512.4**	**4934.2**	**1.2**	**1.0**	**NC**	**0.3**	**35.5**	**89.7**

Sample Id	Aluminium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
BS0901B	7900	4 U	5.9	*2240*	1 J	1.9 UJ	*25.7*	NA	*166* J	8.1 J	*36*	*3320*	10600	*64.9* J	6.6
BS0901B1	8150	4.4 U	4.8	121	0.47	7.9 U	0.38	38300	13.5	5	10.7 J	540	11100	7.9	9.1
BS0901B5	8460	7.3 U	5.7 J	112	0.36	9.5	0.94	38400	12.6	4.8	7.6	*601*	10200	7.8	9.6
BS0901C	9870	4.3 U	2.5	119	0.58	2 J	0.87	NA	*27.5* J	4.6 J	9.8	283	11600	*29.1* J	7.7
BS0901C5	11100	7 U	3.9 J	128	0.6	15.3	0.99	39500	13.3	5.3	12.8	*562*	11700	9.6	14.3
BS0901D	9740	4.3 U	2.6	172	0.85 J	2.4 UJ	0.14	NA	25.6 J	*8.8* J	11.5	267	10100	*30.6* J	9.7
BS0902A	7350	20.5 J	2.9	114	0.3	12.8	0.38 J	NA	14.4	4.9	9	*1500*	11400	*53.9* J	12.9 J
BS0903A	10400	4.7 UJ	4.2	175	0.24	5.2	0.38 J	NA	20.4	4.1	10.4	333	10400	5.1 J	11.8
BS0903B	13100	4.7 UJ	4.5	151	0.55	3.8	0.43	NA	23.4	4.9	9.9	360	12600	5.3 J	13
Representative	**14636.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
BS0901B	NA	252	*0.36*	*5.3*	*34.4*	*97*	*23600*	NA	4.3	*3.4*	NA	0.58	*220* J	*296* J
BS0901B1	10900	359 J	0.3 U	1.5 U	9.6	1.2	672	1950	0.29 U	0.34 U	120	0.24 J	18.3	42.1
BS0901B5	10600	350	0.07 U	1.6 U	10.5	2.6	*855*	2310 J	0.62 U	0.55	320	0.13 J	17.2	38.5
BS0901C	NA	396	0.06	2.2	7.8	2.3	656	NA	0.5	0.14 U	NA	0.11 U	31.1 J	47.3 J
BS0901C5	9220	311	*0.8*	1.5 U	11.1	1.4	*1110*	3160 J	0.89	0.35	660	0.12 UJ	15	46.9
BS0901D	NA	366	0.09	1.4	10	2.9	624	NA	0.68	*2.2*	NA	0.11 UJ	28.5 J	37.6 J
BS0902A	NA	306 J	0.09	*5.3*	12.4	1.1	491	NA	2.6	1.5	NA	0.71 J	1.1 U	32
BS0903A	NA	260	0.11	1.3 UJ	9.8	0.6	419	NA	0.6	1.6	NA	0.11 UJ	25.1	35.5 J
BS0903B	NA	339	0.06 U	1.3 UJ	12.3	0.9	554	NA	0.98 U	1.5 U	NA	0.12 U	29	43.1 J
Representative	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**NC**	**20.4**	**52.6**	**52.4**

Notes:

Results in mg/kg.

NA - Not analyzed.

NC - Not calculated.

U - Not detected.

J - Estimated value.

R - Rejected value.

Table 4.3-2
Radiological Results for Offsite Soil Samples (pCi/g)

Station ID	Sample Depth	Lead-210	Polonium-210	Potassium-40	Uranium-238
000-1A	Soil surface	0 U	15.2	17.7	6.38 UJ
	2 feet	0 U	2.54 UJ	15.7	0.932 U
000-1C	Soil surface	7.51 U	10.4 J	19.2	5.17
	2 feet	0 U	0.224 U	19.5	1.16 U
000-2A	Soil surface	3.01 U	5.35	17	1.99 U
	2 feet	0 U	1.74 J	20.2	1.31 U
000-2C	Soil surface	0 U	2.27 UJ	18.1	3.15 U
000-3B	Soil surface	0 U	1.61 UJ	19	3.18 U
	2 feet	0 U	1.39 UJ	16.8	2 U
023-1B	Soil surface	5.65 U	19.1	16.3	2.86 U
	2 feet	0 U	2.22 UJ	15.9	1.28 U
023-1D	Soil surface	0.441 U	9.75 J	16.8	1.25 U
023-2B	Soil surface	0 U	5.02 J	22.5	1.46 U
	2 feet	0 U	1.55	17.3	0.315 U
023-3A	Soil surface	0 U	1.1 UJ	17.4	2.11 U
	2 feet	0 U	1.79 UJ	17.4	1.43 U
045-1A	Soil surface	24.7	28.1	14.6	14.4
	2 feet	0 U	3.09 UJ	17.6	0.971 U
045-1A01	Soil surface	13.2	9.67	12.6	7.68 U
	2 feet	0 U	0.784	12.3	0.89 U
045-1A02	Soil surface	35.1	19.1	11.3	9.88
	2 feet	0 U	1.26	13.4	1.93 U

Table 4.3-2 (Cont'd)

Station ID	Sample Depth	Lead-210	Polonium-210	Potassium-40	Uranium-238
045-1A03	Soil surface	36.3	9.93	10.5	20.1
	2 feet	0 U	1.49	16	0 U
045-1A04	Soil surface	10.4	11.6	12	3.16 U
	2 feet	0.912 U	0.825	12.6	0.41 U
045-1B	Soil surface	7.62	12.9	15	5.84
	2 feet	0 U	1.87 UJ	19.2	1.04 U
045-1C	Soil surface	5.6 U	0.879 U	14.7	3.8 U
045-2A	Soil surface	5.61 UJ	6.44 UJ	18	1.73 U
	2 feet	0 U	2.58 UJ	17	0.235 U
045-2C	Soil surface	0 U	2.76 J	22.1	3.5 U
045-3B	Soil surface	0 U	2.65 UJ	19.2	2.5 U
	2 feet	3.43 U	10.7 J	18.1	3.88 U
068-1B	Soil surface	4.59 U	18	16.7	11.4
	2 feet	0 U	1.74 UJ	18.7	1.68 U
068-1D	Soil surface	0 U	4.54 J	15.5	0 U
	2 feet	0 U	3.36 UJ	17.6	2.81 U
068-2B	Soil surface	8.09	3.74 U	21.4	4.06 U
	2 feet	0.916 U	1.6 J	12.9	1.58 U
068-3B	Soil surface	0 U	4.43 J	20.2	1.35 U
	2 feet	0 U	1.02 U	14.5	0 U
090-1B	Soil surface	11.2	50.9 J	7.18	26.4
	2 feet	1.1 U	10.2 J	12.4	3.5 U
090-1B01	Soil surface	1.87 U	2.95	12.6	2.11 U
	2 feet	3.66 U	0.839	17.2	1.24 U

Table 4.3-2 (Cont'd)

Station ID	Sample Depth	Lead-210	Polonium-210	Potassium-40	Uranium-238
090-1B02	Soil surface	21.5	26.3	5.96	16.5
090-1B03	Soil surface	20.3	26.7	6.01	26.9
090-1B04	Soil surface	15.2	26.2	7.46	14.5
090-1B05	Soil surface	1.56 U	5.5	14.4	5.32
	2 feet	0 U	1.03	14.4	0.23 U
090-1C05	Soil surface	1.54 U	1.96	15.9	2.8 U
	2 feet	0 U	0.75	14.7	1 U
090-1D	Soil surface	4.75 U	8.11 UJ	17.9	2.66 U
	2 feet	3.03 U	1.75 UJ	11.8	0 U
090-2B	Soil surface	3.96 U	4.95 UJ	19.5	2.48 U
090-3A	Soil surface	2.71 U	3.29 J	17.2	1.09 U
	2 feet	0 U	1.02 UJ	16.9	4.21 U
113-2A	Soil surface	4.81 U	4.93 J	23.5	3.01 U
	2 feet	0 U	1.62 U	20.4	3.49 U
113-3A	Soil surface	0 U	2.62 U	18.5	1.1 U
	2 feet	0 U	6.92 J	20.3	1.56 U
120-2C	Soil surface	6.67	11.7 J	21.8	2.15 U
	2 feet	0 U	0.808 U	17.9	1.33 U
125-3A	Soil surface	6.57 UJ	5.49	17.2	2.27 U
	2 feet	0 U	1.92 UJ	14.7	1.85 U
135-2A	Soil surface	3.35 U	6.15	21.8	1.63 U
	2 feet	0 U	1.53 U	21.2	1.61 U

Table 4.3-2 (Cont'd)

Station ID	Sample Depth	Lead-210	Polonium-210	Potassium-40	Uranium-238
135-2C	Soil surface	1.32 U	6.01 UJ	19.9	0 U
	2 feet	0 U	5.13	18.2	0.583 U
135-3B	Soil surface	2.47 U	9.13	19.6	0 U
	2 feet	0 U	0.989 U	17.2	0.621 U
158-2B	Soil surface	5.24	5.74 J	21.8	3.29 U
	2 feet	0 U	2.15 J	16	2.33 U
158-3B	Soil surface	0 U	6.3 J	21.8	0.564 U
	2 feet	0 U	2.53 J	19.5	1.64 U
180-2B	Soil surface	5.48 U	7.51 J	31.4	3.26 U
180-3A	Soil surface	3.31 U	5.79	23.7	1.16 U
	2 feet	1.6 U	3.92 U	16.2	5.42
180-4A	Soil surface	4.92 U	5.56 UJ	26	1.32 U
203-3A	Soil surface	8.41 UJ	7.35 J	17.2	0 U
	2 feet	0 U	2.31 UJ	16	3.03 U
203-4A	Soil surface	0.728 U	5.02 J	18	0 U
	2 feet	4.76 U	2.15 UJ	19.3	0.572 U
205-3A	Soil surface	1.6 U	0.387 U	15.8	1.46 U
	2 feet	0 U	0.432 U	11.9	0.17 U
205-3B	Soil surface	5.77	1.59	14.7	1.61 U
	2 feet	5 U	1.05	14.3	1.33 U
205-4A	Soil surface	1.43 U	0.438 U	13.9	0 U
	2 feet	1.26 U	1.01	13.5	0 U
225-2A	Soil surface	3.84 U	11.6 J	22.8	2.13 U
	2 feet	0.741 U	2.07	18.3	0.795 U

Table 4.3-2 (Cont'd)

Station ID	Sample Depth	Lead-210	Polonium-210	Potassium-40	Uranium-238
225-2C	Soil surface	9.68	5.99	21.4	3.34 U
	2 feet	0 U	1.41 UJ	15	0 U
225-3B	Soil surface	2.95 U	5.26	22.2	0.0111 U
	2 feet	0 U	1.74	16.5	1.07 U
230-3A	Soil surface	0.546 U	0.848	16.6	1.2 U
	2 feet	1.06 U	0.724	13.6	1.05 U
230-3B	Soil surface	4.92 U	3.34	16.2	0.7 U
	2 feet	3.9 U	1.06	12.6	0.45 U
230-4A	Soil surface	2.69 U	1.33	15.5	1.22 U
	2 feet	1.24 U	0.665 UJ	13.1	0.8 U
240-3A	Soil surface	3.31 U	2.24	16.2	1.04 U
	2 feet	0 U	0.917	14.8	2.05 U
240-3B	Soil surface	4.15 U	2.32	17.3	0.89 U
	2 feet	0 U	0.922	14.6	0.88 U
248-3B	Soil surface	3.63 U	5.08 J	19.7	4.58 U
	2 feet	0 U	1.44	20.5	1.14 U
270-1D	Soil surface	6.17 U	8.87	18.7	1.46 U
	2 feet	0 U	3.37	15.4	0.223 U
270-2B	Soil surface	0 UJ	2.9	23.4	1.32 U
270-2C	Soil surface	9.52	7.55	16.2	2.77 U
270-3A	Soil surface	0 UJ	3.35	22.4	1.79 U
270-3B	Soil surface	0 UJ	1.99	15.8	1.97 U
	2 feet	2.37 U	1.4	17.1	2.5 U

Table 4.3-2 (Cont'd)

Station ID	Sample Depth	Lead-210	Polonium-210	Potassium-40	Uranium-238
293-1A01	Soil surface	50.8	19.9	10.3	0 U
	2 feet	7.83 U	2.41	16.3	0 U
293-1A02	Soil surface	23.2	20.3	9.18	11.4
	2 feet	0 U	1.65	17.1	2 U
293-1A03	Soil surface	41.4	26.1	9.39	22.2
	2 feet	0 U	0.843	15.8	2.71 U
293-1A04	Soil surface	18.3	10.8	14.1	0 U
	2 feet	0 U	1.17	15.2	0 U
293-1B01	Soil surface	35.2	12.7	14.5	9.41
	2 feet	0 U	1.09	15.8	0 U
293-1B03	Soil surface	0.96 U	2.21	15.6	0.98 U
	2 feet	0 U	0.624	17.5	0 U
293-1B04	Soil surface	9.7	7.73	14.9	5.33 U
	2 feet	0 U	0.473 U	14.7	0 U
293-1B05	Soil surface	17.2	7.02	14.6	0 U
	2 feet	3.98 U	0.839	16.1	0 U
293-1D	Soil surface	7.93 UJ	1.85 J	18.6	3.92 U
	2 feet	0 U	12.4	18.7	0 U
293-2C	Soil surface	1.28 U	5.61 J	20.5	2.78 U
	2 feet	0 U	0.359 U	16	1.73 U
293-3A	Soil surface	1.41 U	4.11	19.7	1.63 U
293-3B	Soil surface	1.95 U	3.05	17.8	3.87 UJ
	2 feet	1.85 U	3.24	20.7	0.437 U
315-1A	Soil surface	7.84 U	31.4	15.8	19.5
	2 feet	0 U	2.13 UJ	18.9	1.81 U

Table 4.3-2 (Cont'd)

Station ID	Sample Depth	Lead-210	Polonium-210	Potassium-40	Uranium-238
315-1C	Soil surface	1.53 U	5.02 J	14.2	0 U
315-2A	Soil surface	0 U	2.66 U	16.8	2.62 U
	2 feet	0 U	1.64 UJ	15.4	0.578 U
315-2C	Soil surface	0 U	1.27 J	20.7	1.32 U
	2 feet	0 U	1.02 U	18.2	1.76 U
315-3B	Soil surface	3.5 U	5.01 UJ	19.4	1.5 U
	2 feet	0 U	29.8 J	14.3	1.19 U
315-3B01	Soil surface	2.08 U	2.02	13.5	1.25 U
	2 feet	0 U	1.08	14.6	0.68 U
315-3B02	Soil surface	0 U	0.843	12.8	0.54 U
	2 feet	3.88 U	1.6	15.8	0.78 U
315-3B03	Soil surface	5.84 UJ	1.01	16.1	2.19 U
	2 feet	0 U	0.746	14.5	0.74 U
315-3B04	Soil surface	11	1.82	16.5	1.28 U
	2 feet	0 U	0.751	14.6	0.06 U
338-1B	Soil surface	3.92 U	7.21 J	19.9	2.62 U
	2 feet	0 U	1.8 J	14.4	1.07 U
338-1D	Soil surface	0 U	5.46	18.1	1.97 U
	2 feet	0 U	3.79 J	13.3	0 U
338-2B	Soil surface	5.98 UJ	7.92	15.2	3.45 U
338-2C	Soil surface	3.98 U	8.68 J	19.8	6.79
	2 feet	2.57 U	2.1 UJ	9.58	0.262 U

Table 4.3-2 (Cont'd)

Station ID	Sample Depth	Lead-210	Polonium-210	Potassium-40	Uranium-238
SSBKGD01	Soil surface	0.741 U	0.769	14	0 U
SSBKGD02	Soil surface	3.16 U	1.87	15.1	0.65 U
SSBKGD03	Soil surface	1.14 U	1.02	14.8	0 U
SSBKGD04	Soil surface	1.21 U	0.849	14.7	0 U
SSBKGD05	Soil surface	1.85 U	7.56	15.8	1.35 U

Notes:
U = Not detected.
J = Estimated value.

Table 4.3-3
Analytical Results for Offsite Soil Samples - Southeastern Quadrant

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
	10400	3.7 UJ	4.4	159	0.55	4.3	*7.8*	39.4	5	*17.6*	*1020*	10300	2030 J
SS1132BA	*17100*	4 UJ	4.2	178	0.67	5.66	*7.3*	40	5.7	*20.2*	*733*	15800	26.1 J
SS1132A	10800	4.7 UJ	2.4	144	0.23	14.9	2.7	28.8	4.5	16.2	443	12700	52.8 J
Representative	**15961.5**	**10.4**	**6.7**	**205.7**	**1.4**	**17.3**	**4.9**	**53.0**	**7.8**	**17.2**	**656.3**	**17137.5**	**35.8**

Sample Id	Lithium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
SS1132A	13.2	444	*0.35*	1 UJ	12.7	9.3	*2690*	1	0.98 J	*0.35* J	*42.2*	*127*
SS1132BA	12	512	0.13	1.1 UJ	15.6	*23.2*	1350	*1.7*	*1.1*	0.24	*43.6*	*123* J
SS1133A	10.8	402	0.11 U	*4.7*	10.9	14.7	937	*1.5* U	*1.1*	0.14 J	27.2	84.8 J
Representative	**19.3**	**909.0**	**0.2**	**2.1**	**18.6**	**21.8**	**1512.4**	**1.2**	**1.0**	**0.3**	**35.5**	**89.7**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
BS1132A	13000	3.9 UJ	5	151	0.58	4.5	0.71 J	22.1	5.6	12.1	455	12500	17.1 J
BS1133A	9770	4.3 UJ	3	116	0.43	10	0.52	19.7	5.6	10.9	315	13700	9.6 J
Representative	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Id	Lithium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
BS1132A	14.3	374	*0.34*	1.3	12.6	0.5 U	775	1.2	1.3	0.26 J	33.8	42.5
BS1133A	12.8	*535*	0.13	1.2 UJ	10.1	1.1	442	0.53	0.57 U	0.14	22	49.8 J
Representative	**17.8**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
SS1202C	11000	4 UJ	4.4	126	0.6	5.6	4.1	26.3	5.5	13.2	445	13000	21.6 J
SS1253A	11800	5.4 J	4.6	128	0.54	4.7	0.95	21.9	4.3	13.2	443	13700	0.8 J
Representative	**15961.5**	**10.4**	**6.7**	**205.7**	**1.4**	**17.3**	**4.9**	**53.0**	**7.8**	**17.2**	**656.3**	**17137.5**	**35.8**

Sample Id	Lithium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
SS1202C	8.7	494	0.1	1.1 UJ	12.1	18.4	878	0.7	0.87 U	0.19	25.4	84.9 J
SS1253A	11.1 J	469	0.08	2	13.5	8.4	1230	0.97	0.95 J	0.14	25.1	68.4
Representative	**19.3**	**909.0**	**0.2**	**2.1**	**18.6**	**21.8**	**1512.4**	**1.2**	**1.0**	**0.3**	**35.5**	**89.7**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
BS1202C	8610	4.2 UJ	4.7	181	0.42	5.9	0.29 J	16.9	4.4	7.5	388	10400	6.3 J
BS1253AA	8130	10.9 J	3.8	164	0.41	2.6	0.37 J	15.3	3.7	7.5	403	9740	6.3 J
Representative	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Id	Lithium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
BS1202C	9.8	324	0.12	1.2 UJ	9.9	0.4	466	0.75	1.6	0.1 U	24.3	33.6 J
BS1253AA	9.6 J	305	0.09	1.2 UJ	11.8	0.5 U	648	0.76	1.4 J	0.13	23.9	30.2
Representative	**17.8**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**

Table 4.3-3 (Cont'd)

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
SS1303B	12800	*14.6* J	2.4	126	0.67	5	1	19.3	4.7	14.4	395	14100	14.4 J
SS1352A	12800	3.8 J	3.8	195	0.7	3.7	*6.3*	23.6	5.7	14.9	575	13200	31.9 J
SS1352B	10400	4 UJ	*11*	130	0.79	3.2	4.2	25.3	4.8	13.4	515	13100	29.1 J
SS1352C	12300	10 J	6.7	145	0.71	3.3	1.8	25.1	5.1	12.9	300	13400	27.4 J
SS1353A	9180	4 UJ	5	*234*	1	4.3	1.3	16.4	4.7	13.5	288	12400	15.3 J
SS1353B	13200	4 UJ	6	124	0.74	3.6	1	21.2	4.6	13.3	355	14800	16 J
Representative	**15961.5**	**10.4**	**6.7**	**205.7**	**1.4**	**17.3**	**4.9**	**53.0**	**7.8**	**17.2**	**656.3**	**17137.5**	**35.8**

Sample Id	Lithium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
SS1303B	11.4 J	477	0.09	1.1 UJ	15.6	14.7	890	0.63	0.73 J	0.14 J	22	55.9
SS1352A	17.9	579	*0.31*	1.1 UJ	12.9	8.8	1430	0.26 U	0.96 J	*0.39* J	*37.7*	*91.6*
SS1352B	12.6	523	0.11	1.1 UJ	12.6	13.3	1190	*9.7*	0.46 J	0.19 J	25.8	78
SS1352C	14.3	462	0.12	1 UJ	12.8	5.7	874	0.94	0.71 J	*0.33* J	28.4	63.7
SS1353A	9.8	*1330*	0.05 U	1.1 UJ	9.9	12.1	772	0.9 U	0.54 U	*0.33*	22.8	61 J
SS1353B	12.5 J	504	0.08	1.1 UJ	12.2	10	695	1.1	0.67 J	0.12	26.2	60.2
Representative	**19.3**	**909.0**	**0.2**	**2.1**	**18.6**	**21.8**	**1512.4**	**1.2**	**1.0**	**0.3**	**35.5**	**89.7**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
BS1303B	11800	4.3 UJ	3.1	177	0.5	3.3	0.38	19.7	3.9	9.8	358	11800	6.1 J
BS1352A	11900	6.9 J	4.6	*214*	0.69	3.1	0.48 J	19.1	4.5	12	438	12600	10.7 J
BS1352B	10600	6.5 UJ	3.9	*240*	0.86	3.4	0.97 J	25.4	6.8	13.1	415	14200	19.5 J
BS1352C	10400	4.1 UJ	8.4	175	0.68	2.1	0.54 J	21.3	4.5	10.5	455	11000	7.8
BS1353B	14100	4.3 UJ	7.3	184	0.5	3.7	0.45	19.5	4.6	12.4	445	13500	9.4 J
Representative	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**

Sample Id	Lithium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
BS1303B	11.3 J	301	0.09	1.2 UJ	11.1	0.5 U	672	1.3	1.5 J	0.12	30.7	33.6
BS1352A	13.4	435	0.27	1.2 UJ	11	0.5	360	1.7	1.7	0.21 J	28.3	37.7
BS1352B	16.7	*572*	0.18	1.8 UJ	*17.3*	0.5 U	527	0.44 U	*2.2*	0.29 J	44.1	*52.8*
BS1352C	14.8	368	0.14	1.1 UJ	11.7	0.6	625	5.3	1.3	0.24 J	33.1	49.4
BS1353B	12.9	334	0.11 U	1.2 UJ	11.3	0.7	501	0.84 U	1.6 U	0.15	22.2	41.7 J
Representative	**17.8**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**6.5**	**2.0**	**20.4**	**52.6**	**52.4**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead
SS1582B	12800	4 UJ	3.4	146	0.94	4.4	2.4	*86*	6.1	14	418	14200	24.6
SS1582CA	11800	4 UJ	2	159	0.73	3.5	1.2 J	19.9	7.2	14	353	14000	23.1 J
SS1583A	13200	4 UJ	4.9	140	1.1	2.7	1.5 J	19.2	5.8	14.5	360	14000	18.3
SS1583B	14200	4 UJ	4	195	0.87	4.7	1.5 J	47.1	5.9	15.9	450	15900	21.5
SS1584A	10900	4 UJ	4.5	141	0.54	4.7	0.54	21.4	5.2	13.7	378	15000	14 J
Representative	**15961.5**	**10.4**	**6.7**	**205.7**	**1.4**	**17.3**	**4.9**	**53.0**	**7.8**	**17.2**	**656.3**	**17137.5**	**35.8**

Sample Id	Lithium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Selenium	Silver	Thallium	Vanadium	Zinc
SS1582B	14.5	563	0.1	1.1 UJ	12.4	13.4	820	0.26 U	0.81 J	0.26 J	32.3	68.9
SS1582CA	14.7	554	*0.24*	1.1 UJ	11.9	7.3	507	0.75	0.73 J	0.27 J	10.6	61.2
SS1583A	16.6	567	0.19	1.1 UJ	10.4	9.2	409	*1.5*	0.66 J	0.3 J	22.6	67.6
SS1583B	16	758	*0.23*	1.1 UJ	11.1	9.9	458	0.8	0.8 J	0.26 J	26.1	71.3
SS1584A	11.1	485	0.1 U	1.1 UJ	12.6	8.7	766	0.73 U	0.81 U	0.15	22.9	58.5 J
Representative	**19.3**	**909.0**	**0.2**	**2.1**	**18.6**	**21.8**	**1512.4**	**1.2**	**1.0**	**0.3**	**35.5**	**89.7**

Table 4.3-3 (Cont'd)

Sample Id	Aluminum	Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Chromium		Cobalt		Copper		Fluoride	Iron	Lead	
BS1582B	7860	4.1	UJ	6.5		150		0.76		1.6		0.62	J	16.3		4.3		7.6		400	9700	13	J
BS1582C	8400	4.2	UJ	3.6		149		0.71		3.7		0.63	J	17.5		3.8		8.7		483	9710	15.6	J
BS1583B	14000	4.2	UJ	4.7		130		0.77		3.3		0.49	J	24.3		6.7		12		398	*15900*	12.7	
BS1584A	8340	4.2	UJ	4.7		156		0.42		2.8		0.37		21.1		4.4		8.4		443	11900	5.9	J
Representative	**14638.6**	**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**27.0**		**8.7**		**15.2**		**559.2**	**14930.2**	**26.1**	

Sample Id	Lithium	Manganese	Mercury		Molybdenum		Nickel	Orthophosphate		Total Phosphorus	Selenium		Silver		Thallium		Vanadium	Zinc	
BS1582B	12.1	346	0.11		1.2	UJ	9.9	0.5		447	0.9		1.4		0.17	J	28.3	32	
BS1582C	15.5	332	0.25		1.2	UJ	10.9	0.5	U	573	0.27	U	1.6		0.23	J	31.7	32.4	
BS1583B	15.8	*482*	*0.35*		1.2	UJ	*15.5*	1.3		493	2.5		0.7	J	0.29	J	29.5	47.5	
BS1584A	10.2	294	0.11	U	1.2	UJ	10.6	0.5	U	690	0.92	U	1.4		0.11		27.4	36.5	J
Representative	**17.8**	**475.9**	**0.3**		**5.2**		**14.9**	**8.9**		**840.2**	**6.5**		**2.0**		**20.4**		**52.6**	**52.4**	

Sample Id	Aluminum	Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Chromium		Cobalt		Copper		Fluoride	Iron	Lead	
SS1802BA	13000	3.9	UJ	0.51	UJ	178	J	0.91	U	4.16		2.9		14.3		5.2	U	14.7		433	15400	21.1	J
SS1802C	12300	3.9	UJ	3		172	J	1.2		3.63		1.8		13.1		4.4	U	13.8		348	14100	33	J
SS1803A	12700	3.7	UJ	3.3		183	J	1		2.06		1.7		14.2		5.4	U	12.9		345	15800	30.9	J
SS1803B	*17100*	3.7	UJ	2.5		187	J	0.98	U	1.42		1.7		18.2		5.7	U	15.4		390	14900	*38.2*	J
SS1804A	13400	4	UJ	5		163		1.1		6		1.9	UJ	19.2		5.4		15.2		380	*17200*	18.3	J
Representative	**15961.5**	**10.4**		**6.7**		**205.7**		**1.4**		**17.3**		**4.9**		**53.0**		**7.8**		**17.2**		**656.3**	**17137.5**	**35.8**	

Sample Id	Lithium	Manganese	Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Selenium		Silver		Thallium		Vanadium	Zinc	
SS1802BA	17.3	682	0.09	U	1.1	U	8.4	U	11.9	1080	0.26	U	0.33	J	0.1	UJ	26.1	75.8	
SS1802C	14.5	618	0.16	U	1.1	U	7.4	U	10.5	954	0.5		0.2	J	0.1		24.3	67.3	
SS1803A	13.4	634	0.13	U	1.1	U	7.8	U	18.9	901	0.98		0.37	J	0.1	UJ	23	70.2	
SS1803B	*22.7*	660	*0.22*	U	1	U	9.8	U	20.3	1070	0.99		0.55	J	0.1	U	28.9	75.8	
SS1804A	14.6	559	0.12		1.1	UJ	11.6		3.7	701	0.5		0.94	U	0.2		20.8	61.1	J
Representative	**19.3**	**909.0**	**0.2**		**2.1**		**18.6**		**21.8**	**1512.4**	**1.2**		**1.0**		**0.3**		**35.5**	**89.7**	

Sample Id	Aluminum	Antimony		Arsenic		Barium		Beryllium		Boron	Cadmium	Chromium	Cobalt		Copper	Fluoride	Iron	Lead
BS1803A	9110	3.8	UJ	5.1		179	J	0.89	U	1.15	0.57	15.9	4.4	U	10.8	423	11700	19.2
Representative	**14638.6**	**30.9**		**8.5**		**203.2**		**1.2**		**18.1**	**1.2**	**27.0**	**8.7**		**15.2**	**559.2**	**14930.2**	**26.1**

Sample Id	Lithium	Manganese	Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Selenium	Silver		Thallium		Vanadium	Zinc
BS1803A	12.5	333	0.11	U	1.1	U	9.5	U	0.7	490	1.3	1.4	J	0.1	U	26	37.4
Representative	**17.8**	**475.9**	**0.3**		**5.2**		**14.9**		**8.9**	**840.2**	**6.5**	**2.0**		**20.4**		**52.6**	**52.4**

Notes:

Results in mg/kg.
NA - Not analyzed.
NC - Not calculated.
U - Not detected.
J - Estimated value.
R - Rejected value.

Table 4.3-4
Analytical Results for Offsite Soil Samples - Southwestern Quadrant

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
SS2033A	12500 U	4 U	3.3 U	141	*2*	3.3 UJ	*5.8*	NA	34.4 J	6 J	14.5	555	13600	27.3 J	7.8
SS2033B	13500	4 U	4	135	1.1	2.4 J	*5.9*	NA	32.2	4.5 J	13.4	573	13000	23.2 J	7.9
SS2034A	13500	4.1 U	3.2	142	0.89	3 J	3.1	NA	28.8 J	3.9 J	13.8	561	13200	18.8 J	10.1
Representative	**15961.5**	**10.4**	**6.7**	**205.7**	**1.4**	**17.3**	**4.9**	**NC**	**53.0**	**7.8**	**17.2**	**656.3**	**17137.5**	**35.8**	**19.3**

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
SS2033A	NA	564	0.05 UJ	2	10.9	*23.7*	1470	NA	0.6	0.61	NA	0.1 U	33 J	*90.3* J
SS2033B	NA	404	0.05 UJ	2	11.8	4.8	*1640*	NA	0.29	0.87	NA	0.12	*36.7* J	79.8 J
SS2034A	NA	458	0.05 UJ	*2.7*	9.8	13.2	1270	NA	0.26 U	0.61	NA	0.1 U	29.3 J	81.8 J
Representative	**8722.5**	**909.0**	**0.2**	**2.1**	**18.6**	**21.8**	**1512.4**	**4934.2**	**1.2**	**1.0**	**NC**	**0.3**	**35.5**	**89.7**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
BS2033A	12200	10.5 J	4.2	176	*2*	6.4 J	0.42 J	NA	23.8 J	4.4 J	12.6	391	12900	13.3 J	10
BS2033BA	8120	4.1 U	4.3	154	1	5.2 J	0.1 J	NA	24.4	3.8 J	9.5	486	10900	11.5 J	9.5
BS2034A	12300	5.6	2.3	145	0.83	1.8 J	0.52 J	NA	*81.7*	4.7 J	*16.9*	401	14200	16.2 J	9.4
Representative	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
BS2033A	NA	333	0.05 UJ	1.4	10.9	1.3	647	NA	0.8	1.6	NA	0.11 U	41.4 J	42.1 J
BS2033BA	NA	314	0.05 UJ	1.4	8.3	1.5	491	NA	0.73	1.1	NA	0.1 UJ	30.4 J	34.8 J
BS2034A	NA	453	0.06 UJ	1.2 U	10.4	7.2	*842*	NA	0.33	0.28	NA	0.1 UJ	33.3 J	50.4 J
Representative	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**NC**	**20.4**	**52.6**	**52.4**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
SS2053A	15500	3.8 UJ	4.6	138	0.73	*25.8* J	2.6	24100	21.1	7.6	15.1	541	13700	10.2	15.6
SS2053B	11700	3.9 UJ	4.6	118	0.69	15.1 J	3.9	13400	24.3	5.6	14.3	*732*	12000	11.5	10.3
SS2054AA	13300	9.8 UJ	4	137 J	0.75	13	1	NA	18	5.7	10.9	430	13300	9.7	11.9 J
Representative	**15961.5**	**10.4**	**6.7**	**205.7**	**1.4**	**17.3**	**4.9**	**NC**	**53.0**	**7.8**	**17.2**	**656.3**	**17137.5**	**35.8**	**19.3**

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
SS2053A	7990	435	0.08 U	1.3 U	15.3	5.4	1060	4480	0.51 U	0.3 U	20 U	0.25	29.3	67.6
SS2053B	5700	408	0.07 U	1.3 U	13.7	12.8	*1520*	3960	0.51 U	0.3 U	20 U	0.24	30.4	87.5
SS2054AA	NA	391	0.16	1.3 U	14.3	0.5 U	719	3570	0.52 U	0.4 U	90	0.24	22	54.2
Representative	**8722.5**	**909.0**	**0.2**	**2.1**	**18.6**	**21.8**	**1512.4**	**4934.2**	**1.2**	**1.0**	**NC**	**0.3**	**35.5**	**89.7**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
BS2053AA	12000	4 UJ	5.9	120	0.68	*21.5* J	0.68 U	*80700*	15.1	5.3	8.6	441	11100	6.8	11.7
BS2053B	11000	4.3 UJ	3.8	136	0.75	13 J	0.69	54600	12.3	7	10.8	*567*	11600	9	13.7
BS2054A	12300	6.5 UJ	4.5	128 J	0.77	9.9 U	0.31 U	NA	16.5	5.7	10.1	420	12900	8.1	10.9 J
Representative	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Table 4.3-4 (Cont'd)

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
SS2303A	7490	448	0.09 U	1.3 U	13.7	5	*1520*	3380	0.5 U	0.3 U	20 U	0.28	30.8	77.7
SS2303B	6660	444	*0.93*	1.3 U	14.3	8.1	*1560*	3720	0.51 U	0.3 U	20 U	0.24	33.4	88.5
SS2304A	7070	483	*0.88*	1.3 U	12.7	4.6	1420	3410	0.51 U	0.3 U	20 U	0.28	22.9	66.5
Representative	**8722.5**	**909.0**	**0.2**	**2.1**	**18.6**	**21.8**	**1512.4**	**4934.2**	**1.2**	**1.0**	**NC**	**0.3**	**35.5**	**89.7**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
BS2303A	12600	4.3 UJ	4.7	112	0.72	12.8 J	0.78 U	*75800*	16.7	5.7	9.9	420	11300	9.5	11
BS2303B	10800	4.1 UJ	5.8	126	0.69	9.8 J	0.6 U	*77900*	14.3	5.5	9.2	516	10900	6.3	10.5
BS2304A	8010	4.1 UJ	5.9	97.4	0.49	6.3 UJ	0.44 U	60600	10.3	4.9	9.8	440	10000	17.1	8.5
Representative	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
BS2303A	13100	289	0.12 U	1.4 U	11.4	1.1	700	3170	0.55 U	0.41 U	20 U	0.28	23.3	40
BS2303B	14300	308	0.08 U	1.4 U	10.5	0.9	747	2680	0.53 U	0.59 U	20 U	0.28	19	41.4
BS2304A	10900	277	0.21 U	1.4 U	10.2	1.2	695	2760	0.54 U	0.32 U	20	0.2	14.5	39.9
Representative	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**NC**	**20.4**	**52.6**	**52.4**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
SS2403A	13400	3.9 UJ	5.7	130	0.75	10.2 J	2.6	21200	18.9	6	13.4	589	13100	13.2	12
SS2403B	13800	4 UJ	3.9	133	0.74	10 J	4	7070	21	6	14.6	538	13600	14.2	11.8
Representative	**15961.5**	**10.4**	**6.7**	**205.7**	**1.4**	**17.3**	**4.9**	**NC**	**53.0**	**7.8**	**17.2**	**656.3**	**17137.5**	**35.8**	**19.3**

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
SS2403A	7960	400	0.09 U	1.3 U	13.5	7.6	1010	3460	0.51 U	0.3 U	20 U	0.3	25.9	67.9
SS2403B	5730	500	*0.37*	1.3 U	14.6	10.1	1230	3740	0.52 U	0.31 U	20 U	0.3	28.3	81.3
Representative	**8722.5**	**909.0**	**0.2**	**2.1**	**18.6**	**21.8**	**1512.4**	**4934.2**	**1.2**	**1.0**	**NC**	**0.3**	**35.5**	**89.7**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
BS2403A	11100	4 UJ	3.9	110	0.65	8.3 J	0.62 U	28100	14.3	5.3	9.8	477	11200	7.5	10.7
BS2403B	10900	4.4 UJ	5.3	115	0.64	9 J	0.89 U	*82700*	13.5	5.4	10.4	415	11100	7.7	10.1
Representative	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
BS2403A	9110	336	0.74	1.3 U	12.2	1.2	770	3120	0.53 U	0.31 U	20 U	0.26	19.6	43.4
BS2403B	12400	302	0.08 U	1.5 U	12.5	1	697	2850	0.55 U	0.51 U	20 U	0.33	17.1	43.4
Representative	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**NC**	**20.4**	**52.6**	**52.4**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
SS2483B	8850	*11.8* J	3.6	97.4	0.59	4.7	3.8	NA	22	4.7	9.7	463	10200	17.5 J	10.3 J
SS2484A	10400	4.7 U	5.8	119	0.79 J	1.8	1.6	NA	21.8	5.7	11.2	400	10600 J	18.2 J	14.8 J
Representative	**15961.5**	**10.4**	**6.7**	**205.7**	**1.4**	**17.3**	**4.9**	**NC**	**53.0**	**7.8**	**17.2**	**656.3**	**17137.5**	**35.8**	**19.3**

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
SS2483B	NA	350 J	0.08	1.1 U	10.5	5.8	994	NA	0.44	0.92	NA	0.13 J	35.5	61.9
SS2484A	NA	422	0.09	1.3 U	10.1	4.9	874	NA	*1.8* U	0.39	NA	0.13 J	*36.9*	64.7
Representative	**8722.5**	**909.0**	**0.2**	**2.1**	**18.6**	**21.8**	**1512.4**	**4934.2**	**1.2**	**1.0**	**NC**	**0.3**	**35.5**	**89.7**

Table 4.3-4 (Cont'd)

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
BS2053AA	13700	297	0.06 U	1.3 U	11.7	0.7	671	2980	0.53 U	0.31 U	20 U	0.25	21	39.2
BS2053B	8960	325	*0.58*	1.4 U	13.7	1.8	756	3380	0.57	0.35 U	20 U	0.28	18.7	45.3
BS2054A	NA	304	*0.32*	1.3 U	12.3	0.5 U	528	3300	0.53 U	0.41 U	20	0.23	20.6	47.4
Representative	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**NC**	**20.4**	**52.6**	**52.4**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
SS2252A	13000 J	8.1 U	4.5 J	142	0.56	4.3 J	*26.2* J	NA	*79.5* J	5.9	*17.7*	*1590*	12800	16.5 J	8.7
SS2252B	13400 J	*26.6* J	5.4 J	136	0.84	2 J	*28.1* J	NA	*87.7* J	5	16.2	*1680*	12000	19.7 J	8.7
SS2252C	11400 J	*11.7* U	4.3 J	127	0.22	5.7 J	*13.4* J	NA	42.7 J	6.4	14.7	438	12000	15.9 J	8.6
SS2253A	10200 J	6.2 U	5.2 J	130	0.62	5.2 J	*13.3* J	NA	36.4 J	5.4	13.1	*1160*	11500	20.5 J	7.7
SS2253B	10700 J	*43.2* U	3.1 J	117	0.14	4.5 J	*8.7* J	NA	30.8 J	6.6	13.2	*1150*	11600	20.7 J	7.4
Representative	**15961.5**	**10.4**	**6.7**	**205.7**	**1.4**	**17.3**	**4.9**	**NC**	**53.0**	**7.8**	**17.2**	**656.3**	**17137.5**	**35.8**	**19.3**

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
SS2252A	NA	465	0.05 U	*4.4* U	*20*	4.5	*4430*	NA	1.1 J	*2.3*	NA	0.12 J	*95.8*	*204* J
SS2252B	NA	472	0.05 U	*8.4* U	*20.4*	5.3	*4860*	NA	*1.3* J	*2.3*	NA	0.11 J	*91.7*	*209* J
SS2252C	NA	525	0.05	*6.6* U	14.8	6.5	*2800*	NA	1 J	*1.3*	NA	0.06 J	*44.6*	*129* J
SS2253A	NA	552	0.05 U	*6.2* U	13.4	4	*2520*	NA	0.61 J	*1.1*	NA	0.08 J	35.1	*117* J
SS2253B	NA	546	0.05 U	*6.9* U	11.9	6.9	*1670*	NA	0.87 J	0.76	NA	*0.5* J	30.9	*92.9* J
Representative	**8722.5**	**909.0**	**0.2**	**2.1**	**18.6**	**21.8**	**1512.4**	**4934.2**	**1.2**	**1.0**	**NC**	**0.3**	**35.5**	**89.7**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
BS2252A	10400 J	4.6 U	6.1 J	132	0.68	5.7 J	0.76 J	NA	22.5 J	6.4	9.7	438	12300	11.9 J	8.6
BS2252B	10600 J	8.9 U	3.3 J	119	0.47	2.6 J	0.13 J	NA	18.6 J	6.4	10.4	383	12200	9.3 J	8.1
BS2252C	9610 J	4.2 U	4.9 J	139	0.28	*23.4* J	0.42 J	NA	19.4 J	5.9	9.5	*848*	10600	10.4 J	9.8
BS2253A	8140 J	4.2 U	5.1 J	122	0.14	4.1 J	0.2 J	NA	14.9 J	5.2	9	448	9910	10 J	6.7
BS2253B	8320 J	*75.1* U	4.8 J	114	0.55	9.2 J	0.28 J	NA	14.1 J	6.8	10	458	10100	9.5 J	6.6
Representative	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
BS2252A	NA	351	0.05 U	*5.3* U	13.8	0.5 U	658	NA	0.34 J	1.2	NA	0.06 J	46.4	43.5 J
BS2252B	NA	419	0.05 U	4.8 U	9.5	0.6	462	NA	0.34 J	0.89	NA	0.26 J	38.4	46.2 J
BS2252C	NA	321	0.05 U	4.9 U	9.3	1.7	560	NA	0.38 J	1.4	NA	0.05 J	34.6	38.9 J
BS2253A	NA	381	0.05	*6.4* U	7.6	0.5 U	533	NA	0.46 J	1.1	NA	0.04 J	33.9	36.5 J
BS2253B	NA	383	0.05 U	*6.1* U	8.7	0.5 U	448	NA	0.54 J	1.2	NA	0.04 J	26.6	36.3 J
Representative	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**NC**	**20.4**	**52.6**	**52.4**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
SS2303A	13200	3.9 UJ	4.4	125	0.73	11.3 J	4.8	15200	22.8	5.9	13.8	*668*	12700	15.3	11.5
SS2303B	13300	4 UJ	4.5	124	0.73	10.7 J	*5.2*	10500	25.2	5.9	14.6	*681*	13300	12.1	11.4
SS2304A	11400	3.8 UJ	5.2	127	0.68	9 J	2.7	9040	16.4	5.7	13.1	597	12600	13.7	11.5
Representative	**15961.5**	**10.4**	**6.7**	**205.7**	**1.4**	**17.3**	**4.9**	**NC**	**53.0**	**7.8**	**17.2**	**656.3**	**17137.5**	**35.8**	**19.3**

Table 4.3-4 (Cont'd)

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
BS2483B	10200	17.4 J	2.8	131	0.67	5.2	0.34 J	NA	15.9	5.6	9.2	425	11400	11.6 J	12.7 J
BS2484A	11500	12.9 J	3.4	125	0.86	6.3	0.36 J	NA	18	5.2	11.4	338	11700	11.1 J	13.3 J
Representative	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
S2483B	NA	373 J	0.07	1.1 U	10.3	0.5 U	675	NA	0.41	1.1	NA	0.1 UJ	33.5	37.9
BS2484A	NA	516 J	0.13	1.2 U	10.9	1	613	NA	1.8	0.93	NA	0.12 UJ	38.1	48.2
Representative	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**NC**	**20.4**	**52.6**	**52.4**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
SS2701D	13000 J	61.5 U	5.4 J	183	0.07 U	3.3 J	26.1 J	NA	103 J	5.6	23	1870	12200	16.8 J	9
SS2702A	12100	4.5 UJ	1	198 J	0.6 U	2.1	8	NA	26.5	5.4 U	16.6	593	13800	27.9 J	18.5
SS2702B	18900 J	7.8 UJ	4.1	171 J	0.85	18.3	1.3	15200 J	21.9	6.9	17.1	530	16200 J	10.7	18.5
SS2702C	13200 J	7.7 UJ	4.1	122 J	0.65	18.9	4.6	30500 J	55.8	4.3	13.7	1900	10500 J	18.7	11.2
SS2703A	16400 J	7.9 UJ	3.7	147 J	0.75	13.5	1.8	5850 J	19.6	6.4	14.7	470	15400 J	12.3	14.9
SS2703B	8700 J	7.8 UJ	5.4 U	121 J	0.83 U	7.3	0.51 U	68200 J	9.3	5	8.7	420	10300 J	6.9	13.1 J
Representative	**15961.5**	**10.4**	**6.7**	**205.7**	**1.4**	**17.3**	**4.9**	**NC**	**53.0**	**7.8**	**17.2**	**656.3**	**17137.5**	**35.8**	**19.3**

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
SS2701D	NA	510	0.07	9 U	22.3	52.4	6910	NA	1.2 J	2.8	NA	0.08 J	133	209 J
SS2702A	NA	435	0.15 U	1.3 U	13	24.5	1320	NA	1.1	1.4 J	NA	0.26	36.5	170
SS2702B	8290 J	468 J	0.06 U	1.3 U	15.5	16.3	899	NA	0.59 UJ	0.41 U	NA	12.2 U	31.5	79.9
SS2702C	5030 J	314 J	0.08 U	1.3 U	16.6	7.6	1610	NA	0.89 UJ	0.4 U	NA	12 U	60.3	77
SS2703A	5890 J	482 J	0.05 U	1.3 U	14.3	7.5	822	NA	0.41 UJ	0.41 U	NA	12.3 U	29.3	74.7
SS2703B	15000 J	305 J	0.12 U	1.3 U	10.7	0.9	368	NA	0.97 U	0.41 U	NA	12.2 U	15.8 J	43.7 J
Representative	**8722.5**	**909.0**	**0.2**	**2.1**	**18.6**	**21.8**	**1512.4**	**4934.2**	**1.2**	**1.0**	**NC**	**0.3**	**35.5**	**89.7**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
BS2701D	10800 J	52.9 U	4.2 J	178	0.06 U	6 J	0.48 J	NA	20.6 J	6.2	10.7	398	11500	6.7 J	9
BS2702A	9080	8.1 J	7.7	129	0.41	4.8	0.46	NA	15.2	4.4	9.6	343	10500	5.3 J	11.6 J
BS2703B	9570 J	8.1 UJ	5.7 U	136 J	0.84 U	10	0.53 U	75800 J	10.4	4.4	9.7	540	10000 J	4.6	16.2 J
Representative	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
BS2701D	NA	326	0.05 U	8.9 U	9.6	0.9	535	NA	1.9 J	1.3	NA	0.04 J	42	45 J
BS2702A	NA	358	0.1	1.4 UJ	10.6	1	395	NA	0.91	1.5 J	NA	0.12 U	21.9	37.9
BS2703B	22000 J	260 J	0.11 U	1.4 U	10.5	1.5	193	NA	0.87 U	0.42 U	NA	12.7 U	19.3 J	35.8 J
Representative	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**NC**	**20.4**	**52.6**	**52.4**

Notes:

Results in mg/kg.
NA - Not analyzed.
NC - Not calculated.
U - Not detected.
J - Estimated value.
R - Rejected value.

Table 4.3-5
Analytical Results for Offsite Soil Samples - Northwestern Quadrant

Sample Id	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium	Chromium		Cobalt		Copper		Fluoride	Iron	Lead		Lithium	
SS2931A	14500	J	*102*	U	*18.4*	J	189		0.26		5.2	J	*102*	J	NA	*591*	J	4.6		*59.2*		*9700*	11000	*60.9*	J	8.2	
SS2931A1	14300		6.1	U	*16.1*	J	*272*		1.4		*40.2*		*177*		141000	*470*		2.5		*61.7*		*13000*	9620	*55.8*		9	
SS2931A2	14300		4	U	*15.2*		*206*		*1.5*		*47.8*		*182*		148000	*542*		2.5		*70.9*	J	164	9920	*109*		9.7	
SS2931A3	15900		3.9	U	*15.3*		141		*1.7*		*67.7*		*189*		167000	*608*		2.1		*75.7*	J	*18600*	8400	35.8		11.1	
SS2931A4	*16400*		5.6	U	*12.3*	J	157		1.2		*32.6*		*120*		94200	*309*		4.1		*44.3*		*8940*	11700	30.5		12.2	
SS2931B	13500	J	4.2	U	*12.1*		156		0.21		6.1	J	*159*	J	NA	*474*	J	4.4		*48.3*		*8980*	9330	*80.1*	J	7.2	
SS2931B1	15100		5.5	J	*12.7*	J	153		1.2		*31.1*		*124*		90100	*242*		4.1		*40.5*		*7540*	11200	*94.6*		11.5	
SS2931B3	11500		4	UJ	4.9	J	138		0.76		10.4		*10.8*		31000	35.2		4.9		15.2		*1230*	11900	14.3		11.4	
SS2931B4	14800		4	UJ	*7.4*	J	149		0.92		*20.8*		*55.3*		51100	*138*		5.2		*28.3*		*4040*	13600	*63.9*		11.9	
SS2931B5	*16700*		3.9	UJ	6.4	J	154		1.1		*24.4*		*55.5*		63300	*281*		6		*61.5*		*6290*	14700	*76.1*		13.1	
SS2931C	14200		6.1	UJ	3.6	U	119		0.81		5		*7.5*	J	NA	*63.1*	J	4.4	UJ	*41.1*	J	*1130*	16200	J	33.2	J	14.4	
SS2931D	12000		6.2	UJ	1.3	U	118		0.94		8		*29.3*	J	NA	*79.7*	J	2.7	UJ	*21.1*	J	*1900*	12000	J	*54.3*	J	13.1	
SS2932A	12600		4	UJ	6.4		126		0.4		6.9		3.7		NA	23.3		5.1		12.4		450	15100		9.3	J	13.7	J
SS2932B	12900	J	4.1	UJ	3.2		146	J	0.68		5.4		*5.1*		NA	18.4	J	5		13.4		*708*	14600	J	17.7	J	16	
SS2932C	15000		4.1	U	3.5		164		0.96	J	8	J	*5.9*		NA	20.2	J	*10.9*	J	14.5		363	13300		29.8		10.8	
SS2933A	14100	J	7.9	UJ	4.4	U	154	J	0.94	U	9.7		1.1	U	4680	J	16.3		6.2		13.9		370	14600	J	12.3		14.3	J
SS2933B	*17000*	J	7.9	UJ	4		*295*	J	0.75		15		1.7		7120	J	20.2		6.8		16.1		480	15700	J	19		15.5	
Representative	**15961.5**		**10.4**		**6.7**		**205.7**		**1.4**		**17.3**		**4.9**		**NC**	**53.0**		**7.8**		**17.2**		**656.3**	**17137.5**		**35.8**		**19.3**	

Sample Id	Magnesium		Manganese		Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Potassium		Selenium		Silver		Sulfate		Thallium		Vanadium		Zinc	
SS2931A	NA		358		0.13		*17.9*		*105*		19.1	*30100*	NA		*5.7*	J	*8.3*		NA		*3.6*	J	*630*		*911*	J
SS2931A1	4140		307		*0.51*		*13.4*		*105*		17.2	*49800*	4070	J	*6.7*		*8.7*		20	U	*2.4*	J	*555*		*1210*	
SS2931A2	4060		278	J	*0.31*	U	*17.2*		*115*		14.1	*51500*	4040		*4.6*		*8.3*		215		*2.9*	J	*649*		*1300*	
SS2931A3	3590		224	J	*0.28*	U	*19.1*		*124*		18.1	*45400*	4780		*10.9*		*10.8*		90		*3.5*	J	*713*		*1540*	
SS2931A4	5770		345		*0.69*		*8.7*		*69.4*		9.2	*28900*	4920	J	*4.3*		*5.9*		140		*0.73*	J	*364*		*861*	
SS2931B	NA		306		0.11		*11.2*	U	*74.9*		*25.9*	*26300*	NA	J	*5*		*9.2*		NA		*0.72*	J	*527*		*977*	J
SS2931B1	5830		339		0.7		*7.6*		*61.1*		14	*22500*	4140	J	*4.7*		*5.4*		20	U	*0.57*	J	*298*		*854*	
SS2931B3	7450		376		0.07	U	1.3	U	*18.8*		4.1	*3900*	3010	J	0.65		0.65		20	U	0.29	J	*48.8*		*128*	
SS2931B4	6560		412		0.1	U	*3*		*38.2*		13.3	*11500*	4020	J	*1.8*		*3.4*		20	U	*1.1*	J	*160*		*534*	
SS2931B5	8090		431		0.07	U	*8.7*		*70.4*		7	*11500*	4550	J	*2.5*		*4.9*		20	U	*0.31*	J	*281*		*593*	
SS2931C	NA		523	J	*0.43*		2	U	*24.3*		*31*	*2960*	NA		*1.8*	U	*1.4*	U	NA		*0.36*		20.4	J	*153*	J
SS2931D	NA		420	J	0.16	U	1.8	U	17.2		15.6	*6070*	NA		*2*	U	*2*	U	NA		*0.85*	J	19.7	J	*1250*	J
SS2932A	NA		488		0.09		1.3		14.4		*32.3*	1120	NA		*1.6*		0.86	J	NA		0.15		31.9		71.2	
SS2932B	NA		52.6	J	0.06		2	U	10.9		19.9	*1660*	NA		0.27	U	0.2		NA		0.05	U	*44.1*		83.8	J
SS2932C	NA		478		0.08		1.4		12.6		9.4	*1750*	NA		0.67		0.89		NA		0.1	U	*36.3*	J	88.6	J
SS2933A	5020	J	513	J	0.12	U	1.3	U	11.7		10.3	300	NA		1	U	0.41	U	NA		*12.3*	U	25.1	J	63	J
SS2933B	5950	J	530	J	0.06	U	1.3	U	13.4		12.6	859	NA		0.46	UJ	0.41	U	NA		*12.3*	U	30.3		71.8	
Representative	**8722.5**		**909.0**		**0.2**		**2.1**		**18.6**		**21.8**	**1512.4**	**4934.2**		**1.2**		**1.0**		**NC**		**0.3**		**35.5**		**89.7**	

Table 4.3-5 (Cont'd)

Sample Id	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium	Chromium		Cobalt		Copper		Fluoride	Iron	Lead		Lithium	
BS2931A	14500	J	*112*	U	5.3		173		0.08	U	2.5	J	*8.6*	J	NA	*54.2*	J	6.7		*15.4*		*868*	13100	21.3	J	10.6	
BS2931A1	14200		4.4	UJ	5.5	J	173		0.85		*25.5*		*3*		43500	18.5		6.5		12		*618*	14100	9		16.3	
BS2931A2	*15600*		4.4	U	4.4		153		0.82		*22.9*	U	*5*		29300	*27.1*		6.3		13.7	J	*880*	14800	10.8		16.2	
BS2931A3	14300		4.4	U	4.8		154		0.77		*21.8*	U	*1.8*		34000	18.7		6		11.6	J	*650*	13800	8.8		15.4	
BS2931A4	13900		4.4	UJ	4.3	J	154		0.83		13.5		*2.3*		58000	18.5		6.4		11		*848*	13900	9.2		14.9	
BS2931B	7720	J	3.9	U	5	J	96.2		0.06	U	3.8	J	*7*	J	NA	*35.2*	J	5.6		11.8		*1210*	9930	21.6	J	5.9	
BS2931B1	13200		4.8	J	5.4	J	146		0.87		14.3		*2.8*		55100	18.2		6.4		10.9		*773*	13600	10.7		14	
BS2931B3	12100		4.4	UJ	5.5	J	131		0.74		10.1		0.68		53700	13.7		5.9		11.9		*574*	12900	9.7		13.4	
BS2931B4	12800		4.6	UJ	4.8	J	145		0.74		*18.2*		0.98		49900	15.5		5.7		10		555	12600	8.7		15.1	
BS2931B5	14200		4.4	UJ	4.6	J	163		0.81		17.2		1		51300	17.2		6.2		10.9		*589*	13900	9.1		14.1	
BS2931C	4270		6.6	U	3.3	U	98.6		0.66		4.9		0.19	UJ	NA	14.9	J	4	UJ	9.7	J	423	11100	J	12.7	J	12	
BS2931D	8530		6.4	UJ	2.1	U	111		0.85		8.8		0.21	UJ	NA	*31*	J	4.4	UJ	11.4	J	433	12400	J	14.2	J	14.1	
BS2932A	12000		10.4	J	3.6		172		0.4		4.1		*1.9*		NA	18.6		4.2		10		358	13000		6.3	J	12.5	J
BS2932B	10800	J	4.1	UJ	7.7		133	J	0.41		14.3		0.43		NA	11	J	3.2		9.7		518	12100	J	7.6	J	14	
BS2932C	11700		4.1	U	4.1		128		0.89	J	14.8	R	0.07		NA	*34.5*	J	*11.2*	J	9.8		257	11000		11.1	J	9.8	
BS2933B	*15600*	J	7.9	UJ	4.3		152	J	0.74		16.4		0.51	U	37800	J	16	6.5		11.3		460	14300	J	5		15.7	
Representative	**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**	**27.0**		**8.7**		**15.2**		**559.2**	**14930.2**	**26.1**		**17.8**	

Sample Id	Magnesium		Manganese		Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Potassium		Selenium		Silver		Sulfate	Thallium		Vanadium	Zinc		
BS2931A	NA		388		0.06	U	*12.3*	U	*16*		1.2	*2310*	NA		1.1	J	1.7		NA	0.07	J	*59.3*	*106*	J	
BS2931A1	11300		420		*0.93*		1.5	U	13.9		2.9	*1150*	*3860*	J	0.58	U	0.34	U	20	U	0.12	UJ	23.2	*64.6*		
BS2931A2	10100		444	J	0.08	U	1.5	U	14.9		0.6	*1520*	*4180*		0.43	U	0.34	U	4780	0.15	J	36.8	*84.5*		
BS2931A3	9750		405	J	0.06	U	1.5	U	13.7		1.1	*897*	*3830*		0.6	U	0.34	UJ	3060	0.33	J	25.9	*60.4*		
BS2931A4	12700		383		0.04	U	1.5	U	13.6		1.6	*903*	3040	J	1		0.71		20	U	0.11	UJ	23.6	*59.1*		
BS2931B	NA		287		0.05	U	*8.4*	U	*15.4*		2.6	*2770*	NA	J	1	J	1		NA	0.03	J	38.7	*81.1*	J	
BS2931B1	11200		396		*0.98*		1.5	U	14.3		0.7	*1100*	3060	J	0.83		0.35	U	340	0.11	UJ	22.7	*62.1*		
BS2931B3	11200		373		0.17	U	1.5	U	13.1		0.6	737	3410	J	0.53	U	0.34	U	120	0.15	J	17.9	47.6		
BS2931B4	13000		376		0.24	U	1.5	U	12.9		1.5	805	3400	J	1.9		0.35	U	470	0.11	UJ	21	49.8		
BS2931B5	11900		384		0.03	U	1.5	U	13.5		0.5	738	*3780*	J	0.57	U	0.44		130	U	0.11	UJ	22.1	*53.1*		
BS2931C	NA		300	J	0.09	U	1.9	U	8.5	U	1.1	427	NA		0.96	U	0.22	U	NA	0.14	U	45.4	J	40	J
BS2931D	NA		333	J	0.07	U	1.8	U	17.5		2.1	524	NA		1.5	U	0.21	U	NA	0.13	UJ	*87.8*	J	44.8	J
BS2932A	NA		339		0.11		1.4	UJ	10.8		0.7	478	NA		4.1		1.6	J	NA	0.12		29.6	41.9		
BS2932B	NA		316	J	0.07		3.4	U	8.3		0.5	U 609	NA		4.2		0.89		NA	0.06		43.8	39	J	
BS2932C	NA		350		0.07		2		10.9		3.3	532	NA		0.75		1.2		NA	0.1	U	40.2	J	40.4	J
BS2933B	10500	J	383	J	0.19	U	1.3	U	14		3	543	NA		0.45	UJ	0.41	U	NA	12.3	U	24.7	51.4		
Representative	**18700.0**		**475.9**		**0.3**		**5.2**		**14.9**		**8.9**	**840.2**	**3562.3**		**6.5**		**2.0**		**NC**	**20.4**		**52.6**	**52.4**		

Table 4.3-5 (Cont'd)

Sample Id	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium	Chromium		Cobalt		Copper		Fluoride	Iron		Lead		Lithium	
SS3151A	14000	J	*67.8*	U	*17.5*	J	*390*		0.2		2	J	*78.8*	J	NA	*510*	J	5.1		*54.5*		*8600*	10200		*57.6*	J	7.5	
SS3151B	14900		6.3	U	5.4	U	160		*2*		5.5		*16.4*	J	NA	*74.7*	J	5.5	J	*40*	J	*1740*	*18300*	J	23.1	J	19.3	
SS3151CA	9800		6.1	UJ	2.5	U	77.4		0.81		3.2		1.1	J	NA	16.9	J	4.3	UJ	*21*	J	568	13000	J	12.6	J	14.3	
SS3151D	13200		4.2	UJ	6.6		181		0.92		4.8		*8.8*		NA	52.6		5.9		*39.3*		*745*	13400		15.7	J	17.4	
SS3152A	10500		4.1	UJ	3.1		186	J	0.61	U	1.68		3		NA	21.5		5	U	14.9		513	15300		19.9		17.6	
SS3152B	13300		4	UJ	4.9		148		0.4		5.1		*5.8*		NA	28.7		4.4		13.7		540	14800		12.7	J	12.8	J
SS3152C	13300		4.1	U	3.3		161		1.1	J	4.7	UJ	3.6		NA	23.2	J	*11.3*	J	14		259	14700		26.2		9.5	
SS3153A	9900	J	*69*	U	2.9	J	126		0.86		4.7	J	1.5	J	NA	17.4	J	5.2		13.2		423	12200		4.6	J	7.5	
SS3153B	13400		4	U	2.2		146		0.79		1.9	J	1.3		NA	24.3		4.9	J	14.5		352	14700		*36.2*	J	8.2	
SS3153B1	11500		4	UJ	3.5		126		0.48		8.6	J	1.6	U	4500	15.9		5.9		12.8		338	13400		11.6		10.6	
SS3153B2	13400		4.5	UJ	4.8		129	J	0.96		15.9		0.34	U	29500	15.1	J	6.3		10.5		450	14500		7.3		13.5	
SS3153B3	*16000*		4	UJ	4.5		145	J	1		14.5		0.32	J	8070	18.9	J	7.7		14.3		450	*17300*		10.1		13.6	
SS3153B4	14100		4	UJ	4		153	J	0.95		11.2		0.69	J	5120	17.5	J	7.2		14.5		400	15900		12.1		11.4	
Representative	**15961.5**		**10.4**		**6.7**		**205.7**		**1.4**		**17.3**		**4.9**		**NC**	**53.0**		**7.8**		**17.2**		**656.3**	**17137.5**		**35.8**		**19.3**	

Sample Id	Magnesium	Manganese		Mercury		Molybdenum		Nickel		Orthophosphate	Total Phosphorus	Potassium	Selenium		Silver		Sulfate	Thallium		Vanadium		Zinc	
SS3151A	NA	397		0.07		*17.6*		*90*		12.6	*42400*	NA	*3.2*	J	*6.9*		NA	*3.9*	J	*550*		*771*	J
SS3151B	NA	365	J	0.16	U	1.8	U	*21.9*		*22.2*	*4850*	NA	*1.9*	U	*1.9*	U	NA	*0.51*		*75.6*	J	*180*	J
SS3151CA	NA	305	J	0.18	U	1.7	U	8.8	U	13.9	1050	NA	*1.8*	U	0.51	U	NA	0.19	U	28.5	J	60.8	J
SS3151D	NA	462		*0.24*		1.2	UJ	16.1		12.1	*1960*	NA	*2.8*		*2.3*		NA	*0.46*	J	*55.2*		*158*	
SS3152A	NA	376		0.08	U	1.2	U	11.4	U	13.3	1070	NA	*1.3*		*1.8*	J	NA	0.18		25.9		86.8	
SS3152B	NA	528		0.09		1.1	UJ	14.2		13.5	1450	NA	0.87		*1.1*	J	NA	0.16		34.4		83.5	
SS3152C	NA	558		0.06		1.4		11.8		10	899	NA	0.25	U	0.68		NA	0.1	UJ	25	J	76	J
SS3153A	NA	531		0.06	U	*11.5*	U	10.3		9.1	842	NA	0.57	J	0.43		NA	0.02	J	30.2		63.4	J
SS3153B	NA	541		0.06		2		10		*30.2*	1650	NA	0.33		0.4		NA	0.1	U	26.4	J	66.8	
SS3153B1	4260	445		0.07	U	1.3	U	11.3		12.2	842	3260	0.5	U	0.3	U	20	U	0.16		22.7		59.7	
SS3153B2	*8830*	377		*0.43*		1.5	U	12.5		14.9	794	2420	0.57	U	0.34	U	20		0.17	J	22.7	J	53.5	J
SS3153B3	6680	489		0.07	U	1.3	U	16.8		12	694	4520	0.5	U	0.31	U	20		0.14	J	26.7	J	70.8	J
SS3153B4	5070	594		0.1	U	1.3	U	13.3		16.3	621	4220	0.5	U	0.3	U	20	U	0.14	J	24.2	J	74.3	J
Representative	**8722.5**	**909.0**		**0.2**		**2.1**		**18.6**		**21.8**	**1512.4**	**4934.2**	**1.2**		**1.0**		**NC**	**0.3**		**35.5**		**89.7**	

Sample Id	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium	Chromium		Cobalt		Copper		Fluoride	Iron		Lead		Lithium	
BS3151A	13000	J	*71.7*	U	5.3	J	155		0.08	U	7	J	*2.1*	J	NA	*28.5*	J	6.6		12.6		540	13900		7.9	J	10.9	
BS3151B	7240		6.8	UJ	1.2	U	73.2		0.45	U	3.1		0.29	UJ	NA	20.8	J	2	UJ	8.6	J	458	10500	J	12.1	J	11.1	
BS3151D	8650		4.6	UJ	5.4		142		0.69		2.6		0.26	J	NA	16.1		4.9		10.9		523	9740		13.7	J	15.1	
BS3152A	8610		4.5	UJ	2.7		172	J	0.45	U	1.61		0.34		NA	14.4		5.9	U	11.2		395	13300		15.6		16	
BS3152C	13500		4	U	2.6		162		1	J	3.9	J	0.13		NA	26.9	J	*11.3*	J	11.8		190	*15100*		14.5	J	11.2	
BS3153AA	9880	J	*55.6*	U	4	J	139		0.07	U	6.8	J	0.42	J	NA	18.7	J	6.5		9.7		510	11300		9.9	J	10.3	
BS3153B	10500		4.2	U	2.9		135		0.83		3.3	J	0.27	J	NA	*29.4*		4.8	J	8.6		339	13100		*29.9*	J	8.7	
BS3153B1	13000		4.4	UJ	5		153	J	0.95		11.1		0.34	U	22800	13.7	J	6.6		11.4		350	14800		8.9		12.3	
BS3153B2	11700		4	UJ	3		132	J	0.83		8.6		0.79	J	4350	15.5	J	6.5		12.8		360	14000		10.6		9.8	
BS3153B3	10400		4.3	UJ	4.1		123	J	0.84		13.2		0.33	U	*69100*	14.4	J	5.8		9.8		510	12200		12.6		13.3	
BS3153B4	12200		4.4	UJ	4.8		136	J	0.95		7.5	U	0.34	U	47100	16.4	J	7.1		15		380	14800		9.2		10.9	
Representative	**14638.6**		**30.9**		**8.5**		**203.2**		**1.2**		**18.1**		**1.2**		**65574.4**	**27.0**		**8.7**		**15.2**		**559.2**	**14930.2**		**26.1**		**17.8**	

Table 4.3-5 (Cont'd)

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
BS3151A	NA	395	0.06 U	*10* U	13.4	3	*1090*	NA	0.55 J	1	NA	0.06 J	47.8	*61.1* J
BS3151B	NA	280 J	0.07 U	2.3 U	10.2	1.2	443	NA	1.7 U	0.23 U	NA	0.16 U	*87.8* J	35.9 J
BS3151D	NA	304	*0.31*	1.3 UJ	11.1	0.5 U	451	NA	3.1	1.3	NA	0.23 J	29.9	35.2
BS3152A	NA	338	0.09 U	1.3 U	10.3 U	1.2	501	NA	1.1	0.91 J	NA	0.1 U	22.7	42.7
BS3152C	NA	421	0.08	1.1 U	13.1	1.7	396	NA	0.27 U	0.67	NA	0.1 UJ	24.2 J	49.6 J
BS3153AA	NA	340	0.05 U	*7* U	10.7	1.2	583	NA	0.94 J	1.1	NA	0.05 J	36.8	42.9 J
BS3153B	NA	377	0.09	1.4	11.6	1	512	NA	0.27 U	0.97	NA	0.1 UJ	31.2 J	40.1 J
BS3153B1	6740	407	*0.54*	1.5 U	14.4	2.22	684	2780	0.56 U	0.34 U	30	0.17 J	19.8 J	*53.5* J
BS3153B2	4410	*537*	0.04 U	1.3 U	14.5	*10.1*	808	3150	0.51 U	0.31 U	20	0.14 J	21.4 J	*63.7* J
BS3153B3	15100	325	0.07 U	1.4 U	14.7	1.77	483	2210	0.75	0.33 U	20 U	0.24 J	18.1 J	44.5 J
BS3153B4	7870	400	*2.3*	1.5 U	14.6	1.62	413	2390	0.57 U	0.34 U	20 U	0.17 J	22.8 J	47.8 J
Representative	**18700.0**	**475.9**	**0.3**	**5.2**	**14.9**	**8.9**	**840.2**	**3562.3**	**6.5**	**2.0**	**NC**	**20.4**	**52.6**	**52.4**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
SS3381A	15300	5.7 UJ	*6.8*	129	1	3.3	*22* J	NA	*90.7* J	3.6 UJ	*20.7* J	*2600*	14200 J	27.1 J	16.7
SS3381B	12400	5.8 UJ	4.2 U	96.8	0.67	2.5	*19.1* J	NA	*61.4* J	3.5 UJ	*17.3* J	*2010*	12800 J	0.86 J	12.8
SS3381C	12900	3.8 UJ	5.7	*208* J	0.57 U	3.09	*25.8*	NA	*67*	5.4 U	*19.9*	*1720*	14600	20.3	15.3
SS3381D	13200	5.9 UJ	4 U	69.8	1.1	4.1	*13.1* J	NA	*107* J	2.8 UJ	14.9 J	*1150*	15200 J	26.6 J	12.8
SS3382A	12200	10 J	4	113	0.47	5.5	*8.7*	NA	38.1	3.9	12.8	653	13800	13.2 J	11.2 J
SS3382B	7210	4.2 U	*9.2*	103	0.62 UJ	3.1	*9*	NA	36.6	4.6 U	13.4	*820*	8680 J	*40.8* J	10.3 J
SS3382C	12700	6.1 U	*8.2*	181	0.71 J	*92.2* R	*10.6*	NA	24.3 J	11 J	16.8	540	10600	*54.4*	*55.2*
SS3383A	9470 J	8.5 UJ	2.3	114 J	0.71	*197*	*5.6*	NA	14.4 J	2.2	10.9	*725*	10500 J	14.8 J	*34.7*
SS3383B	10400 J	*11.9* UJ	3.3	144 J	0.91	7.9	4.2	NA	10.7 J	1.8	13.8	*1300*	10100 J	9.8 J	*65.6*
Representative	**15961.5**	**10.4**	**6.7**	**205.7**	**1.4**	**17.3**	**4.9**	**NC**	**53.0**	**7.8**	**17.2**	**656.3**	**17137.5**	**35.8**	**19.3**

Sample Id	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Orthophosphate	Total Phosphorus	Potassium	Selenium	Silver	Sulfate	Thallium	Vanadium	Zinc
SS3381A	NA	382 J	0.17 U	1.6 U	*21.9*	1.8	*3880*	NA	*2.7* U	*1.8* U	NA	*0.52*	*97* J	*183* J
SS3381B	NA	368 J	0.14 U	1.6 U	15.8	3.8	*4690*	NA	*1.9* U	*6.6*	NA	0.22 UJ	21.1 J	*164* J
SS3381C	NA	469	0.19 U	*3.8* U	*20.9*	6.1	*4670*	NA	0.62	*2* J	NA	*0.4*	*90.6*	*215*
SS3381D	NA	415 J	0.16 U	1.7 U	*32.5*	5	*3370*	NA	*1.6* U	0.2 U	NA	*0.37* J	*55.1* J	*126* J
SS3382A	NA	410	0.09	1.1 UJ	13.6	8.8	*1920*	NA	0.43	1 J	NA	0.17	*44.1*	*94.9*
SS3382B	NA	250	0.06	1.2 U	11.7	11	*2820*	NA	*2* U	0.76	NA	0.16 J	*37.5*	*108*
SS3382C	NA	546	0.16	1.7 U	11.5	9.9	*1540*	NA	*2*	*1.5*	NA	*0.31*	*67.6* J	*132* J
SS3383A	NA	53.4 J	0.1	*2.8* U	7.9	11	*1550*	NA	0.93	0.35	NA	0.07	33.2	86.3 J
SS3383B	NA	44.9 J	0.08	*3.5* U	6.7	17.5	*1530*	NA	0.28 U	0.56	NA	0.13	34.4	81.9 J
Representative	**8722.5**	**909.0**	**0.2**	**2.1**	**18.6**	**21.8**	**1512.4**	**4934.2**	**1.2**	**1.0**	**NC**	**0.3**	**35.5**	**89.7**

Sample Id	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Fluoride	Iron	Lead	Lithium
BS3381A	10300	6.3 UJ	5.4 U	92.6	1.2	2.7	*2.2* J	NA	25.4 J	4 UJ	12.2 J	*660*	13200 J	11.4 J	15.8
BS3381B	9970	6.8 UJ	2.7 U	134	0.56	11.5	0.45 UJ	NA	17.6 J	3.3 UJ	11.3 J	*605*	10900 J	3 J	15.2
BS3381D	9900	6.4 U	5.5 U	96.5	1.1	3.1	0.16 UJ	NA	19 J	2.3 UJ	9.3 J	423	12100 J	10.1 J	12.4
BS3382A	10600	4.1 UJ	4.9	172	0.28	9.4	*1.7*	NA	18.2	4.3	10.1	420	12000	6.9 J	15.3 J
BS3382C	8600	5.2 U	4.3	193	0.43 J	13.4 R	0.09 UJ	NA	8.5 J	8 J	11	*888*	5790	9	*57.1*
BS3383A	12500 J	6.7 UJ	*8.7*	116 J	0.22 U	*91.7*	0.74	NA	10.2 J	3	11.8	*605*	12100 J	7 J	*32.6*
BS3383B	7620 J	15.8 UJ	3.9	196 J	0.18 U	6.7	0.05 U	NA	4.9 J	0.79 U	7.2	*1230*	6580 J	1.3 J	*56.8*
Representative	**14638.6**	**30.9**	**8.5**	**203.2**	**1.2**	**18.1**	**1.2**	**65574.4**	**27.0**	**8.7**	**15.2**	**559.2**	**14930.2**	**26.1**	**17.8**

Table 4.3-5 (Cont'd)

Sample Id	Magnesium	Manganese		Mercury		Molybdenum		Nickel		Orthophosphate		Total Phosphorus	Potassium	Selenium		Silver		Sulfate	Thallium		Vanadium		Zinc	
BS3381A	NA	396	J	0.12	U	1.8	U	12.7		1.9		805	NA	2.3	U	0.21	U	NA	0.22	UJ	32.6	J	*59.1*	J
BS3381B	NA	242	J	0.16	U	1.9	U	8.1		2.1		485	NA	2.4	U	0.56	U	NA	0.1	U	*92.6*	J	39.1	J
BS3381D	NA	319	J	0.13	U	1.8	U	7.3	U	0.7		637	NA	1.3	U	0.21	U	NA	0.1	U	32.9	J	37.6	J
BS3382A	NA	316		0.09		1.2	UJ	12		2.7		595	NA	0.37		1.6	J	NA	0.13		27		39.3	
BS3382C	NA	129		0.09		1.7		6.5		1		332	NA	0.64		2		NA	0.13	UJ	27.6	J	28.9	J
BS3383A	NA	263	J	0.08		3.7	U	9.6		*10*		543	NA	3.5		0.96		NA	0.05	U	48.9		39.2	J
BS3383B	NA	198	J	0.09		3.5	U	2.5		0.5	U	394	NA	0.48		1.5		NA	0.89		32.5		29	J
Representative	**18700.0**	**475.9**		**0.3**		**5.2**		**14.9**		**8.9**		**840.2**	**3562.3**	**6.5**		**2.0**		**NC**	**20.4**		**52.6**		**52.4**	

Notes:

Results in mg/kg.

NA - Not analyzed.

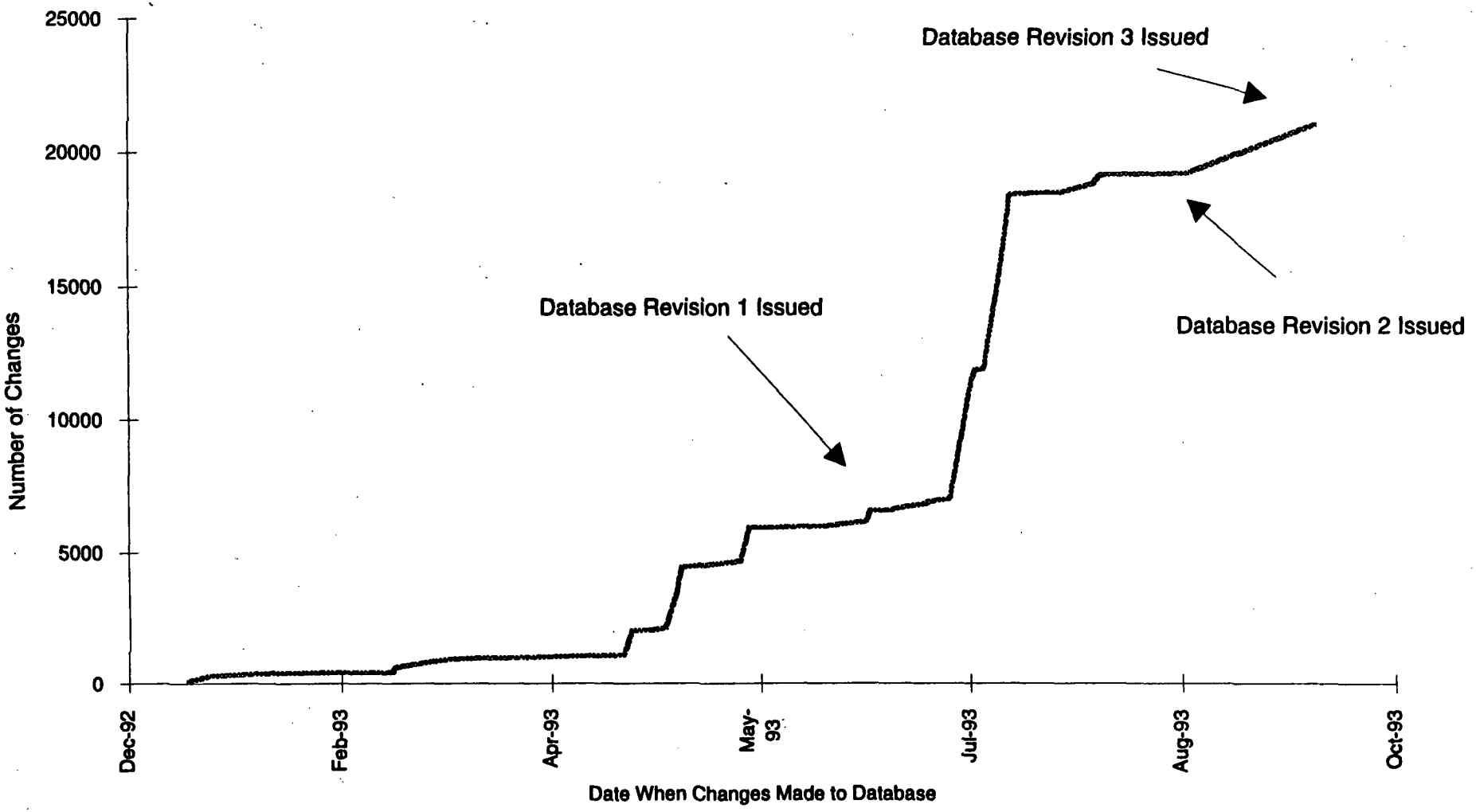
NC - Not calculated.

U - Not detected.

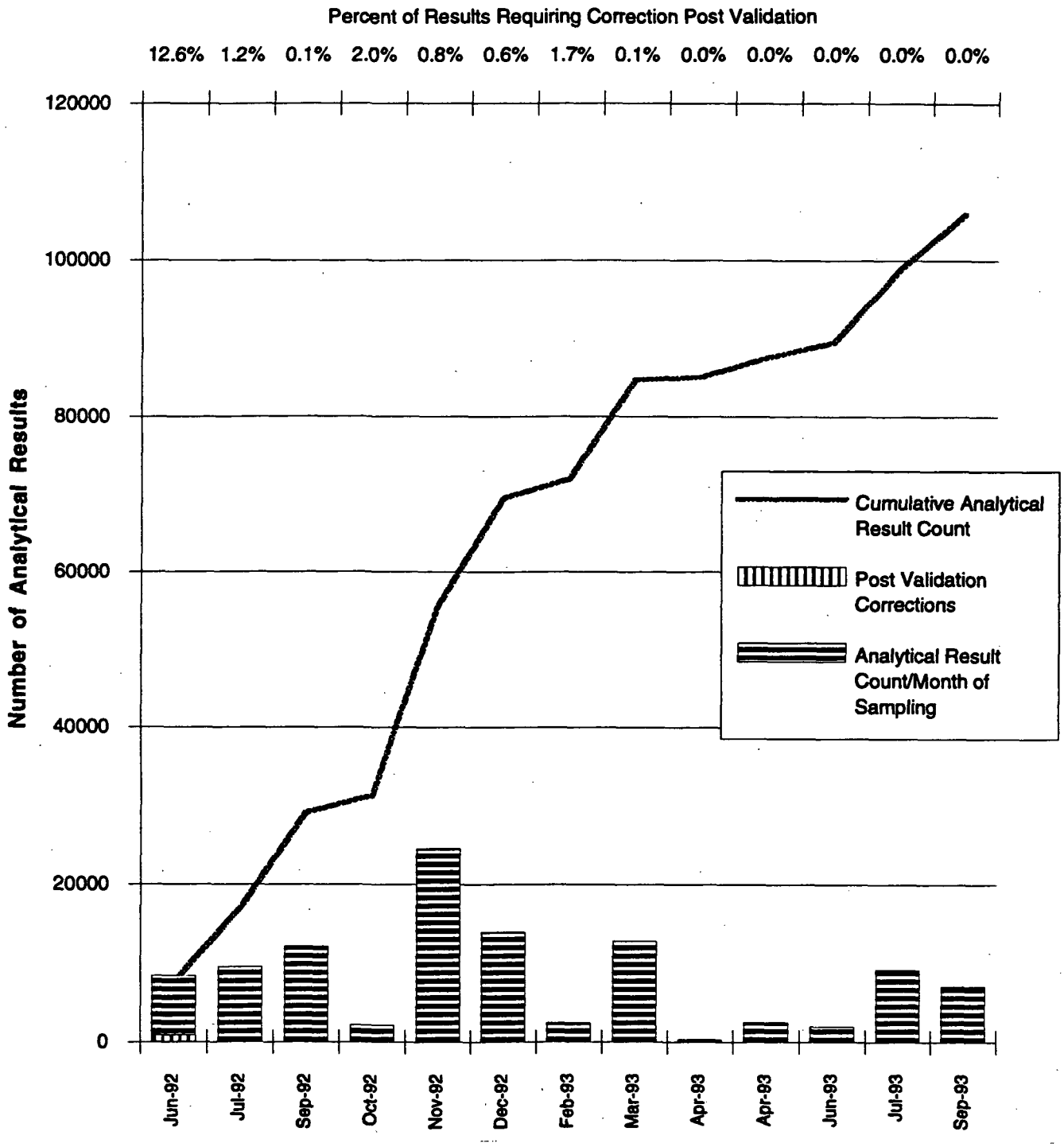
J - Estimated value.

R - Rejected value.

Figures for Section 4.1

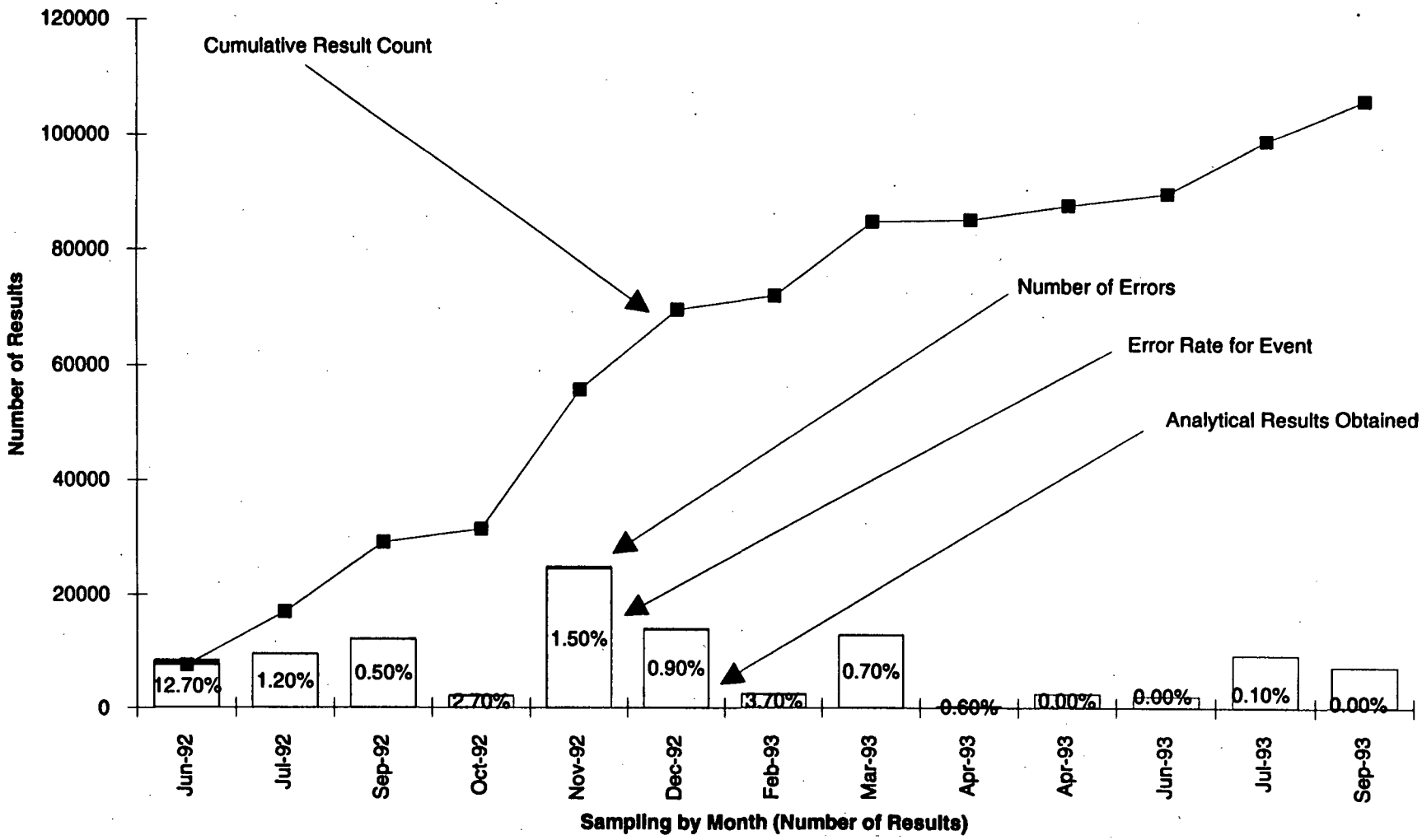


BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO		
EASTERN MICHAUD FLATS POCATELLO, IDAHO		
Cumulative "Other" Changes		
JOB No.	DRAWING NO.	REV.
21372	FIGURE 4.1-1	



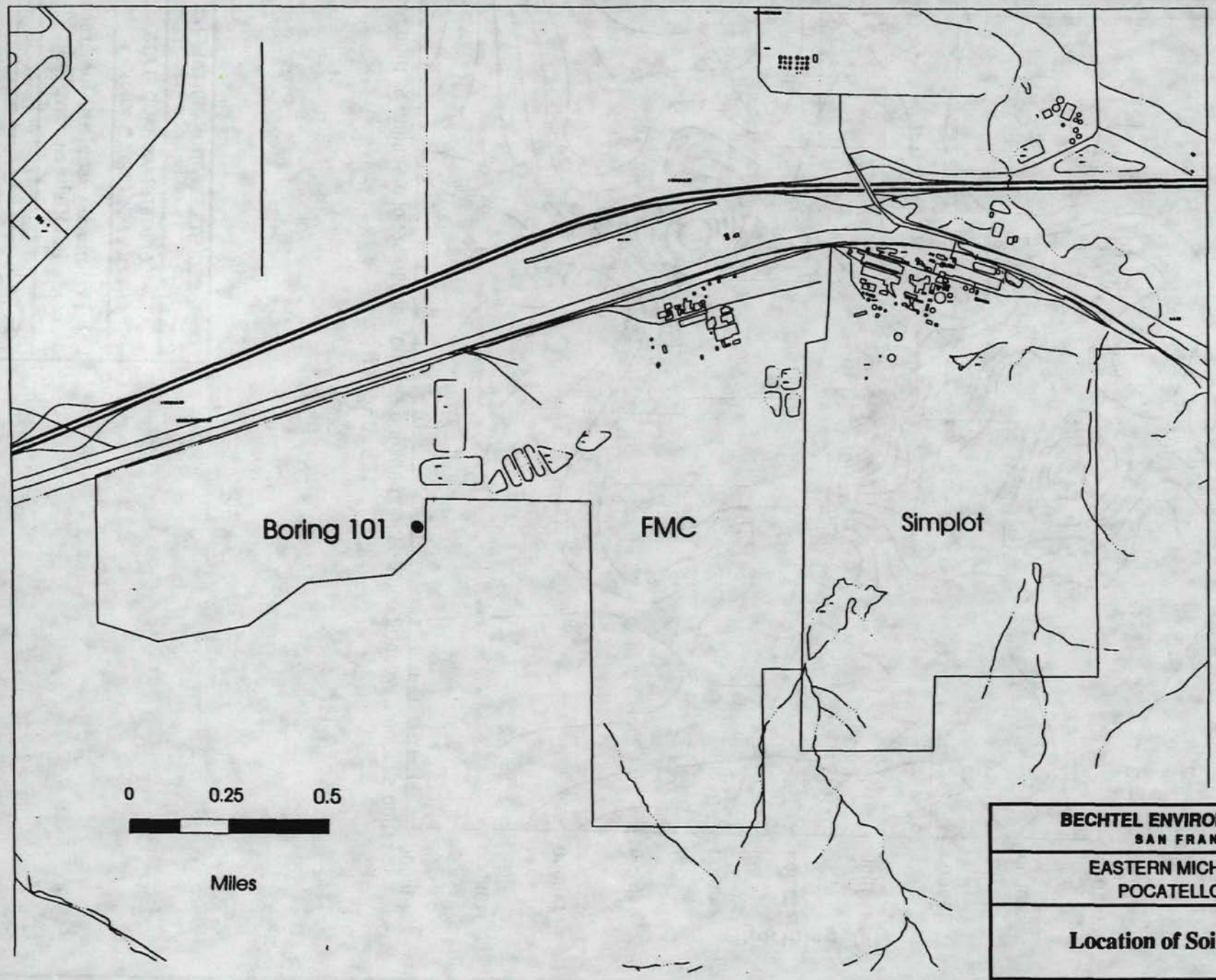
BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Post-Validation Corrections of Analytical Results and Qualifiers versus Time of Sample Collection			
BECHTEL	JOB No.	DRAWING NO.	REV.
	21372	FIGURE 4.1-2	

93-1477b. 277 fp
12-9-93 lw/ rs:1



BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO		
EASTERN MICHAUD FLATS POCATELLO, IDAHO		
Cumulative Post-Validation Corrections and Error Rates for Data Validation Qualifiers and Analytical Results		
JOB No.	DRAWING NO.	REV.
21372	FIGURE 4.1-3	

Figures for Section 4.2



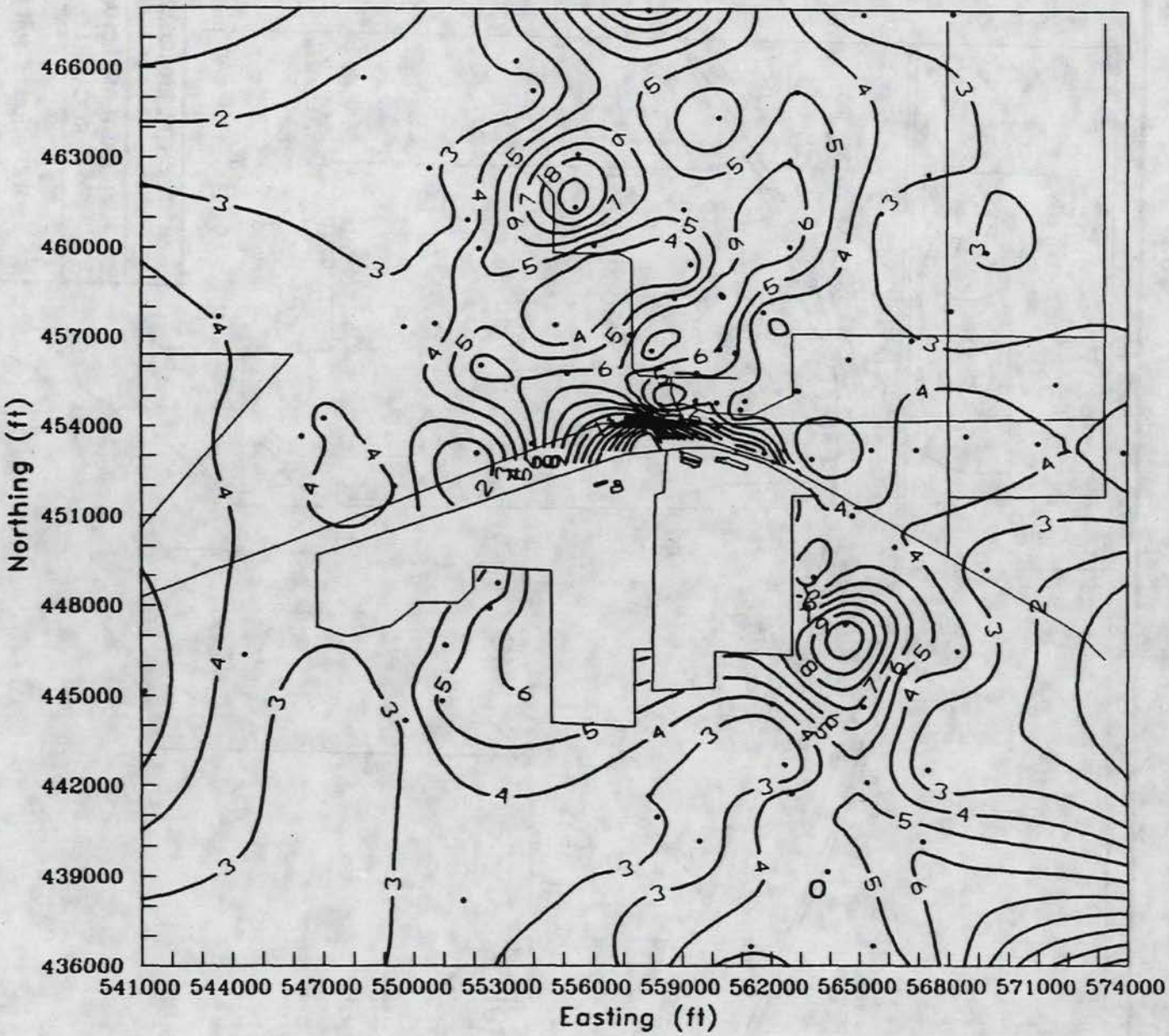
BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Location of Soil Boring 101

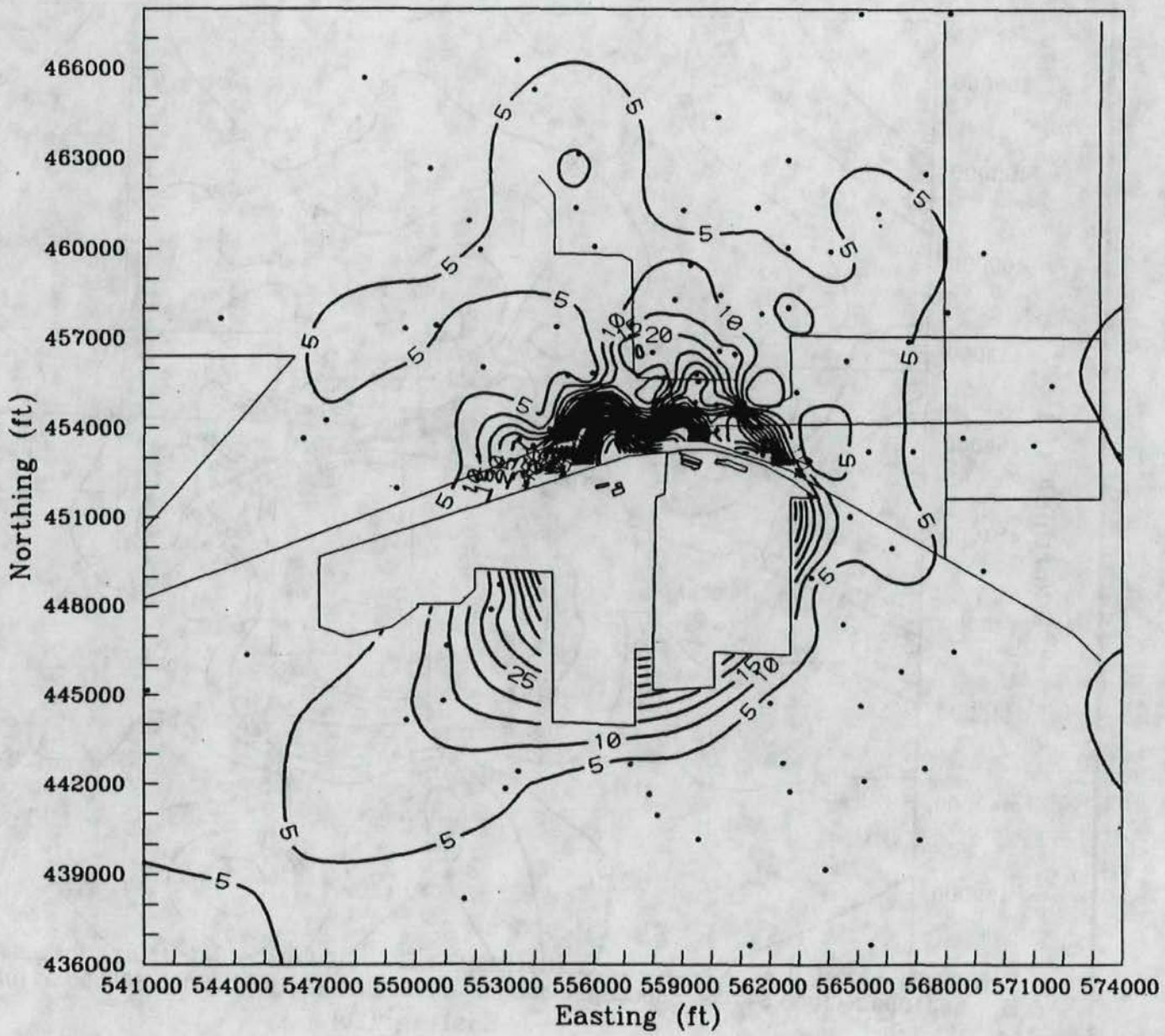
JOB No.	DRAWING NO.	REV.
21372	FIGURE 4.2.1-1	

93-1477b.177
10-27-93 lw/ :0



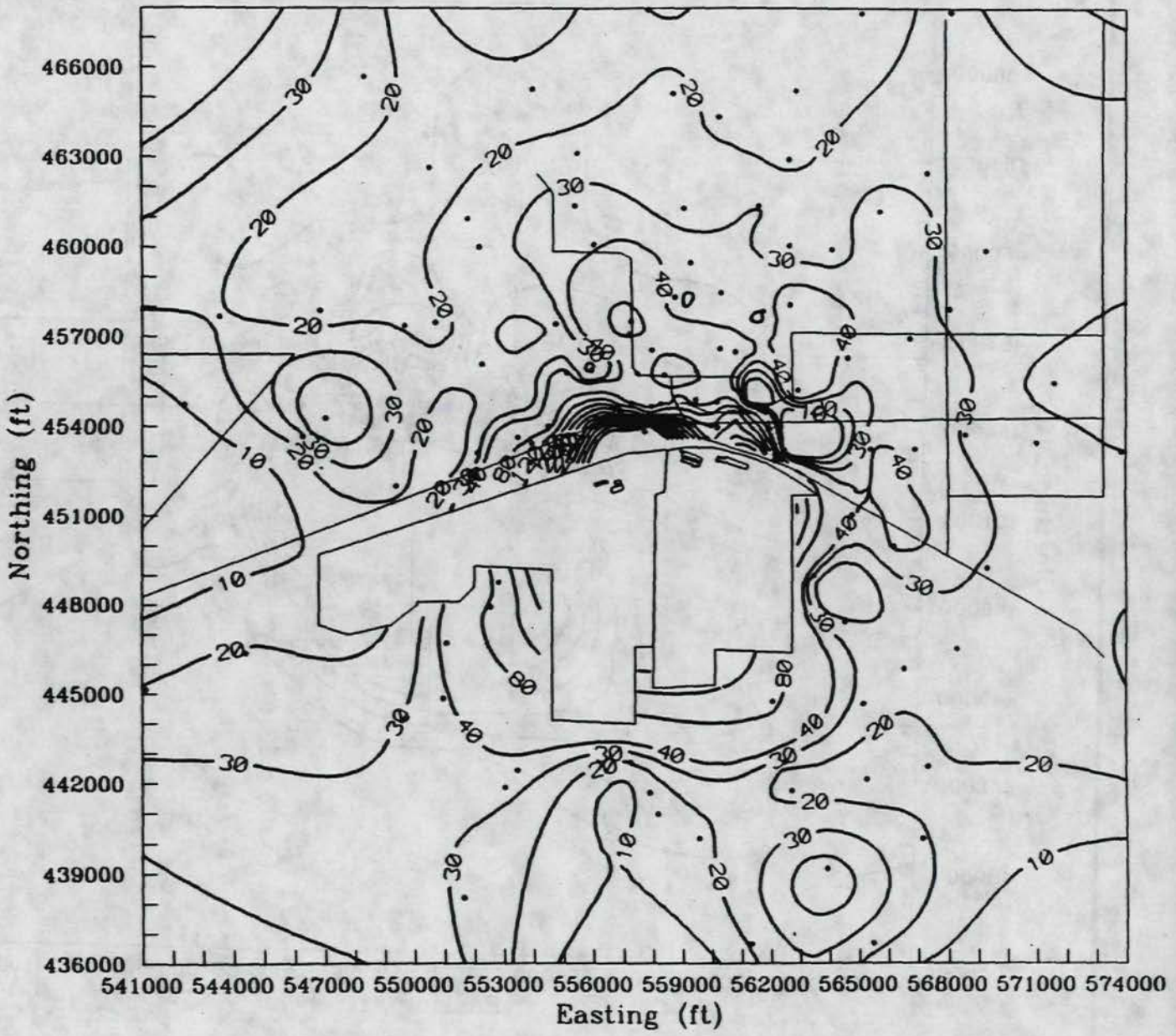
BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Preliminary Isopleths for Arsenic in Offsite Surface Soils			
BECHTEL	JOB No.	DRAWING NO.	REV.
	21372	FIGURE 4.2.1-2	

93-1477b.165
10-27-93 lw/:0



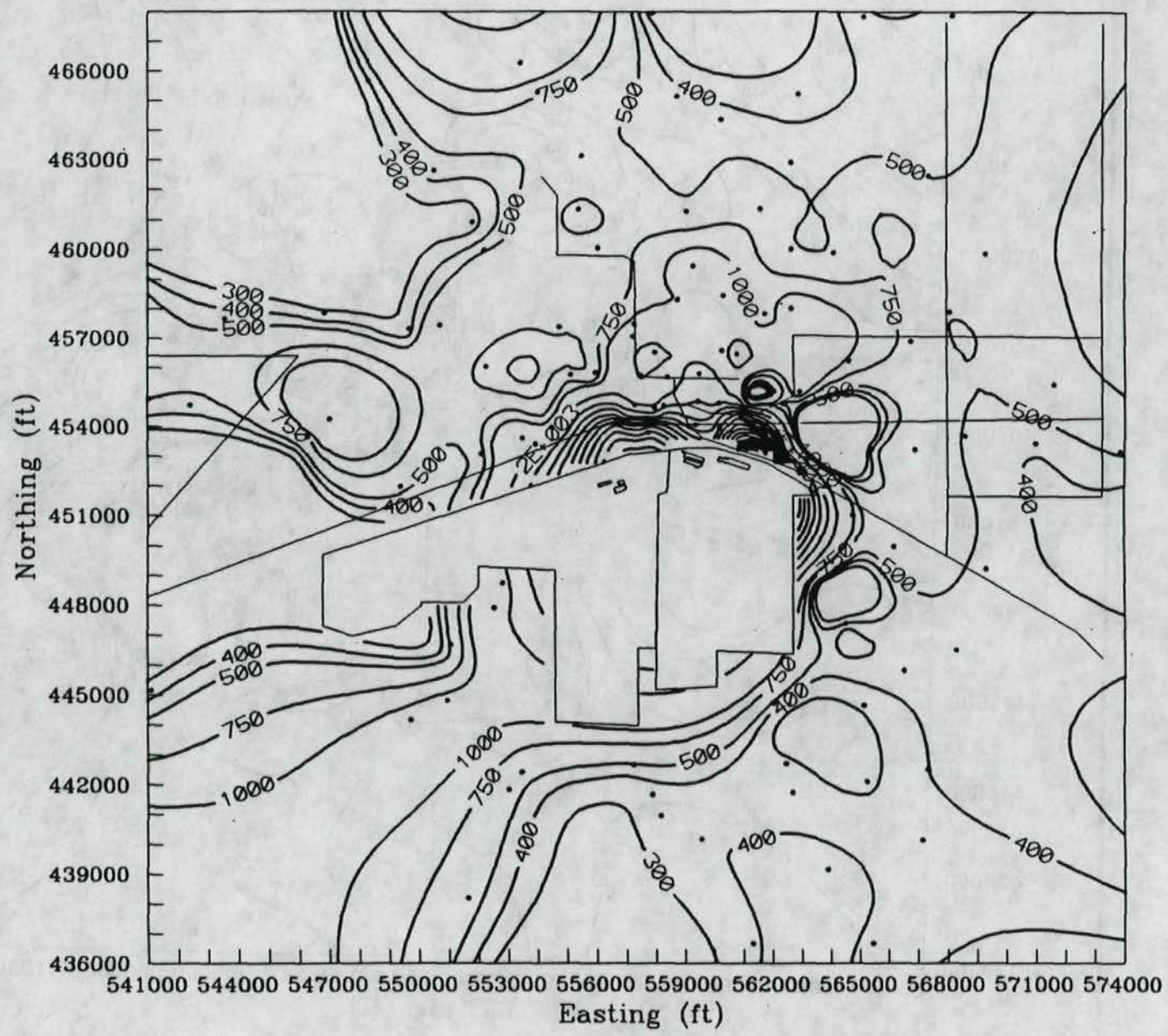
BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO		
EASTERN MICHAUD FLATS POCATELLO, IDAHO		
Preliminary Isopleths for Cadmium in Offsite Surface Soils		
JOB No.	DRAWING NO.	REV.
21372	FIGURE 4.2.1-3	

93-1477b. 168
11-1-93 lw/vk:1



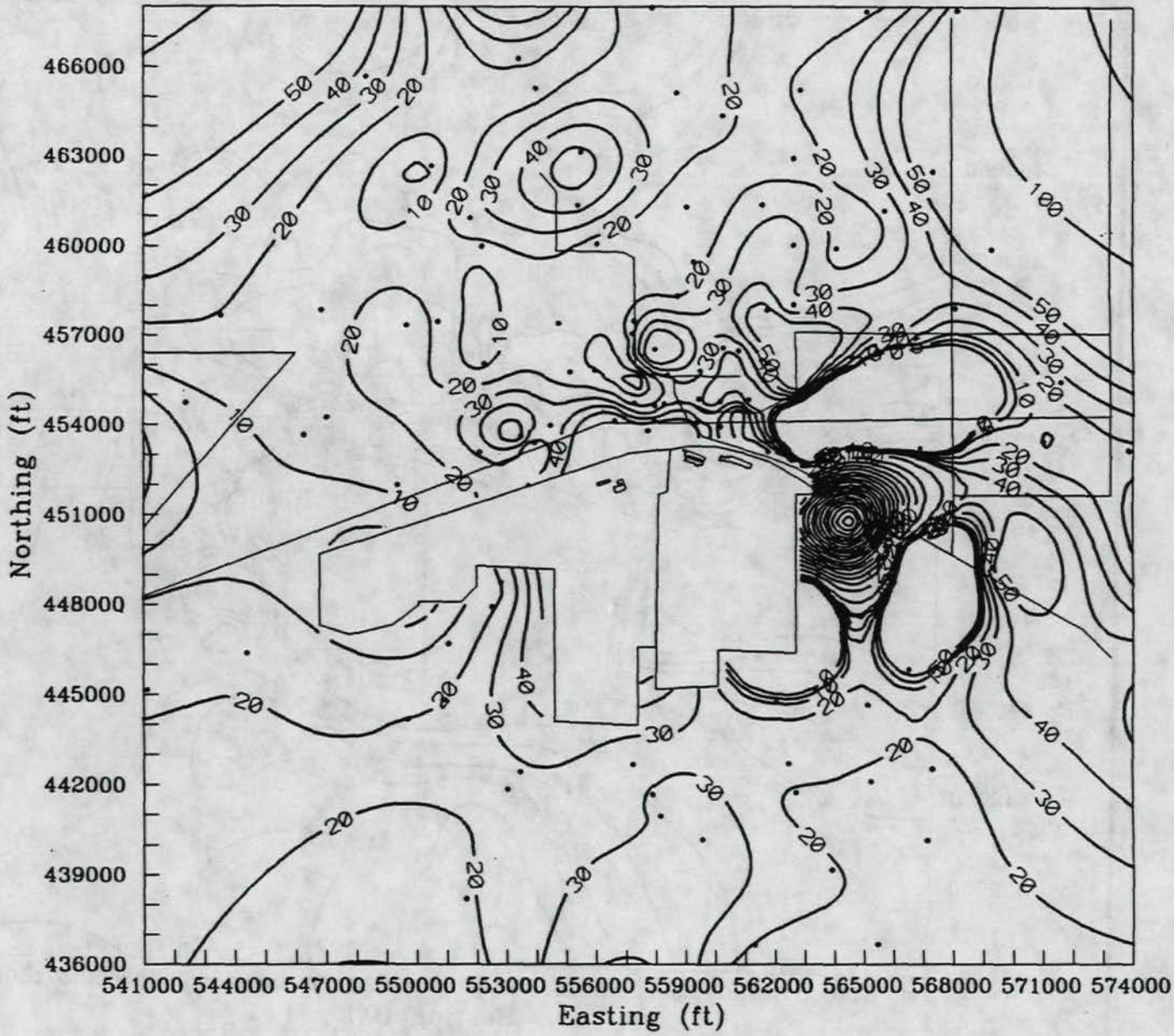
BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO		
EASTERN MICHAUD FLATS POCATELLO, IDAHO		
Preliminary Isopleths for Total Chromium in Offsite Surface Soils		
JOB No.	DRAWING NO.	REV.
21372	FIGURE 4.2.1-4	

93-1477b, 167
10-27-93 kw/:0



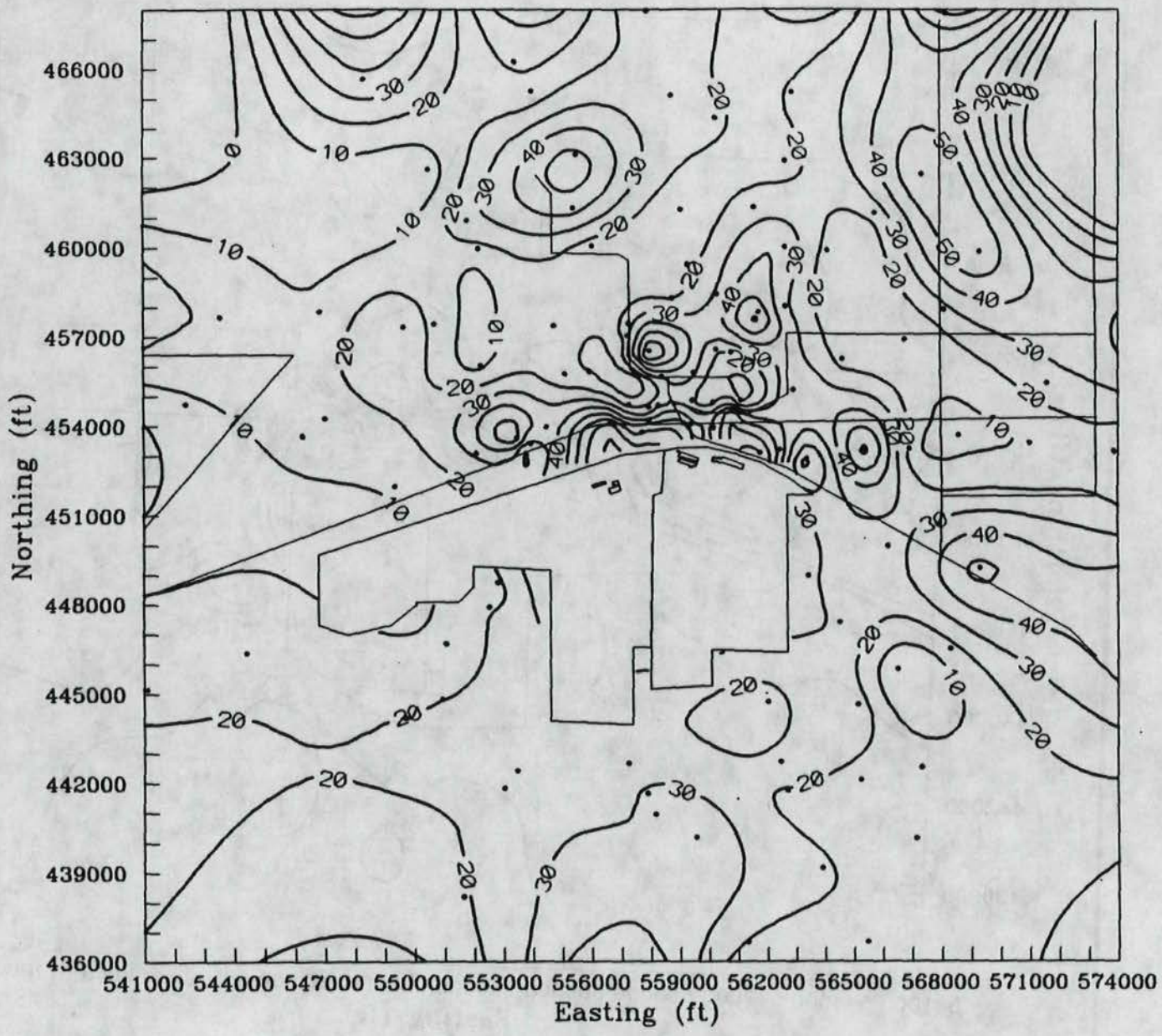
BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Preliminary Isopleths for Fluoride in Offsite Surface Soils			
BECHTEL	JOB No.	DRAWING NO.	REV.
	21372	FIGURE 4.2.1-5	

93-1477b.168
10-27-93 lw/ :0



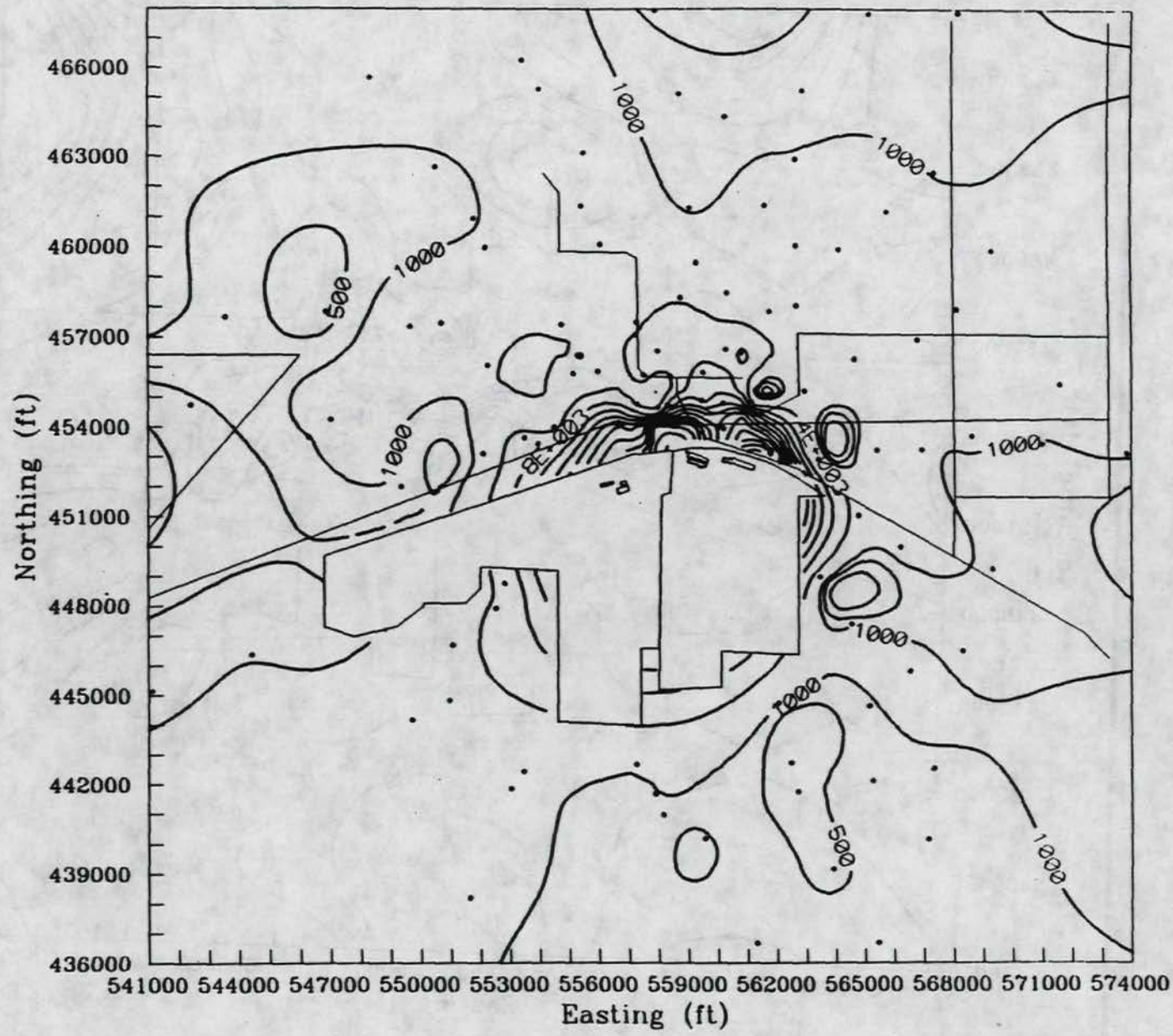
BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO		
EASTERN MICHAUD FLATS POCATELLO, IDAHO		
Preliminary Isopleths for Lead in Offsite Surface Soils		
JOB No.	DRAWING NO.	REV.
21372	FIGURE 4.2.1-6	

93-1477b, 170
10-27-93 lw/ :0



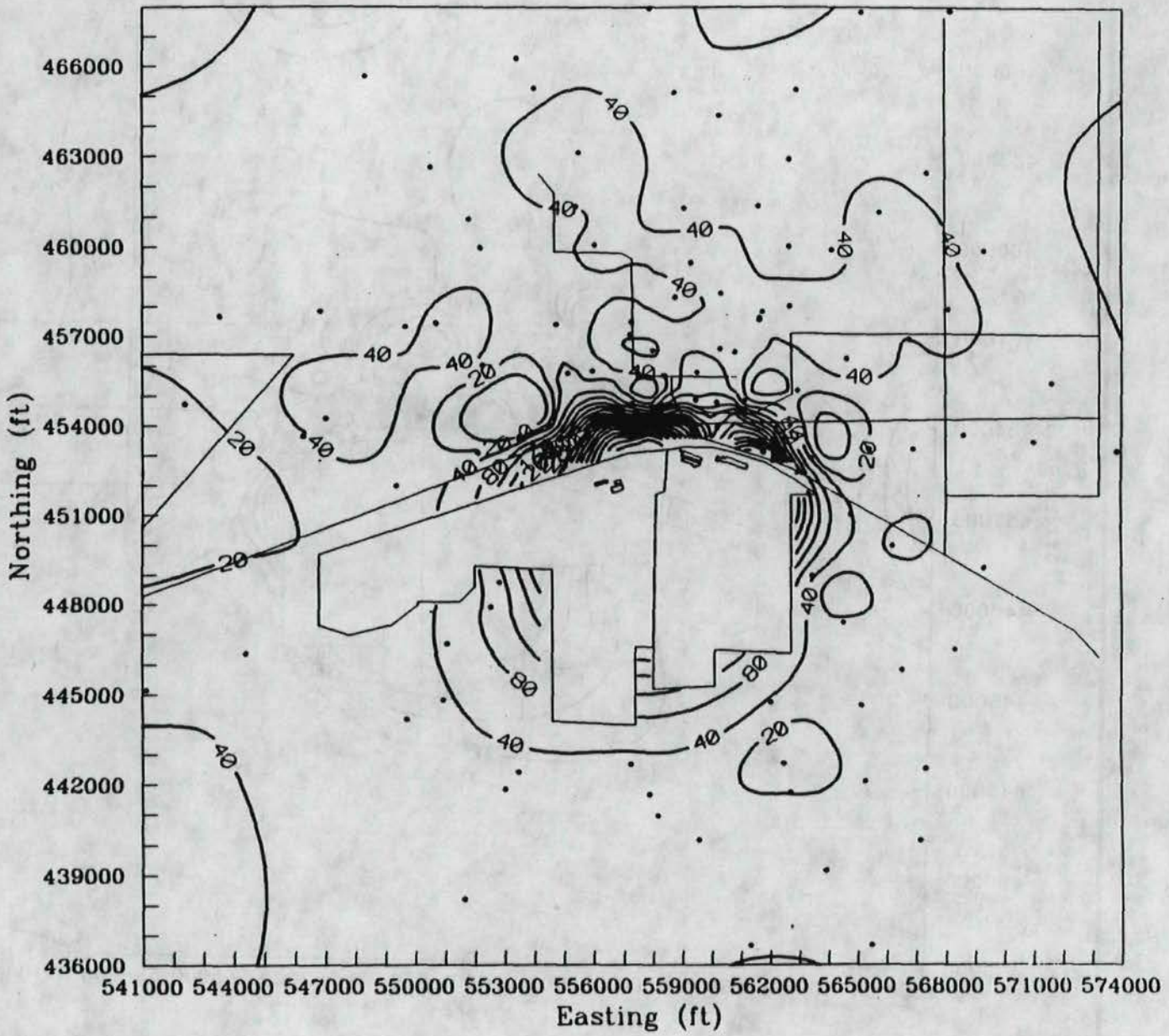
BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Preliminary Isopleths for Lead in Offsite Surface Soils with Highest Single Concentration Removed			
BECHTEL	JOB No.	DRAWING NO.	REV.
	21372	FIGURE 4.2.1-7	

93-1477b. 174
10-27-93 lw/ :0



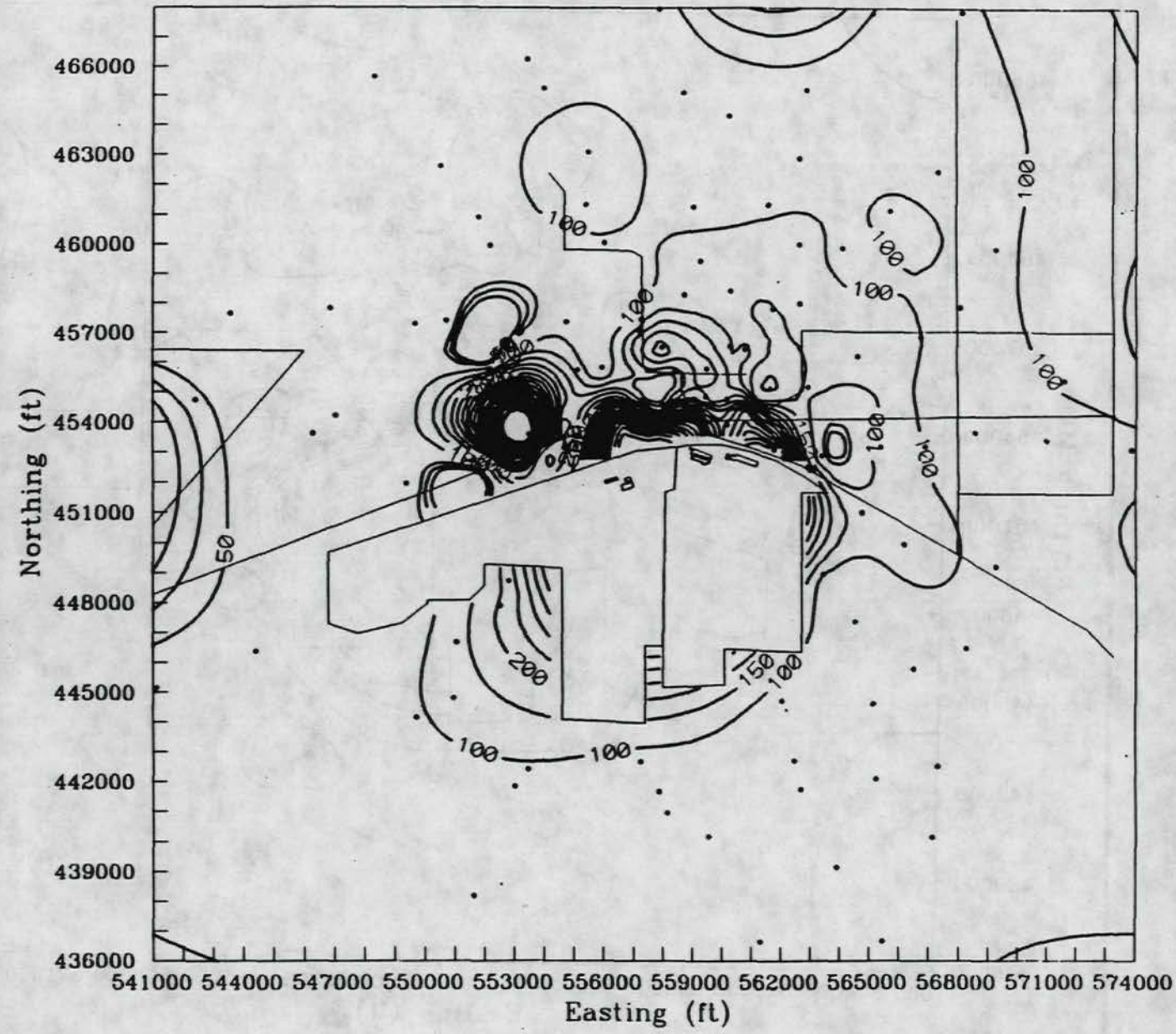
BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Preliminary Isopleths for Total Phosphorus in Offsite Surface Soils			
BECHTEL	JOB No.	DRAWING NO.	REV.
	21372	FIGURE 4.2.1-8	

93-1477b, 171
10-27-93 lw/ :0



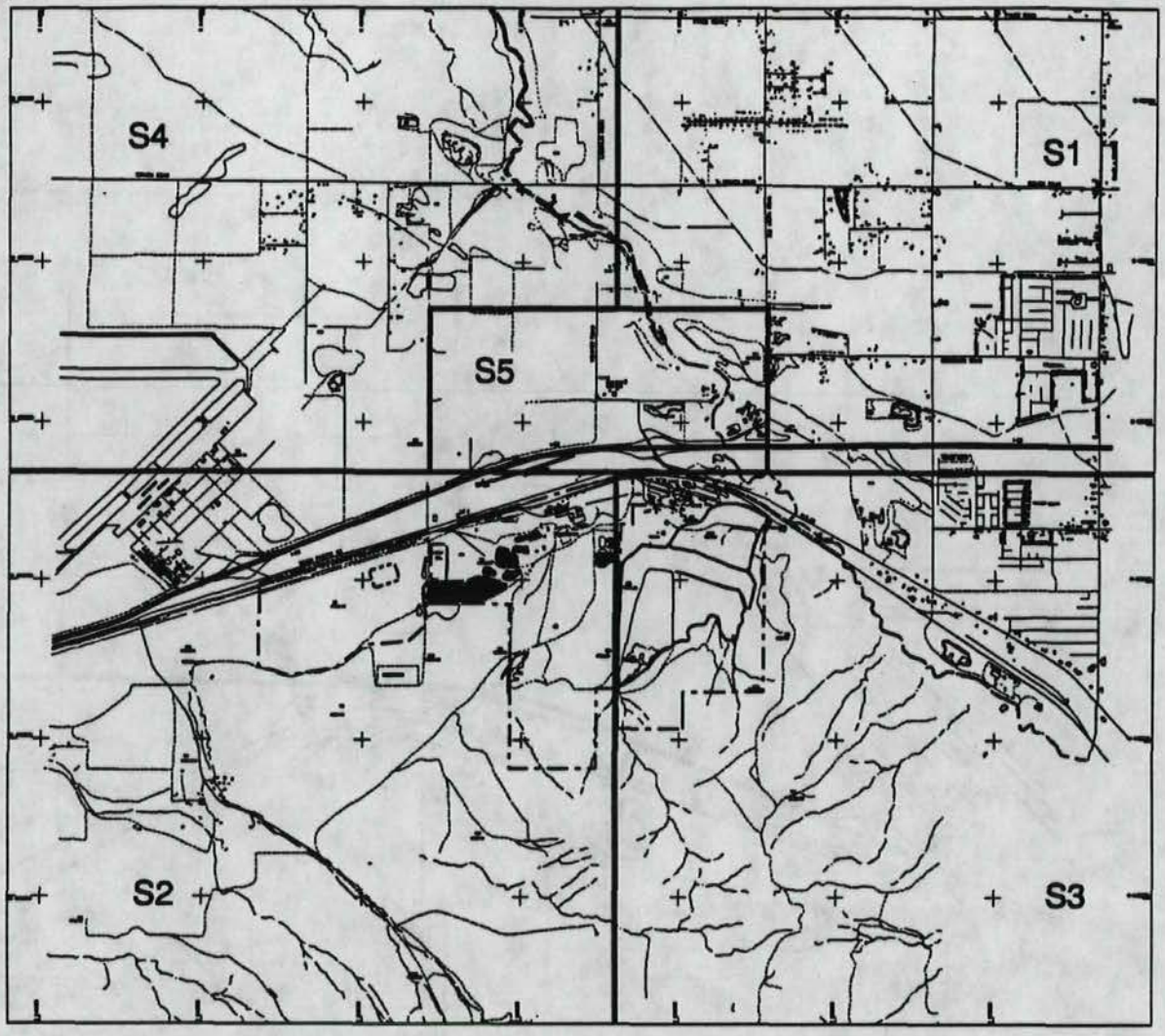
BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Preliminary Isopleths for Vanadium in Offsite Surface Soils			
BECHTEL	JOB No.	DRAWING NO.	REV.
	21372	FIGURE 4.2.1-9	

93-1477b. 172
11-2-93 lw/ vk:1



BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Preliminary Isopleths for Zinc in Offsite Surface Soils			
BECHTEL	JOB No.	DRAWING NO.	REV.
	21372	FIGURE 4.2.1-10	

93-1477b.173
10-27-93 lw/:0



0 6000 12000 FEET

0 12000 24000 36000 METERS

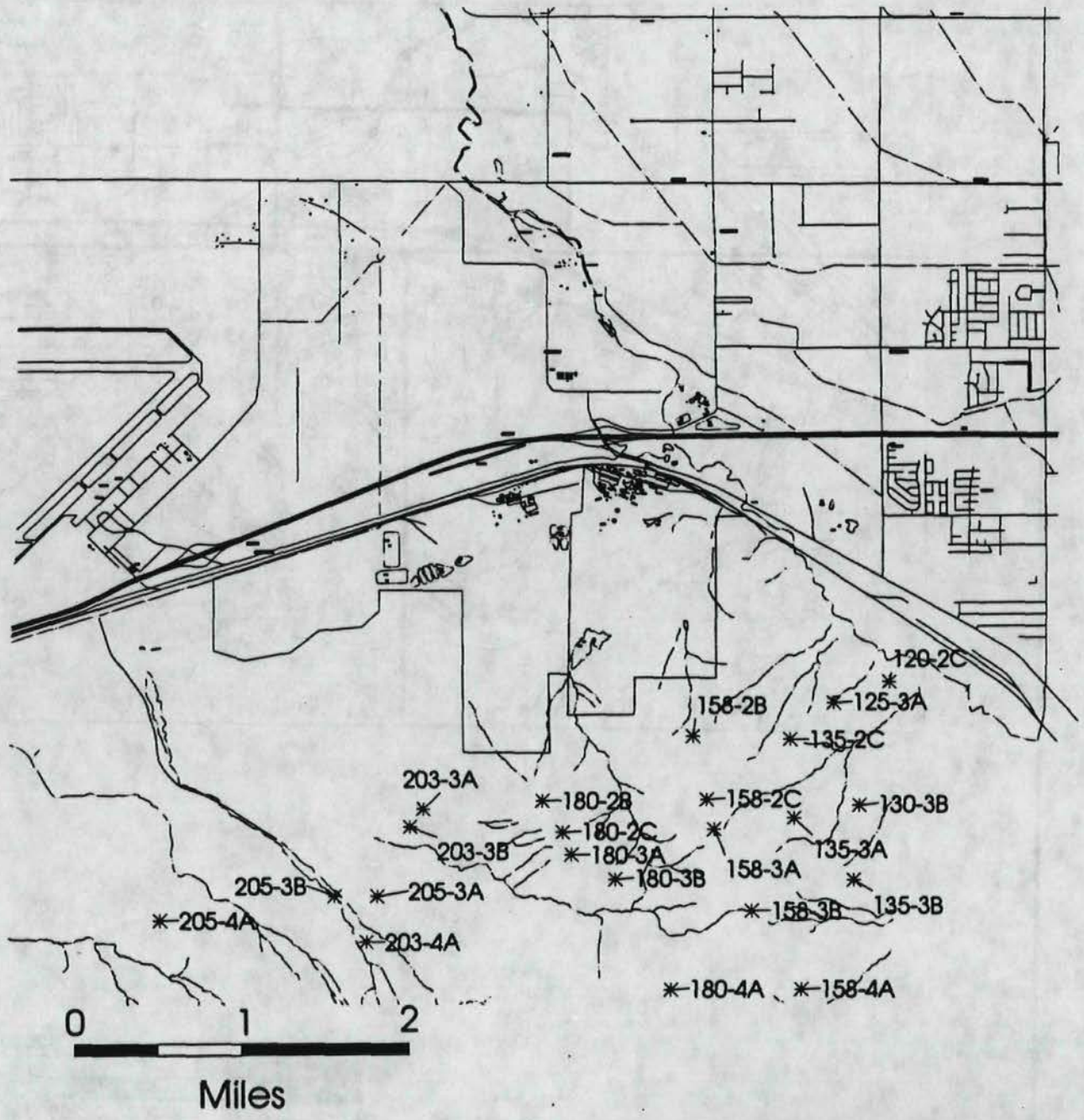
BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Map of Offsite Soil Sectors 1 through 5

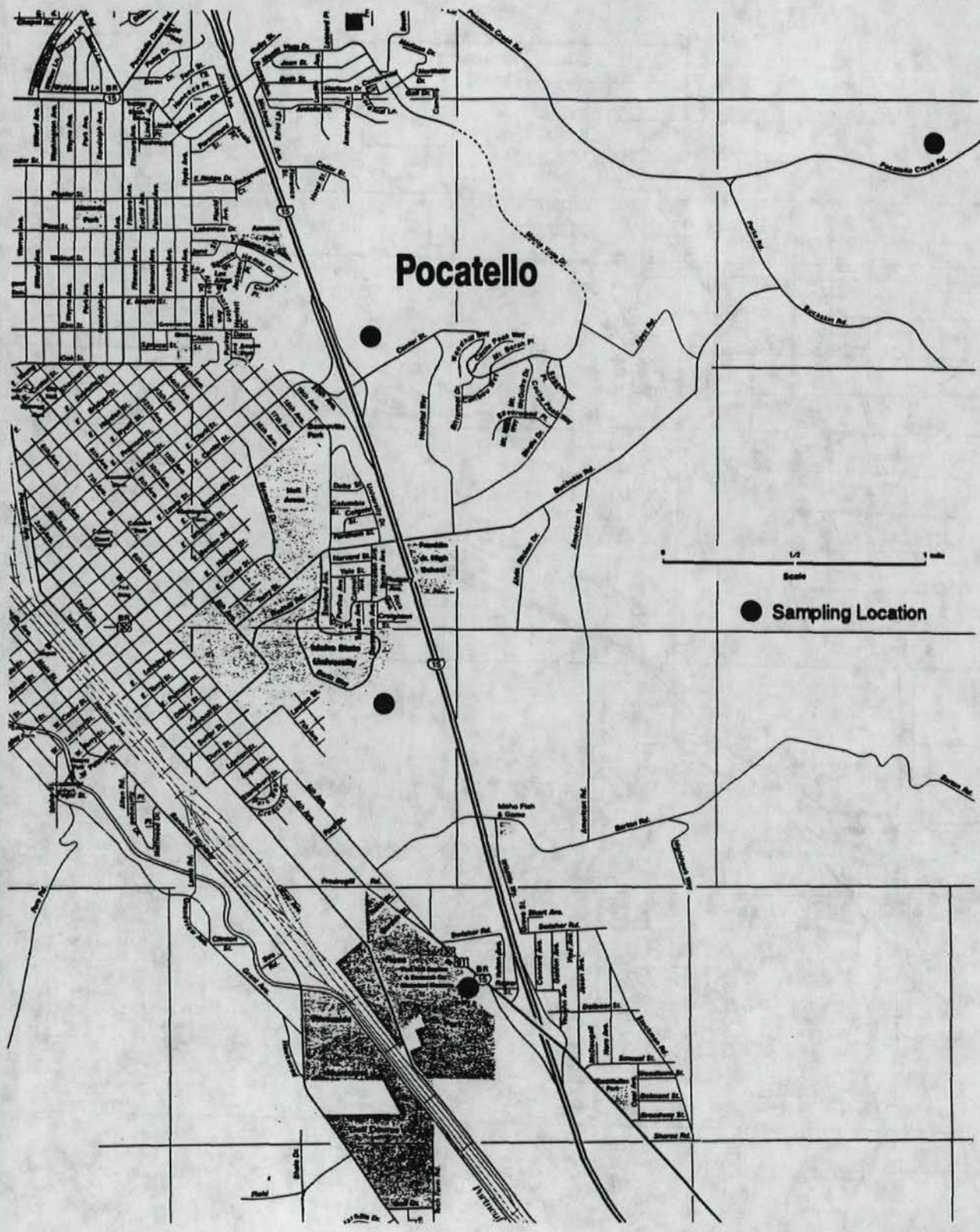
JOB No.	DRAWING NO.	REV.
21372	FIGURE 4.2.1-11	

93-1477b.175
10-27-93 lw/:0



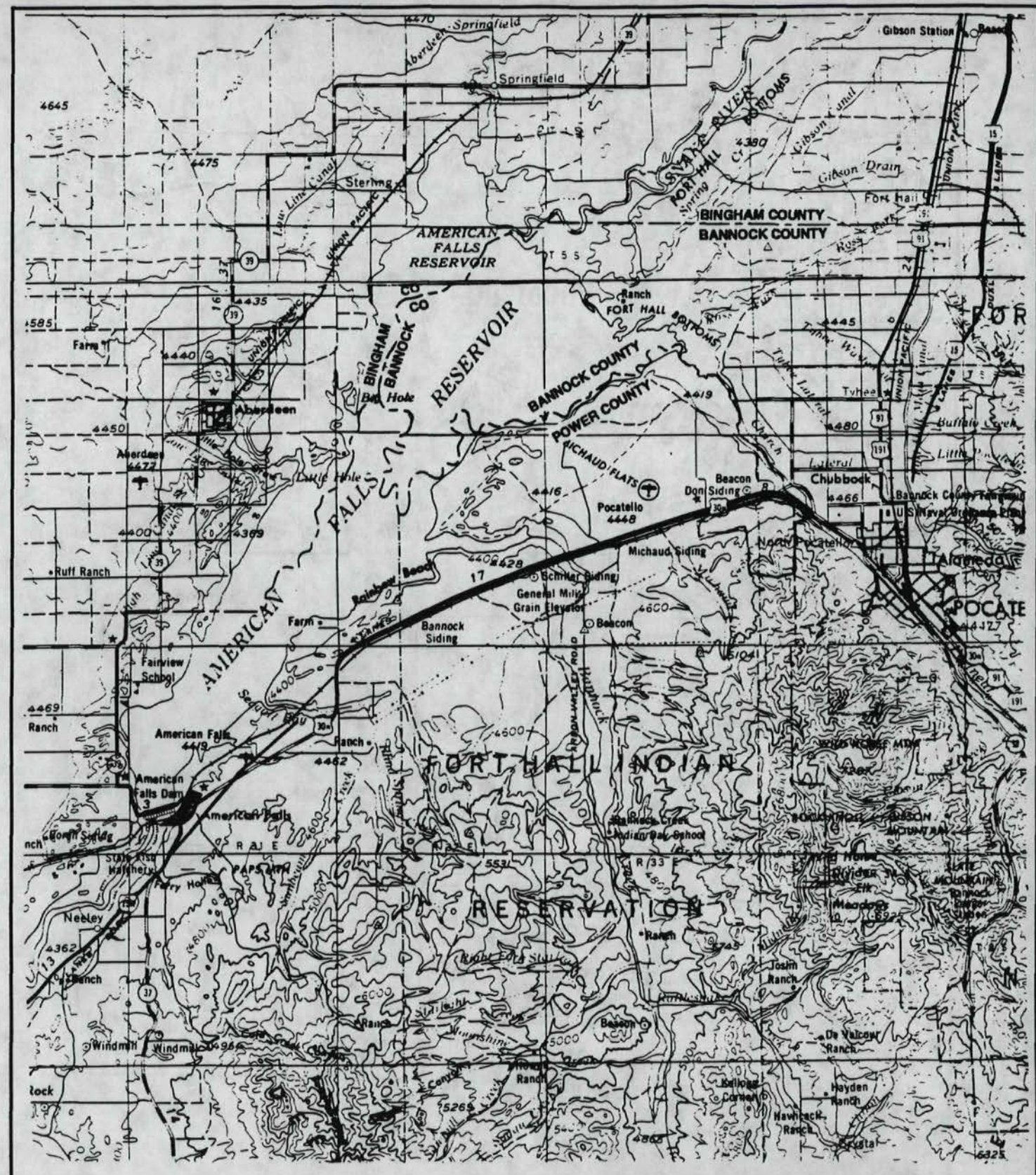
BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO		
EASTERN MICHAUD FLATS POCATELLO, IDAHO		
Representative Surface Soil Sampling Locations		
JOB No.	DRAWING NO.	REV.
21372	FIGURE 4.2.1-12	

93-1477b, 176
10-27-93 lw/ :0



BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO		
EASTERN MICHAUD FLATS POCATELLO, IDAHO		
Sampling Locations for Surface Soil Samples Collected in and around Pocatello		
BECHTEL	JOB No. 21372	DRAWING NO. FIGURE 4.2.1-13
		REV.

93-1477b. 178
10-27-93 lw/ :0

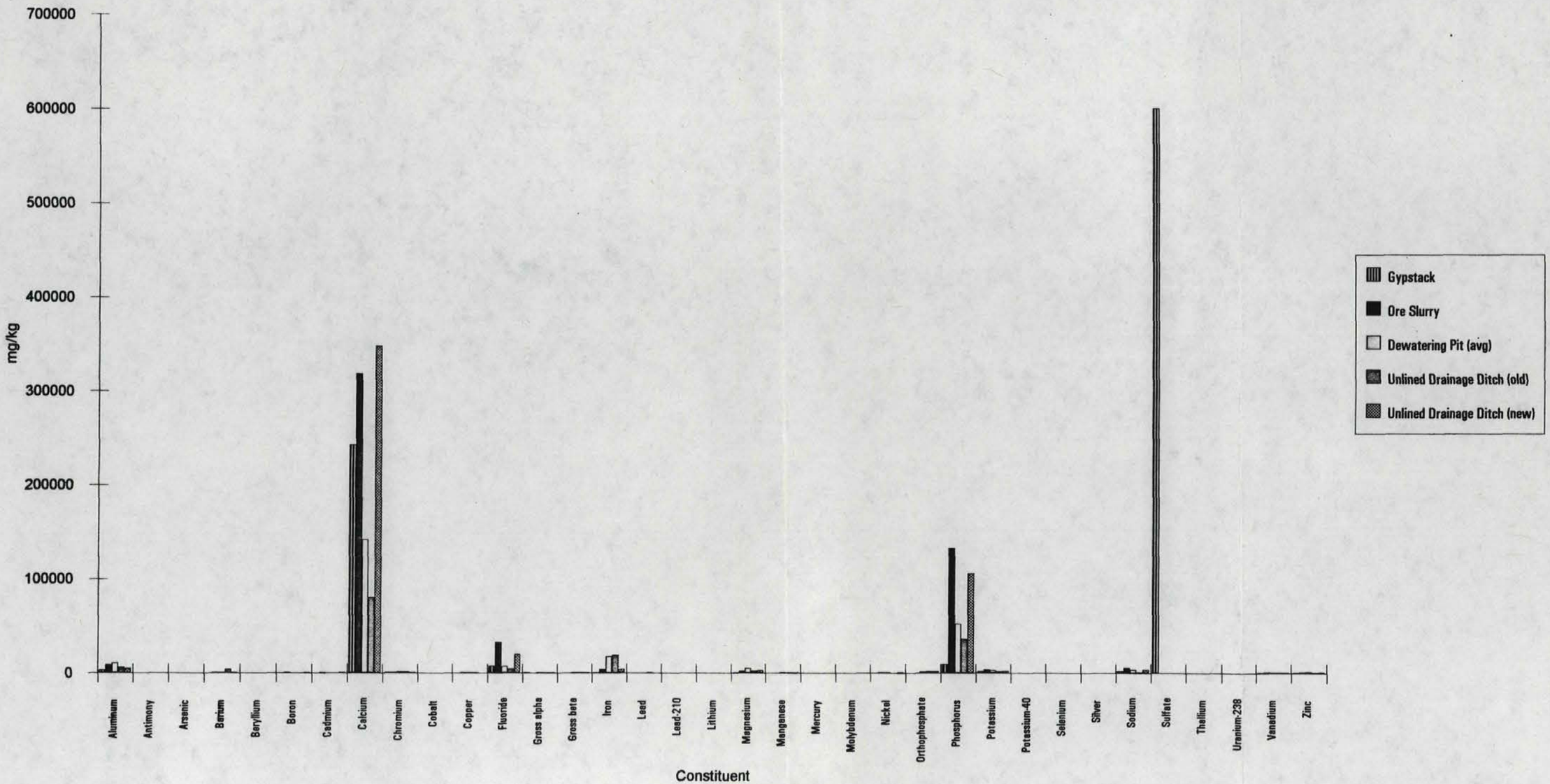


BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS POCATELLO, IDAHO

Map Showing Bannock, Bingham, and Power Counties

JOB No.	DRAWING NO.	REV.
21372	FIGURE 4.2.1-14	



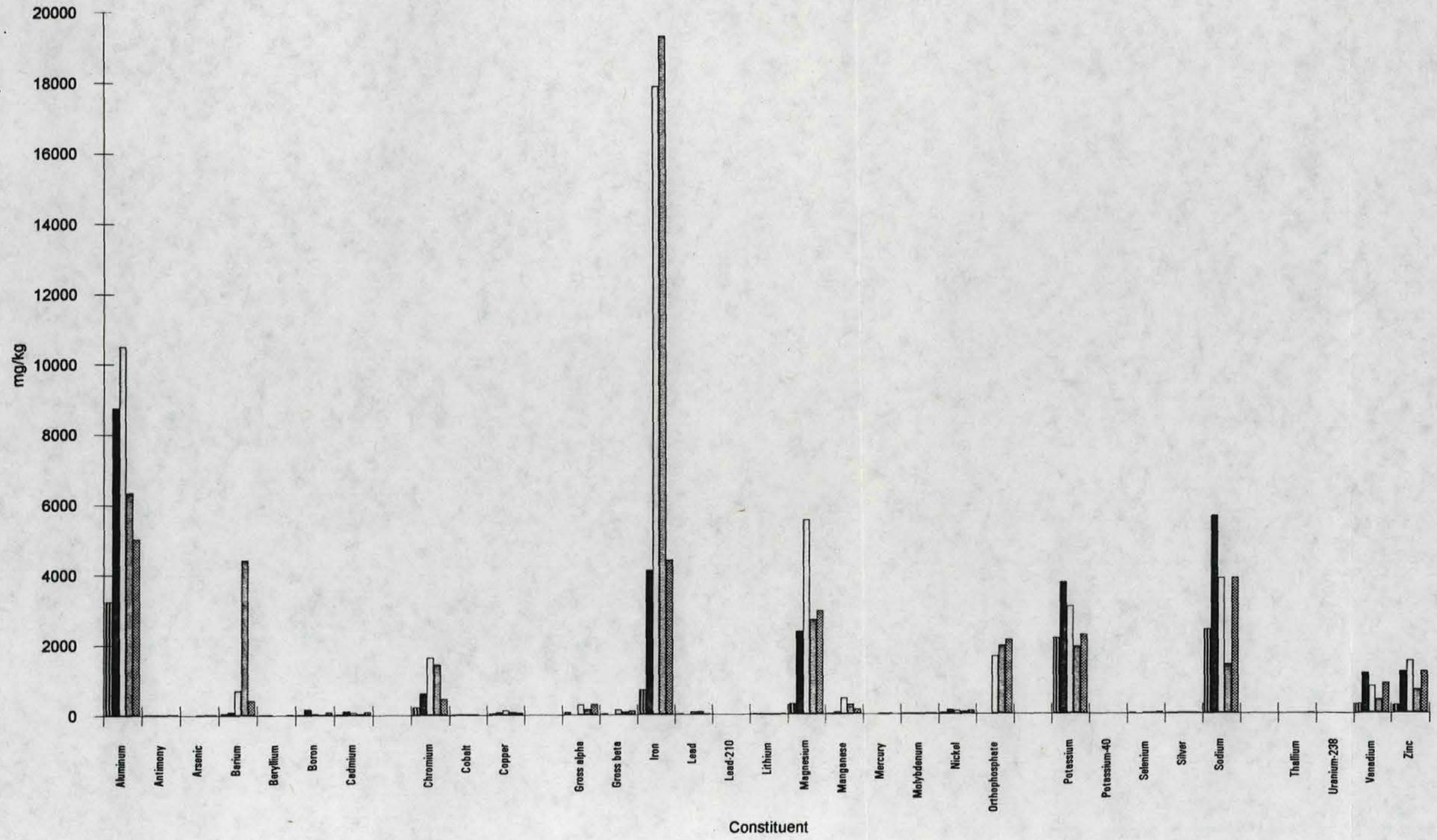
BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Characteristic Constituents of Simplot Potential Source Solids

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.2.2-1	

93-1477b.326
1-12-94 /vk: 1



BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Characteristic Constituents of Simplot Potential Source Solids without Sulfate, Fluoride, Total Phosphorus, or Calcium			
BECHTEL	JOB No. 21372	DRAWING No. FIGURE 4.2.2-3	REV.

93-14770.326
1-12-94 /KK: 1

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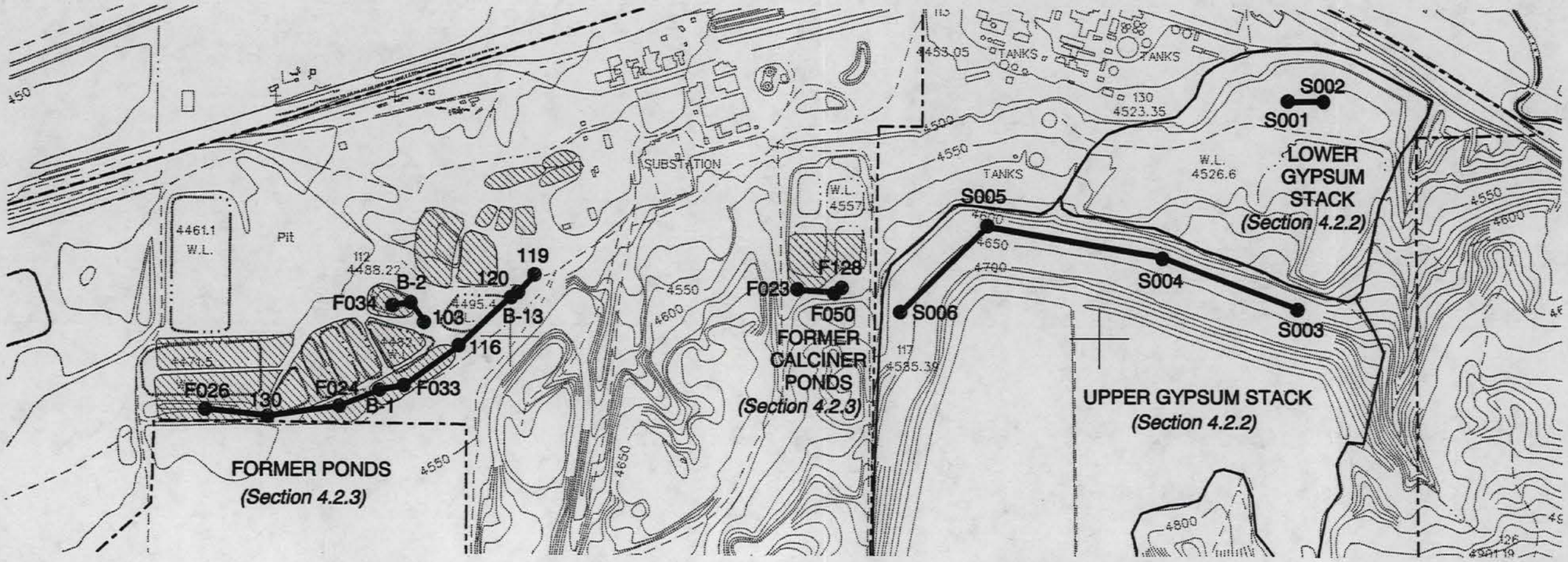
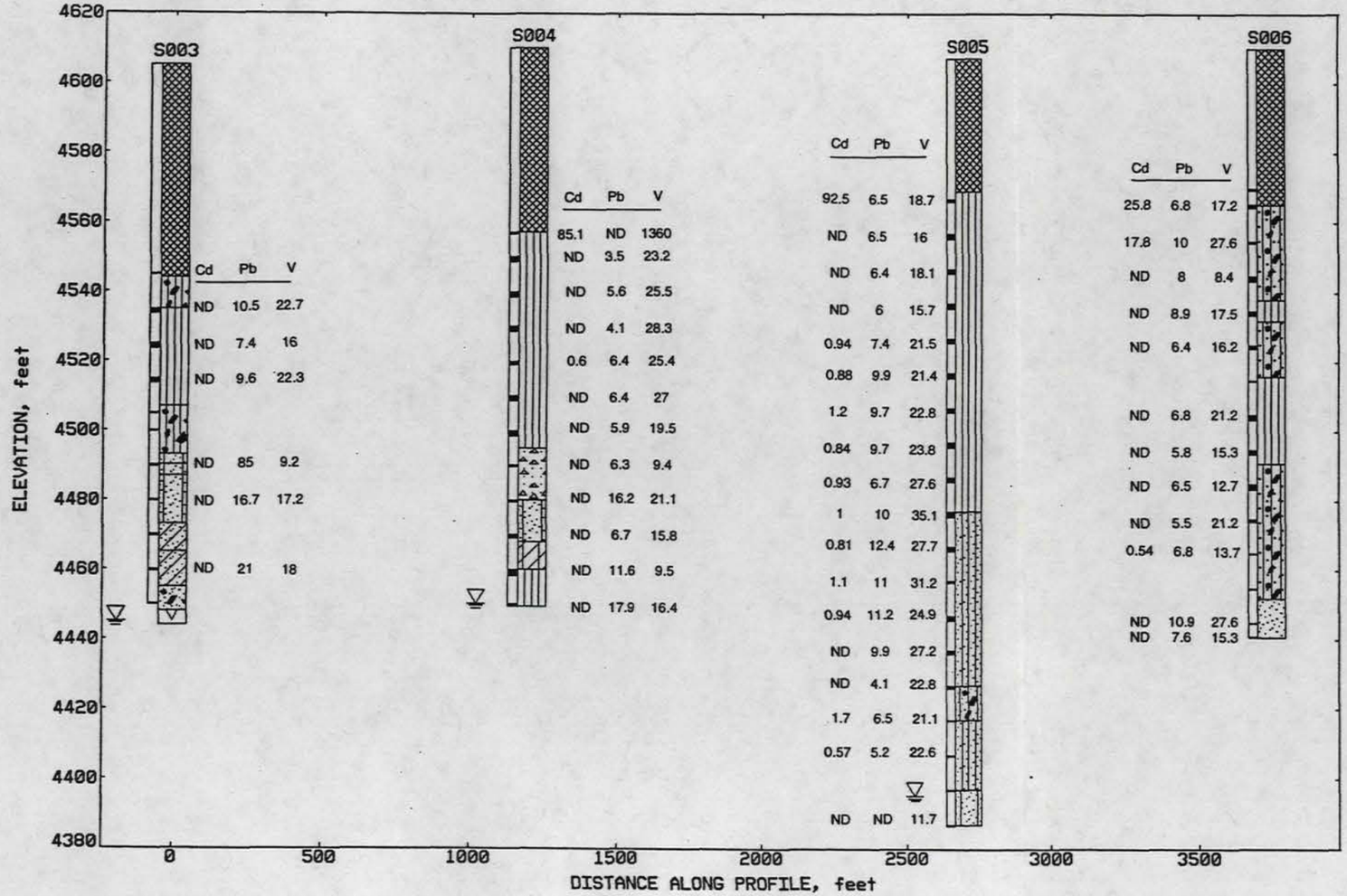


BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO		
EASTERN MICHAUD FLATS POCATELLO, IDAHO		
Cross-Section Lines - On Site Soils		
Job Number	Drawing No.	Rev.
21372	FIGURE 4.2.2-4	



EXPLANATION OF SOIL AND ROCK SYMBOLS

- INDUSTRIAL FILL OR OTHER ARTIFICIAL TOPSOIL
- GRAVEL ONLY
- SANDY GRAVEL
- SILTY GRAVEL
- CLAYEY GRAVEL
- GRAVEL, SAND & SILT IN ROUGHLY COMPARABLE PROPORTIONS
- GRAVELLY SAND
- SAND ONLY
- CEMENTED OR INDURATED SAND; SANDSTONE
- SILTY SAND
- CLAYEY SAND
- GRAVELLY SILT
- SANDY SILT
- SILT
- CLAYEY SILT
- GRAVELLY CLAY
- SANDY CLAY
- SILTY CLAY
- CLAY
- CALICHE AND CALCITE-CEMENTED ALLUVIAL DEPOSITS
- BASALT
- TUFF
- RHYOLITE

Cd = Cadmium

Pb = Lead

V = Vanadium

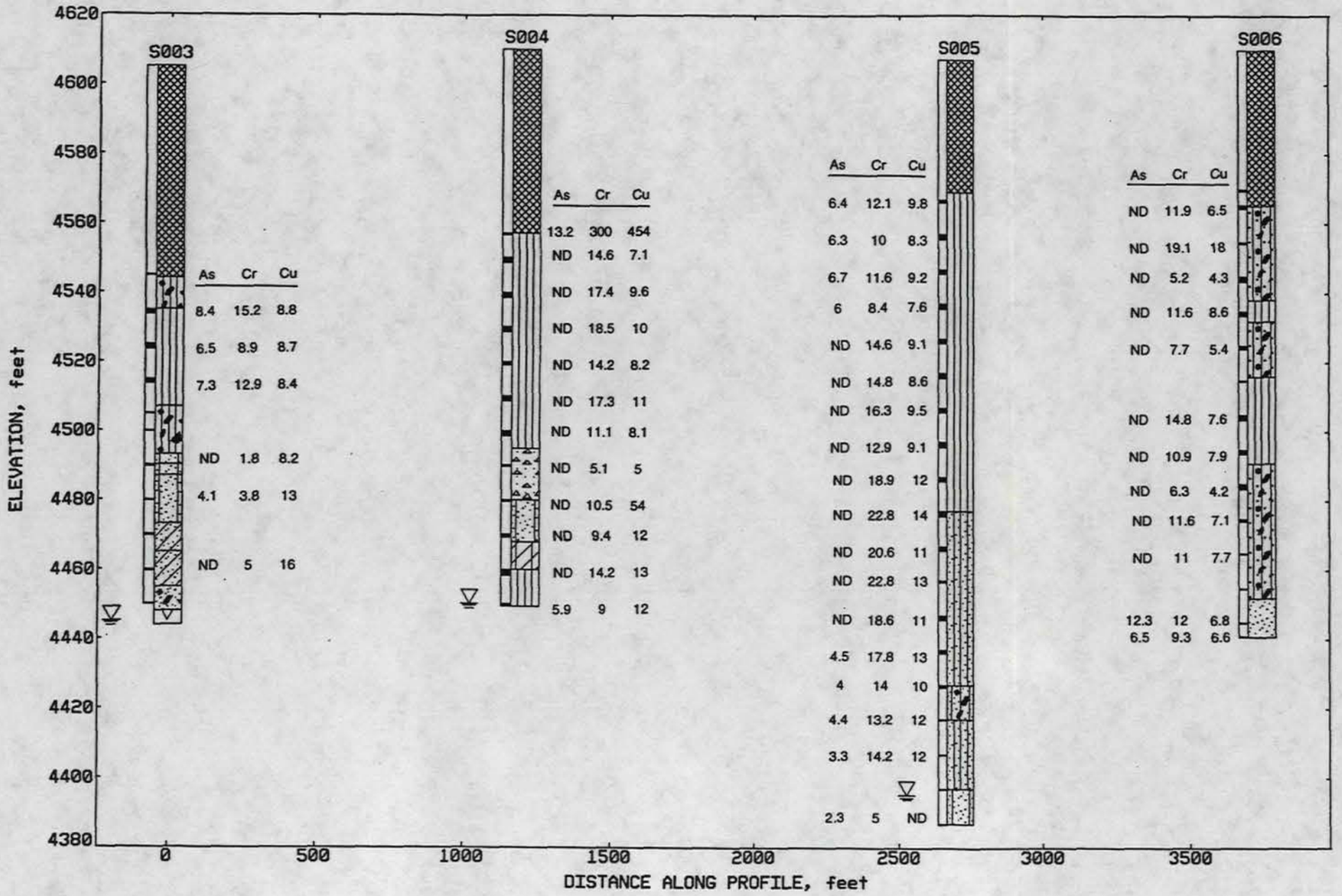
Cd	Pb	V	
25	86.8	17.2	(Concentrations in mg/kg)

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Cross Section of Upper Gypsum Stack, Cadmium, Lead, and Vanadium Profile

Job Number	Drawing No.	Rev.
21372	FIGURE 4.2.2-5	0



EXPLANATION OF SOIL AND ROCK SYMBOLS

- INDUSTRIAL FILL OR OTHER ARTIFICIAL TOPSOIL
- GRAVEL ONLY
- SANDY GRAVEL
- SILTY GRAVEL
- CLAYEY GRAVEL
- GRAVEL, SAND & SILT IN ROUGHLY COMPARABLE PROPORTIONS
- GRAVELLY SAND
- SAND ONLY
- CEMENTED OR INDURATED SAND; SANDSTONE
- SILTY SAND
- CLAYEY SAND
- GRAVELLY SILT
- SANDY SILT
- SILT
- CLAYEY SILT
- GRAVELLY CLAY
- SANDY CLAY
- SILTY CLAY
- CLAY
- CALICHE AND CALCITE-CEMENTED ALLUVIAL DEPOSITS
- BASALT
- TUFF
- RHYOLITE

As = Arsenic

Cr = Chromium

Cu = Copper

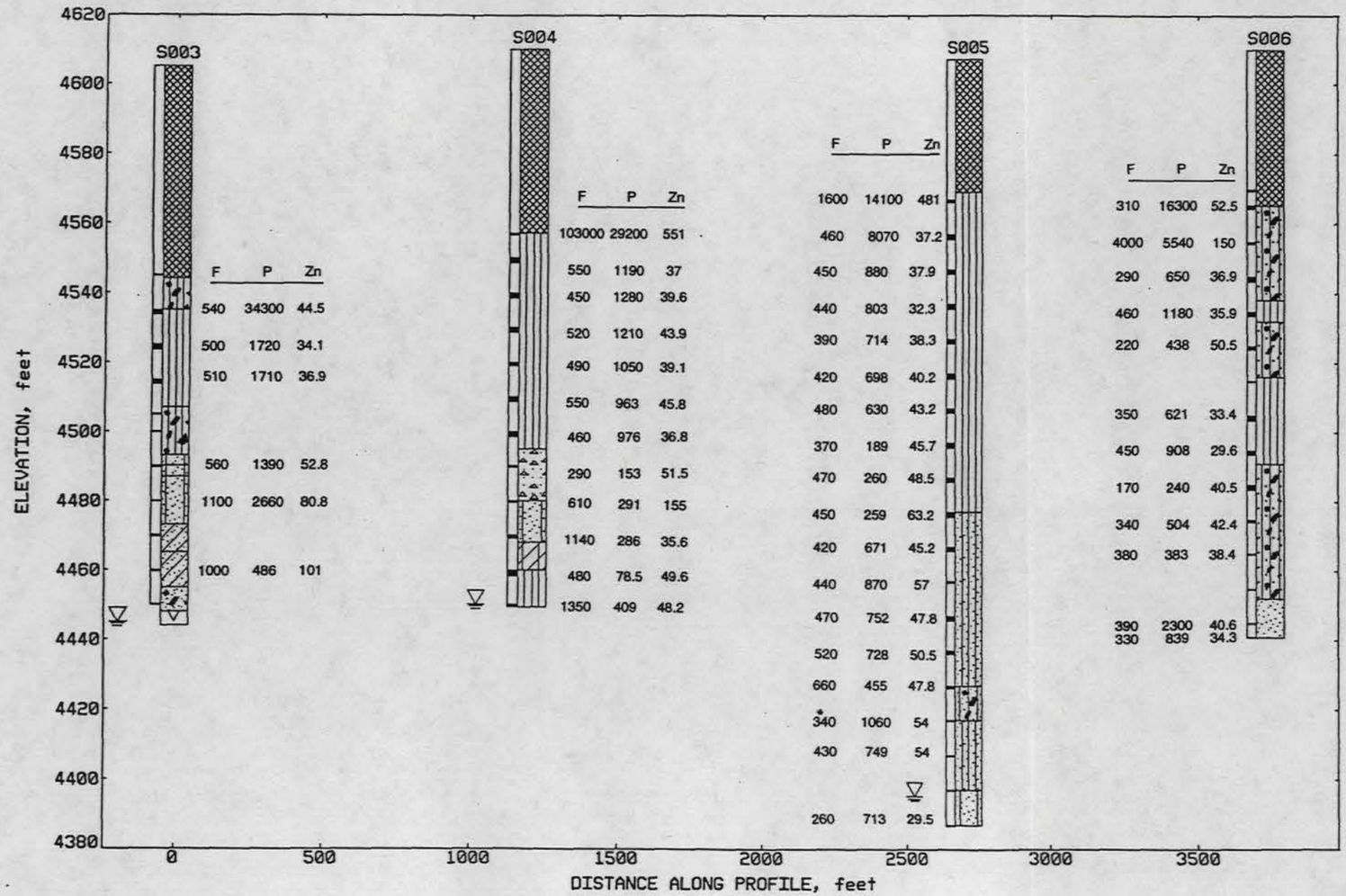
As	Cr	Cu	
6.4	12.1	9.8	(Concentrations in mg/kg)

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Cross Section of Upper Gypsum Stack, Arsenic, Chromium, and Copper Profile

Job Number	Drawing No.	Rev.
21372	FIGURE 4.2.2-6	0



EXPLANATION OF SOIL AND ROCK SYMBOLS

- INDUSTRIAL FILL OR OTHER ARTIFICIAL TOPSOIL
- GRAVEL ONLY
- SANDY GRAVEL
- SILTY GRAVEL
- CLAYEY GRAVEL
- GRAVEL, SAND & SILT IN ROUGHLY COMPARABLE PROPORTIONS
- GRAVELLY SAND
- SAND ONLY
- CEMENTED OR INDURATED SAND; SANDSTONE
- SILTY SAND
- CLAYEY SAND
- GRAVELLY SILT
- SANDY SILT
- SILT
- CLAYEY SILT
- GRAVELLY CLAY
- SANDY CLAY
- SILTY CLAY
- CLAY
- CALICHE AND CALCITE-CEMENTED ALLUVIAL DEPOSITS
- BASALT
- TUFF
- RHYOLITE

F = Fluoride

P = Phosphoruos

Zn = Zinc

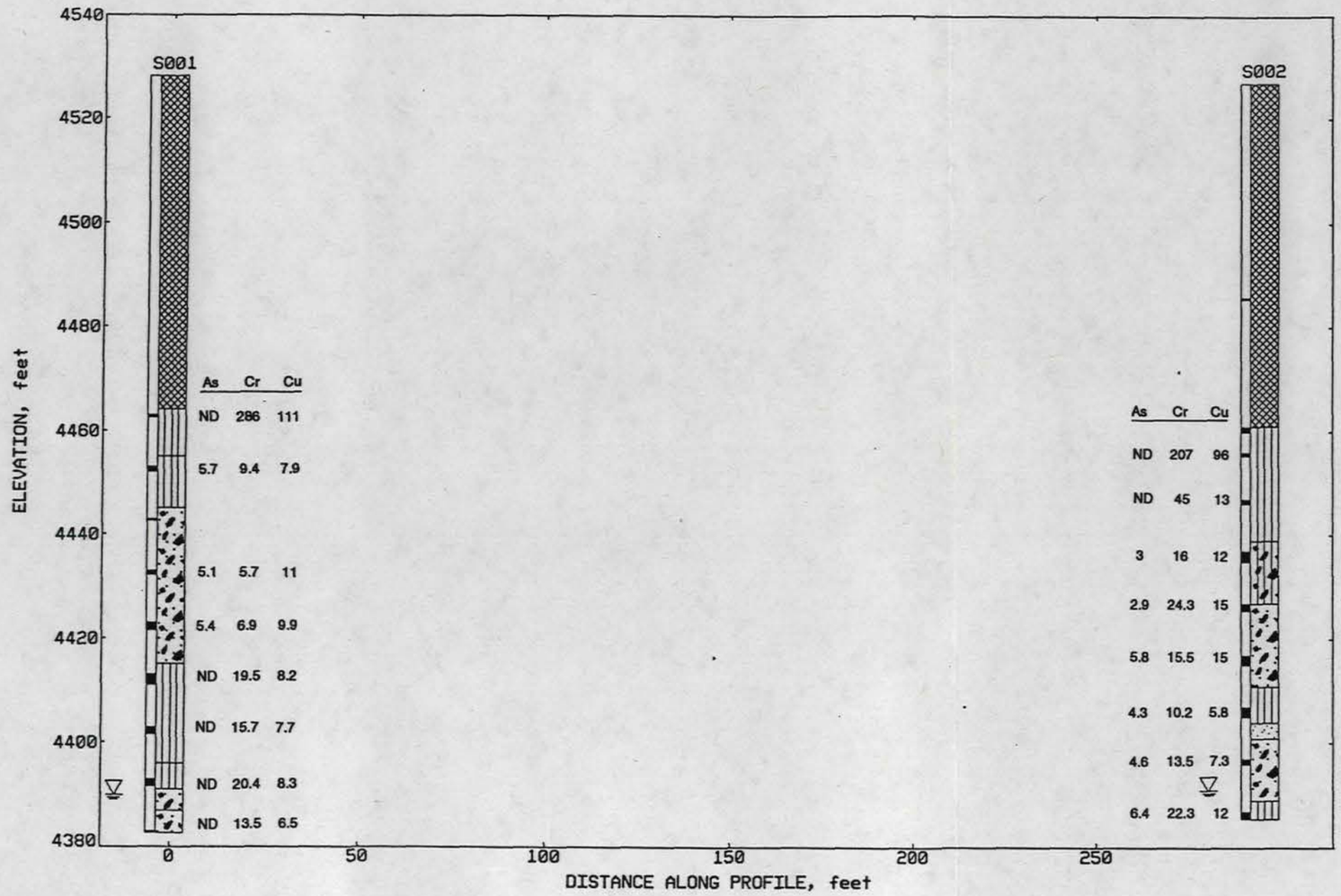
F	P	Zn	
480	78.5	49.6	(Concentrations in mg/kg)

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Cross Section of Upper Gypsum Stack, Fluoride, Total Phosphorus, and Zinc Profile

Job Number	Drawing No.	Rev.
21372	FIGURE 4.2.2-7	0



EXPLANATION OF SOIL AND ROCK SYMBOLS

- INDUSTRIAL FILL OR OTHER ARTIFICIAL TOPSOIL
- GRAVEL ONLY
- SANDY GRAVEL
- SILTY GRAVEL
- CLAYEY GRAVEL
- GRAVEL, SAND & SILT IN ROUGHLY COMPARABLE PROPORTIONS
- GRAVELLY SAND
- SAND ONLY
- CEMENTED OR INDURATED SAND; SANDSTONE
- SILTY SAND
- CLAYEY SAND
- GRAVELLY SILT
- SANDY SILT
- SILT
- CLAYEY SILT
- GRAVELLY CLAY
- SANDY CLAY
- SILTY CLAY
- CLAY
- CALICHE AND CALCITE-CEMENTED ALLUVIAL DEPOSITS
- BASALT
- TUFF
- RHYOLITE

As = Arsenic

Cr = Chromium

Cu = Copper

As	Cr	Cu	
3	16	12	(Concentrations in mg/kg)

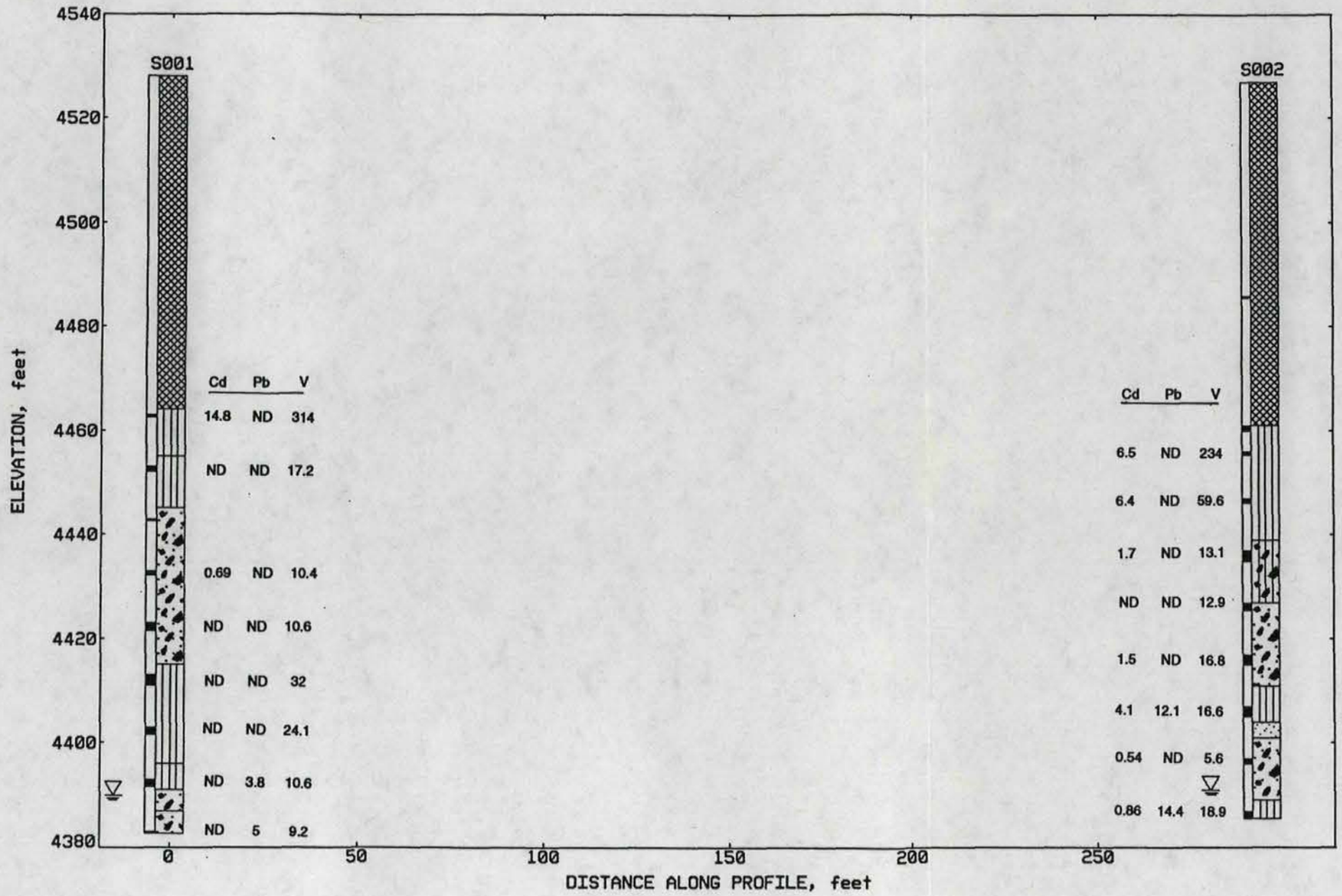
BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Cross Section of Lower Gypsum Stack, Arsenic, Chromium, and Copper Profile

JOB No.	DRAWING NO.	REV.
21372	FIGURE 4.2.2-8	

93-1477b.311 fp 1-12-94



EXPLANATION OF SOIL AND ROCK SYMBOLS

- INDUSTRIAL FILL OR OTHER ARTIFICIAL TOPSOIL
- GRAVEL ONLY
- SANDY GRAVEL
- SILTY GRAVEL
- CLAYEY GRAVEL
- GRAVEL, SAND & SILT IN ROUGHLY COMPARABLE PROPORTIONS
- GRAVELLY SAND
- SAND ONLY
- CEMENTED OR INDURATED SAND; SANDSTONE
- SILTY SAND
- CLAYEY SAND

- GRAVELLY SILT
- SANDY SILT
- SILT
- CLAYEY SILT
- GRAVELLY CLAY
- SANDY CLAY
- SILTY CLAY
- CLAY
- CALICHE AND CALCITE-CEMENTED ALLUVIAL DEPOSITS
- BASALT
- TUFF
- RHYOLITE

Cd = Cadmium

Pb = Lead

V = Vanadium

Cd	Pb	V	
4.1	12.1	16.6	(Concentrations in mg/kg)

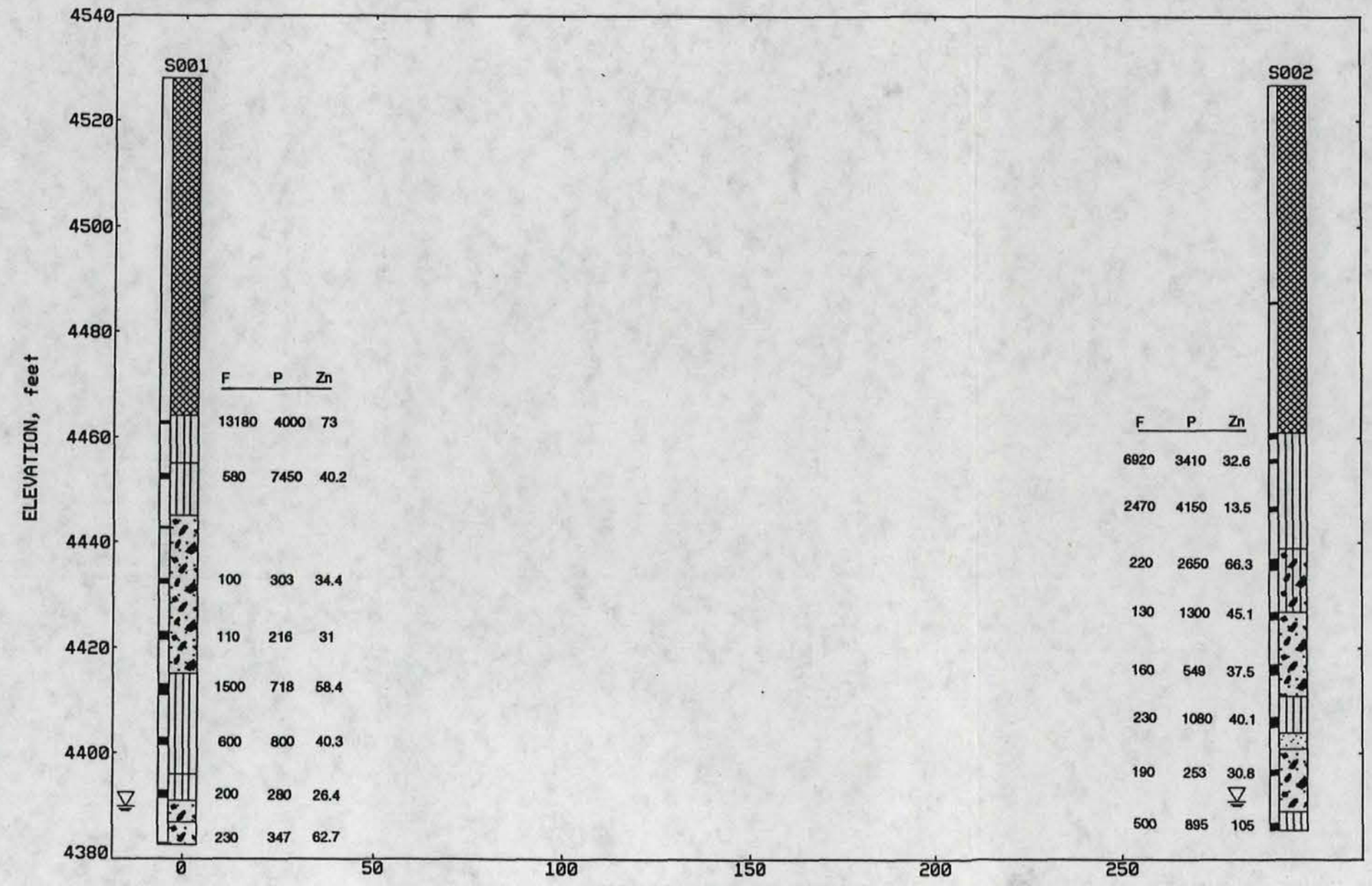
BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Cross Section of Lower Gypsum Stack, Cadmium, Lead, and Vanadium Profile

JOB No.	DRAWING NO.	REV.
21372	FIGURE 4.2.2-9	

93-1477b.312 fp 1-12-94



EXPLANATION OF SOIL AND ROCK SYMBOLS

- INDUSTRIAL FILL OR OTHER ARTIFICIAL TOPSOIL
- GRAVEL ONLY
- SANDY GRAVEL
- SILTY GRAVEL
- CLAYEY GRAVEL
- GRAVEL, SAND & SILT IN ROUGHLY COMPARABLE PROPORTIONS
- GRAVELLY SAND
- SAND ONLY
- CEMENTED OR INDURATED SAND; SANDSTONE
- SILTY SAND
- CLAYEY SAND
- GRAVELLY SILT
- SANDY SILT
- SILT
- CLAYEY SILT
- GRAVELLY CLAY
- SANDY CLAY
- SILTY CLAY
- CLAY
- CALICHE AND CALCITE-CEMENTED ALLUVIAL DEPOSITS
- BASALT
- TUFF
- RHYOLITE

F = Fluoride

P = Phosphorous

Zn = Zinc

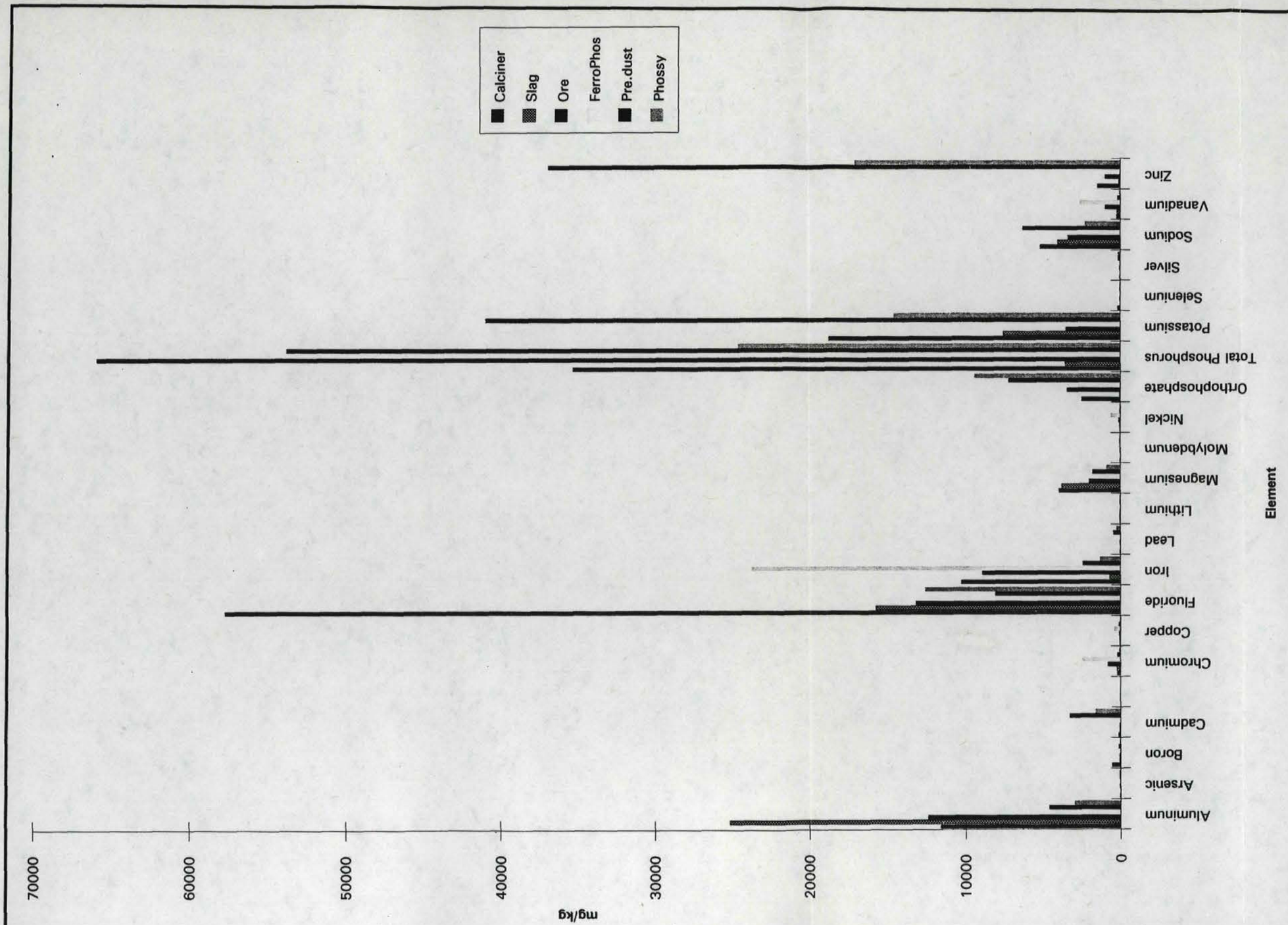
F	P	Zn	
160	549	37.5	(Concentrations in mg/kg)

BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO		
EASTERN MICHAUD FLATS POCATELLO, IDAHO		
Cross Section of Lower Gypsum Stack, Fluoride, Total Phosphorus, and Zinc Profile		
JOB No.	DRAWING NO.	REV.
21372	FIGURE 4.2.2-10	

93-1477b.313 fb 1-12-94

BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Characteristic Constituents of FMC Potential Source Solids			
BECHTEL	JOB No.	DRAWING NO.	REV.
	21372	FIGURE 4.2.3-1	

93-1477b.279 1-14-94 vk/rs : 1

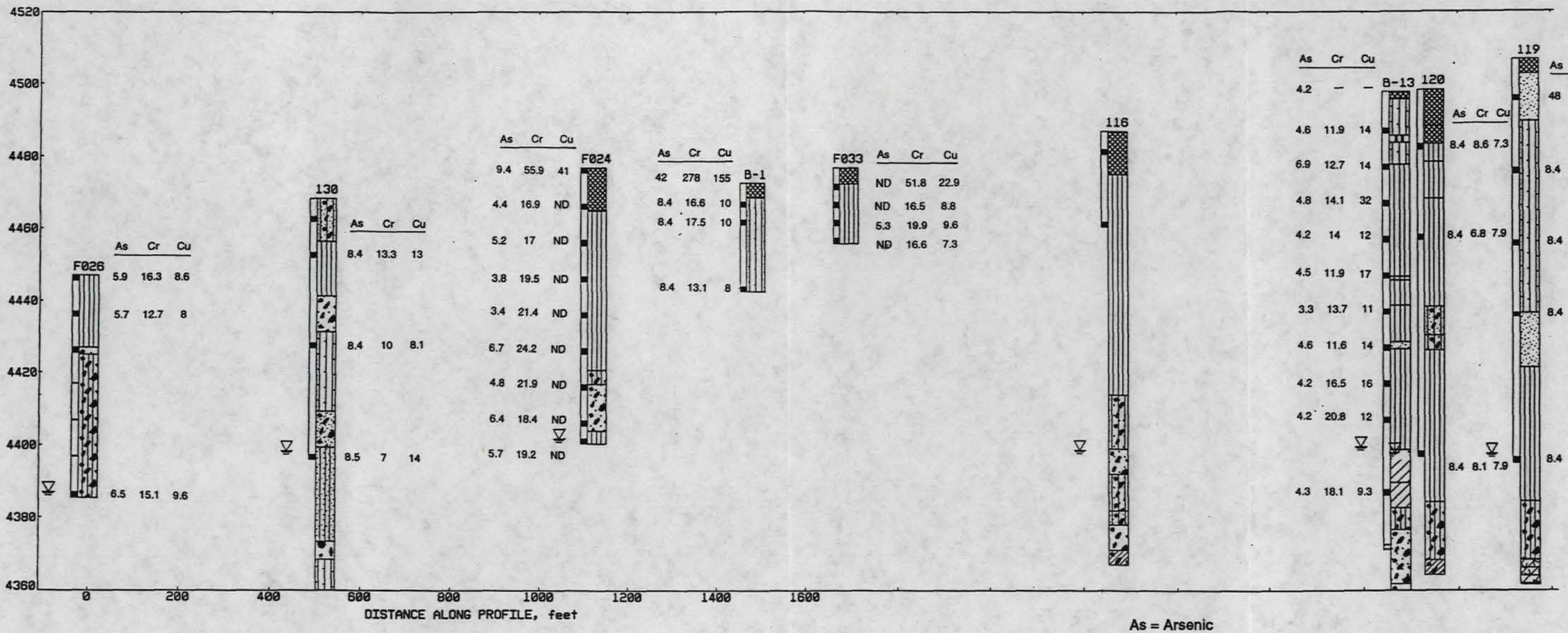


BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Characteristic Constituents of FMC Potential Source Solids Without Calcium			
BECHTEL	JOB No. 21372	DRAWING NO. FIGURE 4.2.3-2	REV.

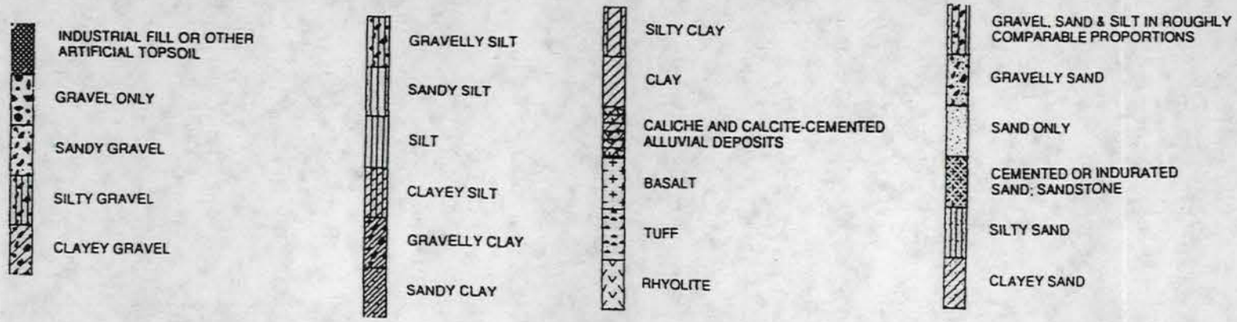
93-1477b.332 1-14-94 rs : 0

BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Characteristic Constituents of FMC Potential Source Solids Without Calcium, Fluoride, and Total Phosphorous			
BECHTEL	JOB No.	DRAWING NO.	REV.
	21372	FIGURE 4.2.3-3	

93-1477b.333 1-14-94 rs : 0



EXPLANATION OF SOIL AND ROCK SYMBOLS



As = Arsenic

Cr = Chromium

Cu = Copper

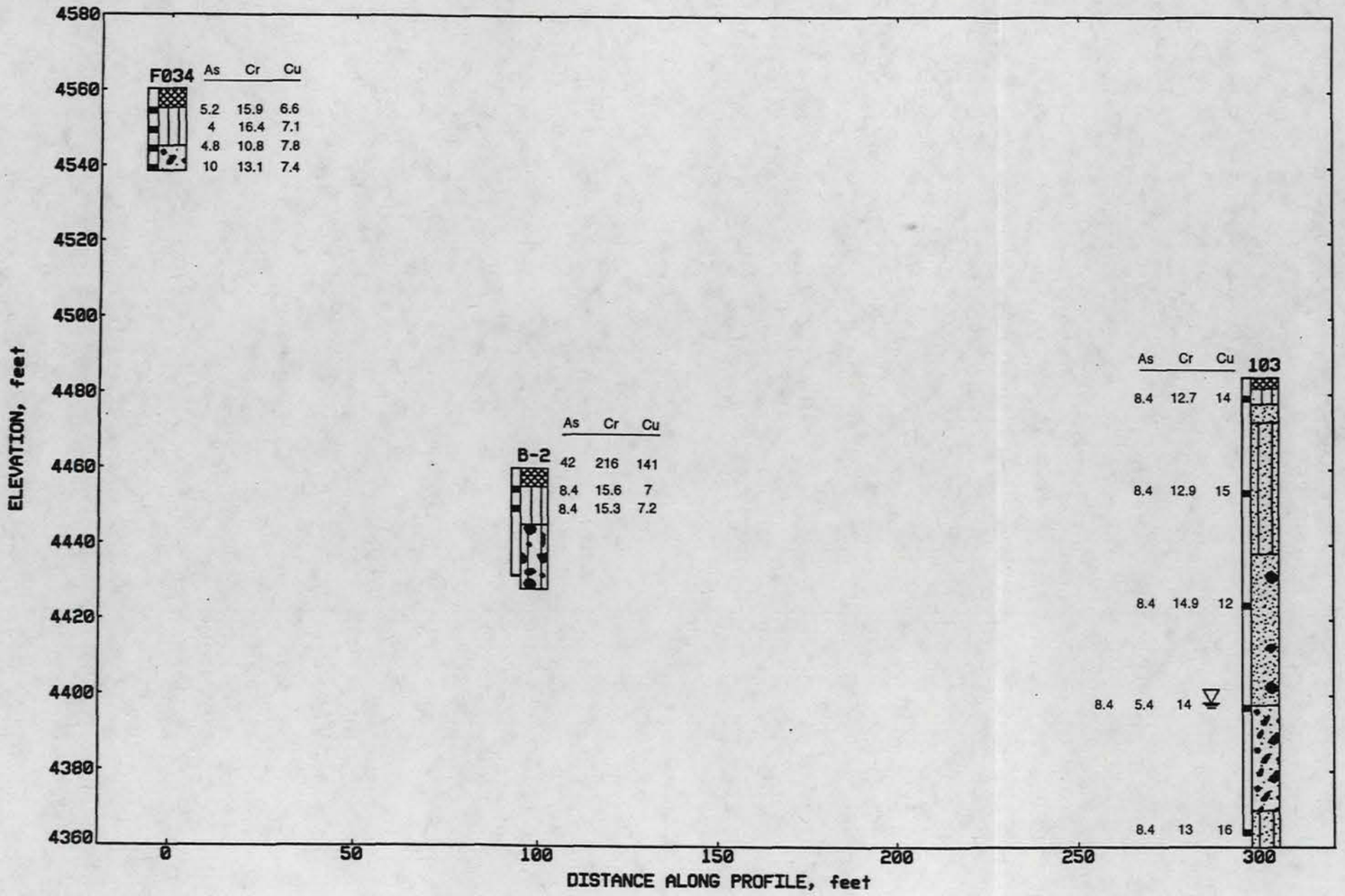
As	Cr	Cu	
4.3	18.1	9.3	(Concentrations in mg/kg)

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Southwest Pond Area Section
Arsenic, Chromium, and Copper Profile
(Sheet 1 of 2)

Job Number	Drawing No.	Rev.
21372	FIGURE 4.2.3-4	0



EXPLANATION OF SOIL AND ROCK SYMBOLS

- INDUSTRIAL FILL OR OTHER ARTIFICIAL TOPSOIL
- GRAVEL ONLY
- SANDY GRAVEL
- SILTY GRAVEL
- CLAYEY GRAVEL
- GRAVEL, SAND & SILT IN ROUGHLY COMPARABLE PROPORTIONS
- GRAVELLY SAND
- SAND ONLY
- CEMENTED OR INDURATED SAND; SANDSTONE
- SILTY SAND
- CLAYEY SAND

- GRAVELLY SILT
- SANDY SILT
- SILT
- CLAYEY SILT
- GRAVELLY CLAY
- SANDY CLAY
- SILTY CLAY
- CLAY
- CALICHE AND CALCITE-CEMENTED ALLUVIAL DEPOSITS
- BASALT
- TUFF
- RHYOLITE

As = Arsenic

Cr = Chromium

Cu = Copper

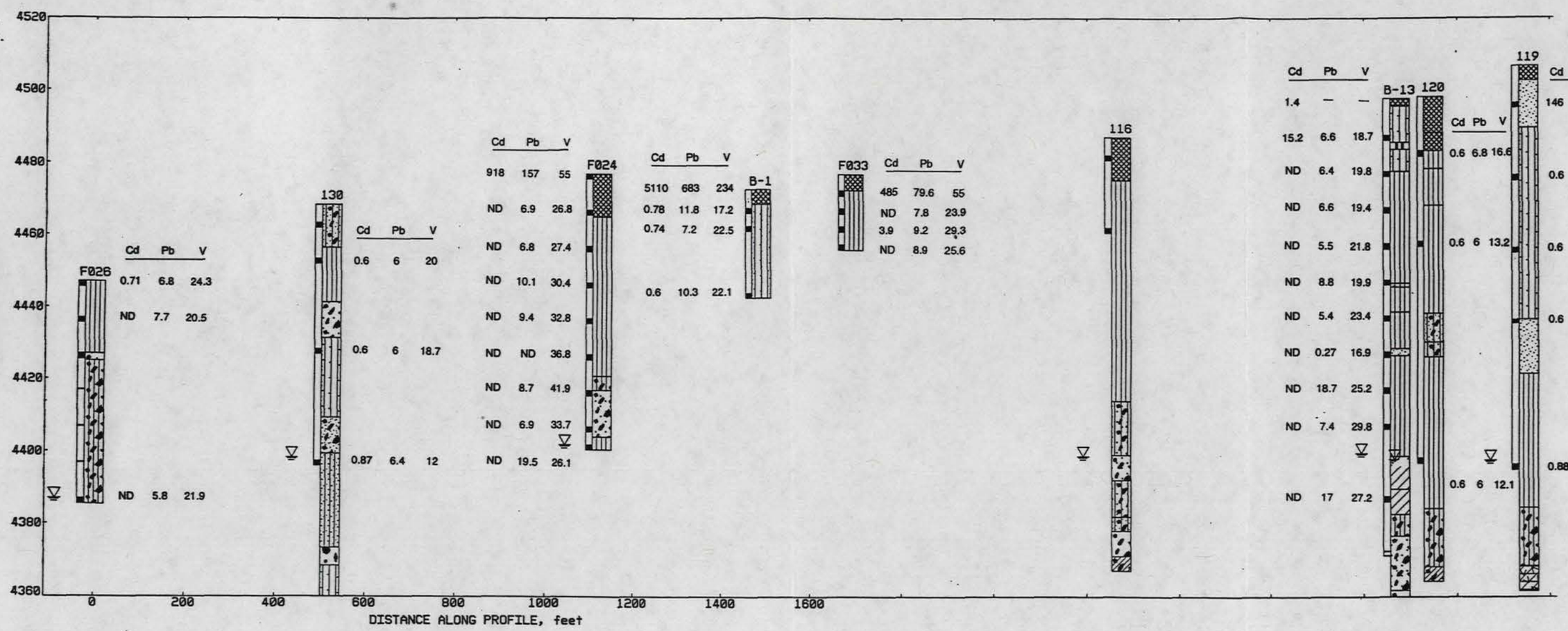
As	Cr	Cu	
8.4	14.9	12	(Concentrations in mg/kg)

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Southwest Pond Area Section
Arsenic, Chromium, and Copper Profile
(Sheet 2 of 2)

Job Number	Drawing No.	Rev.
21372	FIGURE 4.2.3-4	0



EXPLANATION OF SOIL AND ROCK SYMBOLS

- INDUSTRIAL FILL OR OTHER ARTIFICIAL TOPSOIL
- GRAVEL ONLY
- SANDY GRAVEL
- SILTY GRAVEL
- CLAYEY GRAVEL
- GRAVELLY SILT
- SANDY SILT
- SILT
- CLAYEY SILT
- GRAVELLY CLAY
- SANDY CLAY
- SILTY CLAY
- CLAY
- CALICHE AND CALCITE-CEMENTED ALLUVIAL DEPOSITS
- BASALT
- TUFF
- RHYOLITE
- GRAVEL, SAND & SILT IN ROUGHLY COMPARABLE PROPORTIONS
- GRAVELLY SAND
- SAND ONLY
- CEMENTED OR INDURATED SAND; SANDSTONE
- SILTY SAND
- CLAYEY SAND

Cd = Cadmium

Pb = Lead

V = Vanadium

Cd	Pb	V
0.88	9.6	13.4

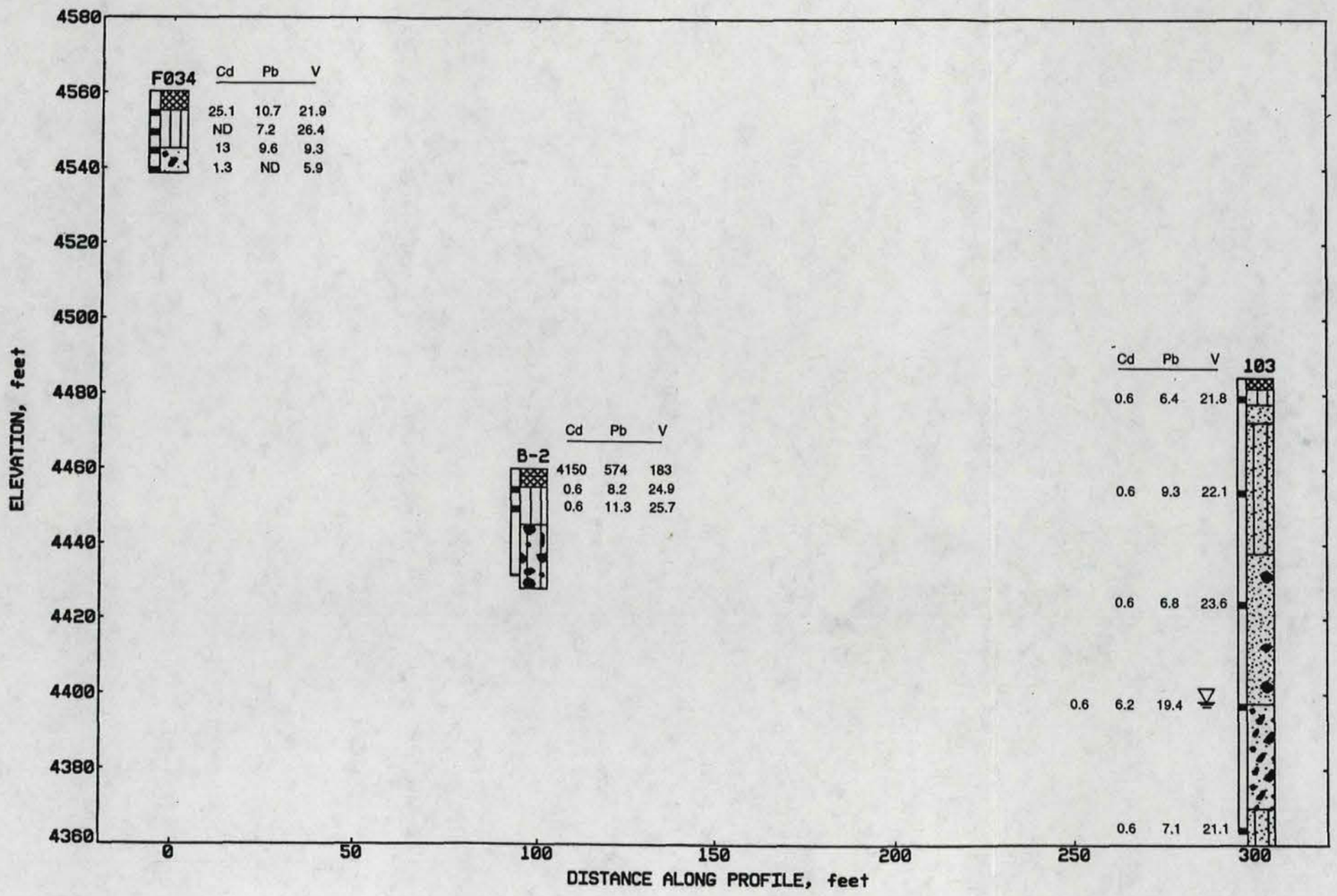
(Concentrations in mg/kg)

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Southwest Pond Area Section
Cadmium, Lead and Vanadium Profile
(Sheet 1 of 2)

Job Number	Drawing No.	Rev.
21372	FIGURE 4.2.3-5	0



EXPLANATION OF SOIL AND ROCK SYMBOLS

- INDUSTRIAL FILL OR OTHER ARTIFICIAL TOPSOIL
- GRAVEL ONLY
- SANDY GRAVEL
- SILTY GRAVEL
- CLAYEY GRAVEL
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- GRAVELLY SAND
- SAND ONLY
- CEMENTED OR INDURATED SAND; SANDSTONE
- SILTY SAND
- CLAYEY SAND
- GRAVELLY SILT
- SANDY SILT
- SILT
- CLAYEY SILT
- GRAVELLY CLAY
- SANDY CLAY
- SILTY CLAY
- CLAY
- CALICHE AND CALCITE-CEMENTED ALLUVIAL DEPOSITS
- BASALT
- TUFF
- RHYOLITE

Cd = Cadmium

Pb = Chromium

V = Vanadium

Cd	Pb	V
0.6	7.1	21.1

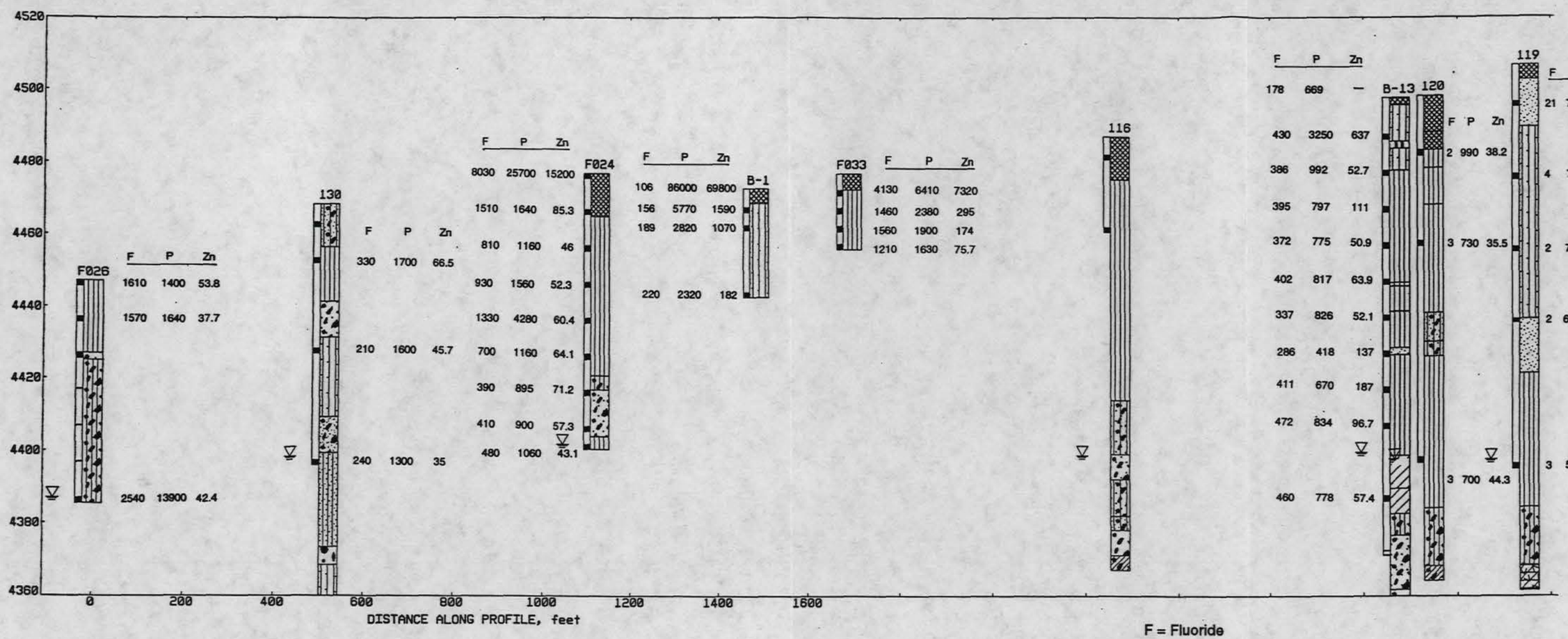
(Concentrations in mg/kg)

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Southwest Pond Area Section
Cadmium, Lead, and Vanadium Profile
(Sheet 2 of 2)

Job Number	Drawing No.	Rev.
21372	FIGURE 4.2.3-5	0



EXPLANATION OF SOIL AND ROCK SYMBOLS

- INDUSTRIAL FILL OR OTHER ARTIFICIAL TOPSOIL
- GRAVEL ONLY
- SANDY GRAVEL
- SILTY GRAVEL
- CLAYEY GRAVEL
- GRAVELLY SILT
- SANDY SILT
- SILT
- CLAYEY SILT
- GRAVELLY CLAY
- SANDY CLAY
- SILTY CLAY
- CLAY
- CALICHE AND CALCITE-CEMENTED ALLUVIAL DEPOSITS
- BASALT
- TUFF
- RHYOLITE
- GRAVEL, SAND & SILT IN ROUGHLY COMPARABLE PROPORTIONS
- GRAVELLY SAND
- SAND ONLY
- CEMENTED OR INDURATED SAND; SANDSTONE
- SILTY SAND
- CLAYEY SAND

F = Fluoride

P = Phosphorous

Zn = Zinc

F	P	Zn
3	586	29.3

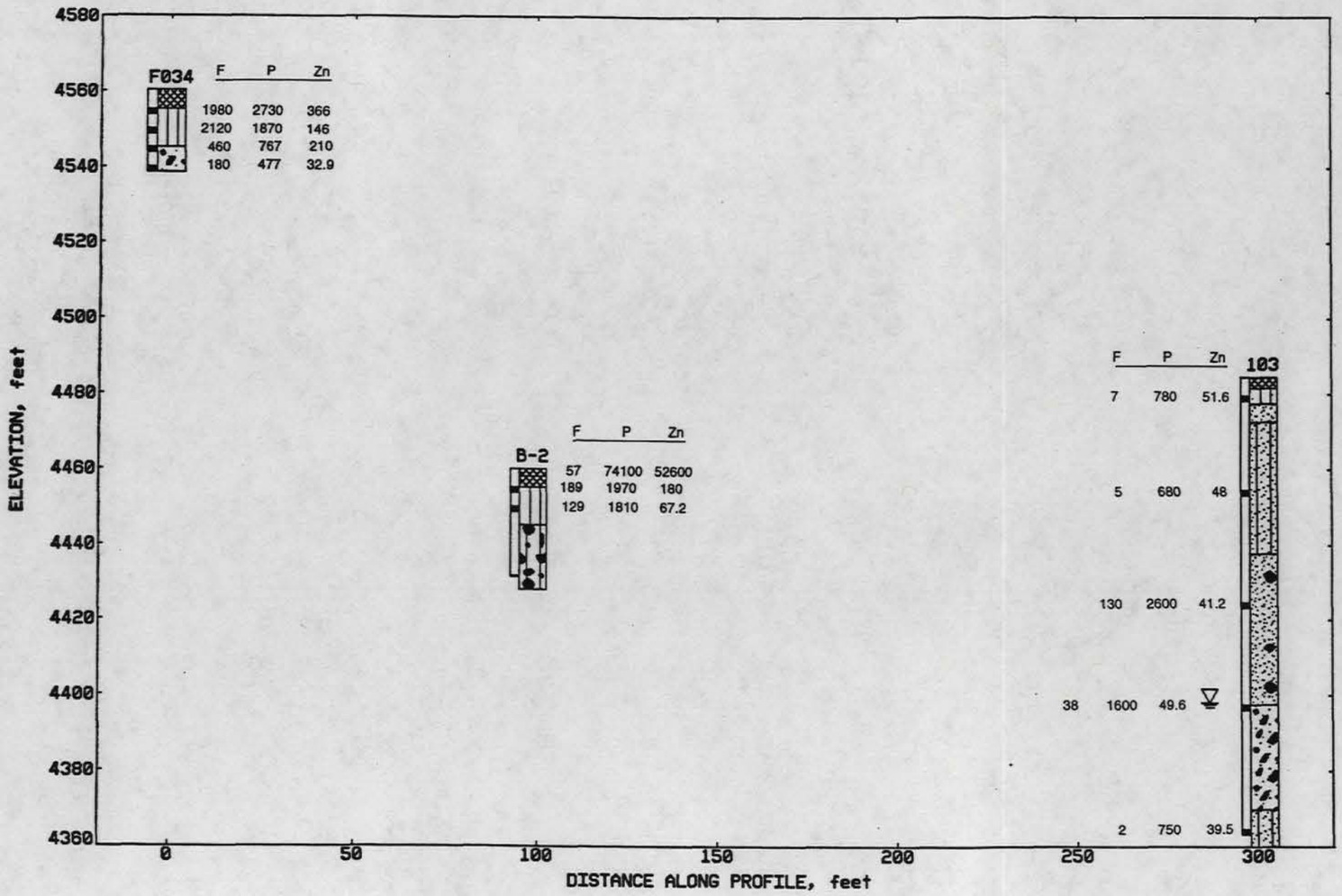
(Concentrations in mg/kg)

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Southwest Pond Area Section Fluoride, Phosphorus, and Zinc Profile (Sheet 1 of 2)

Job Number	Drawing No.	Rev.
21372	FIGURE 4.2.3-6	0



EXPLANATION OF SOIL AND ROCK SYMBOLS

- INDUSTRIAL FILL OR OTHER ARTIFICIAL TOPSOIL
- GRAVEL ONLY
- SANDY GRAVEL
- SILTY GRAVEL
- CLAYEY GRAVEL
- GRAVEL, SAND & SILT IN ROUGHLY COMPARABLE PROPORTIONS
- GRAVELLY SAND
- SAND ONLY
- CEMENTED OR INDURATED SAND; SANDSTONE
- SILTY SAND
- CLAYEY SAND
- GRAVELLY SILT
- SANDY SILT
- SILT
- CLAYEY SILT
- GRAVELLY CLAY
- SANDY CLAY
- SILTY CLAY
- CLAY
- CALICHE AND CALCITE-CEMENTED ALLUVIAL DEPOSITS
- BASALT
- TUFF
- RHYOLITE

F = Fluoride

P = Phosphorous

Zn = Zinc

F	P	Zn
38	1600	49.6

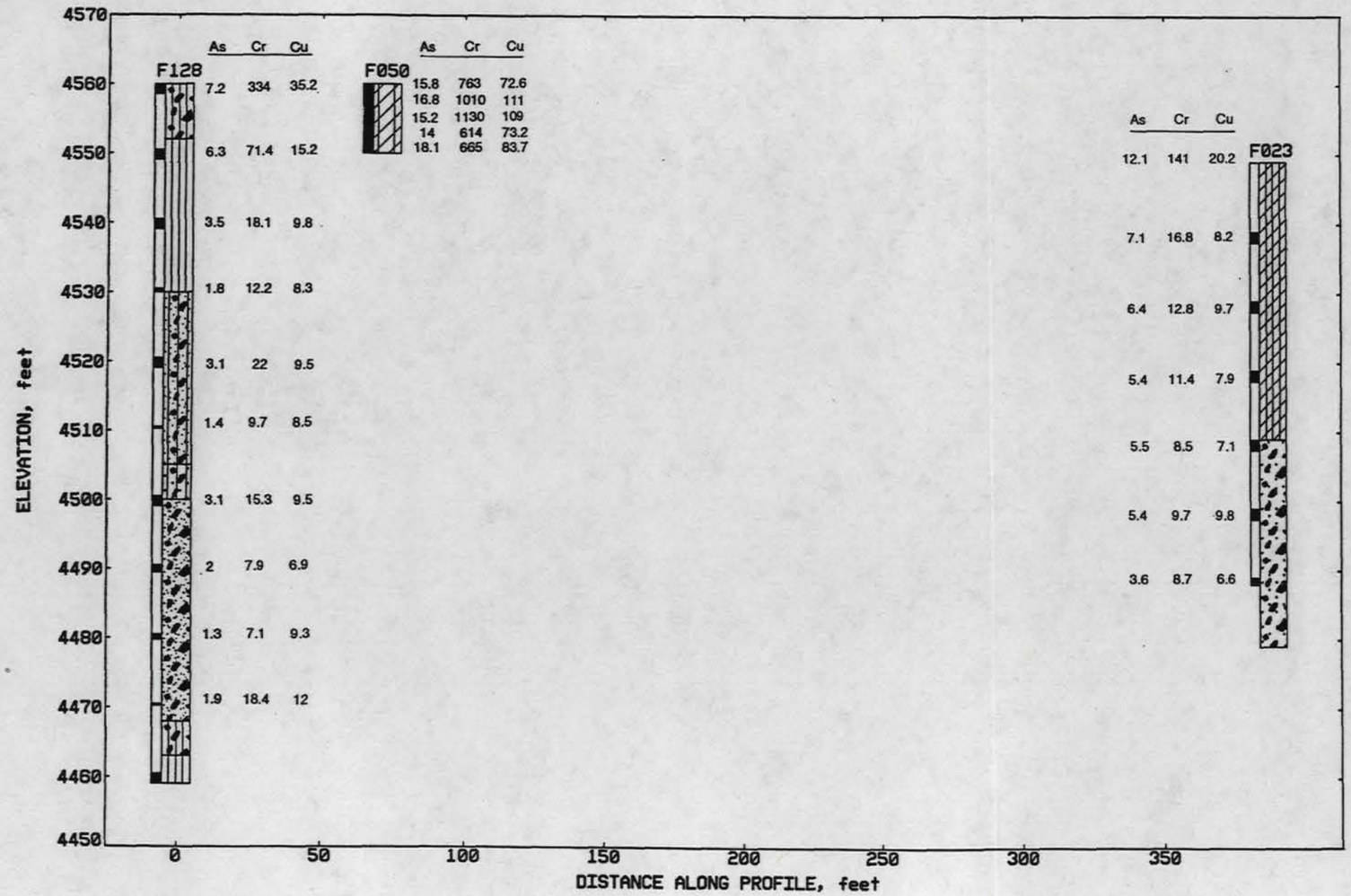
(Concentrations in mg/kg)

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Southwest Pond Area Section Fluoride, Phosphorus, and Zinc Profile (Sheet 2 of 2)

Job Number	Drawing No.	Rev.
21372	FIGURE 4.2.3-6	0



EXPLANATION OF SOIL AND ROCK SYMBOLS

- INDUSTRIAL FILL OR OTHER ARTIFICIAL TOPSOIL
- GRAVEL ONLY
- SANDY GRAVEL
- SILTY GRAVEL
- CLAYEY GRAVEL
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- GRAVELLY SAND
- SAND ONLY
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- SILTY SAND
- CLAYEY SAND
- GRAVELLY SILT
- SANDY SILT
- SILT
- CLAYEY SILT
- GRAVELLY CLAY
- SANDY CLAY
- SILTY CLAY
- CLAY
- CALICHE AND CALCITE-CEMENTED ALLUVIAL DEPOSITS
- BASALT
- TUFF
- RHYOLITE

As = Arsenic

Cr = Chromium

Cu = Copper

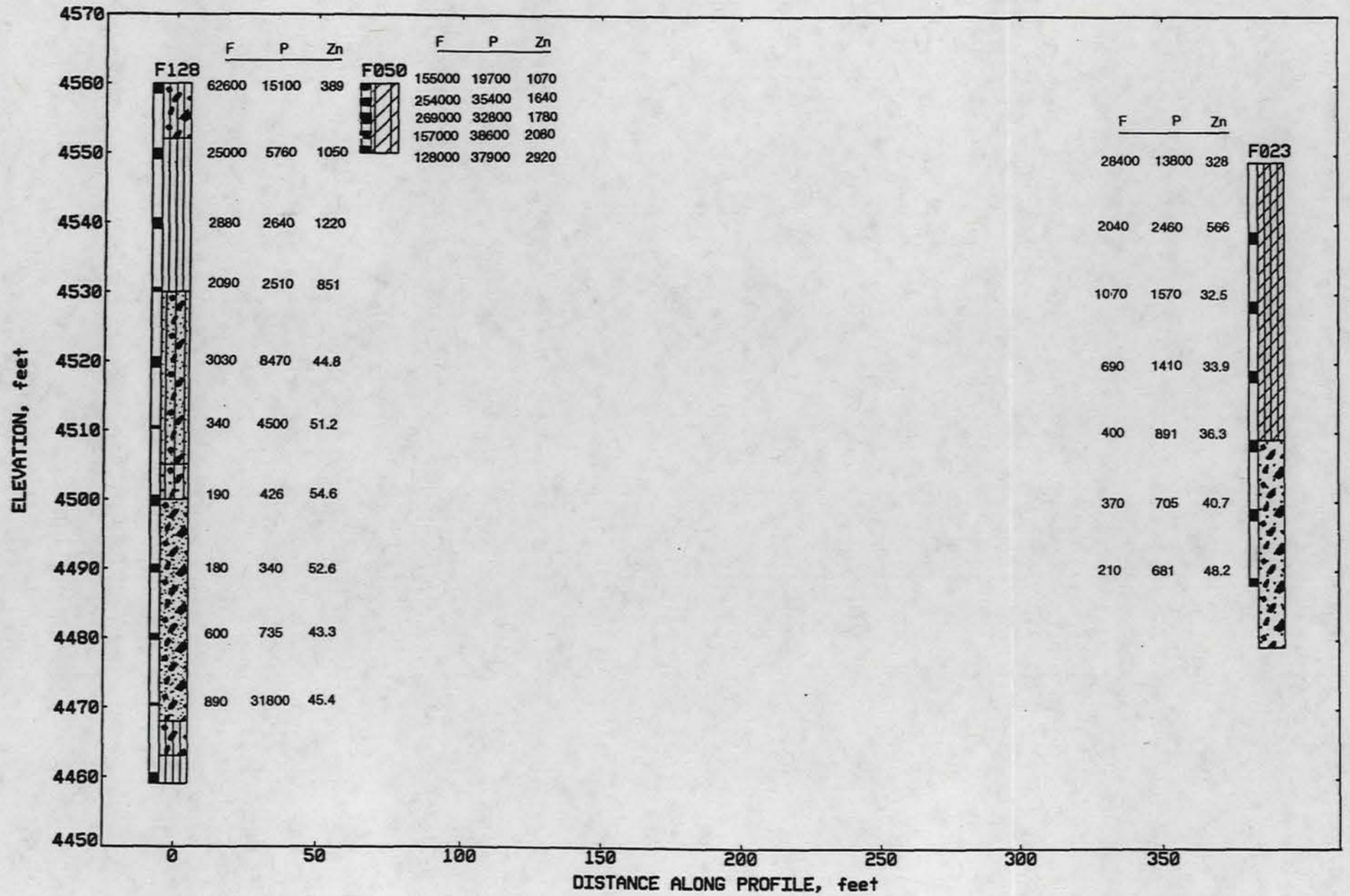
As	Cr	Cu	
3.6	8.7	6.6	(Concentrations in mg/kg)

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Calciner Pond Area Section
Arsenic, Chromium, and Copper Profile

Job Number	Drawing No.	Rev.
21372	FIGURE 4.2.3-7	0



EXPLANATION OF SOIL AND ROCK SYMBOLS

- INDUSTRIAL FILL OR OTHER ARTIFICIAL TOPSOIL
- GRAVEL ONLY
- SANDY GRAVEL
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- SANDY SILT
- SILT
- CLAYEY SILT
- GRAVELLY CLAY
- SANDY CLAY
- SILTY CLAY
- CLAY
- CALICHE AND CALCITE-CEMENTED ALLUVIAL DEPOSITS
- BASALT
- TUFF
- RHYOLITE

F = Fluoride

P = Phosphorous

Zn = Zinc

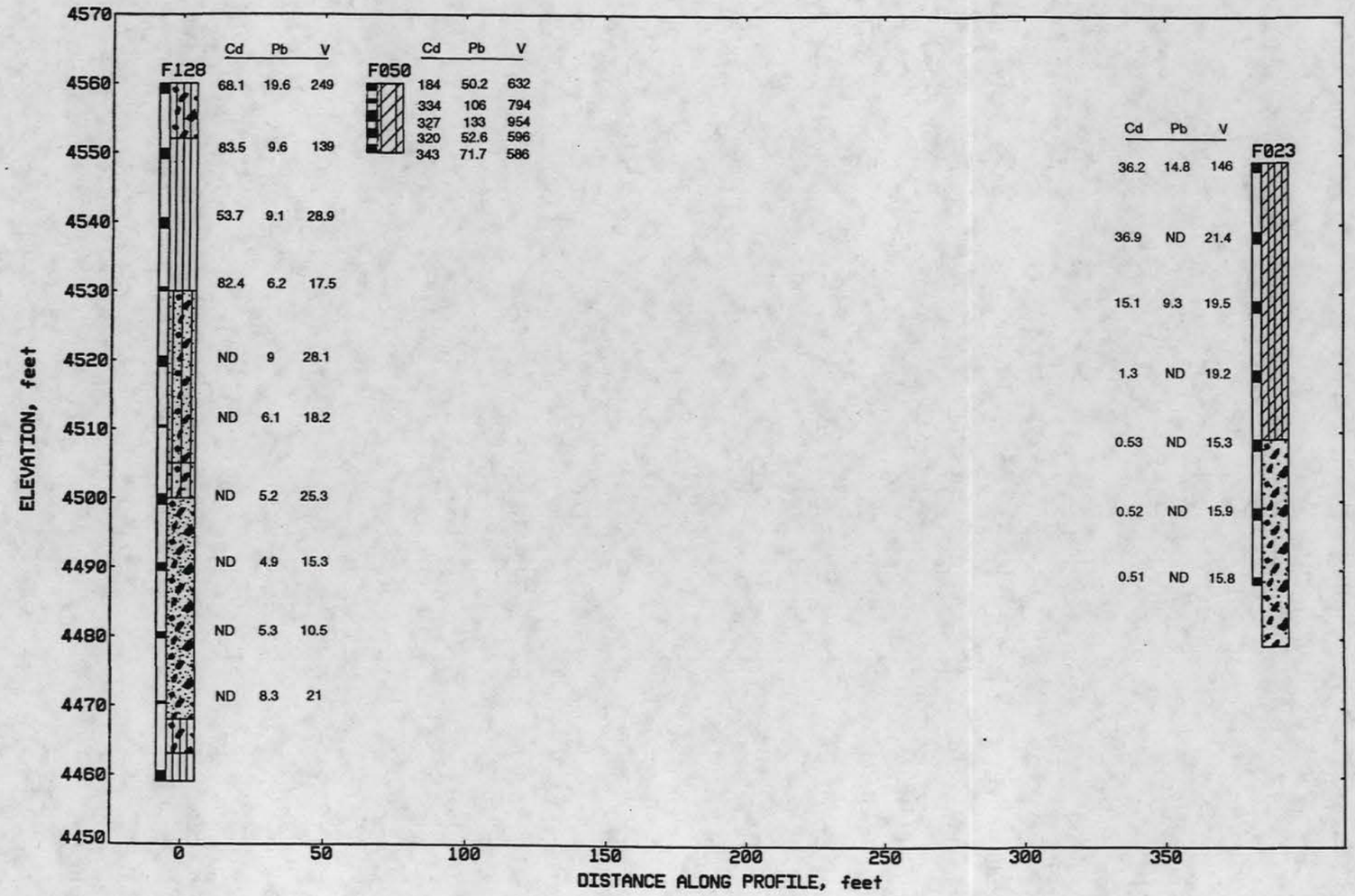
F	P	Zn	
210	681	48.2	(Concentrations in mg/kg)

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Calciner Pond Area Section
Fluoride, Phosphorus, and Zinc Profile

Job Number	Drawing No.	Rev.
21372	FIGURE 4.2.3-8	0



EXPLANATION OF SOIL AND ROCK SYMBOLS

- INDUSTRIAL FILL OR OTHER ARTIFICIAL TOPSOIL
- GRAVEL ONLY
- SANDY GRAVEL
- SILTY GRAVEL
- CLAYEY GRAVEL
- GRAVEL, SAND & SILT IN ROUGHLY COMPARABLE PROPORTIONS
- GRAVELLY SAND
- SAND ONLY
- CEMENTED OR INDURATED SAND; SANDSTONE
- SILTY SAND
- CLAYEY SAND
- GRAVELLY SILT
- SANDY SILT
- SILT
- CLAYEY SILT
- GRAVELLY CLAY
- SANDY CLAY
- SILTY CLAY
- CLAY
- CALICHE AND CALCITE-CEMENTED ALLUVIAL DEPOSITS
- BASALT
- TUFF
- RHYOLITE

Cd = Cadmium

Pb = Lead

V = Vanadium

Cd	Pb	V
15.1	9.3	19.5

(Concentrations in mg/kg)

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

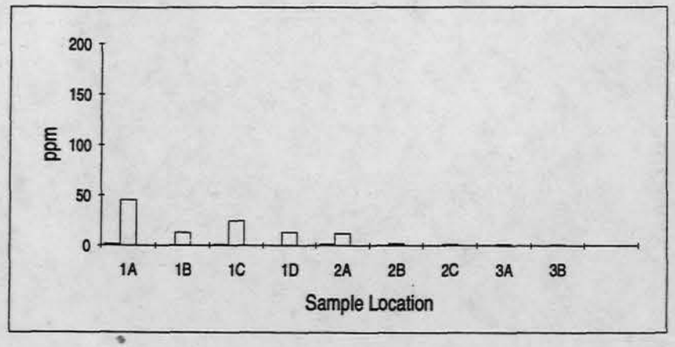
Calciner Pond Area Section
Cadmium, Lead, and Vanadium Profile

Job Number	Drawing No.	Rev.
21372	FIGURE 4.2.3-9	0

Figures for Section 4.3

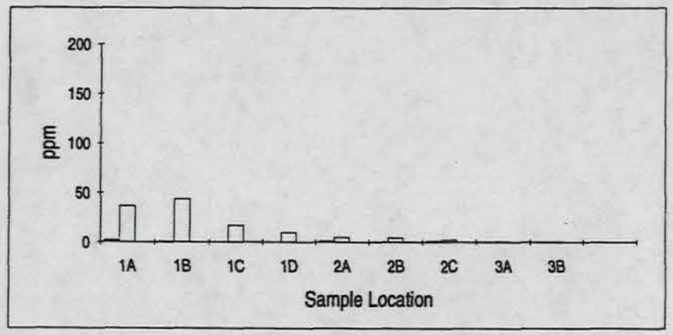
Cadmium in Offsite Soils
Bearing 000

Location	BS in ppm	SS in ppm
1A	1.7	45.3
1B	0.31	12.9
1C	0.99	24.6
1D		13.1
2A	1.4	12
2B	0.38	2.1
2C	0.28	1.3
3A	0.55	1.4
3B	0.31	0.93



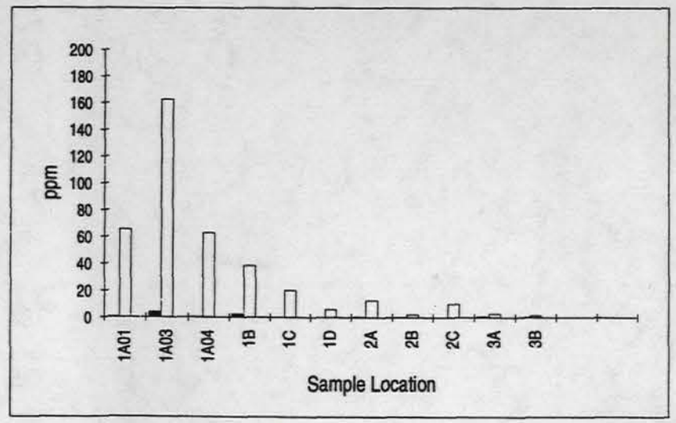
Cadmium in Offsite Soils
Bearing 023

Location	BS in ppm	SS in ppm
1A	2	36.6
1B	0.83	43.5
1C		16.9
1D		9.7
2A	1.2	4.9
2B	0.39	4.5
2C	0.99	2.4
3A	0.28	0.64
3B	0.27	0.49



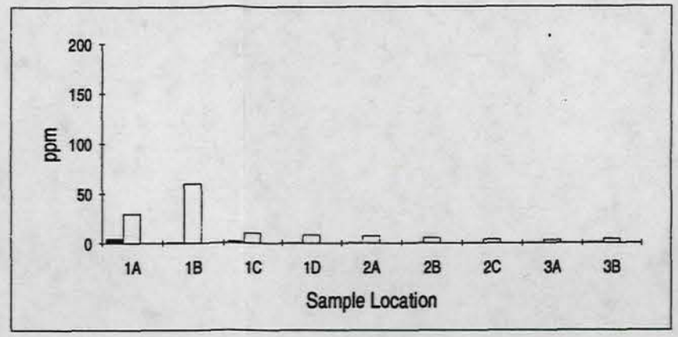
Cadmium in Offsite Soils
Bearing 045

Location	BS in ppm	SS in ppm
1A	0.8	112
1A01	0.61	65.6
1A03	4.3	163
1A04	0.39	62.8
1B	2.6	38.7
1C		20.2
1D		6
2A	0.5	12.7
2B	0.34	2.3
2C		10.2
3A	0.74	2.8
3B	0.36	1.5



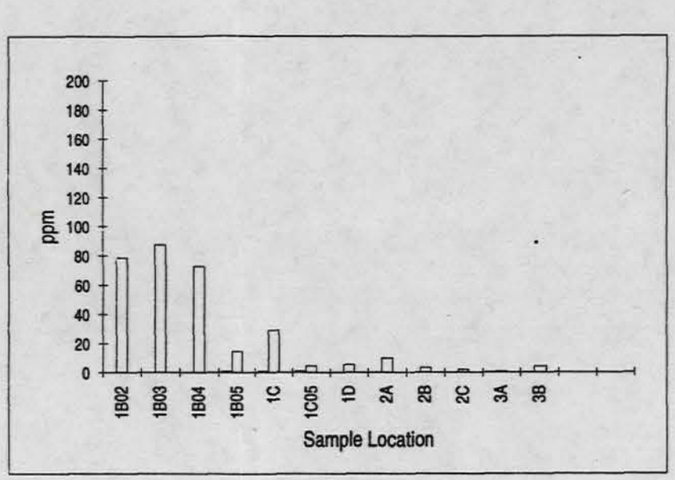
Cadmium in Offsite Soils
Bearing 068

Location	BS in ppm	SS in ppm
1A	4.4	29.4
1B	0.5	59.3
1C	1.5	10
1D	0.38	8.3
2A	0.38	7.2
2B	0.42	5.2
2C	0.34	3.9
3A	0.4	2.9
3B	0.48	4



Cadmium in Offsite Soils
Bearing 090

Location	BS in ppm	SS in ppm
1B	25.7	78.4
1B02		78.5
1B03		87.4
1B04		72.5
1B05	0.94	14.5
1C	0.87	29
1C05	0.99	4.5
1D	0.14	5.5
2A	0.38	9.8
2B		3.3
2C		2.1
3A	0.38	0.92
3B	0.43	4.3



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

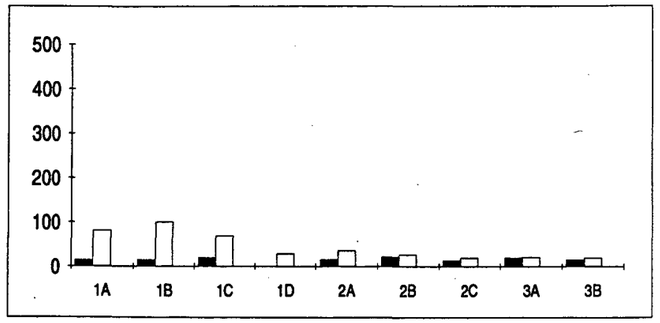
Concentration of Cadmium in Relationship with Distance from Site, NE Quadrant

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-1	

93-1477h.225
12-3-93 /Vk: 0

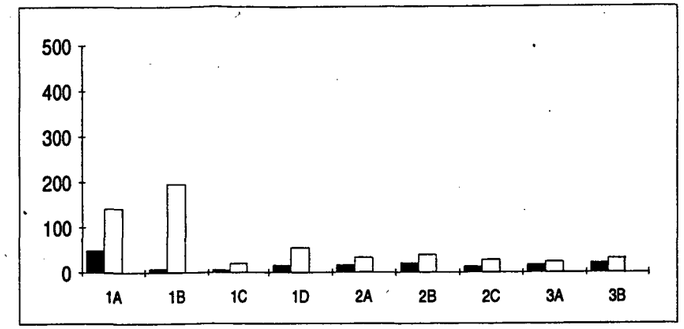
Chromium in Offsite Soils
Bearing 000

Location	BS in ppm	SS in ppm
1A	14.5	80.5
1B	14.7	99.4
1C	19.9	68.4
1D		28.8
2A	15.6	35.7
2B	21.8	26.5
2C	14.1	19.2
3A	20.2	21.3
3B	15.3	19.4



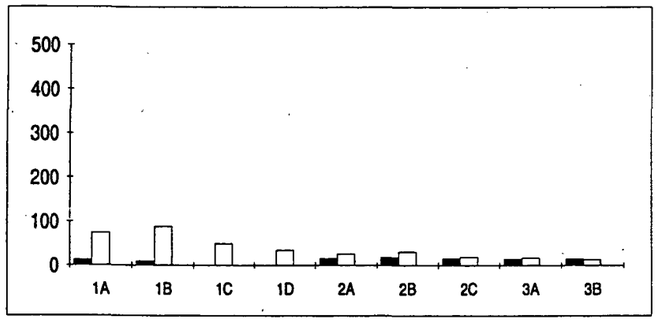
Chromium in Offsite Soils
Bearing 068

Location	BS in ppm	SS in ppm
1A	49	141
1B	8.2	195
1C	6.3	20.2
1D	16.2	54.8
2A	16.2	32.6
2B	20.8	38.9
2C	13.1	28
3A	17.5	23.9
3B	21.3	31.7



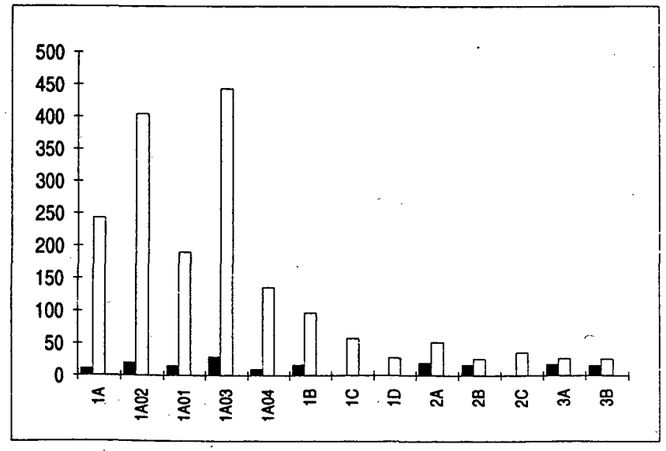
Chromium in Offsite Soils
Bearing 023

Location	BS in ppm	SS in ppm
1A	12.4	73.9
1B	9.7	87.5
1C		48.9
1D		34.4
2A	16	26
2B	18.3	30.7
2C	15.6	19
3A	15	17
3B	15.1	13.3



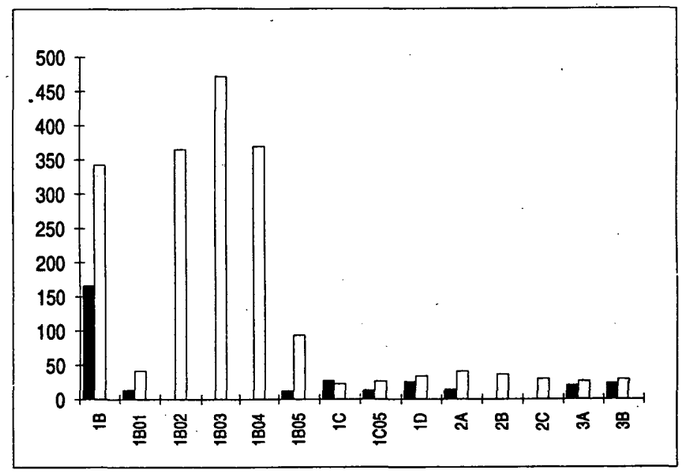
Chromium in Offsite Soils
Bearing 045

Location	BS in ppm	SS in ppm
1A	11	243
1A02	19.7	404
1A01	15.4	190
1A03	29.2	443
1A04	9.8	136
1B	16.6	96.8
1C		57.3
1D		27.6
2A	19.4	51.6
2B	16.9	26.2
2C		35.8
3A	17.9	26.8
3B	16	25.8



Chromium in Offsite Soils
Bearing 090

Location	BS in ppm	SS in ppm
1B	166	342
1B01	13.5	41.4
1B02		365
1B03		471
1B04		369
1B05	12.6	93.3
1C	27.5	22.4
1C05	13.3	26.1
1D	25.6	34
2A	14.4	40.8
2B		36.3
2C		29.6
3A	20.4	26.3
3B	23.4	28.8



Legend:
- Below surface concentration in ppm
- Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Chromium in Relationship with Distance from Site, NE Quadrant

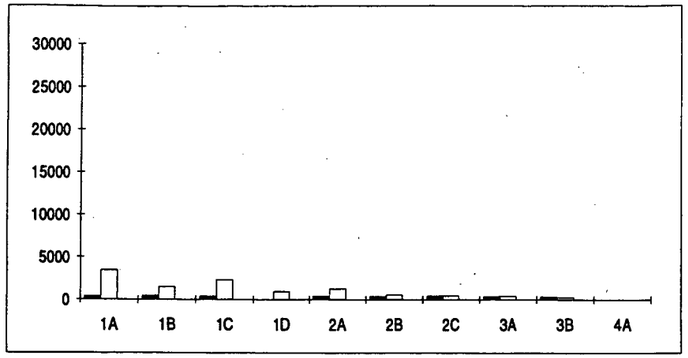
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-2	

93-14770.226
12-4-93 /WK:0

Fluoride in Offsite Soil

Bearing 000

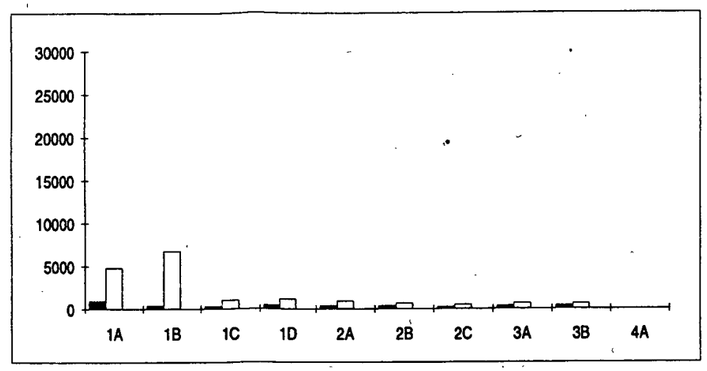
Location	BS in ppm	SS in ppm
1A	385	3450
1B	470	1490
1C	403	2340
1D		940
2A	445	1290
2B	408	575
2C	455	458
3A	383	438
3B	360	305
4A		



Fluoride in Offsite Soil

Bearing 068

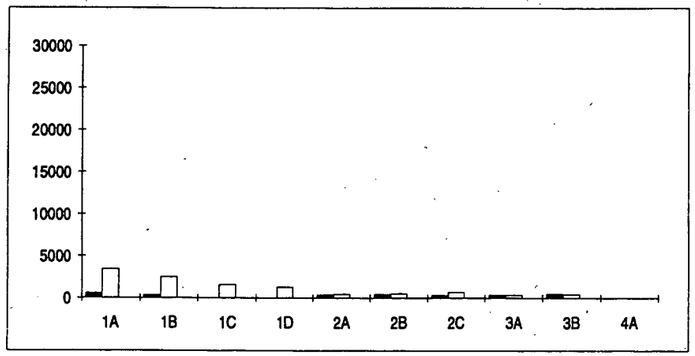
Location	BS in ppm	SS in ppm
1A	953	4780
1B	405	6730
1C	310	1040
1D	470	1180
2A	388	913
2B	363	685
2C	237	490
3A	360	670
3B	393	618
4A		



Fluoride in Offsite Soil

Bearing 023

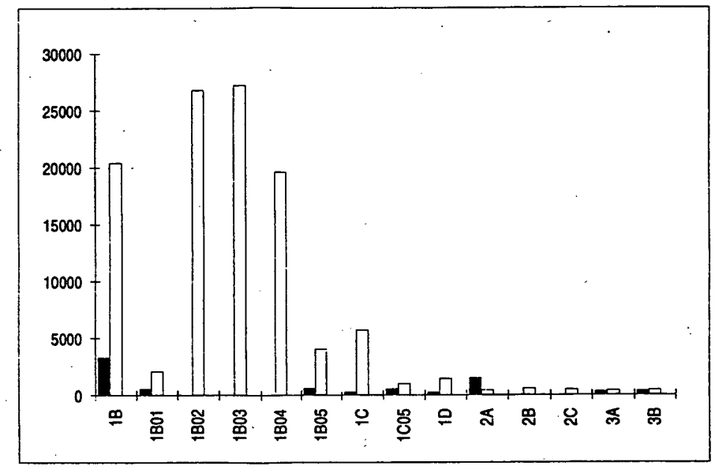
Location	BS in ppm	SS in ppm
1A	600	3420
1B	375	2500
1C		1590
1D		1280
2A	380	468
2B	463	528
2C	363	708
3A	390	368
3B	510	448
4A		



Fluoride in Offsite Soil

Bearing 090

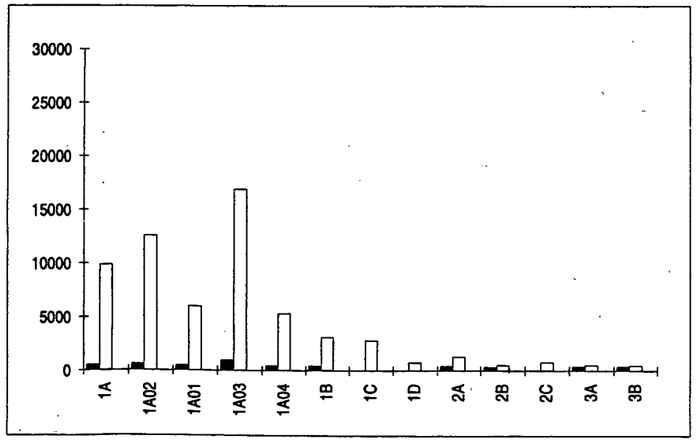
Location	BS in ppm	SS in ppm
1B	3320	20400
1B01	540	2100
1B02		26800
1B03		27200
1B04		19600
1B05	601	4040
1C	283	5720
1C05	562	1000
1D	267	1460
2A	1500	448
2B		575
2C		495
3A	333	405
3B	360	468



Fluoride in Offsite Soil

Bearing 045

Location	BS in ppm	SS in ppm
1A	533	9880
1A02	610	12600
1A01	470	6020
1A03	990	16900
1A04	470	5350
1B	458	3130
1C		2820
1D		765
2A	448	1300
2B	358	510
2C		793
3A	413	510
3B	395	475



Legend:

■ Below surface concentration in ppm

□ Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

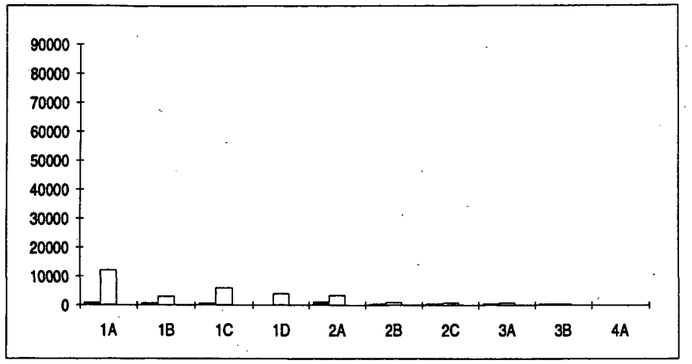
Concentration of Fluoride in Relationship with Distance from Site, NE Quadrant

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-3	

93-1477b.227
12-6-93 /vk:1

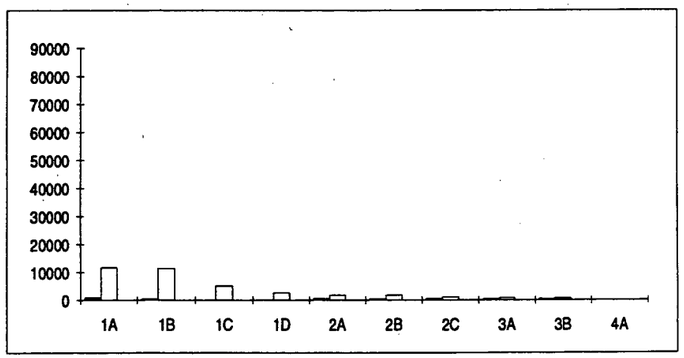
Total Phosphorus in Offsite Soil
Bearing 000

Location	BS in ppm	SS in ppm
1A	928	12200
1B	667	3050
1C	648	6010
1D		3980
2A	1260	3400
2B	404	955
2C	460	737
3A	491	782
3B	431	458
4A		



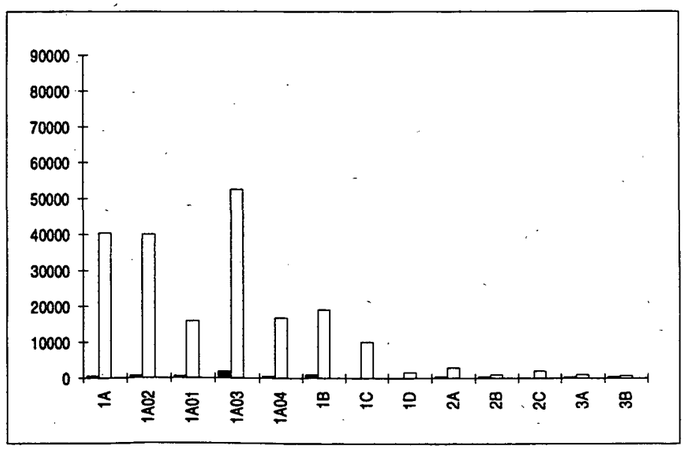
Total Phosphorus in Offsite Soil
Bearing 023

Location	BS in ppm	SS in ppm
1A	944	11700
1B	543	11400
1C		5110
1D		2640
2A	607	1910
2B	539	1840
2C	584	1120
3A	464	782
3B	496	745
4A		



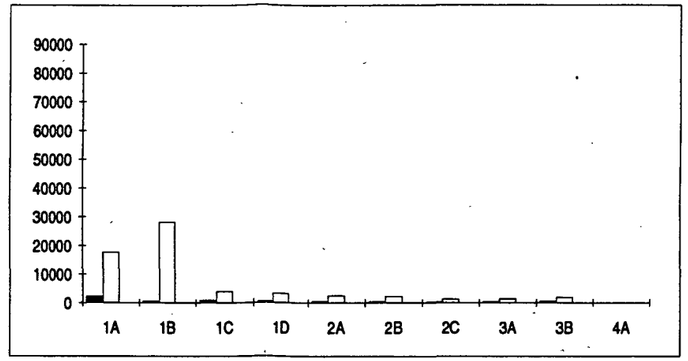
Total Phosphorus in Offsite Soil
Bearing 045

Location	BS in ppm	SS in ppm
1A	622	40400
1A02	779	40000
1A01	598	15900
1A03	1950	52600
1A04	570	16900
1B	1040	19100
1C		10100
1D		1660
2A	464	2960
2B	447	1010
2C		2030
3A	454	1000
3B	474	778



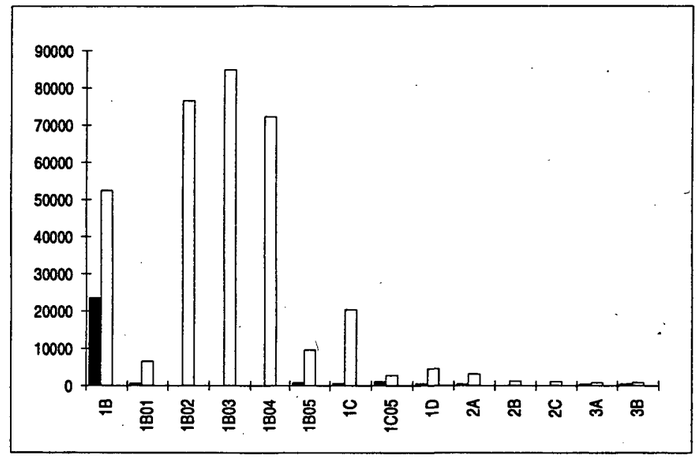
Total Phosphorus in Offsite Soil
Bearing 068

Location	BS in ppm	SS in ppm
1A	2320	17600
1B	610	28100
1C	907	3970
1D	505	3260
2A	580	2560
2B	507	2300
2C	361	1320
3A	431	1420
3B	625	1930
4A		



Total Phosphorus in Offsite Soil
Bearing 090

Location	BS in ppm	SS in ppm
1B	23600	52400
1B01	672	6510
1B02		76600
1B03		84900
1B04		72200
1B05	855	9590
1C	656	20400
1C05	1110	2760
1D	624	4560
2A	491	3190
2B		1260
2C		1140
3A	419	819
3B	554	896



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

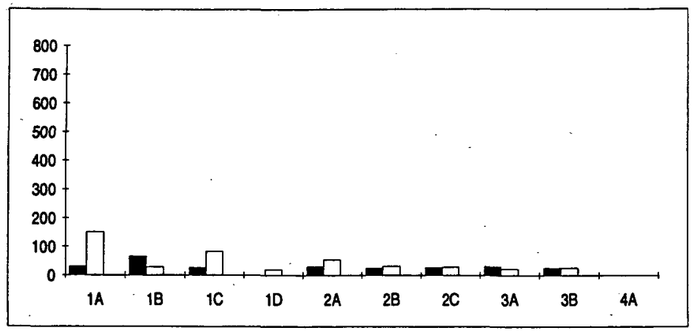
Concentration of Total Phosphorus in Relationship with Distance from Site, NE Quadrant

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-4	

93-1477h.228
12-4-93 Mt: 1

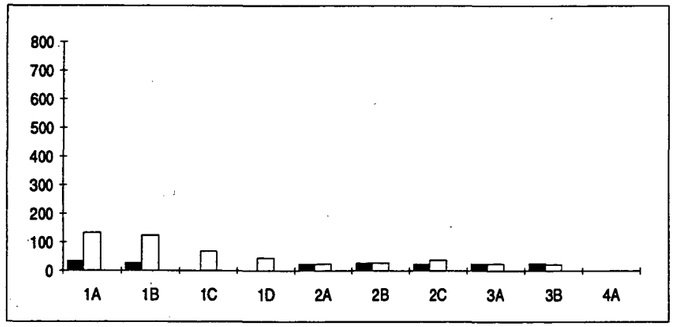
Vanadium in Offsite Soils
Bearing 000

Location	BS in ppm	SS in ppm
1A	30.8	151
1B	66.1	28.3
1C	26.9	83.6
1D		20.3
2A	30.6	54.7
2B	25	31.6
2C	26.8	28.8
3A	31.5	22.7
3B	25.8	27
4A		



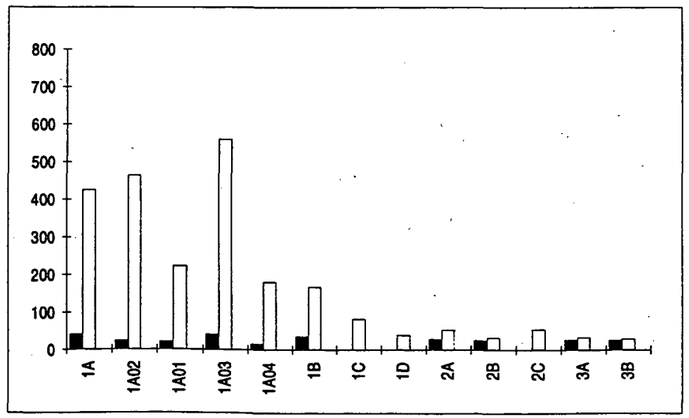
Vanadium in Offsite Soils
Bearing 023

Location	BS in ppm	SS in ppm
1A	34.7	133
1B	27.7	124
1C		68.1
1D		45.2
2A	23.7	23.8
2B	27.8	27.4
2C	24	38.1
3A	25.7	24.9
3B	27.1	22.5
4A		



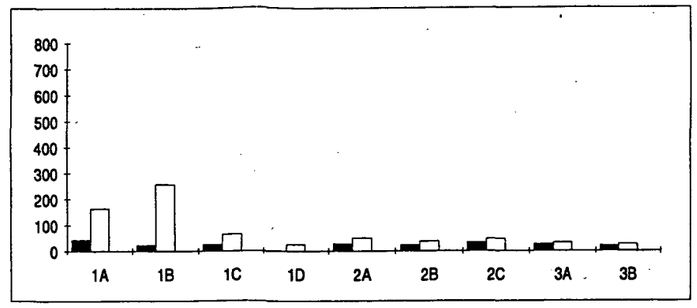
Vanadium in Offsite Soils
Bearing 045

Location	BS in ppm	SS in ppm
1A	41	425
1A02	23.8	463
1A01	21.3	222
1A03	41.1	559
1A04	14.7	180
1B	35.1	167
1C		82
1D		38.7
2A	27.9	53.4
2B	25.6	32.3
2C		54.3
3A	26.6	32.6
3B	26.7	29.1



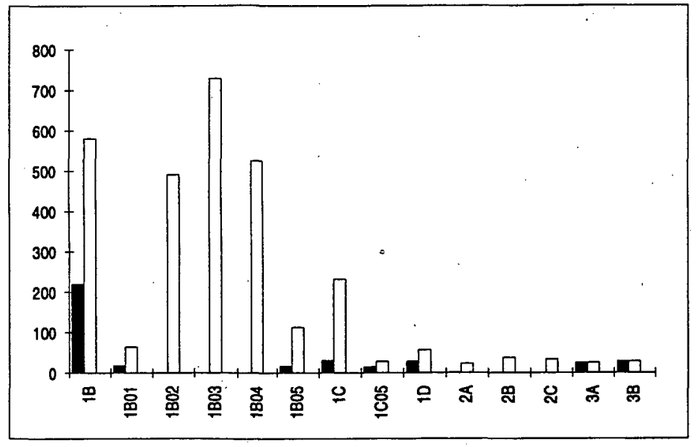
Vanadium in Offsite Soils
Bearing 068

Location	BS in ppm	SS in ppm
1A	44.2	163
1B	23.7	257
1C	26.1	65.4
1D	1.1	25.4
2A	29.4	51.3
2B	24.1	38.3
2C	33.3	47.4
3A	27.2	32.7
3B	21	27.5
4A		



Vanadium in Offsite Soils
Bearing 090

Location	BS in ppm	SS in ppm
1B	220	580
1B01	18.3	63.9
1B02		491
1B03		729
1B04		525
1B05	17.2	113
1C	31.1	232
1C05	15	28
1D	28.5	56.8
2A	1.1	23.1
2B		37.4
2C		33.5
3A	25.1	25.5
3B	29	28.5



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Vandium in Relationship with Distance from Site, NE Quadrant

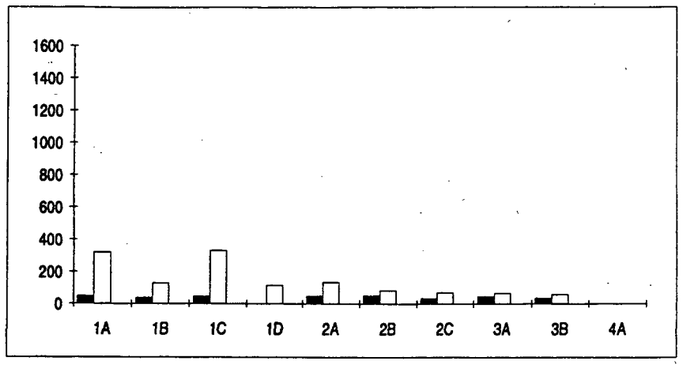
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-5	

93-1477b.229
12-4-93 /vk: 1

Zinc in Offsite Soils

Bearing 000

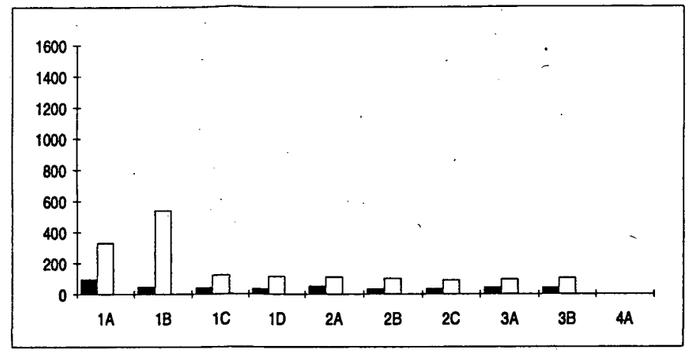
Location	BS in ppm	SS in ppm
1A	48.4	321
1B	39.7	128
1C	45.9	331
1D		114
2A	49.2	134
2B	52	81.6
2C	34.1	69.6
3A	45.8	65.8
3B	36.2	58.5
4A		



Zinc in Offsite Soils

Bearing 068

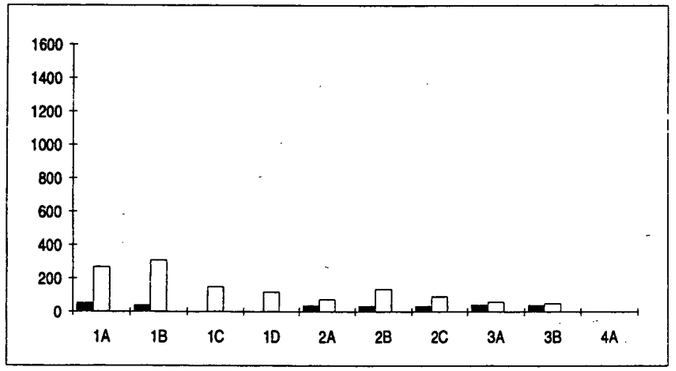
Location	BS in ppm	SS in ppm
1A	95.7	329
1B	48	538
1C	43.1	123
1D	35	114
2A	51.8	112
2B	35.2	101
2C	35.2	91.3
3A	43.3	94.9
3B	41.3	104
4A		



Zinc in Offsite Soils

Bearing 023

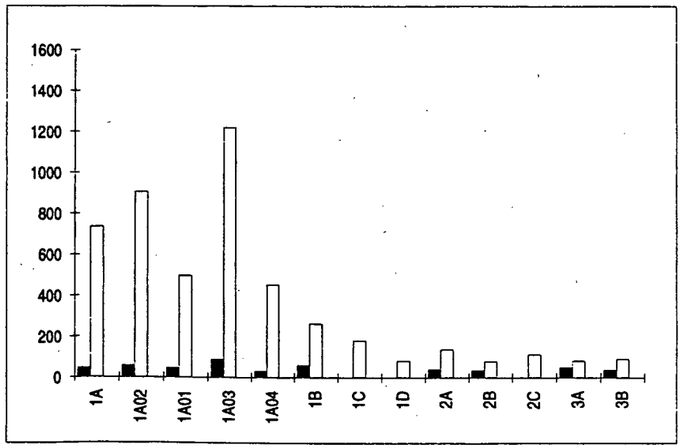
Location	BS in ppm	SS in ppm
1A	54.2	267
1B	39.2	307
1C		148
1D		117
2A	36	72.6
2B	34.1	135
2C	34.5	91.3
3A	41.7	57.9
3B	39.2	50.3
4A		



Zinc in Offsite Soils

Bearing 045

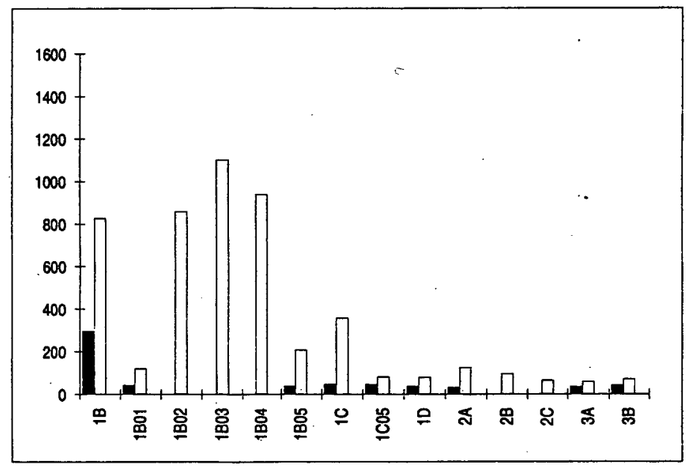
Location	BS in ppm	SS in ppm
1A	47.2	735
1A02	57.9	906
1A01	46.2	497
1A03	88.4	1220
1A04	31.3	452
1B	60.2	263
1C		180
1D		81.1
2A	41.1	137
2B	36.3	78.6
2C		113
3A	50.1	82
3B	38.1	90.7



Zinc in Offsite Soils

Bearing 090

Location	BS in ppm	SS in ppm
1B	296	827
1B01	42.1	120
1B02		858
1B03		1100
1B04		938
1B05	38.5	207
1C	47.3	357.4
1C05	46.9	81.5
1D	37.6	78.7
2A	32	124
2B		95.9
2C		64.7
3A	35.5	58.7
3B	43.1	71.2



Legend:

■ Below surface concentration in ppm

□ Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Zinc in Relationship with Distance from Site, NE Quadrant

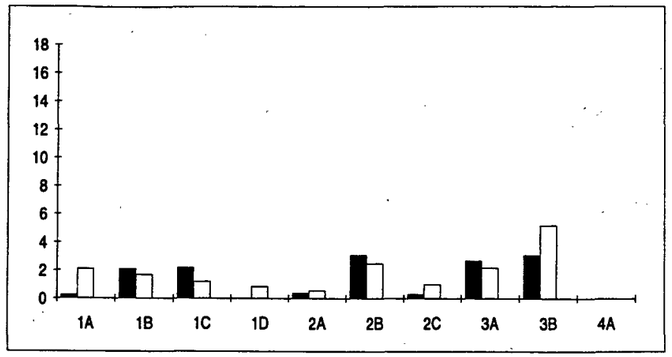
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-6	

83-1477b.230
12-6-83 MK:1

Selenium in Offsite Soils

Bearing 000

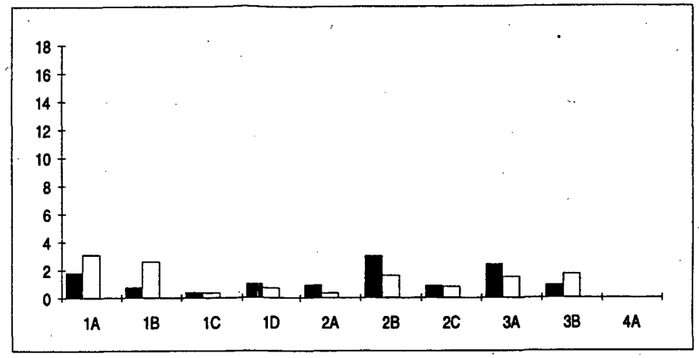
Location	BS in ppm	SS in ppm
1A	0.27	2.1
1B	2.1	1.7
1C	2.2	1.2
1D		0.85
2A	0.4	0.56
2B	3.1	2.5
2C	0.3	1
3A	2.7	2.2
3B	3.1	5.2
4A		



Selenium in Offsite Soils

Bearing 068

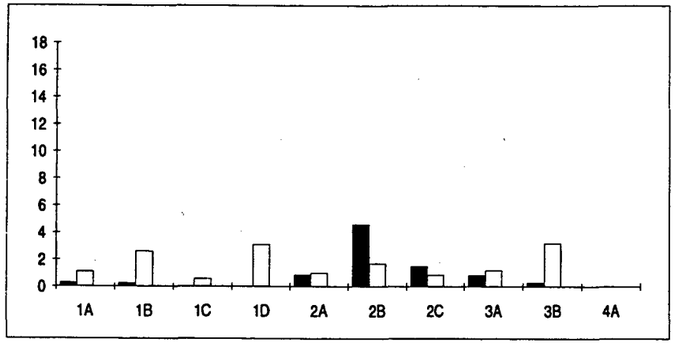
Location	BS in ppm	SS in ppm
1A	1.8	3.1
1B	0.76	2.6
1C	0.41	0.35
1D	1	0.71
2A	0.94	0.36
2B	3	1.6
2C	0.86	0.8
3A	2.4	1.5
3B	0.92	1.7
4A		



Selenium in Offsite Soils

Bearing 023

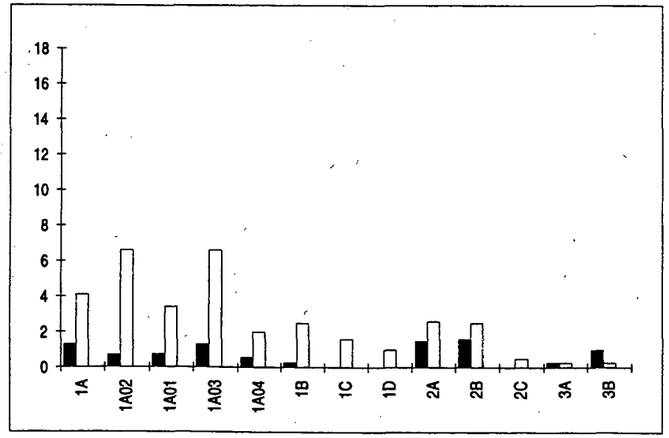
Location	BS in ppm	SS in ppm
1A	0.29	1.1
1B	0.25	2.6
1C		0.59
1D		3.1
2A	0.86	0.99
2B	4.6	1.7
2C	1.5	0.87
3A	0.84	1.2
3B	0.3	3.2
4A		



Selenium in Offsite Soils

Bearing 045

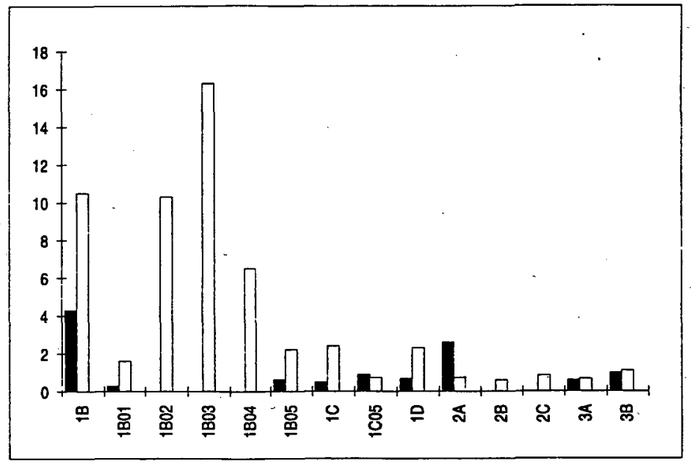
Location	BS in ppm	SS in ppm
1A	1.3	4.1
1A02	0.7	6.6
1A01	0.73	3.4
1A03	1.3	6.6
1A04	0.57	2
1B	0.28	2.5
1C		1.6
1D		1
2A	1.5	2.6
2B	1.6	2.5
2C		0.5
3A	0.29	0.27
3B	1	0.26



Selenium in Offsite Soils

Bearing 090

Location	BS in ppm	SS in ppm
1B	4.3	10.5
1B01	0.29	1.6
1B02		10.3
1B03		16.3
1B04		6.5
1B05	0.62	2.2
1C	0.5	2.4
1C05	0.89	0.73
1D	0.68	2.3
2A	2.6	0.73
2B		0.6
2C		0.84
3A	0.6	0.67
3B	0.98	1.1



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Selenium in Relationship with Distance from Site, NE Quadrant

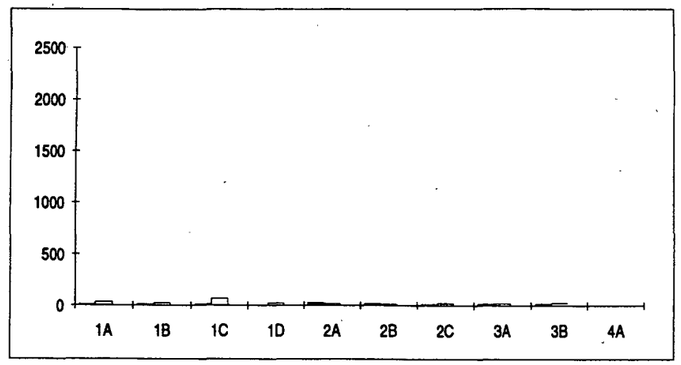
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-7	

83-1477b.231
12-6-83 MK:1

Lead in Offsite Soils

Bearing 000

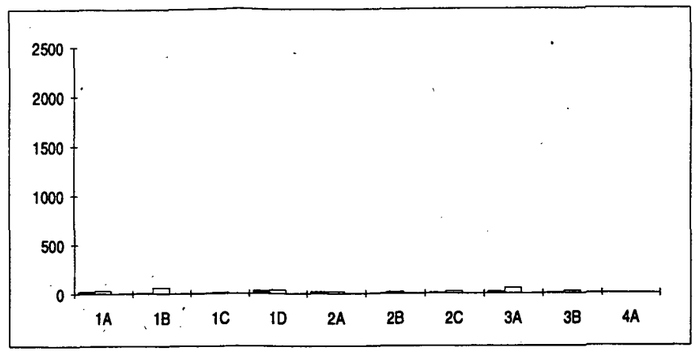
Location	BS in ppm	SS in ppm
1A	9.4	33.9
1B	12.1	24.1
1C	11.9	68.1
1D		20.8
2A	29.3	17.2
2B	20.5	12.3
2C	9.8	21.5
3A	17.2	21.6
3B	16.6	26
4A		



Lead in Offsite Soils

Bearing 068

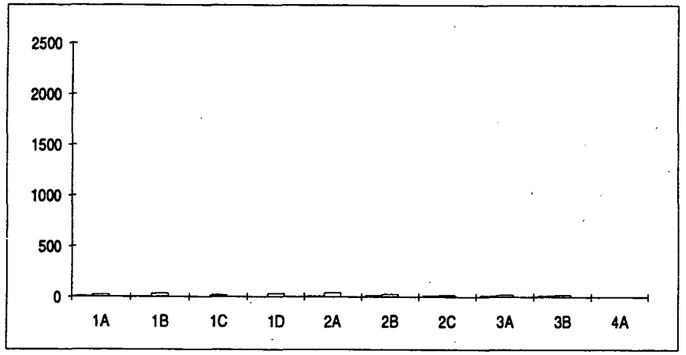
Location	BS in ppm	SS in ppm
1A	23.4	29.2
1B	8.1	61.3
1C	3.9	10.9
1D	32.4	39.4
2A	20.8	18.7
2B	5	17.7
2C	10.1	23.7
3A	19.1	56.7
3B	8.3	24.4
4A		



Lead in Offsite Soils

Bearing 023

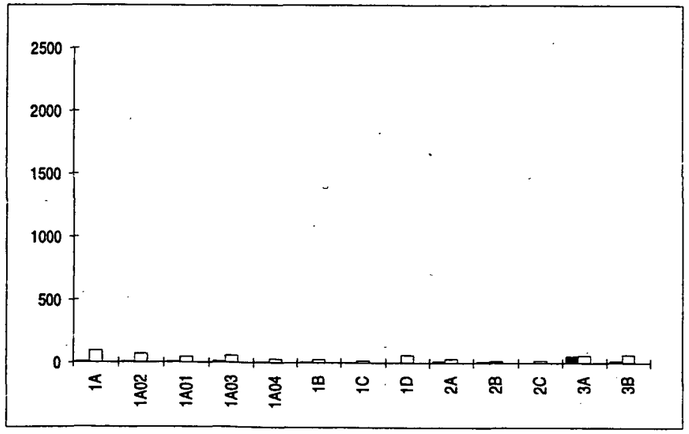
Location	BS in ppm	SS in ppm
1A	7.5	23.2
1B	4.9	32.3
1C		19.3
1D		30.7
2A	6.4	39.9
2B	14.6	25.9
2C	11.5	17.5
3A	14.3	20.5
3B	11	19.3
4A		



Lead in Offsite Soils

Bearing 045

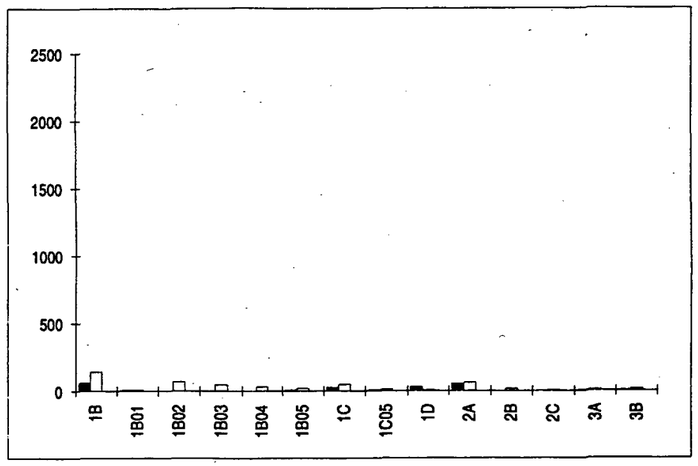
Location	BS in ppm	SS in ppm
1A	8.1	95
1A02	8.2	69.5
1A01	7.73	45.1
1A03	11.3	57.3
1A04	6.4	29.3
1B	7.5	27.6
1C		17.1
1D		62.7
2A	13.9	31.4
2B	12.7	16.5
2C		20.2
3A	55.1	59.5
3B	14.8	64.4



Lead in Offsite Soils

Bearing 090

Location	BS in ppm	SS in ppm
1B	64.9	142
1B01	7.9	10.6
1B02		69.3
1B03		47.6
1B04		31.4
1B05	7.8	19.1
1C	29.1	50
1C05	9.6	12
1D	30.6	5.7
2A	53.9	63.3
2B		16.2
2C		8.5
3A	5.1	9.6
3B	5.3	15.2



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Lead in Relationship with Distance from Site, NE Quadrant

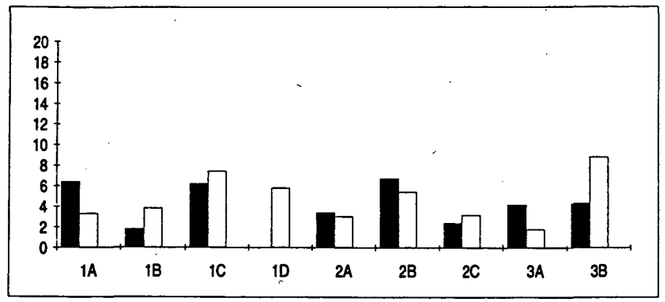
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-8	

93-1477b.232
12-8-93 Nk: 1

Arsenic in Offsite Soils

Bearing 000

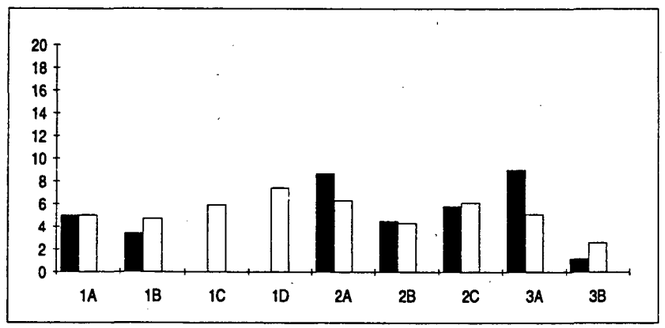
Location	BS in ppm	SS in ppm
1A	6.4	3.3
1B	1.8	3.8
1C	6.2	7.4
1D		5.8
2A	3.4	3
2B	6.7	5.4
2C	2.4	3.2
3A	4.2	1.8
3B	4.3	8.8



Arsenic in Offsite Soils

Bearing 023

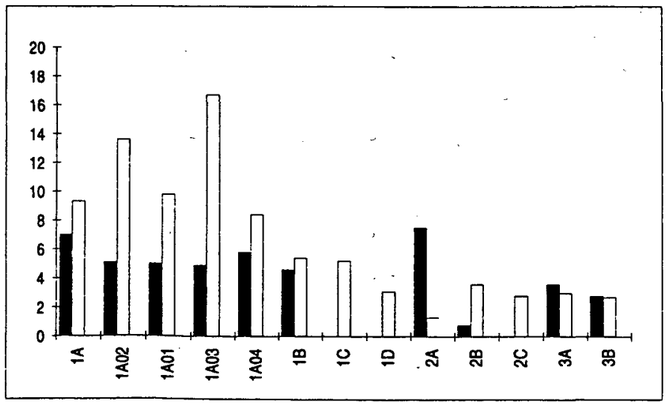
Location	BS in ppm	SS in ppm
1A	5	5
1B	3.4	4.7
1C		5.9
1D		7.4
2A	8.7	6.3
2B	4.5	4.3
2C	5.8	6.1
3A	9	5.1
3B	1.2	2.6



Arsenic in Offsite Soils

Bearing 045

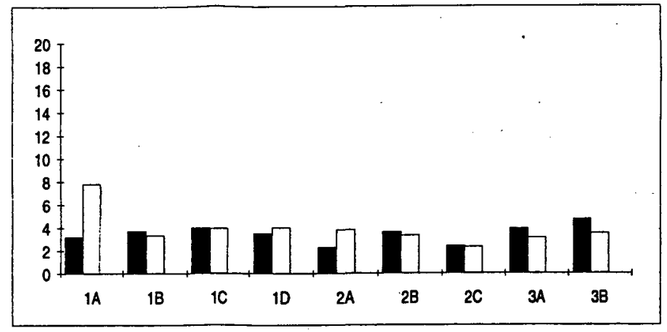
Location	BS in ppm	SS in ppm
1A	7	9.3
1A02	5.1	13.6
1A01	5	9.8
1A03	4.9	16.7
1A04	5.8	8.4
1B	4.6	5.4
1C		5.2
1D		3.1
2A	7.5	1.3
2B	0.79	3.6
2C		2.8
3A	3.6	3
3B	2.8	2.7



Arsenic in Offsite Soils

Bearing 068

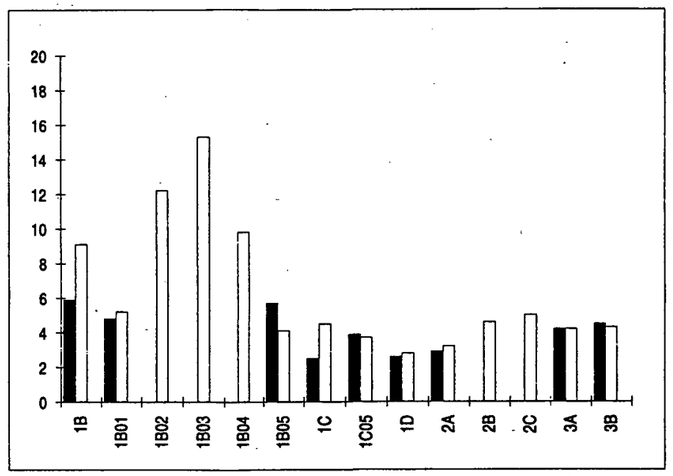
Location	BS in ppm	SS in ppm
1A	3.2	7.8
1B	3.7	3.3
1C	4	3.9
1D	3.5	4
2A	2.3	3.8
2B	3.6	3.3
2C	2.4	2.3
3A	3.9	3.1
3B	4.7	3.5



Arsenic in Offsite Soils

Bearing 090

Location	BS in ppm	SS in ppm
1B	5.9	9.1
1B01	4.8	5.2
1B02		12.2
1B03		15.3
1B04		9.8
1B05	5.7	4.1
1C	2.5	4.5
1C05	3.9	3.7
1D	2.6	2.8
2A	2.9	3.2
2B		4.6
2C		5
3A	4.2	4.2
3B	4.5	4.3



Legend:

■ Below surface concentration in ppm

□ Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Arsenic in Relationship with Distance from Site, NE Quadrant

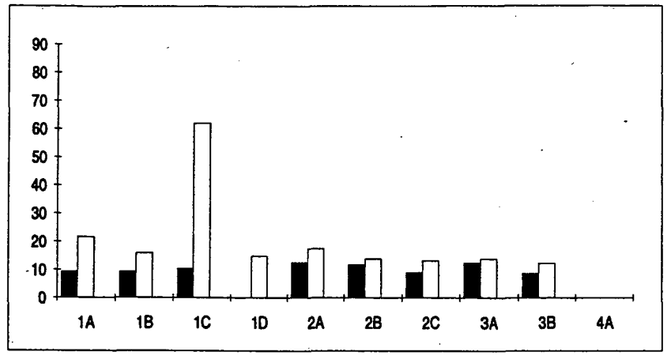
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-9	

93-1477b.233
12-6-93 /kk : 1

Copper in Offsite Soils

Bearing 000

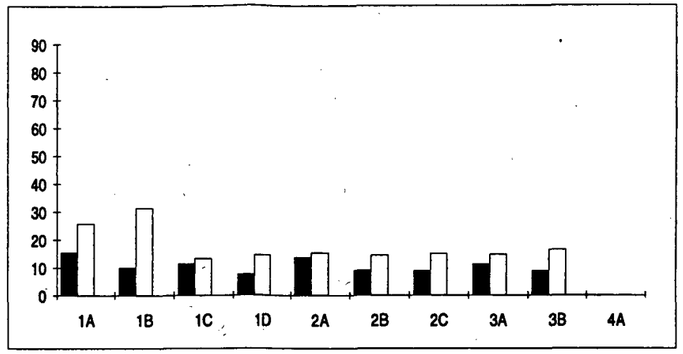
Location	BS in ppm	SS in ppm
1A	9.4	21.6
1B	9.3	15.9
1C	10.4	61.9
1D		14.8
2A	12.6	17.5
2B	11.8	13.9
2C	9	13.2
3A	12.5	13.9
3B	8.7	12.3
4A		



Copper in Offsite Soils

Bearing 068

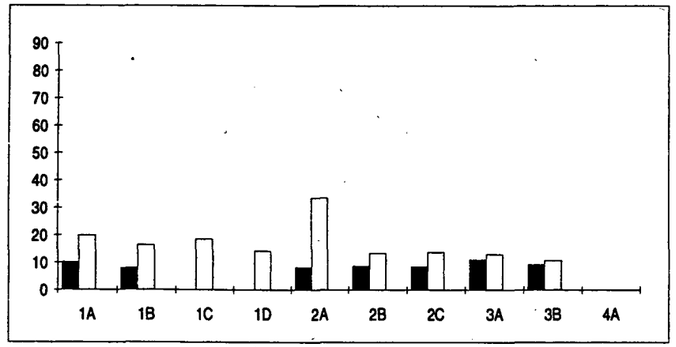
Location	BS in ppm	SS in ppm
1A	15.4	25.7
1B	10	31.3
1C	11.4	13.2
1D	7.5	14.4
2A	13.7	15.3
2B	9	14.3
2C	8.8	14.9
3A	11.2	14.7
3B	8.8	16.3
4A		



Copper in Offsite Soils

Bearing 023

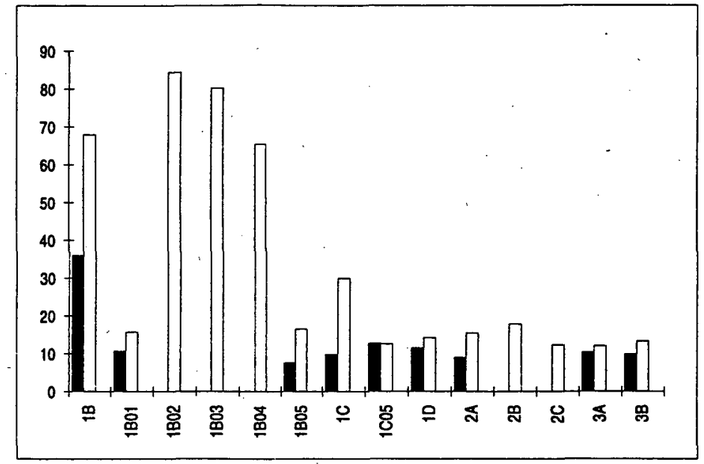
Location	BS in ppm	SS in ppm
1A	10.2	19.9
1B	8.1	16.4
1C		18.5
1D		14.2
2A	8.3	33.6
2B	8.7	13.4
2C	8.5	13.7
3A	11	13
3B	9.3	10.8
4A		



Copper in Offsite Soils

Bearing 090

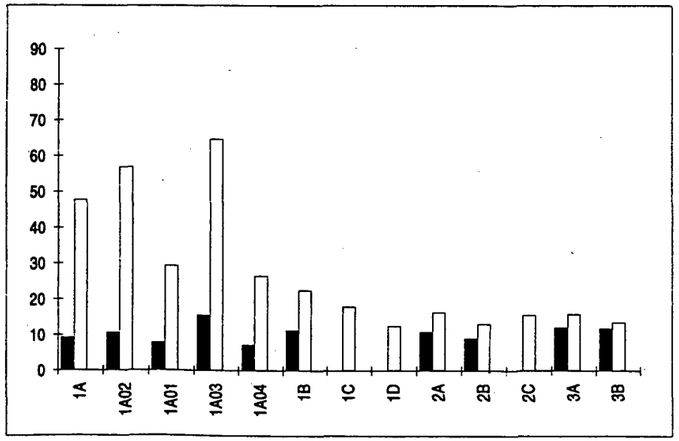
Location	BS in ppm	SS in ppm
1B	36	67.9
1B01	10.7	15.7
1B02		84.4
1B03		80.2
1B04		65.3
1B05	7.6	16.5
1C	9.8	29.9
1C05	12.8	12.6
1D	11.5	14.2
2A	9	15.4
2B		17.8
2C		12.3
3A	10.4	12.1
3B	9.9	13.3



Copper in Offsite Soils

Bearing 045

Location	BS in ppm	SS in ppm
1A	9.2	47.7
1A02	10.5	56.9
1A01	7.8	29.4
1A03	15.5	64.7
1A04	7.2	26.5
1B	11.3	22.5
1C		17.9
1D		12.5
2A	10.8	16.3
2B	9.1	13.1
2C		15.5
3A	12	15.7
3B	11.8	13.5



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

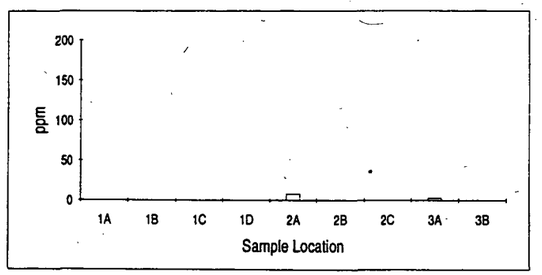
Concentration of Copper in Relationship with Distance from Site, NE Quadrant

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-10	

93-1477b.234
12-4-93 /vk : 1

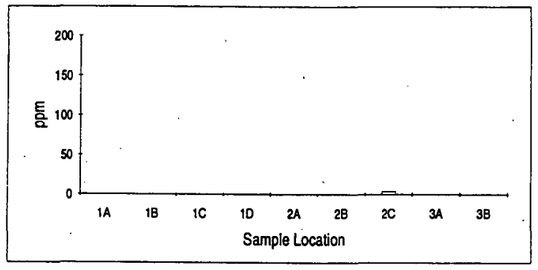
Cadmium in Offsite Soils
Bearing 113

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	0.71	7.8
2B		
2C		
3A	0.52	2.7
3B		



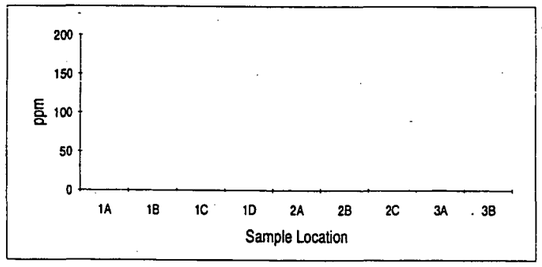
Cadmium in Offsite Soils
Bearing 120

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C	0.29	4.1
3A		
3B		



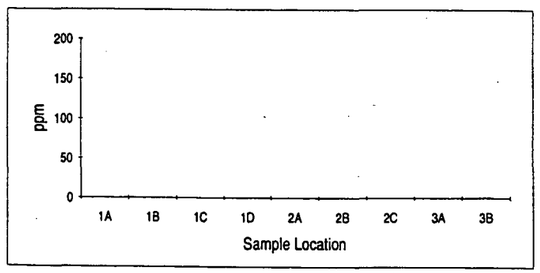
Cadmium in Offsite Soils
Bearing 125

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	0.37	0.95
3B		



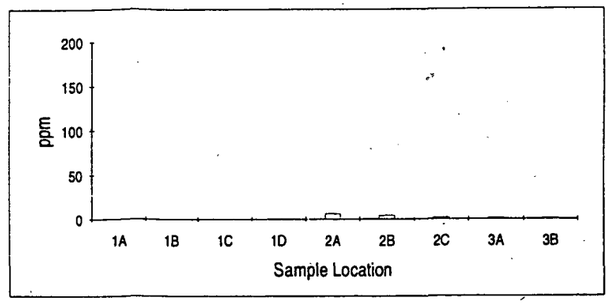
Cadmium in Offsite Soils
Bearing130

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	0.38	1



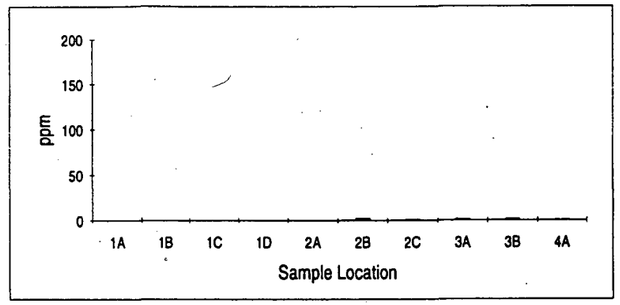
Cadmium in Offsite Soils
Bearing 135

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	0.48	6.3
2B	0.97	4.2
2C	0.54	1.8
3A		1.3
3B	0.45	1



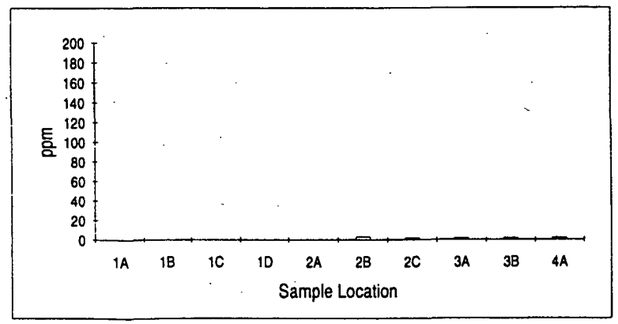
Cadmium in Offsite Soils
Bearing 158

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B	0.62	2.4
2C	0.63	1.2
3A		1.5
3B	0.49	1.5
4A	0.37	0.54



Cadmium in Offsite Soils
Bearing 180

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		2.9
2C		1.8
3A	0.57	1.7
3B		1.7
4A		1.9



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

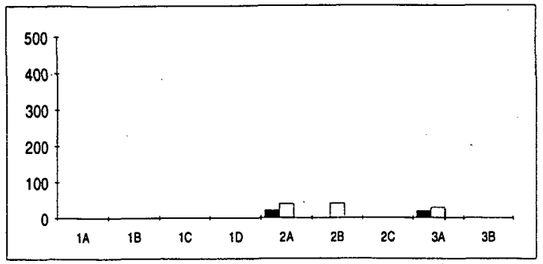
Concentration of Cadmium in Relationship with Distance from Site, SE Quadrant

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-11	

93-1477b.235
12-8-93 Mk:1

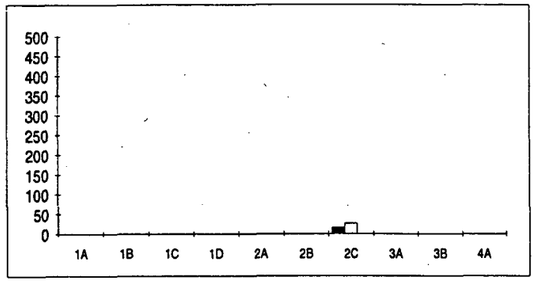
Chromium in Offsite Soils
Bearing 113

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	22.1	39.4
2B		40
2C		
3A	19.7	28.8
3B		



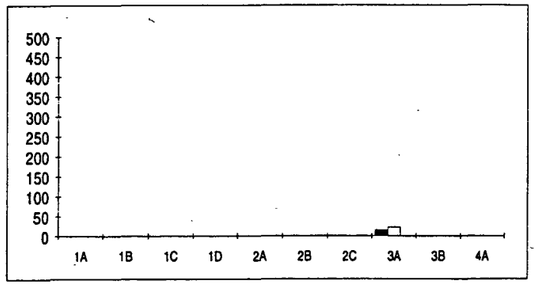
Chromium in Offsite Soils
Bearing 120

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C	16.9	26.3
3A		
3B		
4A		



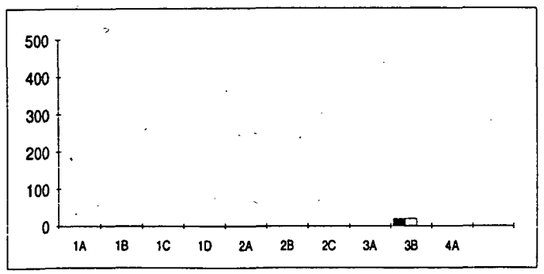
Chromium in Offsite Soils
Bearing 125

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	15.3	21.9
3B		
4A		



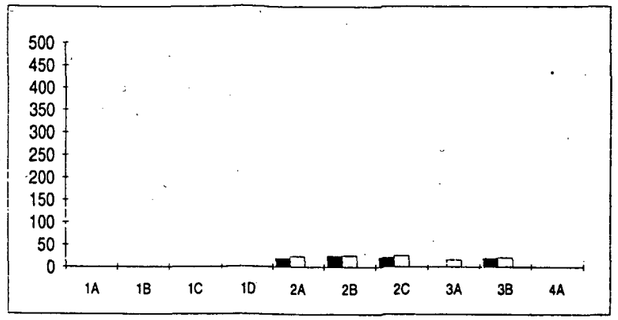
Chromium in Offsite Soils
Bearing 130

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	19.7	19.3
4A		



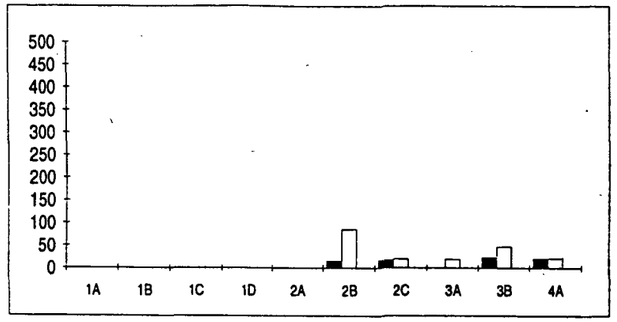
Chromium in Offsite Soils
Bearing 135

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	19.1	23.6
2B	25.4	25.3
2C	21.3	25.1
3A		16.4
3B	19.5	21.2
4A		



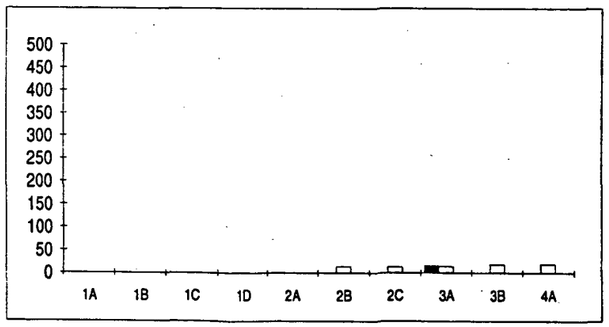
Chromium in Offsite Soils
Bearing 158

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B	16.3	86
2C	17.5	19.9
3A		19.2
3B	24.3	47.1
4A	21.1	21.4



Chromium in Offsite Soils
Bearing 180

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		14.3
2C		13.1
3A	15.9	14.2
3B		18.2
4A		19.2



Legend:

■ Below surface concentration in ppm

□ Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Chromium in Relationship with Distance from Site, SE Quadrant

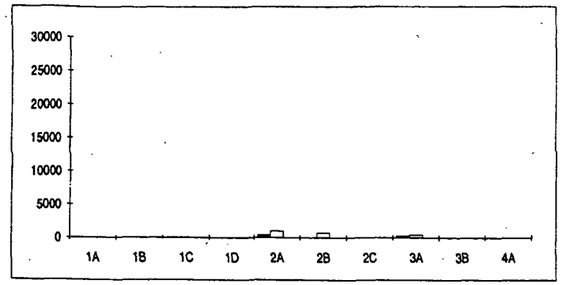
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-12	

93-1477b.236
12-6-93 /vk: 1

Fluoride in Offsite Soil

Bearing 113

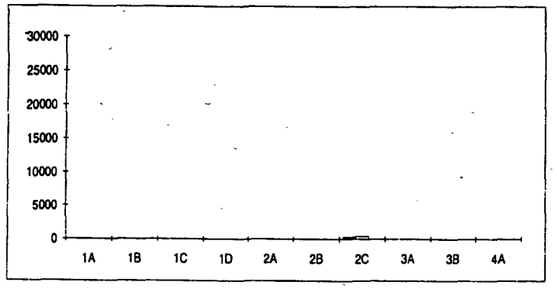
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	455	1020
2B		733
2C		
3A	315	443
3B		
4A		



Fluoride in Offsite Soil

Bearing 120

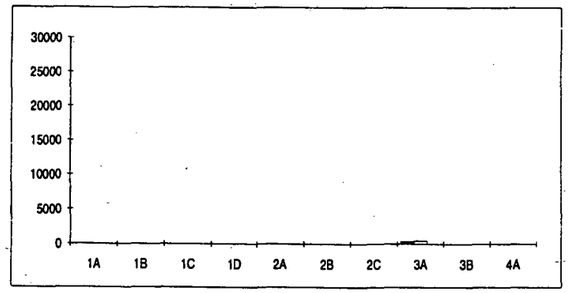
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C	388	445
3A		
3B		
4A		



Fluoride in Offsite Soil

Bearing125

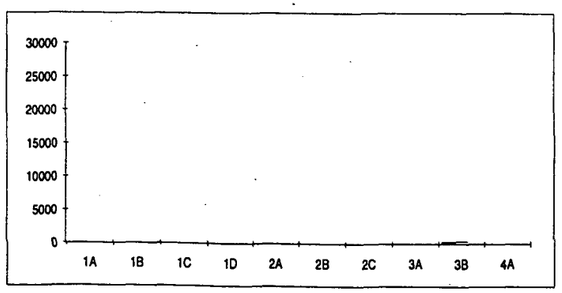
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	403	443
3B		
4A		



Fluoride in Offsite Soil

Bearing 130

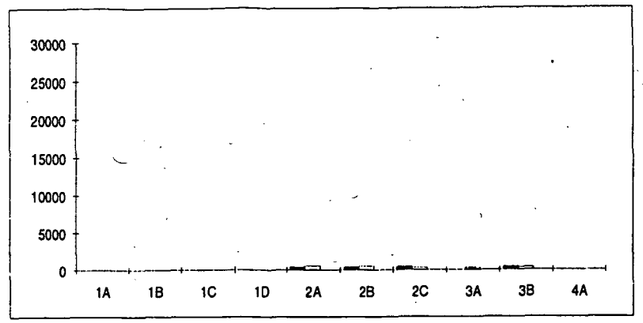
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	358	395
4A		



Fluoride in Offsite Soil

Bearing 135

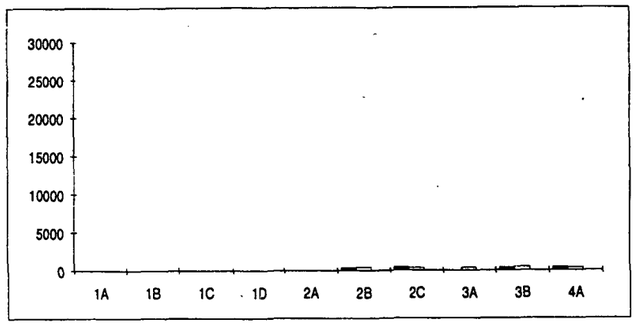
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	438	575
2B	415	515
2C	455	300
3A		288
3B	445	355
4A		



Fluoride in Offsite Soil

Bearing 158

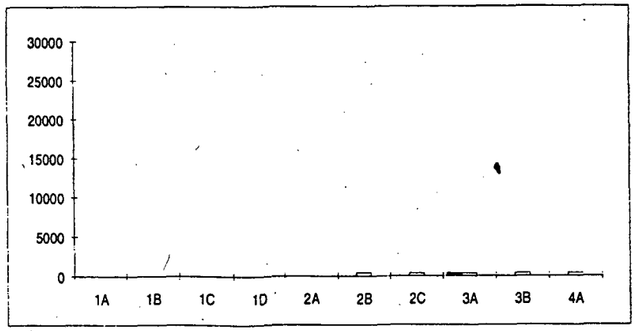
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B	400	418
2C	483	353
3A		360
3B	398	450
4A	443	378



Fluoride in Offsite Soil

Bearing 180

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		433
2C		348
3A	423	345
3B		390
4A		380



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

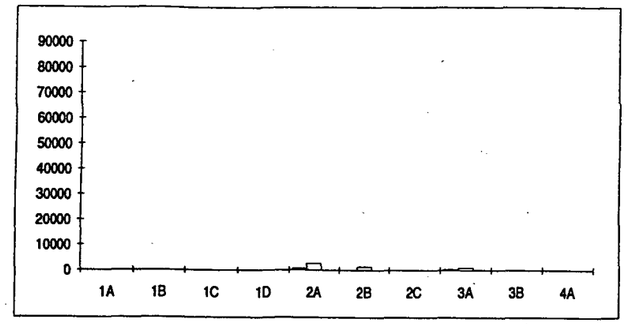
Concentration of Fluoride in Relationship with Distance from Site, SE Quadrant

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-13	

93-1417h.237
12-9-93 MA:1

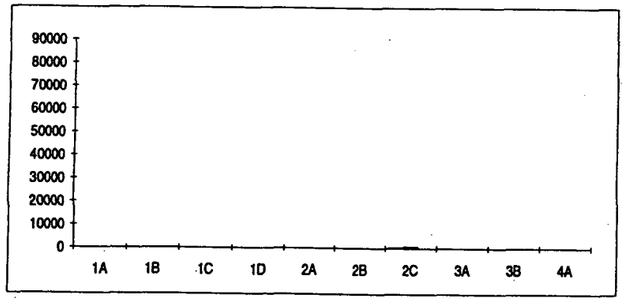
Total Phosphorus in Offsite Soil
Bearing 113

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	775	2690
2B		1350
2C		
3A	442	937
3B		
4A		



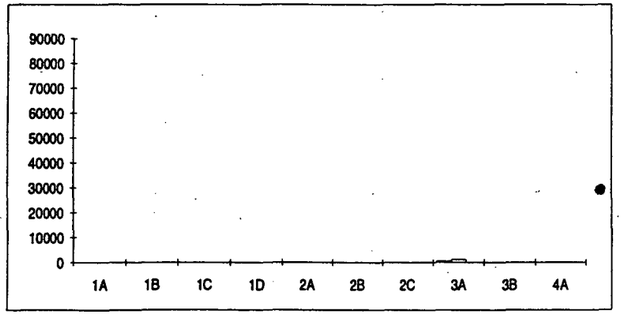
Total Phosphorus in Offsite Soil
Bearing 120

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C	466	878
3A		
3B		
4A		



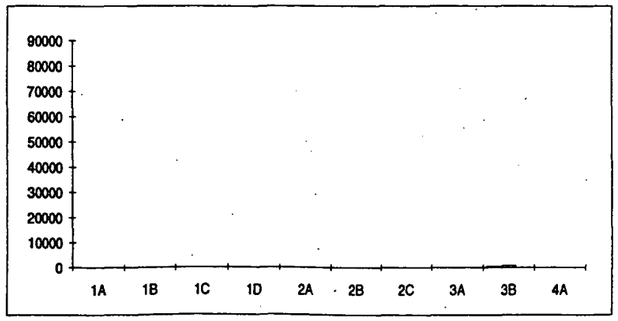
Total Phosphorus in Offsite Soil
Bearing 125

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	648	1230
3B		
4A		



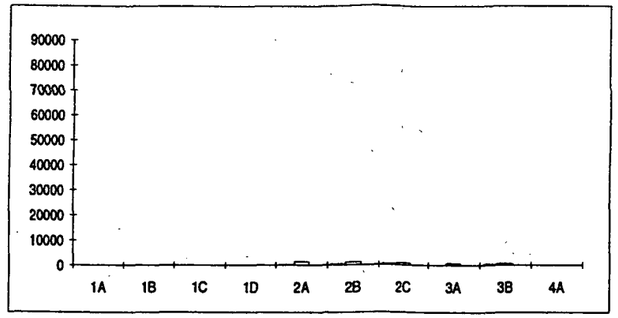
Total Phosphorus in Offsite Soil
Bearing 130

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	672	890
4A		



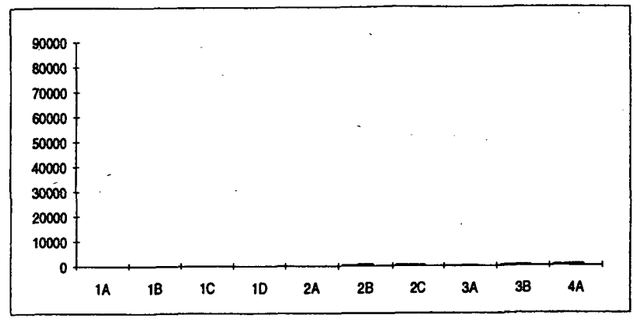
Total Phosphorus in Offsite Soil
Bearing 135

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	360	1430
2B	527	1190
2C	625	874
3A		772
3B	501	695
4A		



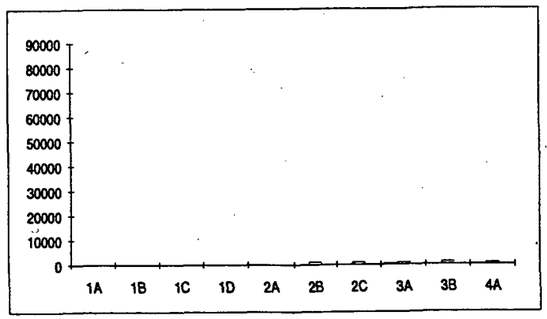
Total Phosphorus in Offsite Soil
Bearing158

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B	447	820
2C	573	507
3A		409
3B	493	458
4A	690	766



Total Phosphorus in Offsite Soil
Bearing180

Location	BS in ppm	SS in ppm	
1A			
1B			
1C			
1D			
2A			
2B		1080	
2C		954	
3A	490	901	
3B		1070	85000
4A		701	



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

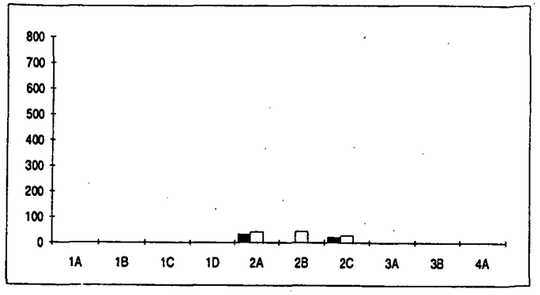
Concentration of Total Phosphorus in Relationship with Distance from Site, SE Quadrant

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-14	

93-14770.238
12-3-93 /VK : 0

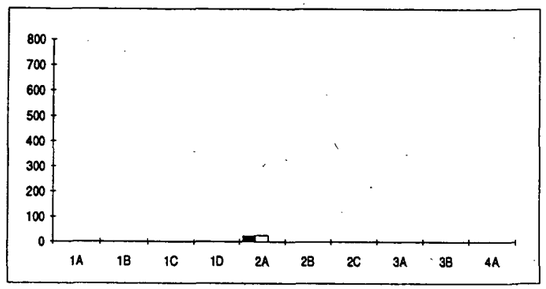
Vanadium in Offsite Soils
Bearing113

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	33.8	42.2
2B		43.6
2C	22	27.2
3A		
3B		
4A		



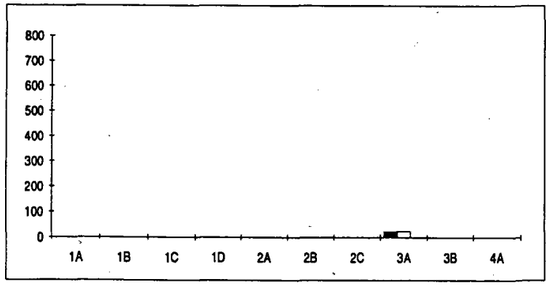
Vanadium in Offsite Soils
Bearing 120

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	24.3	25.4
2B		
2C		
3A		
3B		
4A		



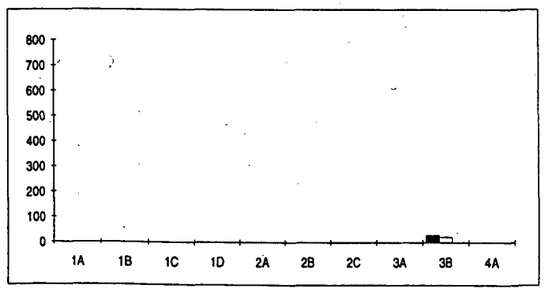
Vanadium in Offsite Soils
Bearing 125

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	23.9	25.1
3B		
4A		



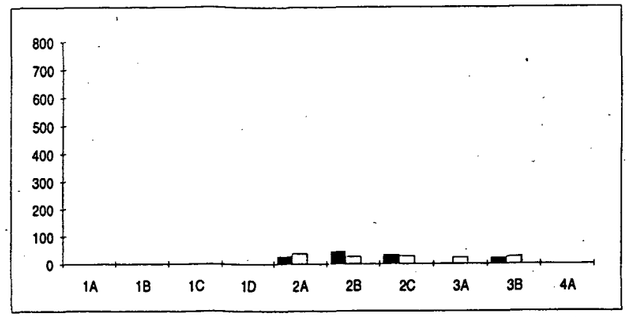
Vanadium in Offsite Soils
Bearing130

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	30.7	22
4A		



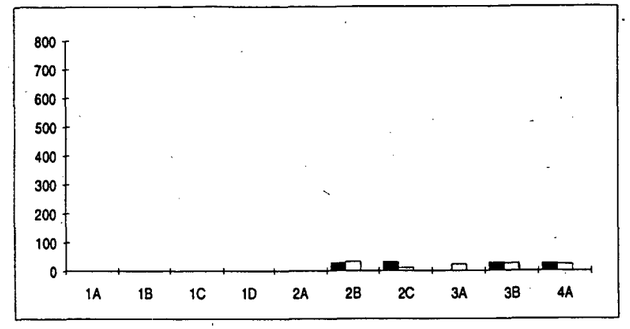
Vanadium in Offsite Soils
Bearing 135

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	28.3	37.7
2B	44.1	25.8
2C	33.1	28.4
3A		22.8
3B	22.2	26.2
4A		



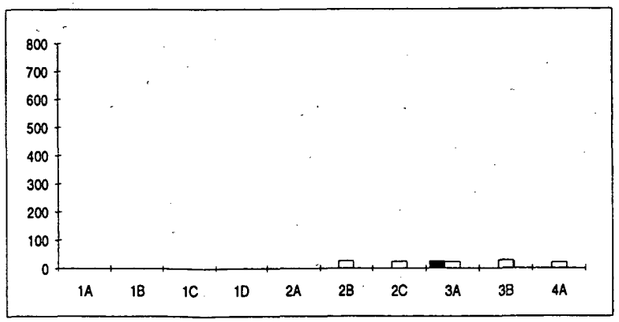
Vanadium in Offsite Soils
Bearing 158

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B	28.3	32.3
2C	31.7	10.6
3A		22.6
3B	29.5	26.1
4A	27.4	22.9



Vanadium in Offsite Soils
Bearing 180

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		26.1
2C		24.3
3A	26	23
3B		28.9
4A		20.8



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Vanadium in Relationship with Distance from Site, SE Quadrant

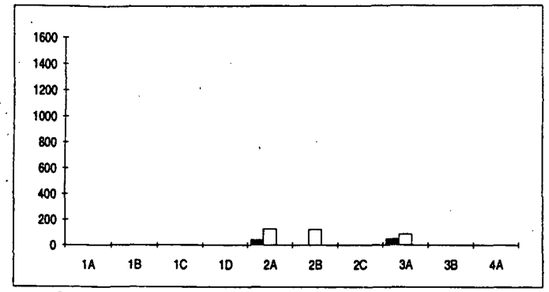
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-15	

83-1477b.239
12-3-93 /vk: 0

Zinc in Offsite Soils

Bearing113

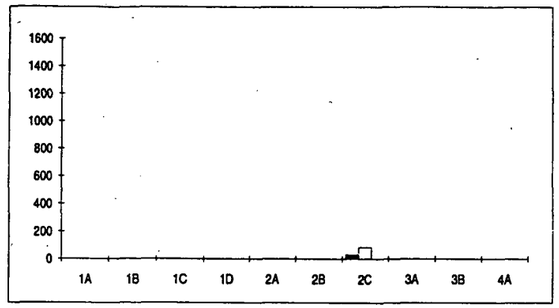
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	42.5	127
2B		123
2C		
3A	49.8	84.8
3B		
4A		



Zinc in Offsite Soils

Bearing 120

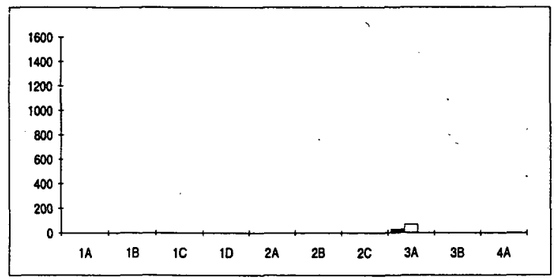
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C	33.6	84.9
3A		
3B		
4A		



Zinc in Offsite Soils

Bearing 125

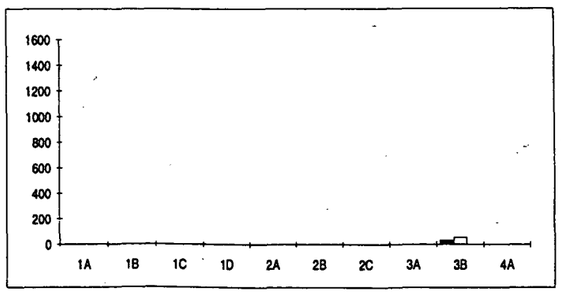
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	30.2	68.4
3B		
4A		



Zinc in Offsite Soils

Bearing 130

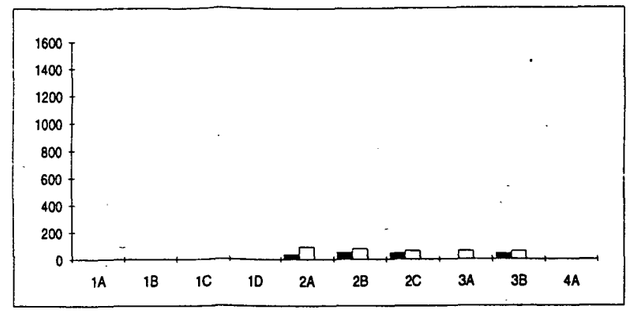
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	33.6	55.9
4A		



Zinc in Offsite Soils

Bearing 135

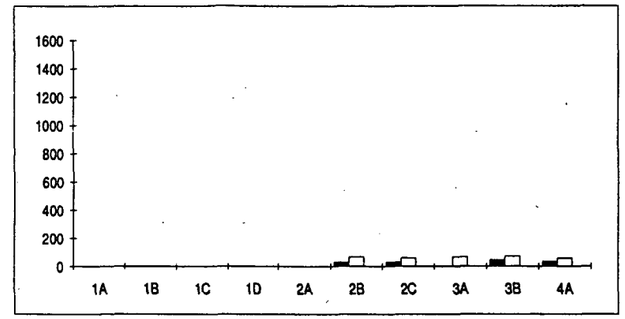
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	37.7	91.6
2B	52.8	78
2C	49.4	63.7
3A		61
3B	41.7	60.2
4A		



Zinc in Offsite Soils

Bearing 158

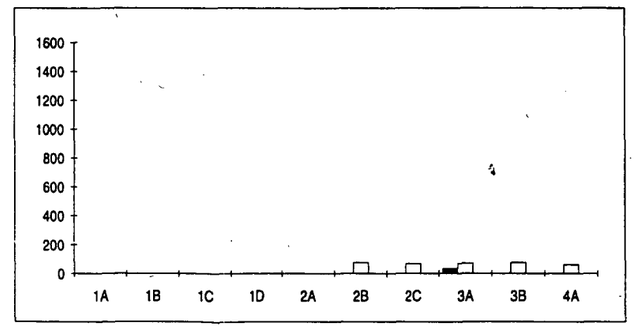
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B	32	68.9
2C	32.4	61.2
3A		67.6
3B	47.5	71.3
4A	36.5	58.5



Zinc in Offsite Soils

Bearing 180

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		75.8
2C		67.3
3A	37.4	70.2
3B		75.8
4A		61.1



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Zinc in Relationship with Distance from Site, SE Quadrant

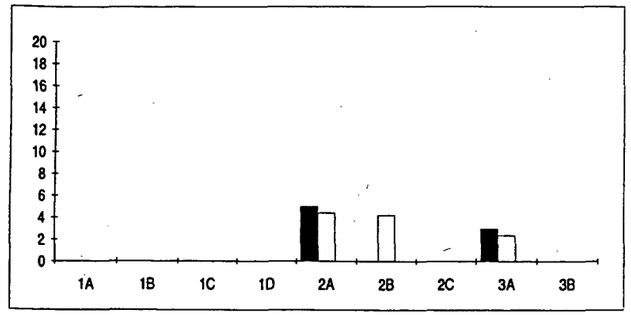
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-16	

83-1477b.240
12-3-93 /vk : 0

Arsenic in Offsite Soils

Bearing 113

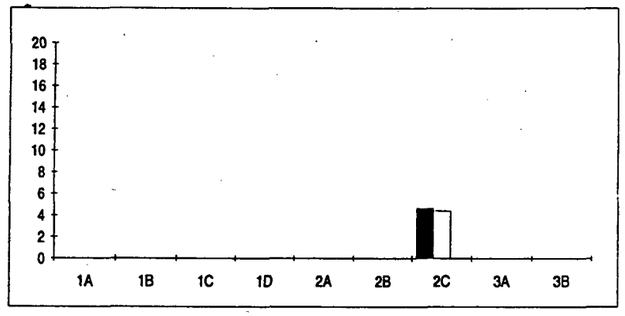
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	5	4.4
2B		4.2
2C		
3A	3	2.4
3B		



Arsenic in Offsite Soils

Bearing 120

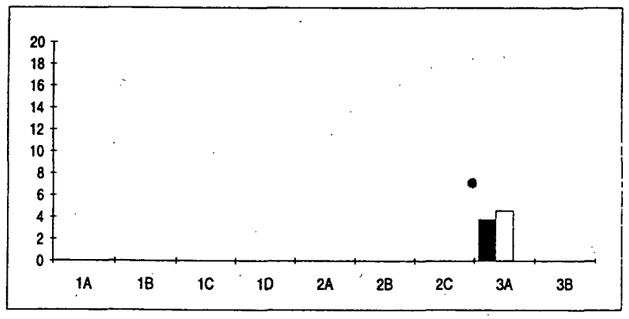
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C	4.7	4.4
3A		
3B		



Arsenic in Offsite Soils

Bearing 125

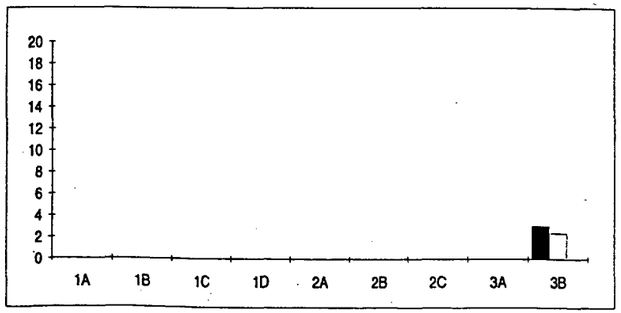
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	3.8	4.6
3B		



Arsenic in Offsite Soils

Bearing 130

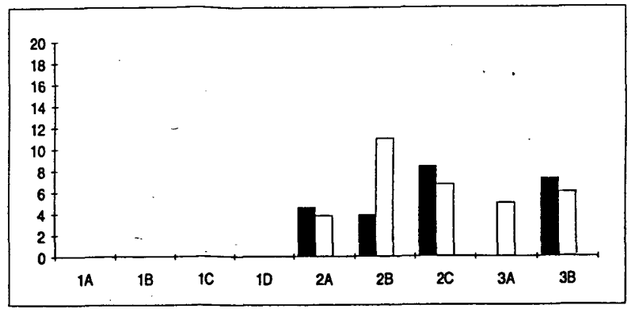
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	3.1	2.4



Arsenic in Offsite Soils

Bearing 135

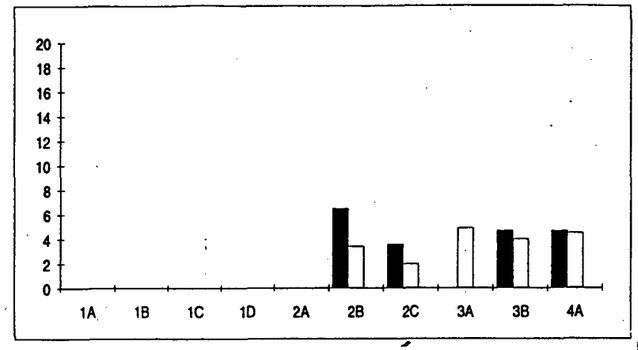
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	4.6	3.8
2B	3.9	11
2C	8.4	6.7
3A		5
3B	7.3	6



Arsenic in Offsite Soils

Bearing 158

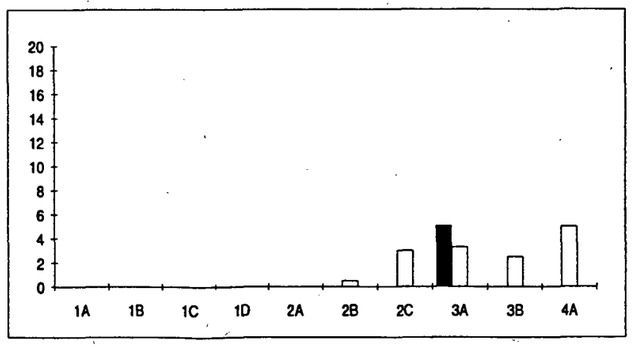
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B	6.5	3.4
2C	3.6	2
3A		4.9
3B	4.7	4
4A	4.7	4.5



Arsenic in Offsite Soils

Bearing 180

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		0.51
2C		3
3A	5.1	3.3
3B		2.5
4A		5



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Arsenic in Relationship with Distance from Site, SE Quadrant

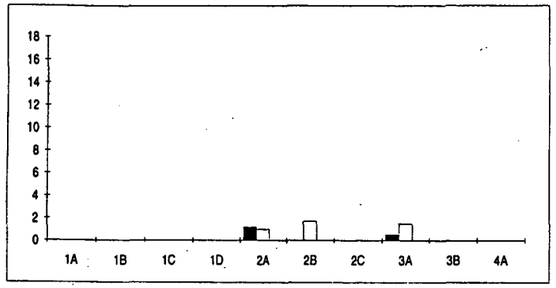
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-17	

93-1477h.241
12-3-93 MK:10

Selenium in Offsite Soils

Bearing 113

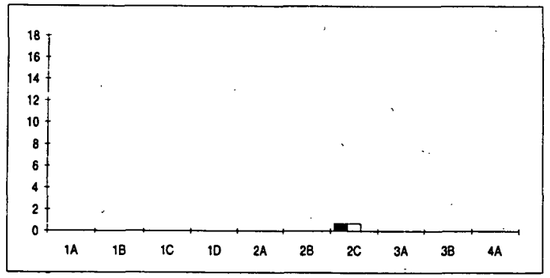
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	1.2	1
2B		1.7
2C		
3A	0.53	1.5
3B		
4A		



Selenium in Offsite Soils

Bearing120

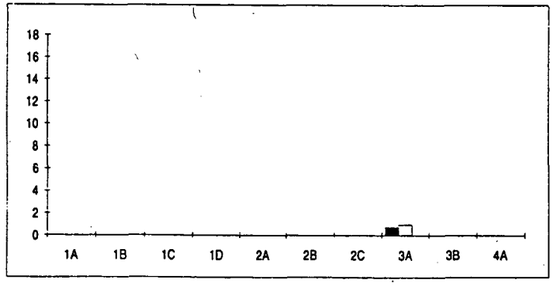
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C	0.75	0.7
3A		
3B		
4A		



Selenium in Offsite Soils

Bearing 125

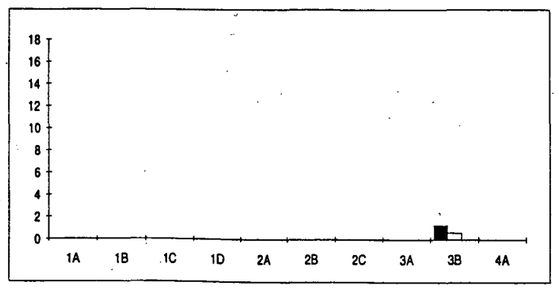
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	0.76	0.97
3B		
4A		



Selenium in Offsite Soils

Bearing 130

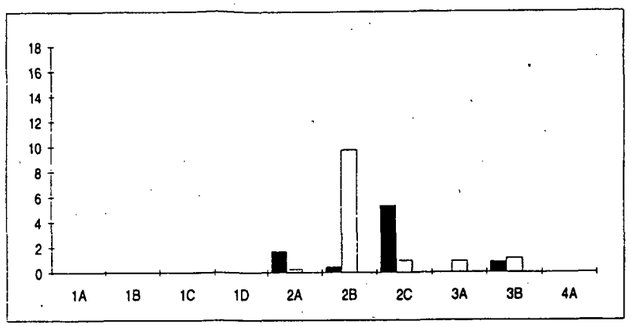
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	1.3	0.63
4A		



Selenium in Offsite Soils

Bearing 135

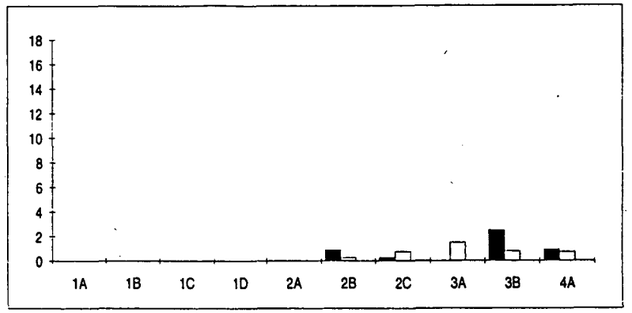
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	1.7	0.26
2B	0.44	9.7
2C	5.3	0.94
3A		0.9
3B	0.84	1.1
4A		



Selenium in Offsite Soils

Bearing 158

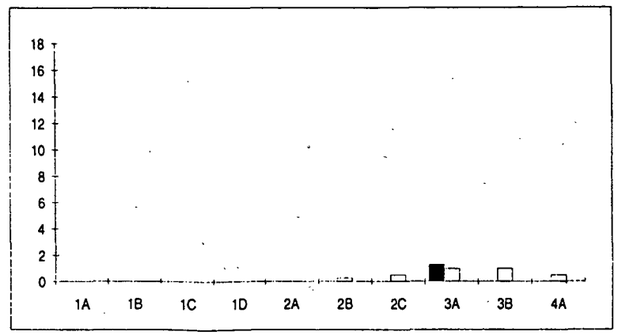
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B	0.9	0.26
2C	0.27	0.75
3A		1.5
3B	2.5	0.8
4A	0.92	0.73



Selenium in Offsite Soils

Bearing 180

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		0.26
2C		0.5
3A	1.3	0.98
3B		0.99
4A		0.5



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Selenium in Relationship with Distance from Site, SE Quadrant

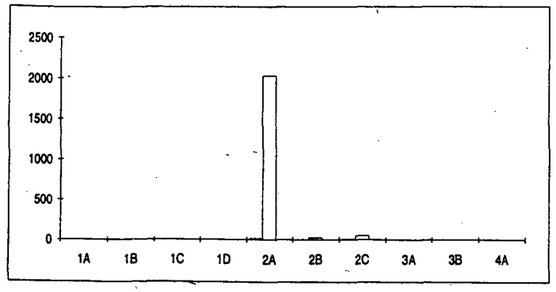
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-18	

93-1477b.242
12-3-93 Mk:0

Lead in Offsite Soils

Bearing 113

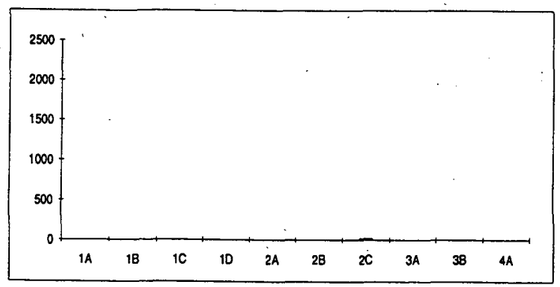
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	17.1	2030
2B		26.1
2C	9.6	52.8
3A		
3B		
4A		



Lead in Offsite Soils

Bearing120

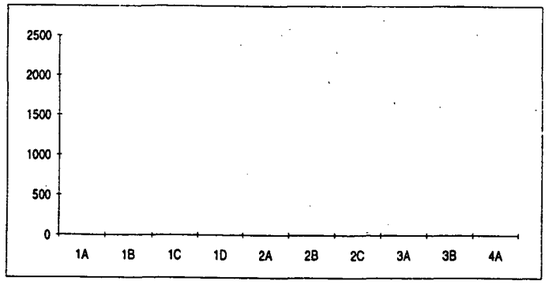
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C	6.3	21.6
3A		
3B		
4A		



Lead in Offsite Soils

Bearing 125

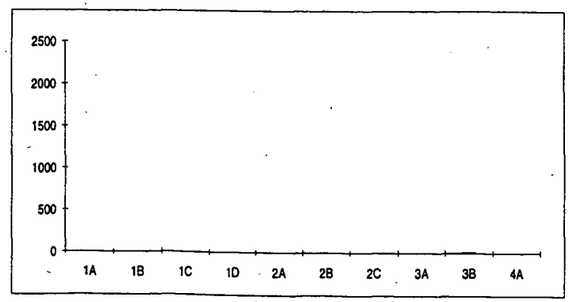
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	6.3	0.8
3B		
4A		



Lead in Offsite Soils

Bearing 130

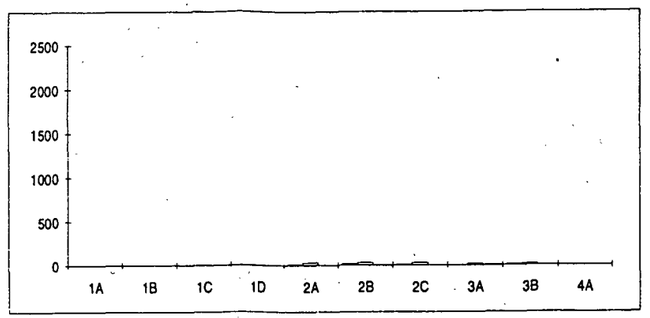
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	6.1	14.4
4A		



Lead in Offsite Soils

Bearing 135

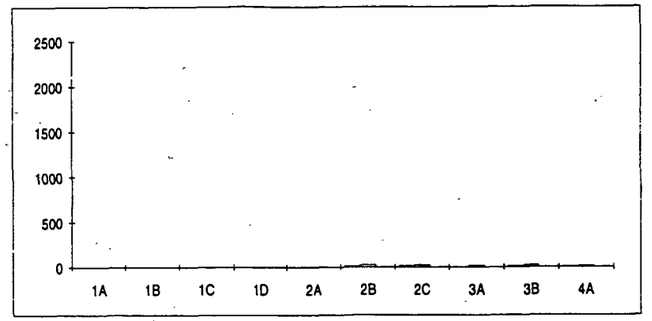
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	10.7	31.9
2B	19.5	29.1
2C	7.8	27.4
3A		15.3
3B	9.4	16
4A		



Lead in Offsite Soils

Bearing 158

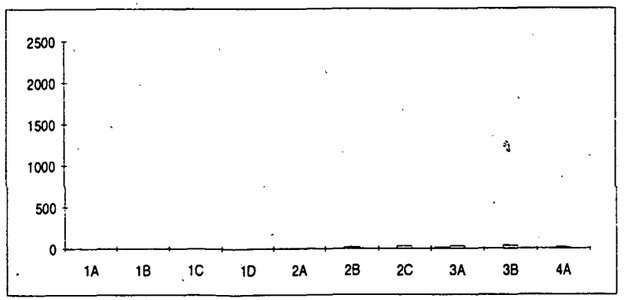
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B	13	24.6
2C	15.6	23.1
3A		18.3
3B	12.7	21.5
4A	5.9	14



Lead in Offsite Soils

Bearing180

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		21.1
2C		33
3A	19.2	30.9
3B		38.2
4A		18.3



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Lead in Relationship with Distance from Site, SE Quadrant

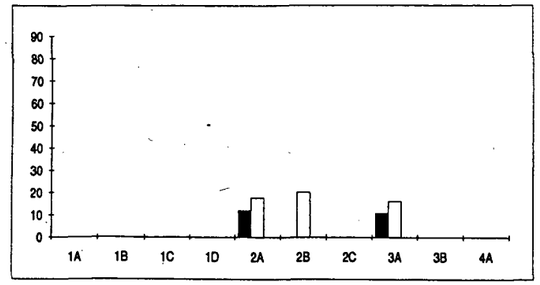
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-19	

93-1477b.243
12-3-93 /vk : 0

Copper in Offsite Soils

Bearing 113

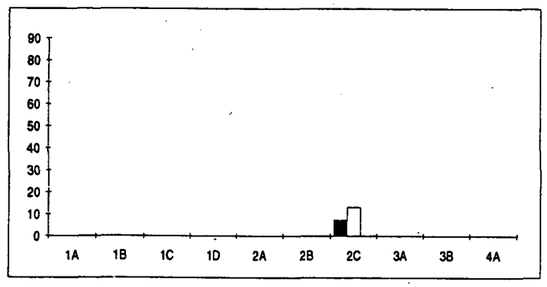
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	12.1	17.6
2B		20.2
2C		
3A	10.9	16.2
3B		
4A		



Copper in Offsite Soils

Bearing 120

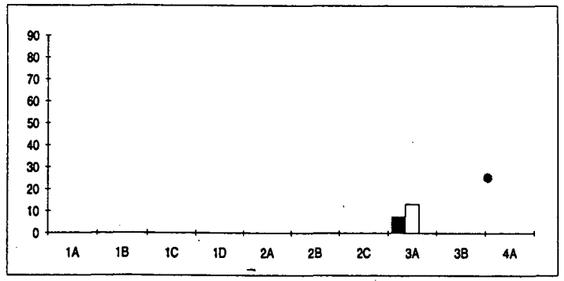
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C	7.5	13.2
3A		
3B		
4A		



Copper in Offsite Soils

Bearing 125

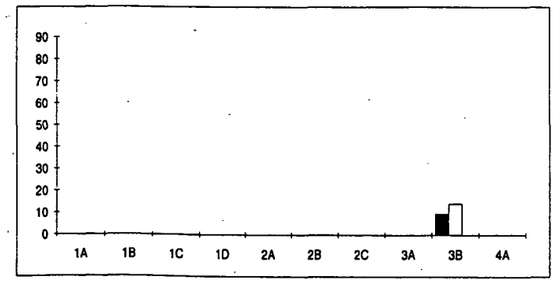
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	7.5	13.2
3B		
4A		



Copper in Offsite Soils

Bearing 130

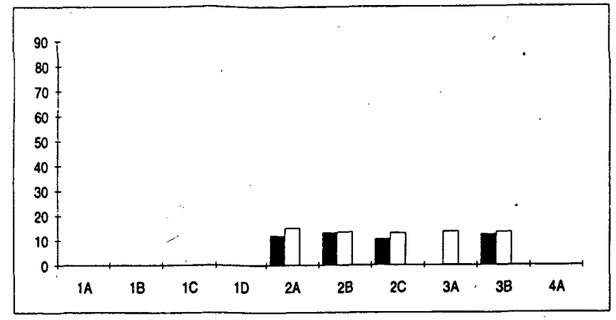
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	9.8	14.4
4A		



Copper in Offsite Soils

Bearing 135

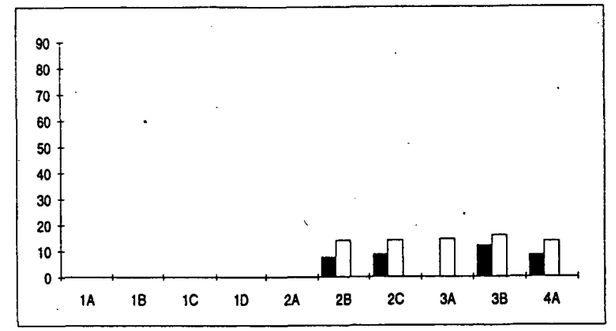
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	12	14.9
2B	13.1	13.4
2C	10.5	12.9
3A		13.5
3B	12.4	13.3
4A		



Copper in Offsite Soils

Bearing 158

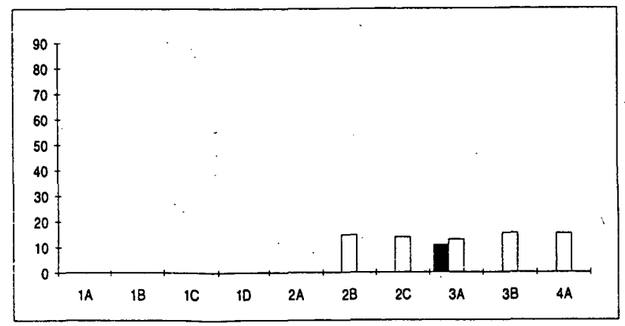
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B	7.6	14
2C	8.7	14
3A		14.5
3B	12	15.9
4A	8.4	13.7



Copper in Offsite Soils

Bearing 180

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		14.7
2C		13.8
3A	10.8	12.9
3B		15.4
4A		15.2



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

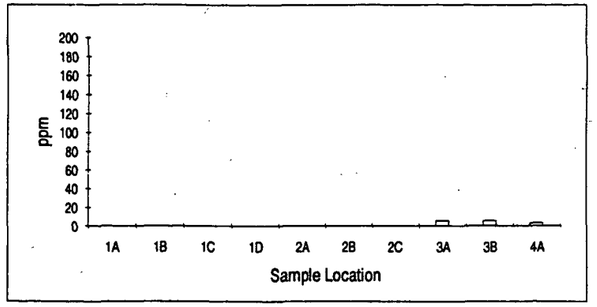
Concentration of Copper in Relationship with Distance from Site, SE Quadrant

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-20A	

93-1477b.244
12-3-93 /rk: 0

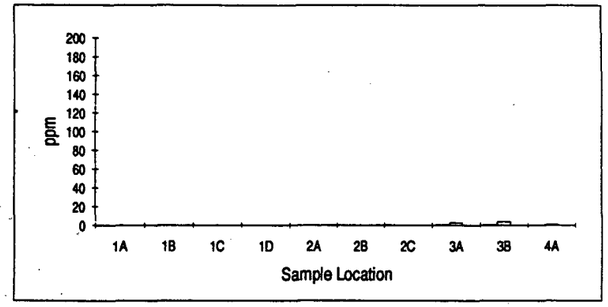
Cadmium in Offsite Soils
Bearing 203

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	0.42	5.8
3B	0.1	5.9
4A	0.52	3.1



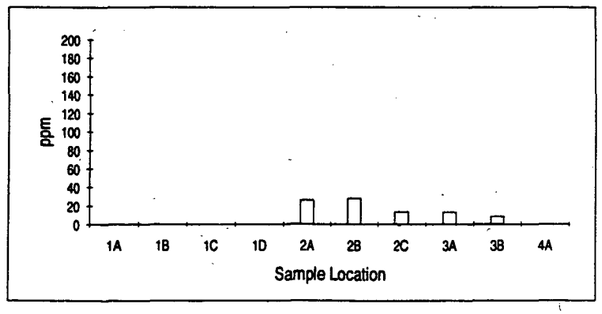
Cadmium in Offsite Soils
Bearing 205

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	0.68	2.6
3B	0.69	3.9
4A	0.31	1



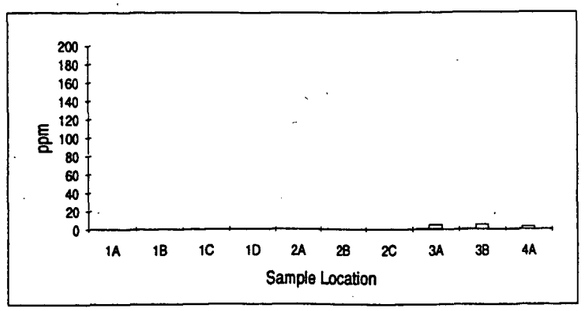
Cadmium in Offsite Soils
Bearing 225

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	0.76	26.2
2B	0.13	28.1
2C	0.42	13.4
3A	0.2	13.3
3B	0.28	8.7
4A		



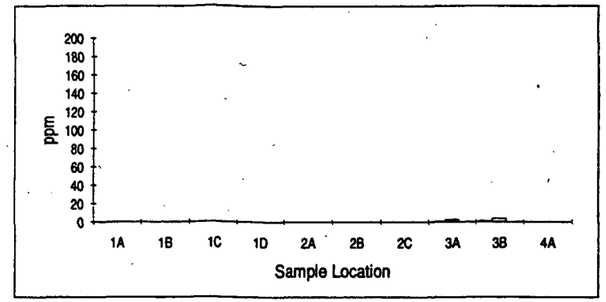
Cadmium in Offsite Soils
Bearing 230

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	0.78	4.8
3B	0.6	5.2
4A	0.44	2.7



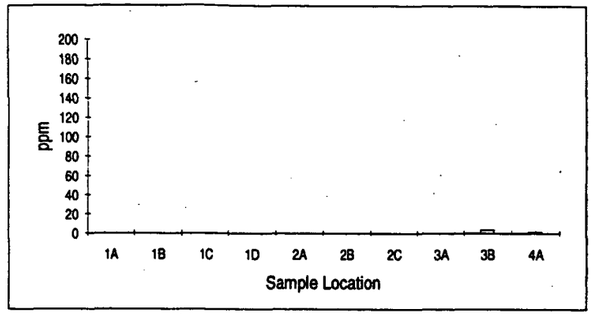
Cadmium in Offsite Soils
Bearing 240

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	0.62	2.6
3B	0.89	4
4A		



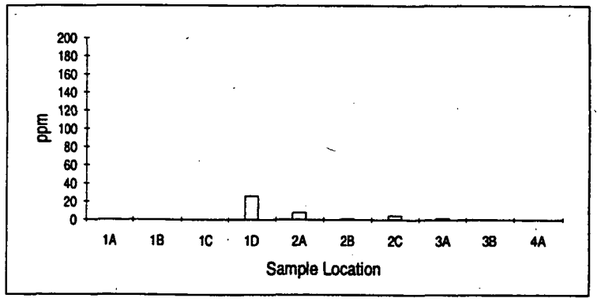
Cadmium in Offsite Soils
Bearing 248

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	0.34	3.8
4A	0.36	1.6



Cadmium in Offsite Soils
Bearing 270

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D	0.48	26.1
2A	0.46	8
2B		1.3
2C		4.6
3A		1.8
3B	0.53	0.51
4A		



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

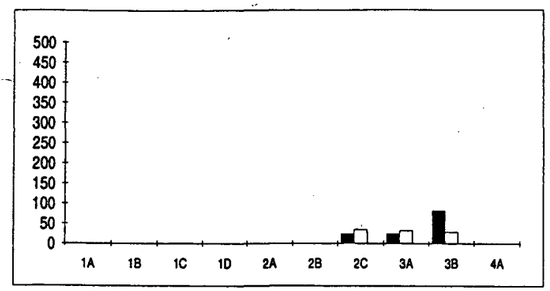
Concentration of Cadmium in Relationship with Distance from Site, SW Quadrant

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-20B	

93-1477b.272
12-8-93 MK:0

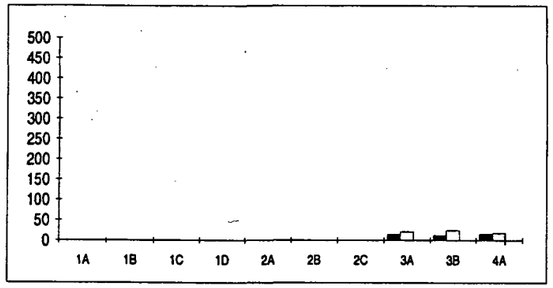
Chromium in Offsite Soils
Bearing 203

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C	23.8	34.4
3A	24.4	32.2
3B	81.7	28.8
4A		



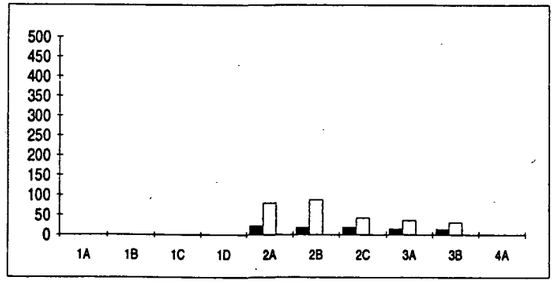
Chromium in Offsite Soils
Bearing 205

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	15.1	21.1
3B	12.3	24.3
4A	16.5	18



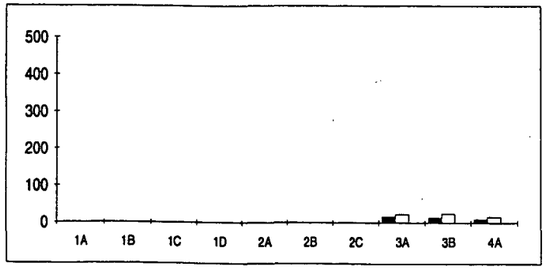
Chromium in Offsite Soils
Bearing 225

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	22.5	79.5
2B	18.6	87.7
2C	19.4	42.7
3A	14.9	36.4
3B	14.1	30.8
4A		



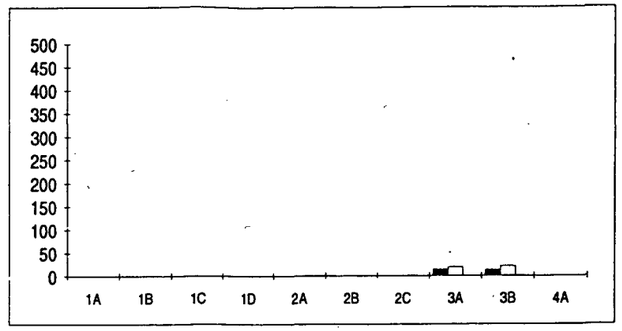
Chromium in Offsite Soils
Bearing 230

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	16.7	22.8
3B	14.3	25.2
4A	10.3	16.4



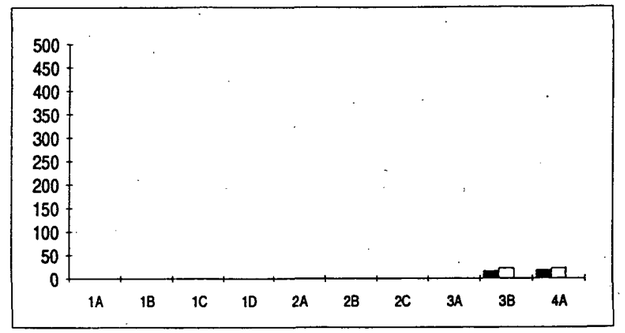
Chromium in Offsite Soils
Bearing 240

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	14.3	18.9
3B	13.5	21
4A		



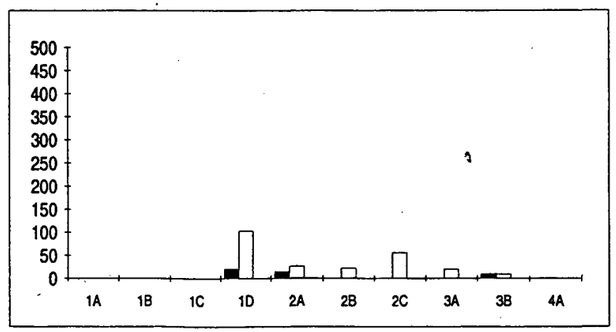
Chromium in Offsite Soils
Bearing 248

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	15.9	22
4A	18	21.8



Chromium in Offsite Soils
Bearing 270

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D	20.6	103
2A	15.2	26.5
2B		21.9
2C		55.8
3A		19.6
3B	10.4	9.3
4A		



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Chromium in Relationship with Distance from Site, SW Quadrant

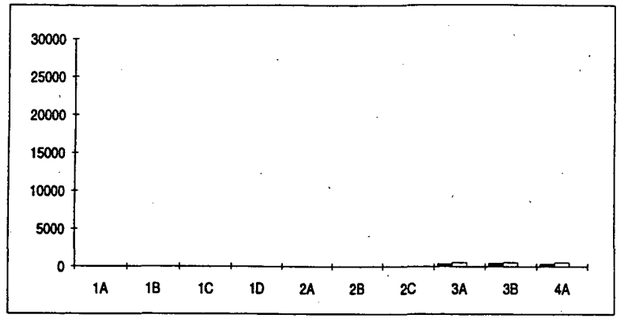
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-21	

83-1477b.245
12-3-93 MK: 0

Fluoride in Offsite Soil

Bearing 203

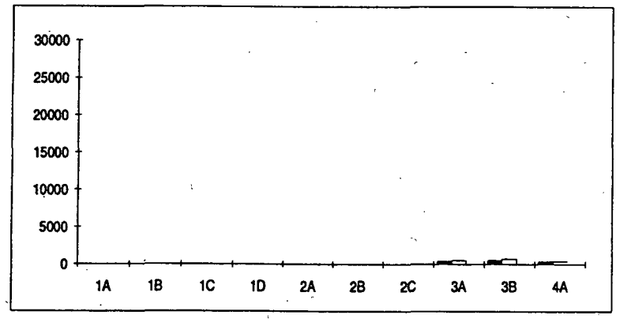
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	391	555
3B	486	573
4A	401	561



Fluoride in Offsite Soil

Bearing 205

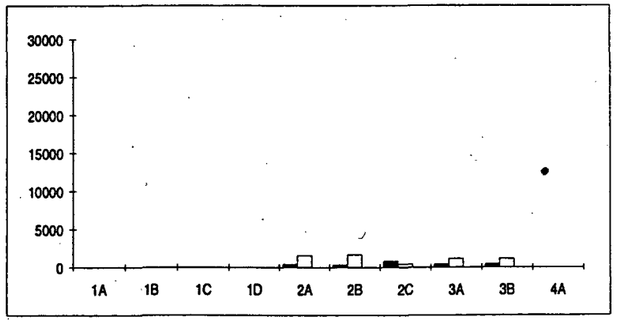
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	441	541
3B	567	732
4A	420	430



Fluoride in Offsite Soil

Bearing 225

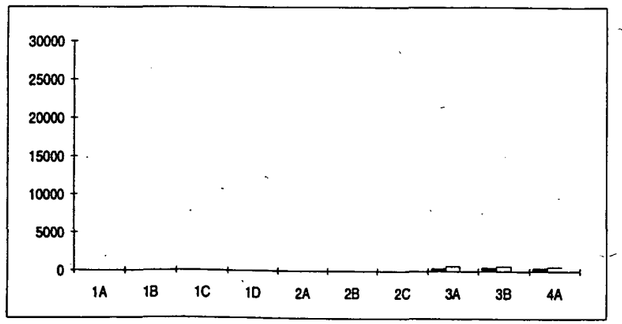
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	438	1590
2B	383	1680
2C	848	438
3A	448	1160
3B	458	1150
4A		



Fluoride in Offsite Soil

Bearing 230

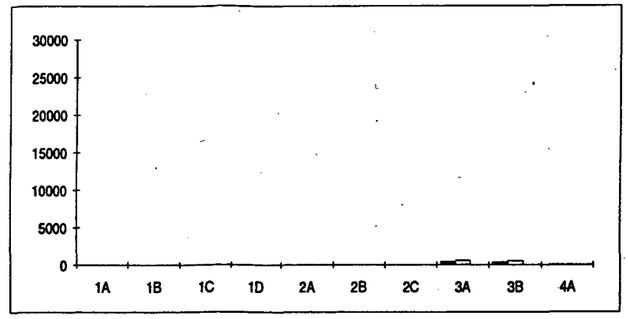
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	420	668
3B	516	681
4A	440	597



Fluoride in Offsite Soil

Bearing 240

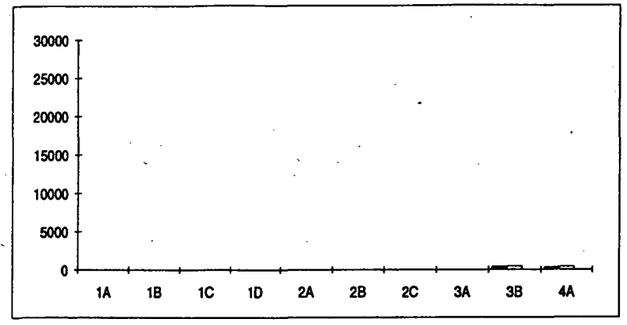
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	477	589
3B	415	538
4A		



Fluoride in Offsite Soil

Bearing 248

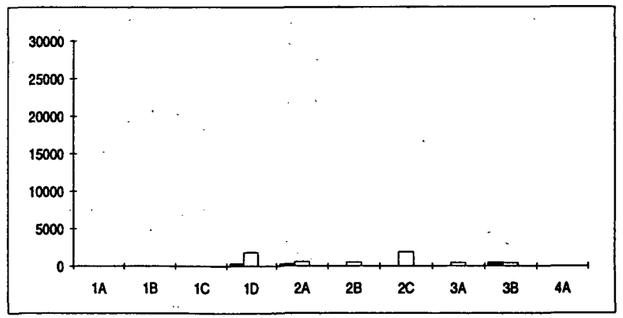
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	425	463
4A	338	400



Fluoride in Offsite Soil

Bearing 270

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D	398	1870
2A	343	593
2B		530
2C		1900
3A		470
3B	540	420
4A		



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

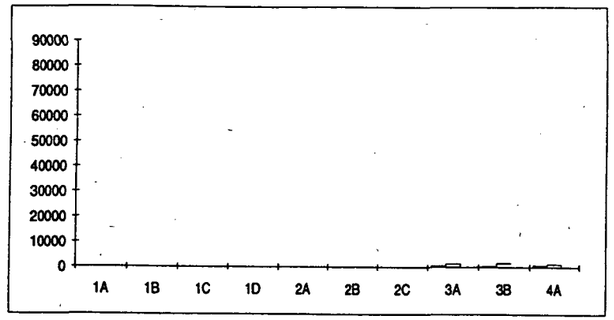
Concentration of Fluoride in Relationship with Distance from Site, SW Quadrant

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-22	

93-1477b.246
12-3-93 MK: 0

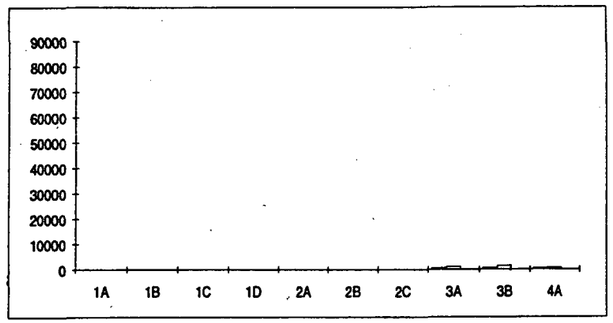
Total Phosphorus in Offsite Soil
Bearing 203

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	647	1470
3B	491	1640
4A	842	1270



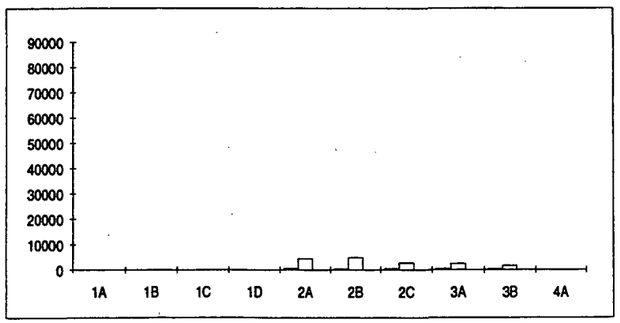
Total Phosphorus in Offsite Soil
Bearing 205

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	671	1060
3B	756	1520
4A	528	719



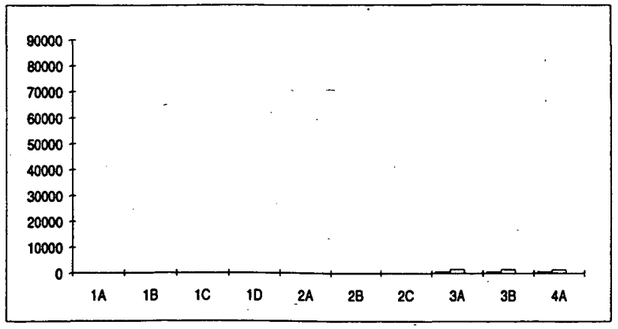
Total Phosphorus in Offsite Soil
Bearing 225

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	658	4430
2B	462	4860
2C	560	2800
3A	533	2520
3B	448	1670
4A		



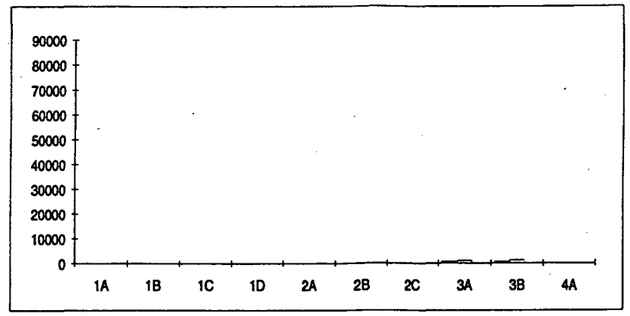
Total Phosphorus in Offsite Soil
Bearing 230

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	700	1520
3B	747	1560
4A	695	1420



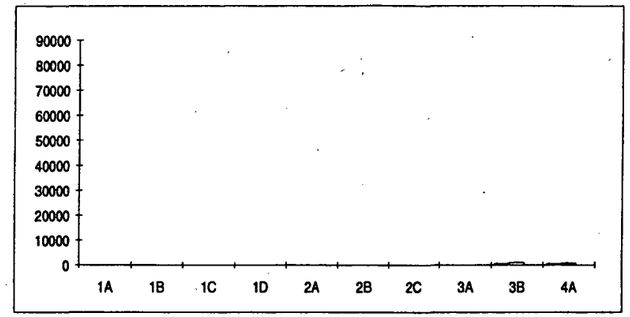
Total Phosphorus in Offsite Soil
Bearing 240

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	770	1010
3B	697	1230
4A		



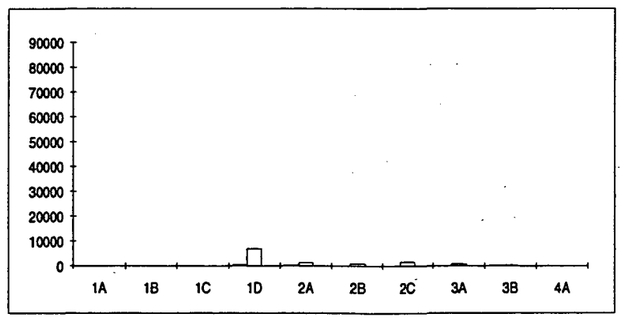
Total Phosphorus in Offsite Soil
Bearing 248

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	675	994
4A	613	874



Total Phosphorus in Offsite Soil
Bearing 270

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D	535	6910
2A	395	1320
2B		899
2C		1610
3A		822
3B	193	368
4A		



Legend:

■ Below surface concentration in ppm

□ Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

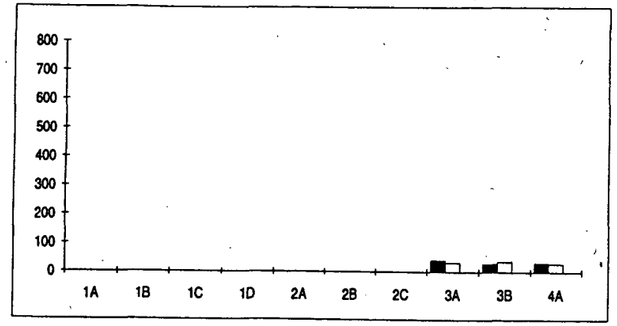
Concentration of Total Phosphorus in Relationship with Distance from Site, SW Quadrant

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-23	

93-1477b.247
12-3-93 MK: 0

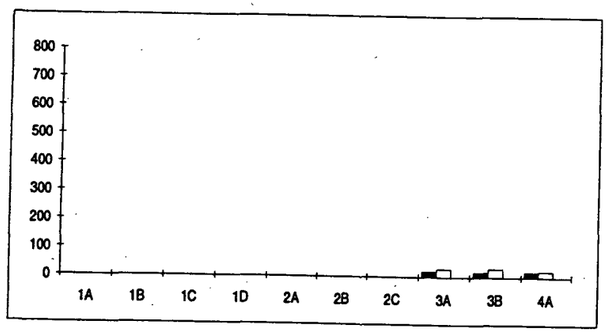
Vanadium in Offsite Soils
Bearing 203

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	41.4	33
3B	30.4	36.7
4A	33.3	29.3



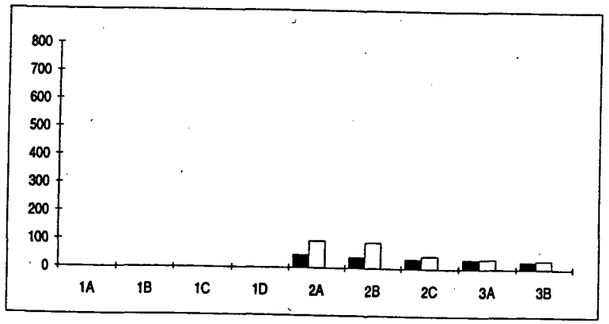
Vanadium in Offsite Soils
Bearing 205

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	21	29.3
3B	18.7	30.4
4A	20.6	22



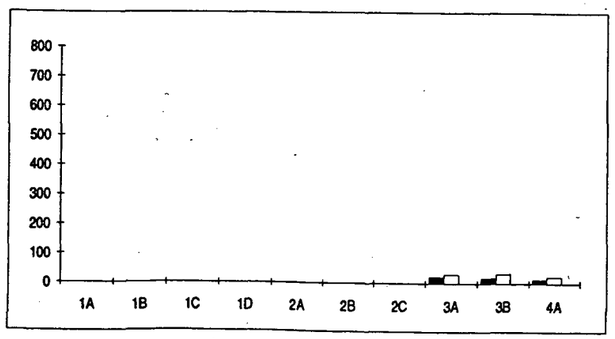
Vanadium in Offsite Soils
Bearing 225

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	46.4	95.8
2B	38.4	91.7
2C	34.6	44.6
3A	33.9	35.1
3B	26.6	30.9
4A		



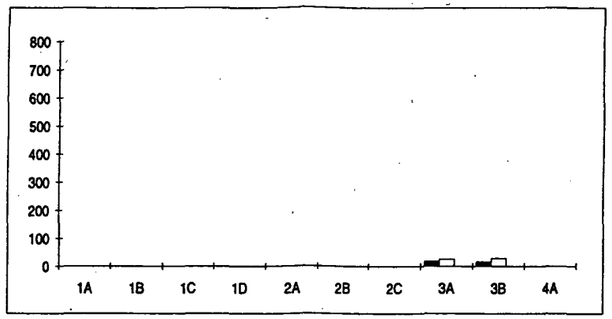
Vanadium in Offsite Soils
Bearing 230

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	23.3	30.8
3B	19	33.4
4A	14.5	22.9



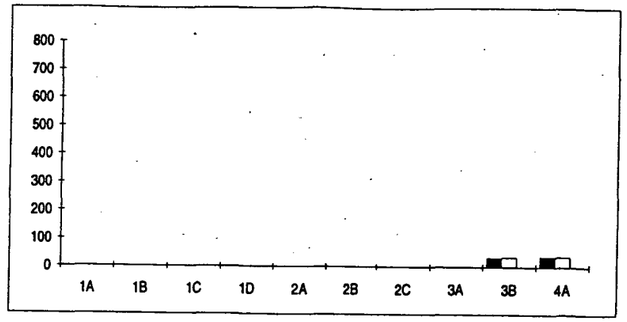
Vanadium in Offsite Soils
Bearing 240

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	19.6	25.9
3B	17.1	28.3
4A		



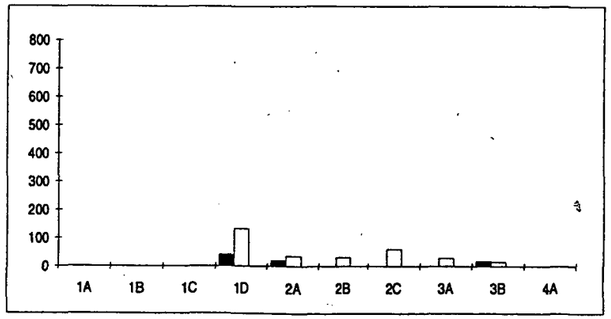
Vanadium in Offsite Soils
Bearing 248

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	33.5	35.5
4A	38.1	36.9



Vanadium in Offsite Soils
Bearing 270

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D	42	133
2A	21.9	36.5
2B		31.5
2C		60.3
3A		29.3
3B	19.3	15.8
4A		



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Vanadium in Relationship with Distance from Site, SW Quadrant

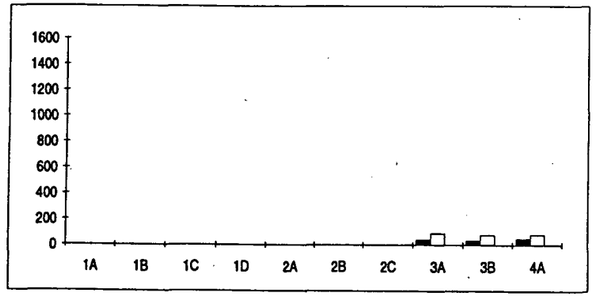
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-24	

83-1477b.248
12-3-93 MK: 0

Zinc in Offsite Soils

203

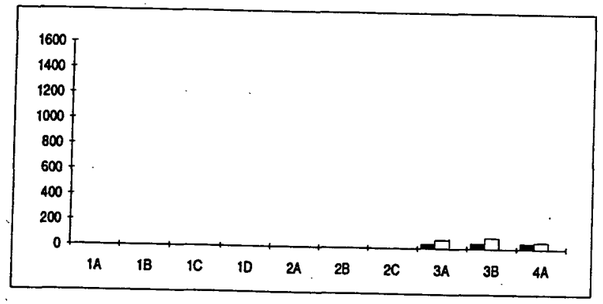
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	42.1	90.3
3B	34.8	79.8
4A	50.4	81.8



Zinc in Offsite Soils

Bearing 205

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	39.2	67.6
3B	45.3	87.5
4A	47.4	54.2



Zinc in Offsite Soils

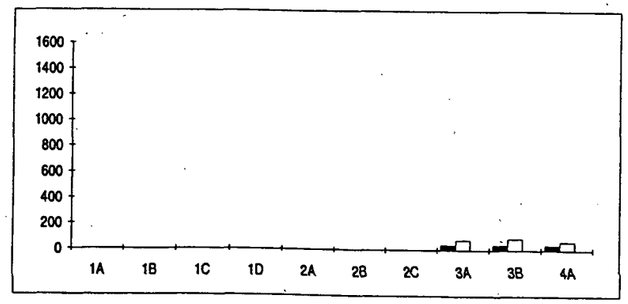
Bearing 225

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	43.5	204
2B	46.2	209
2C	38.9	129
3A	36.5	117
3B	36.3	92.9
4A		

Zinc in Offsite Soils

Bearing 230

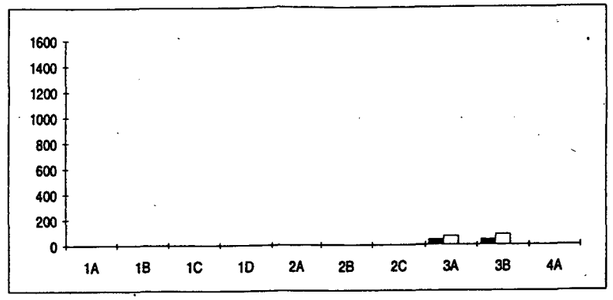
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	40	77.7
3B	41.4	88.5
4A	39.9	66.5



Zinc in Offsite Soils

Bearing 240

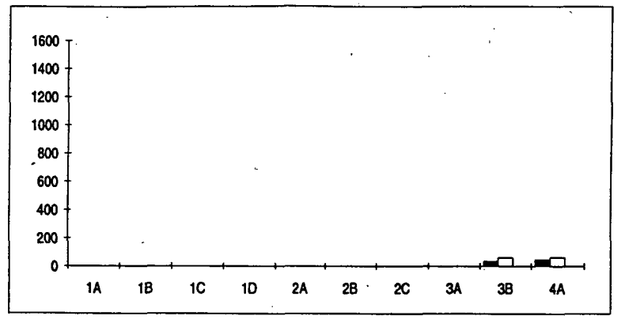
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	43.4	67.9
3B	43.4	81.3
4A		



Zinc in Offsite Soils

Bearing 248

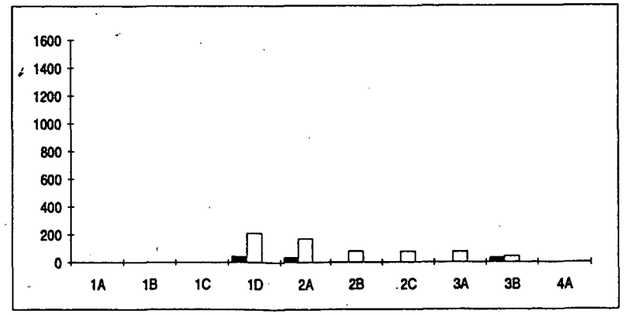
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	37.9	61.9
4A	48.2	64.7



Zinc in Offsite Soils

Bearing 270

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D	45	209
2A	37.9	170
2B		79.9
2C		77
3A		74.7
3B	35.8	43.7
4A		



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Zinc in Relationship with Distance from Site, SW Quadrant

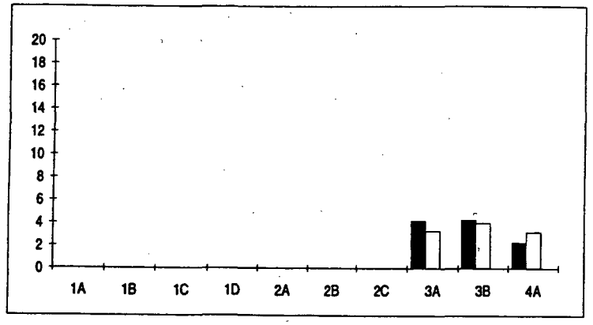
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-25	

93-1477b.248
12-3-93 MK:1.0

Arsenic in Offsite Soils

Bearing 203

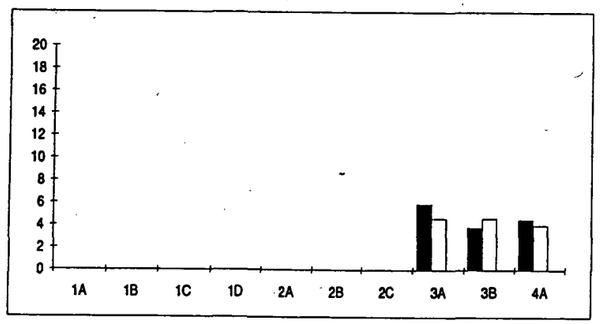
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	4.2	3.3
3B	4.3	4
4A	2.3	3.2



Arsenic in Offsite Soils

Bearing 205

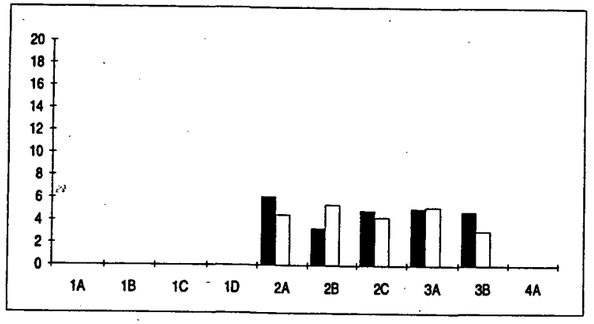
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	5.9	4.6
3B	3.8	4.6
4A	4.5	4



Arsenic in Offsite Soils

Bearing 225

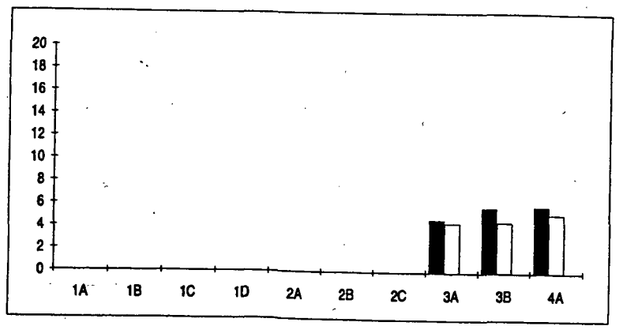
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	6.1	4.5
2B	3.3	5.4
2C	4.9	4.3
3A	5.1	5.2
3B	4.8	3.1
4A		



Arsenic in Offsite Soils

Bearing 230

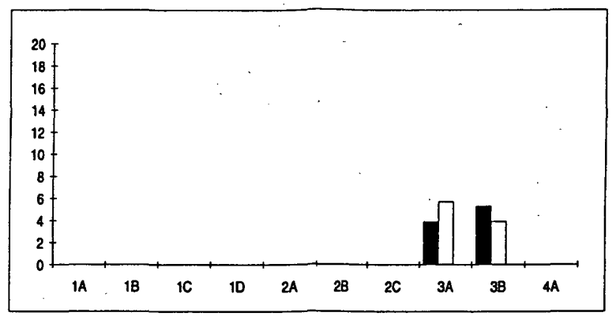
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	4.7	4.4
3B	5.8	4.5
4A	5.9	5.2



Arsenic in Offsite Soils

Bearing 240

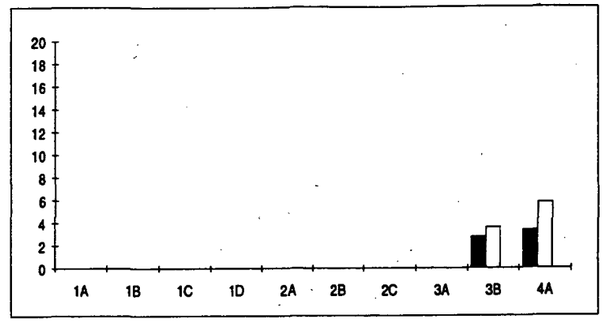
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	3.9	5.7
3B	5.3	3.9
4A		



Arsenic in Offsite Soils

Bearing 248

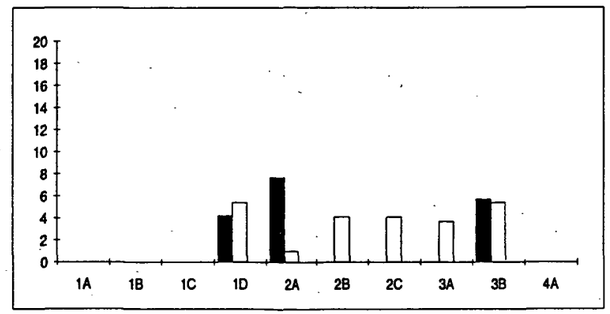
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	2.8	3.6
4A	3.4	5.8



Arsenic in Offsite Soils

Bearing 270

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D	4.2	5.4
2A	7.7	1
2B		4.1
2C		4.1
3A		3.7
3B	5.7	5.4
4A		



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Arsenic in Relationship with Distance from Site, SW Quadrant

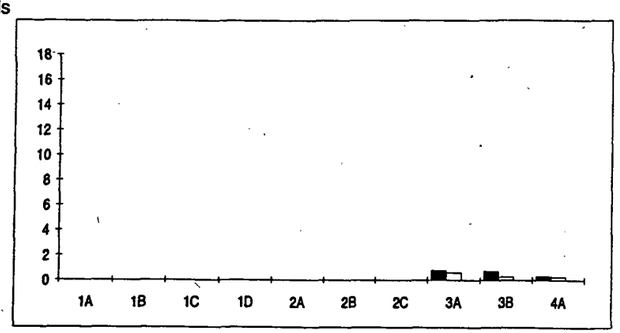
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-26	

93-1477b.250
12-3-93 MK:0

Selenium in Offsite Soils

Bearing 203

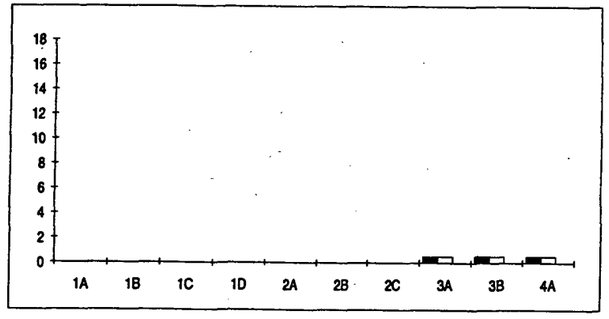
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	0.8	0.6
3B	0.73	0.29
4A	0.33	0.26



Selenium in Offsite Soils

Bearing 205

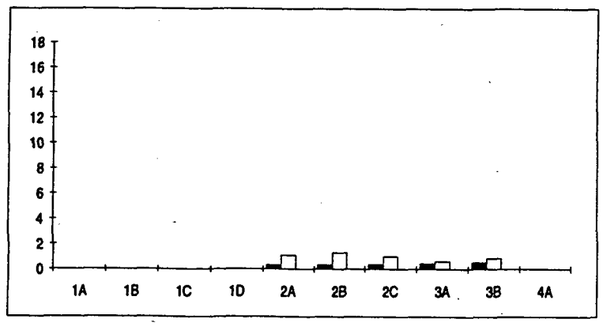
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	0.53	0.51
3B	0.57	0.51
4A	0.53	0.52



Selenium in Offsite Soils

Bearing 225

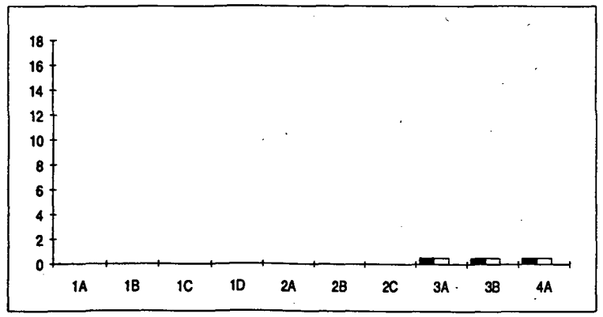
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	0.34	1.1
2B	0.34	1.3
2C	0.38	1
3A	0.46	0.61
3B	0.54	0.87
4A		



Selenium in Offsite Soils

Bearing 230

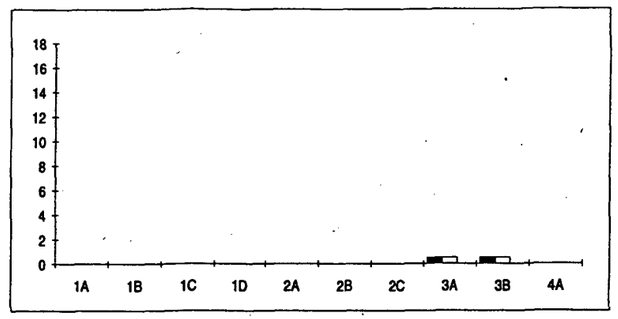
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	0.55	0.5
3B	0.53	0.51
4A	0.54	0.51



Selenium in Offsite Soils

Bearing 240

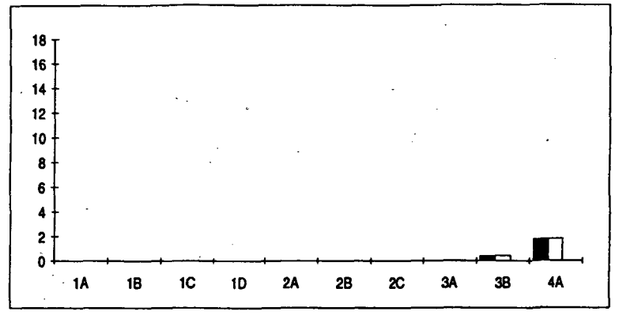
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	0.53	0.51
3B	0.55	0.52
4A		



Selenium in Offsite Soils

Bearing 248

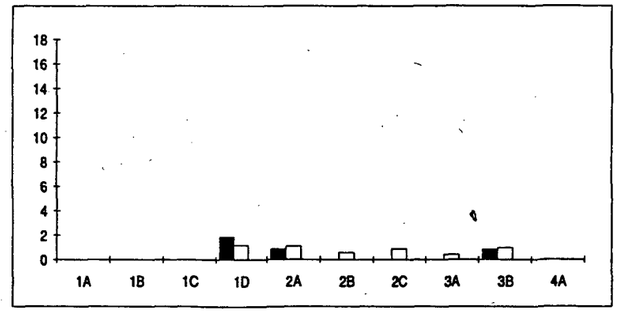
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	0.41	0.44
4A	1.8	1.8



Selenium in Offsite Soils

Bearing 270

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D	1.9	1.2
2A	0.91	1.1
2B		0.59
2C		0.89
3A		0.41
3B	0.87	0.97
4A		



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Selenium in Relationship with Distance from Site, SW Quadrant

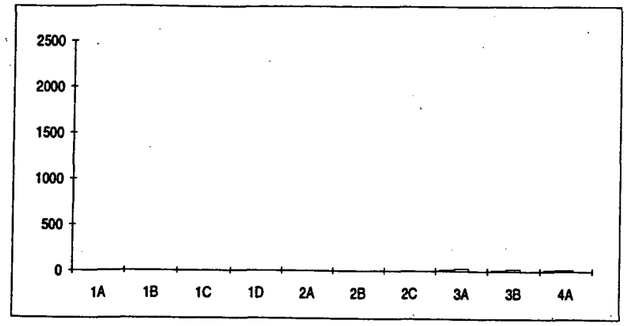
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-27	

93-1477b.251
12-3-93 MK : 0

Lead in Offsite Soils

Bearing 203

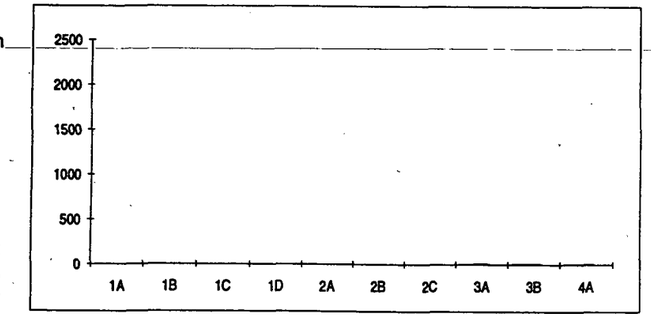
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	13.3	27.3
3B	11.5	23.2
4A	16.2	18.8



Lead in Offsite Soils

Bearing 205

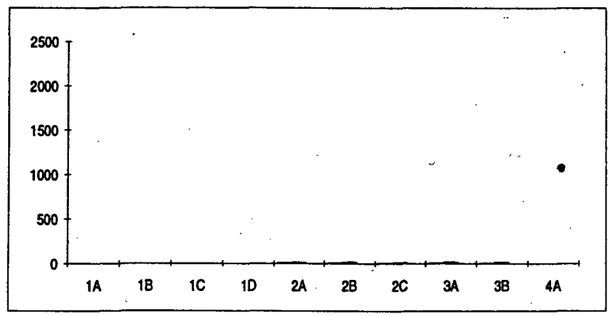
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	6.8	10.2
3B	9	11.5
4A	8.1	9.7



Lead in Offsite Soils

Bearing 225

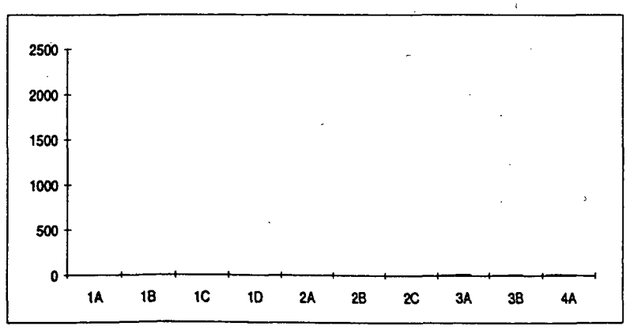
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	11.9	16.5
2B	9.3	19.7
2C	10.4	15.9
3A	10	20.5
3B	9.5	20.7
4A		



Lead in Offsite Soils

Bearing 230

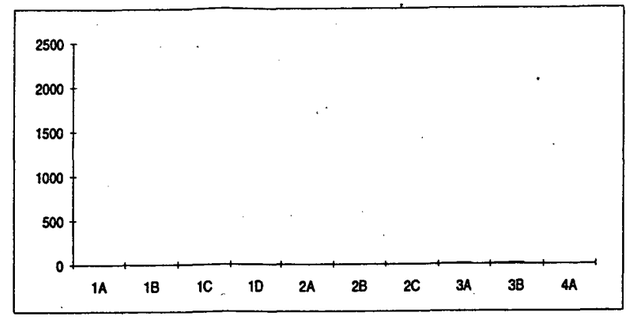
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	9.5	15.3
3B	6.3	12.1
4A	17.1	13.7



Lead in Offsite Soils

Bearing 240

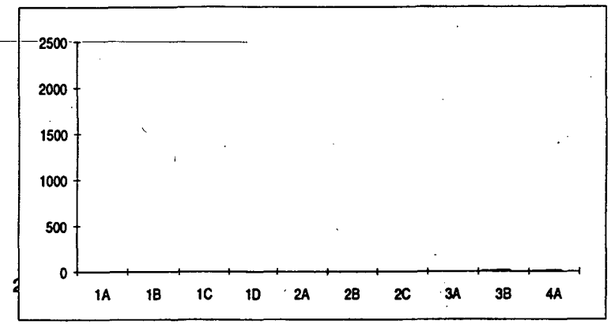
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	7.5	13.2
3B	7.7	14.2
4A		



Lead in Offsite Soils

Bearing 248

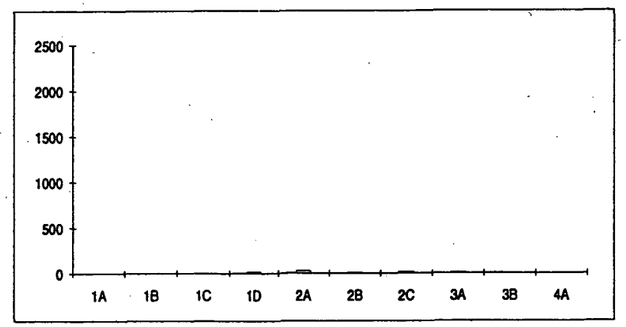
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	11.6	17.5
4A	11.1	18.2



Lead in Offsite Soils

Bearing 270

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D	6.7	16.8
2A	5.3	27.9
2B		10.7
2C		18.7
3A		12.3
3B	4.6	6.9
4A		



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Lead in Relationship with Distance from Site, SW Quadrant

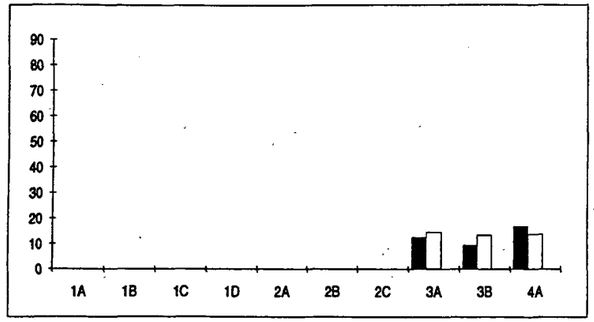
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-28	

83-14770.252
12-3-93 NK:10

Copper in Offsite Soils

Bearing 203

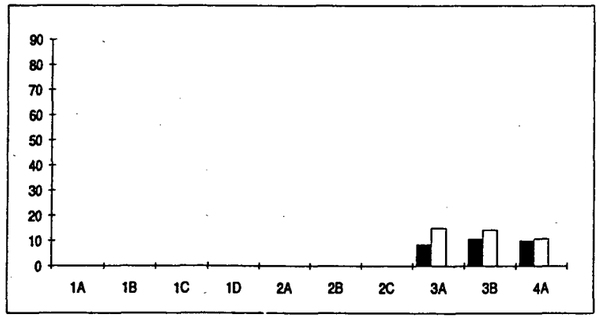
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	12.6	14.5
3B	9.5	13.4
4A	16.9	13.8



Copper in Offsite Soils

Bearing 205

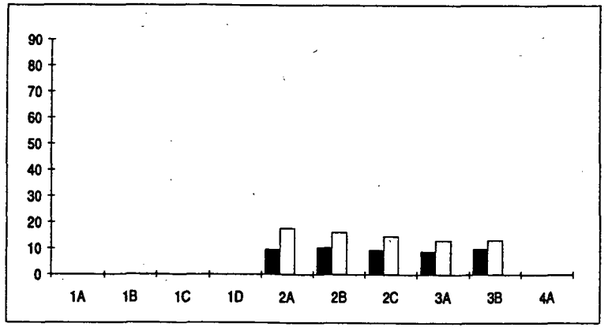
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	8.6	15.1
3B	10.8	14.3
4A	10.1	10.9



Copper in Offsite Soils

Bearing 225

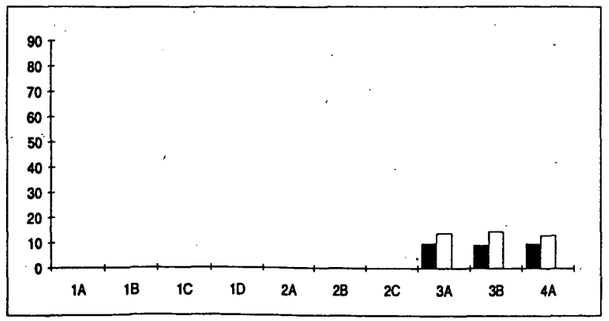
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A	9.7	17.7
2B	10.4	16.2
2C	9.5	14.7
3A	9	13.1
3B	10	13.2
4A		



Copper in Offsite Soils

Bearing 230

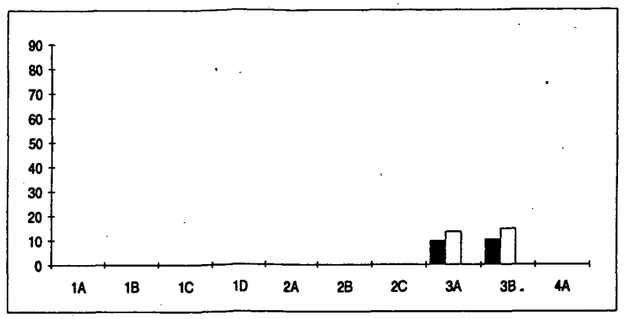
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	9.9	13.8
3B	9.2	14.6
4A	9.8	13.1



Copper in Offsite Soils

Bearing 240

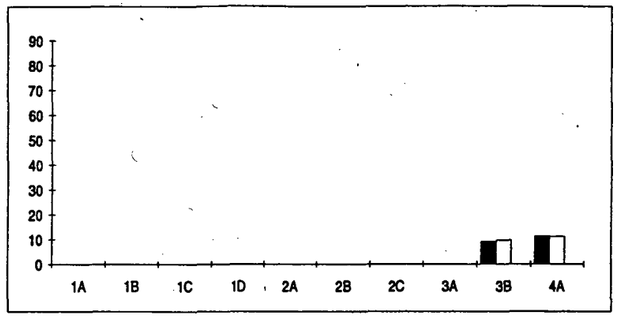
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A	9.8	13.4
3B	10.4	14.6
4A		



Copper in Offsite Soils

Bearing 248

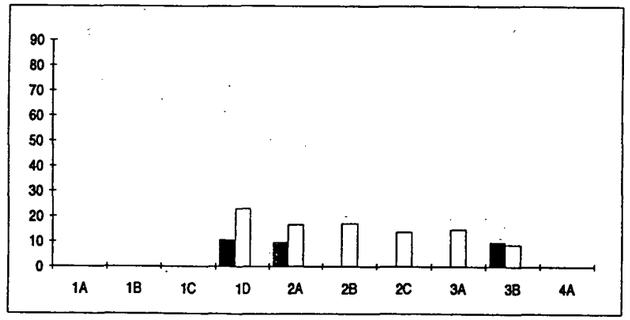
Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D		
2A		
2B		
2C		
3A		
3B	9.2	9.7
4A	11.4	11.2



Copper in Offsite Soils

Bearing 270

Location	BS in ppm	SS in ppm
1A		
1B		
1C		
1D	10.7	23
2A	9.6	16.6
2B		17.1
2C		13.7
3A		14.7
3B	9.7	8.7
4A		



Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

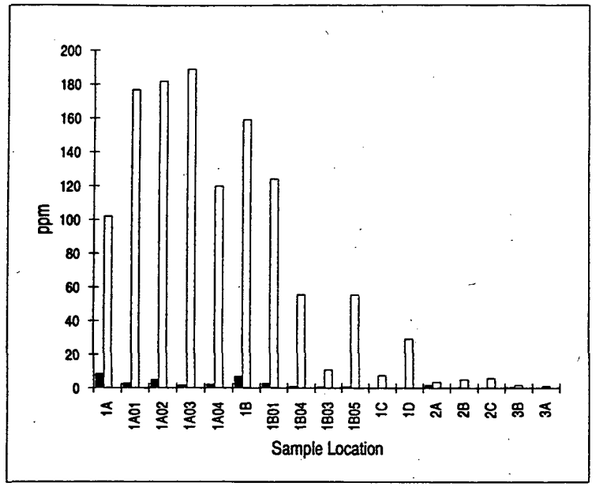
Concentration of Copper in Relationship with Distance from Site, SW Quadrant

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-29	

93-1477b.253
12-3-93 /vk : 0

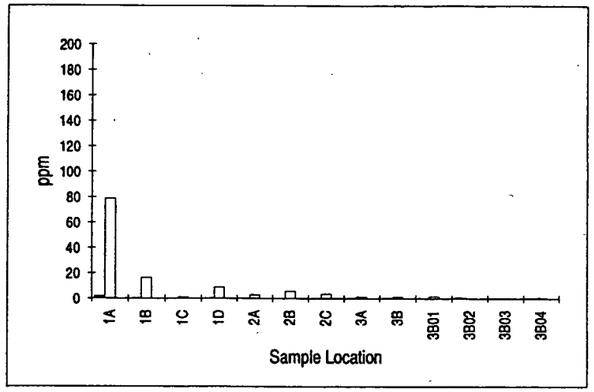
Cadmium in Offsite Soils
Bearing 293

Location	BS in ppm	SS in ppm
1A	8.6	102
1A01	3	177
1A02	5	182
1A03	1.8	189
1A04	2.3	120
1B	7	159
1B01	2.8	124
1B04	0.98	55.3
1B03	0.68	10.8
1B05	1	55.5
1C	0.19	7.5
1D	0.21	29.3
2A	1.9	3.7
2B	0.43	5.1
2C	0.07	5.9
3B	0.51	1.7
3A		1.1



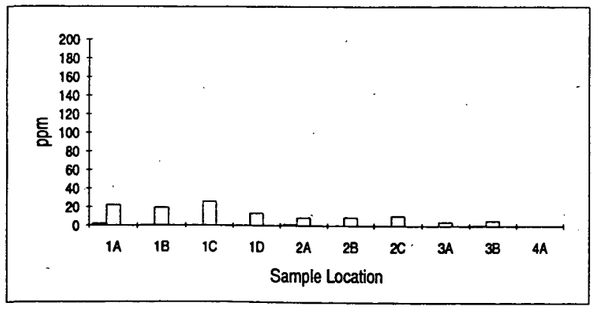
Cadmium in Offsite Soils
Bearing 315

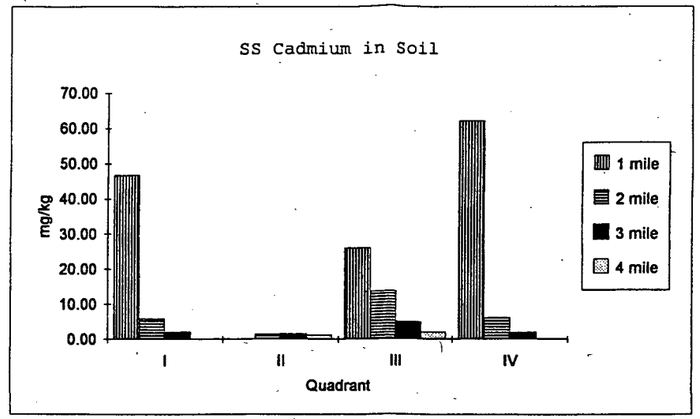
Location	BS in ppm	SS in ppm
1A	2.1	78.8
1B	0.29	16.4
1C		1.1
1D	0.26	8.8
2A	0.34	3
2B		5.8
2C	0.13	3.6
3A	0.42	1.5
3B	0.27	1.3
3B01	0.34	1.6
3B02	0.79	0.34
3B03	0.33	0.32
3B04	0.34	0.69



Cadmium in Offsite Soils
Bearing 338

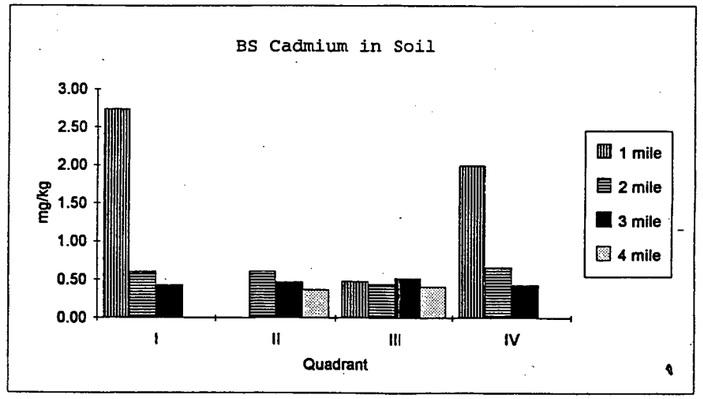
Location	BS in ppm	SS in ppm
1A	2.2	22
1B	0.45	19.1
1C		25.8
1D	0.16	13.1
2A	1.7	8.7
2B		9
2C	0.09	10.6
3A	0.05	4.2
3B	0.74	5.6
4A		





Cadmium, total
Surface Sample (SS)
Quadrant

Distance	I	II	III	IV
1 mile	46.72	no data	26.10	62.18
2 mile	5.85	1.48	13.60	6.16
3 mile	1.99	1.48	4.84	1.84
4 mile	no data	1.22	2.10	no data



Cadmium, total
Below Surface Sample (BS)
Quadrant

Distance	I	II	III	IV
1 mile	2.74	no data	0.48	2.00
2 mile	0.60	0.61	0.44	0.67
3 mile	0.42	0.46	0.51	0.42
4 mile	no data	0.37	0.41	no data

Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

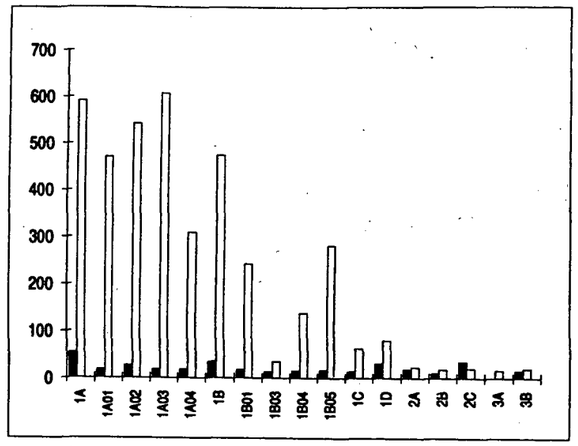
Concentration of Cadmium in Relationship with Distance from Site, NW Quadrant

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-30	

83-1477b.254
12-3-93 /vk : 0

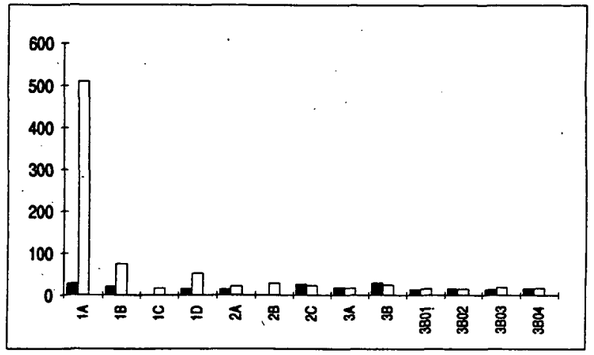
Chromium in Offsite Soils
Bearing 293

Location	BS in ppm	SS in ppm
1A	54.2	591
1A01	18.5	470
1A02	27.1	542
1A03	18.7	608
1A04	18.5	309
1B	35.2	474
1B01	18.2	242
1B03	13.7	35.2
1B04	15.5	138
1B05	17.2	281
1C	14.9	63.1
1D	31	79.7
2A	18.6	23.3
2B	11	18.4
2C	34.5	20.2
3A		16.3
3B	16	20.2



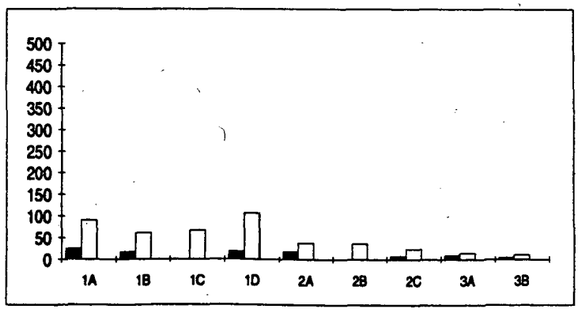
Chromium in Offsite Soils
Bearing 315

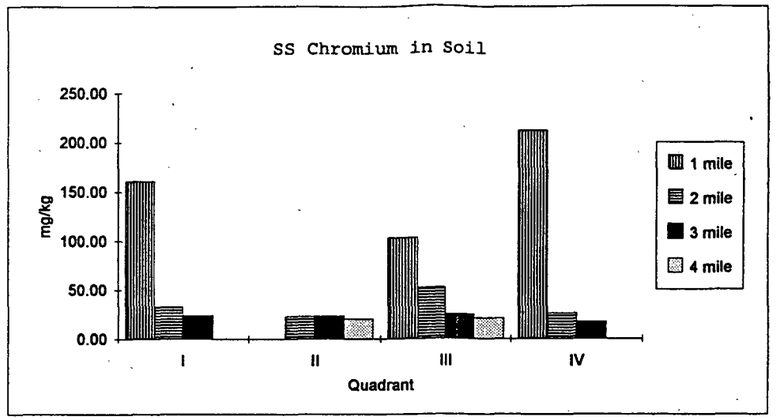
Location	BS in ppm	SS in ppm
1A	28.5	510
1B	20.8	74.7
1C		16.9
1D	16.1	52.6
2A	14.4	21.5
2B		28.7
2C	26.9	23.2
3A	18.7	17.4
3B	29.4	24.3
3B01	13.7	15.9
3B02	15.5	15.1
3B03	14.4	18.9
3B04	16.4	17.5



Chromium in Offsite Soils
Bearing 338

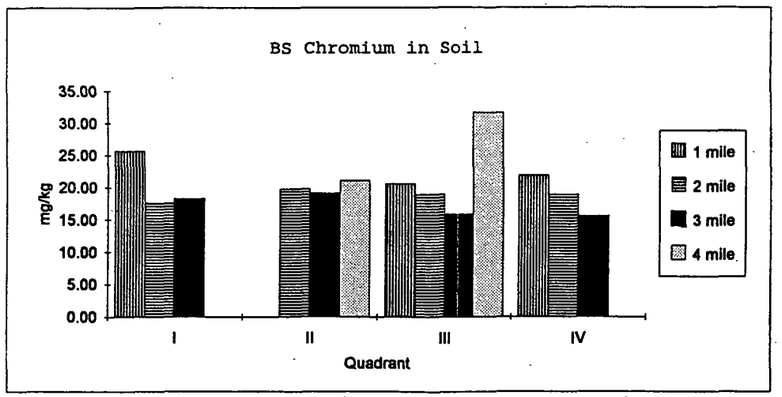
Location	BS in ppm	SS in ppm
1A	25.4	90.7
1B	17.6	61.4
1C		67
1D	19	107
2A	18.2	38.1
2B		36.6
2C	8.5	24.3
3A	10.2	14.4
3B	4.9	10.7
4A		





Chromium, total
Surface Sample (SS)
Quadrant

Distance	I	II	III	IV
1 mile	160.70	no data	103.00	212.10
2 mile	32.69	22.92	52.35	26.03
3 mile	23.43	22.92	24.46	17.07
4 mile	no data	20.30	21.25	no data



Chromium, total
Below Surface Sample (BS)
Quadrant

Distance	I	II	III	IV
1 mile	25.67	no data	20.60	21.87
2 mile	17.60	19.80	18.93	18.87
3 mile	18.21	19.07	15.81	15.47
4 mile	no data	21.10	31.63	no data

Legend:

■ Below surface concentration in ppm

□ Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Chromium in Relationship with Distance from Site, NW Quadrant

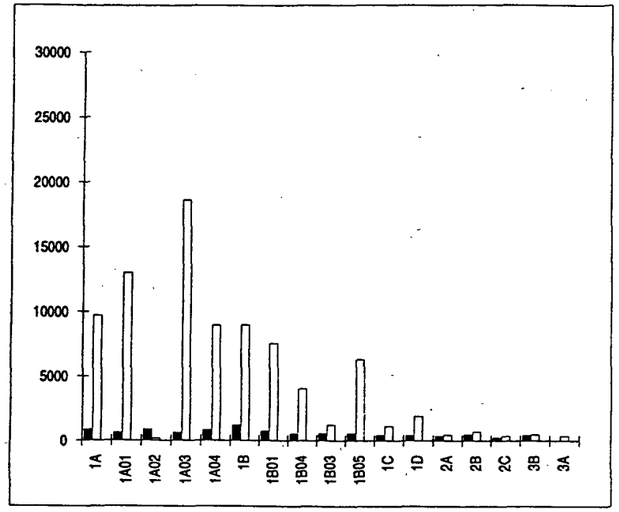
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-31	

93-1477b.255
12-6-93 /vk : 0

Fluoride in Offsite Soil

Bearing 293

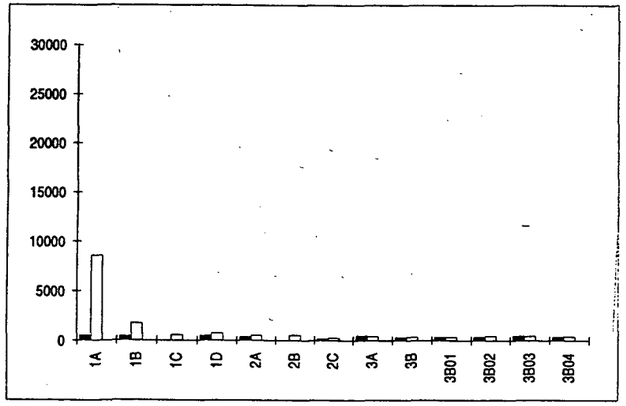
Location	BS in ppm	SS in ppm
1A	868	9700
1A01	618	13000
1A02	880	164
1A03	650	18600
1A04	848	8940
1B	1210	8980
1B01	773	7540
1B04	555	4040
1B03	574	1230
1B05	589	6290
1C	423	1130
1D	433	1900
2A	358	450
2B	518	708
2C	257	363
3B	460	480
3A		370



Fluoride in Offsite Soil

Bearing 315

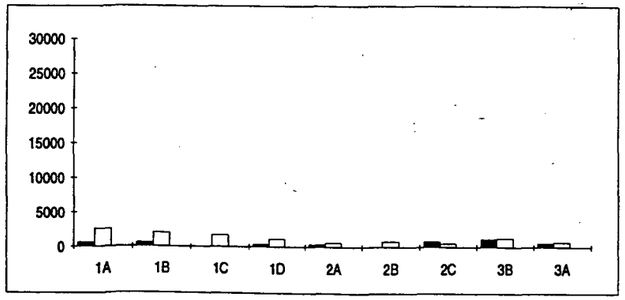
Location	BS in ppm	SS in ppm
1A	540	8600
1B	458	1740
1C		568
1D	523	745
2A	395	513
2B		540
2C	190	259
3A	510	423
3B	339	352
3B01	350	338
3B02	360	450
3B03	510	450
3B04	380	400

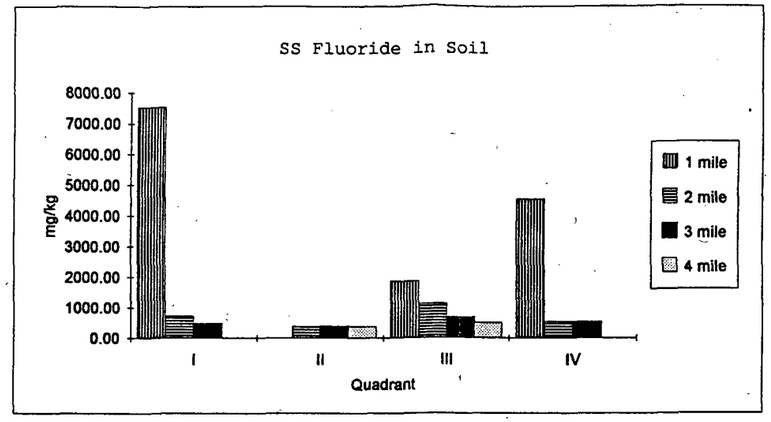


Fluoride in Offsite Soil

Bearing 338

Location	BS in ppm	SS in ppm
1A	660	2600
1B	605	2010
1C		1720
1D	423	1150
2A	420	653
2B		820
2C	888	540
3B	1230	1300
3A	605	725



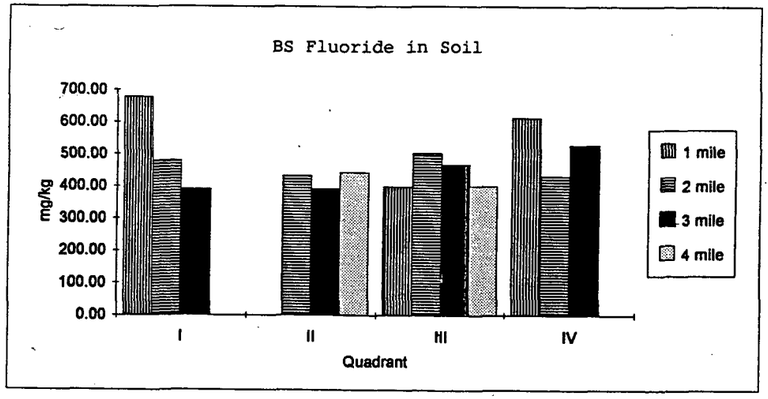


Fluoride

Surface Sample (SS)

Quadrant

Distance	I	II	III	IV
1 mile	7532.20	no data	1870.00	4536.13
2 mile	722.12	385.44	1121.83	538.44
3 mile	470.50	385.44	656.92	528.80
4 mile	no data	379.00	497.00	no data



Fluoride

Below Surface Sample (BS)

Quadrant

Distance	I	II	III	IV
1 mile	678.72	no data	398.00	613.71
2 mile	479.86	433.43	503.00	432.29
3 mile	389.70	390.33	465.33	527.11
4 mile	no data	443.00	399.75	no data

Legend:

■ Below surface concentration in ppm

□ Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

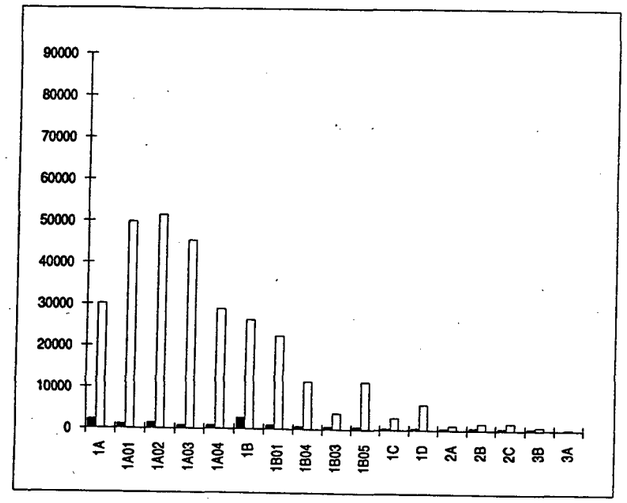
Concentration of Fluoride in Relationship with Distance from Site, NW Quadrant

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-32	

83-1477b.256
12-6-93 MK:0

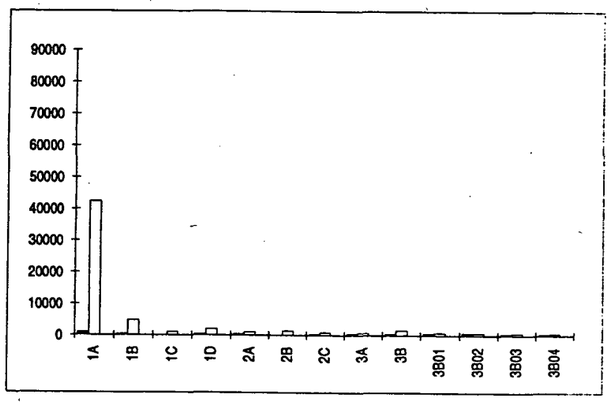
Total Phosphorus in Offsite Soil
Bearing 293

Location	BS in ppm	SS in ppm
1A	2310	30100
1A01	1150	49800
1A02	1520	51500
1A03	897	45400
1A04	903	28900
1B	2770	26300
1B01	1100	22500
1B04	805	11500
1B03	737	3900
1B05	738	11500
1C	427	2960
1D	524	6070
2A	478	1120
2B	609	1660
2C	532	1750
3B	543	859
3A		300



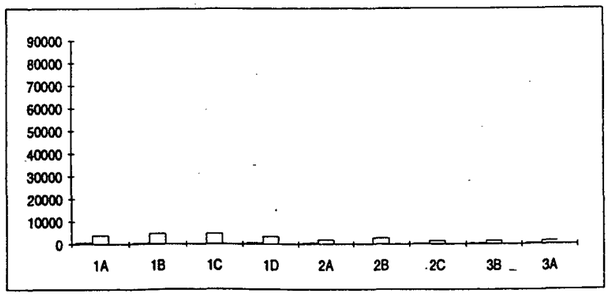
Total Phosphorus in Offsite Soil
Bearing 315

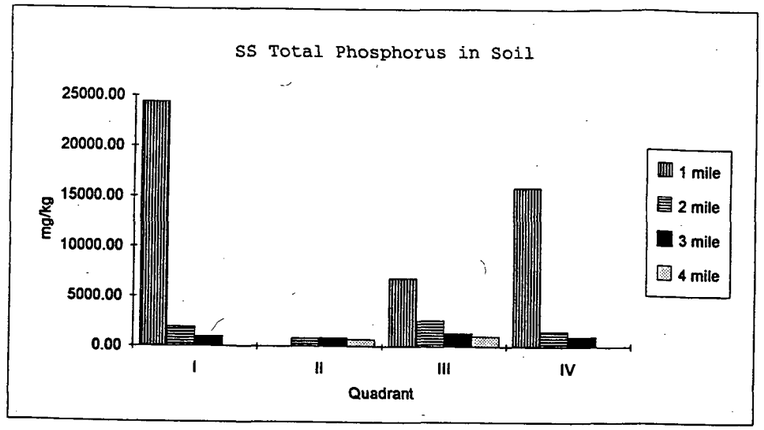
Location	BS in ppm	SS in ppm
1A	1090	42400
1B	443	4850
1C		1050
1D	451	1960
2A	501	1070
2B		1450
2C	396	899
3A	583	842
3B	512	1650
3B01	684	842
3B02	808	794
3B03	483	694
3B04	413	621



Total Phosphorus in Offsite Soil
Bearing 338

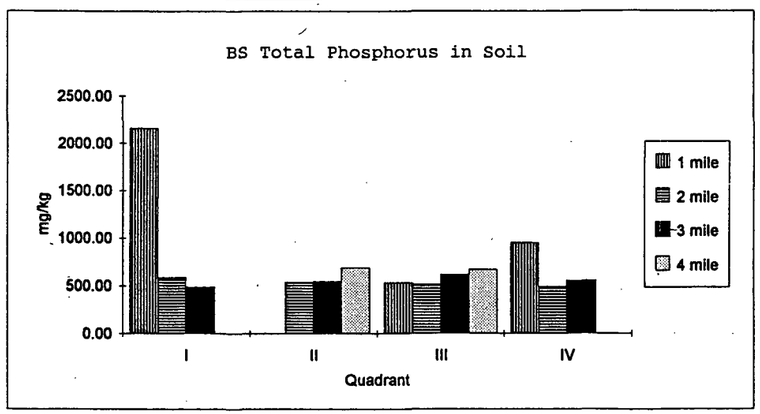
Location	BS in ppm	SS in ppm
1A	805	3880
1B	485	4690
1C		4670
1D	637	3370
2A	595	1920
2B		2820
2C	332	1540
3B	394	1530
3A	543	1550





Phosphorus, total
Surface Sample (SS)
Quadrant

Distance	I	II	III	IV
1 mile	24414.40	no data	6910.00	15939.17
2 mile	1947.76	818.00	2653.17	1581.00
3 mile	961.00	818.00	1337.23	968.20
4 mile	no data	733.50	1070.75	no data



Phosphorus, total
Below Surface Sample (BS)
Quadrant

Distance	I	II	III	IV
1 mile	2161.39	no data	535.00	954.05
2 mile	589.57	539.00	518.75	491.86
3 mile	483.90	541.00	610.67	551.44
4 mile	no data	690.00	669.50	no data

Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

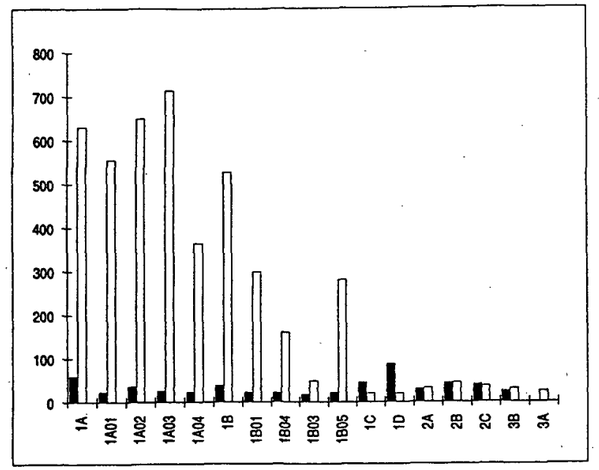
Concentration of Total Phosphorus in Relationship with Distance from Site, NW Quadrant

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-33	

93-1477b.257
12-8-93 NK:10

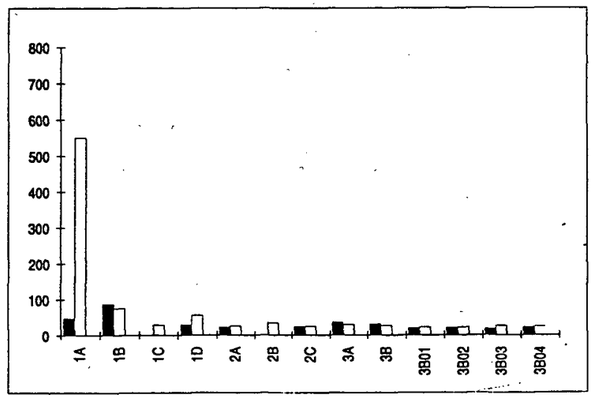
Vanadium in Offsite Soils
Bearing 293

Location	BS in ppm	SS in ppm
1A	59.3	630
1A01	23.2	555
1A02	36.8	649
1A03	25.9	713
1A04	23.6	364
1B	38.7	527
1B01	22.7	298
1B04	21	160
1B03	17.9	48.8
1B05	22.1	281
1C	45.4	20.4
1D	87.8	19.7
2A	29.6	31.9
2B	43.8	44.1
2C	40.2	36.3
3B	24.7	30.3
3A		25.1



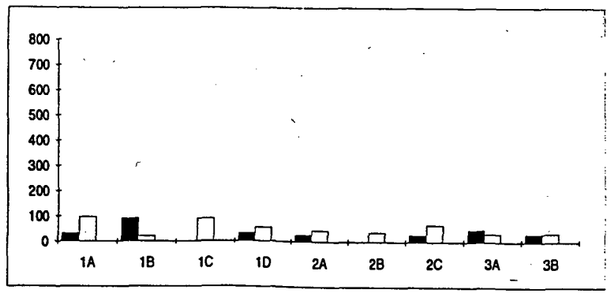
Vanadium in Offsite Soils
Bearing 315

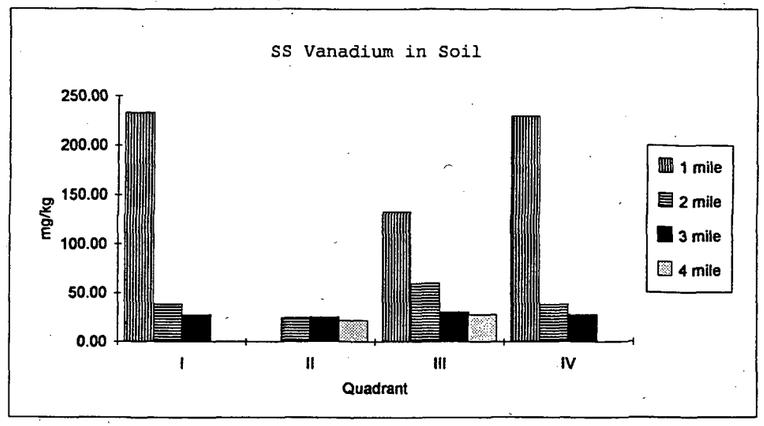
Location	BS in ppm	SS in ppm
1A	47.8	550
1B	87.8	75.6
1C		28.5
1D	29.9	55.2
2A	22.7	25.9
2B		34.4
2C	24.2	25
3A	36.8	30.2
3B	31.2	26.4
3B01	19.8	22.7
3B02	21.4	22.7
3B03	18.1	26.7
3B04	22.8	24.2



Vanadium in Offsite Soils
Bearing 338

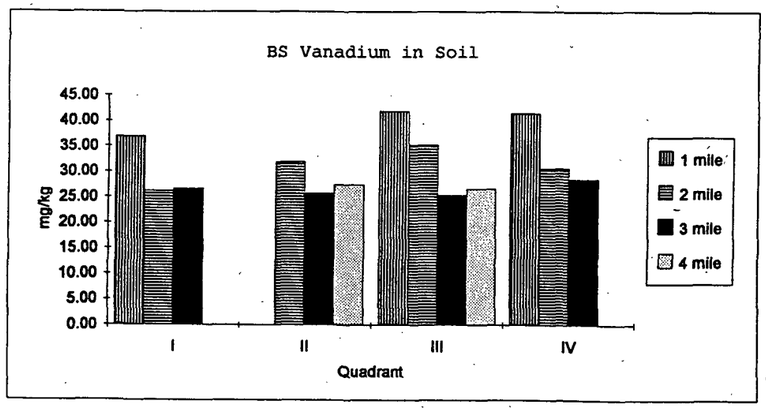
Location	BS in ppm	SS in ppm
1A	32.6	97
1B	92.6	21.1
1C		90.6
1D	32.9	55.1
2A	27	44.1
2B		37.5
2C	27.6	67.6
3A	48.9	33.2
3B	32.5	34.4





Vanadium, total
Surface Sample (SS)
Quadrant

Distance	I	II	III	IV
1 mile	233.46	no data	133.00	230.09
2 mile	38.81	24.88	60.07	38.53
3 mile	27.30	24.88	30.34	27.59
4 mile	no data	21.85	27.78	no data



Vanadium, total
Below Surface Sample (BS)
Quadrant

Distance	I	II	III	IV
1 mile	36.92	no data	42.00	41.51
2 mile	26.21	31.94	35.33	30.73
3 mile	26.57	25.72	25.32	28.47
4 mile	no data	27.40	26.63	no data

Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Vanadium in Relationship with Distance from Site, NW Quadrant

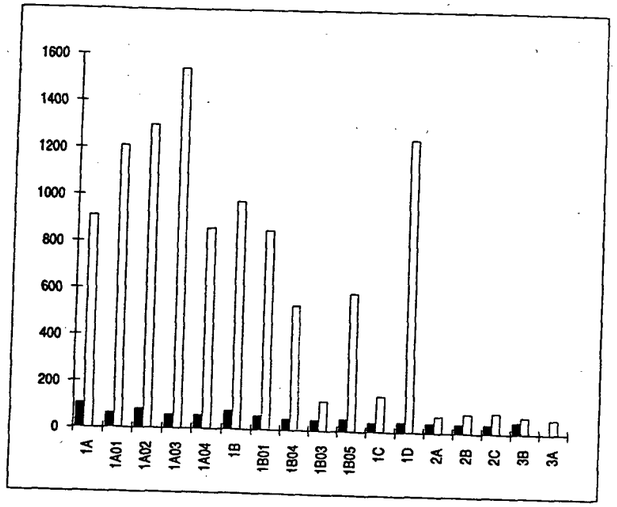
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-34	

93-1477b.256
12-6-93 MK:10

Zinc in Offsite Soils

Bearing 293

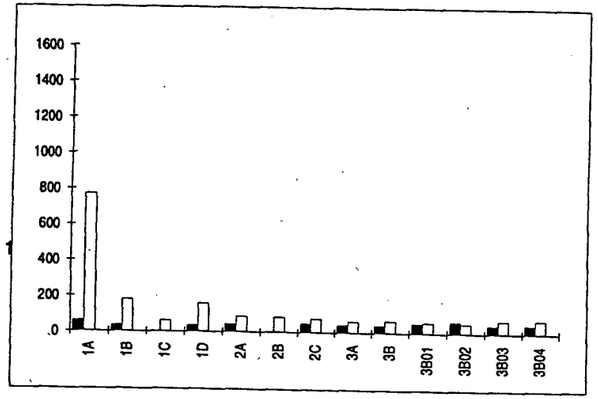
Location	BS in ppm	SS in ppm
1A	106	911
1A01	64.6	1210
1A02	84.5	1300
1A03	60.4	1540
1A04	59.1	861
1B	81.1	977
1B01	62.1	854
1B04	49.8	534
1B03	47.6	128
1B05	53.1	593
1C	40	153
1D	44.8	1250
2A	41.9	71.2
2B	39	83.8
2C	40.4	88.6
3B	51.4	71.8
3A		63



Zinc in Offsite Soils

Bearing 315

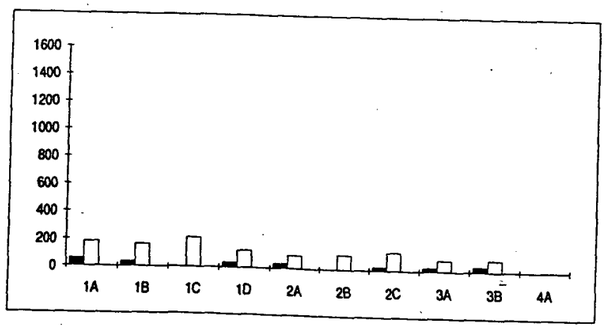
Location	BS in ppm	SS in ppm
1A	61.1	771
1B	35.9	180
1C		60.8
1D	35.2	158
2A	42.7	86.8
2B		83.5
2C	49.6	76
3A	42.9	63.4
3B	40.1	66.8
3B01	53.5	59.7
3B02	63.7	53.5
3B03	44.5	70.8
3B04	47.8	74.3

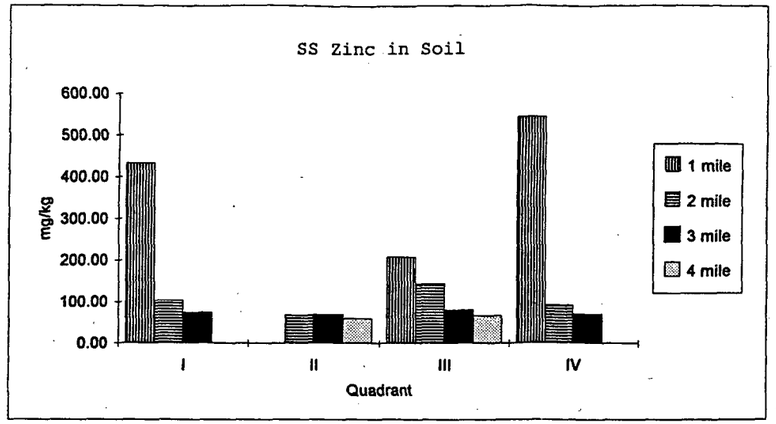


Zinc in Offsite Soils

Bearing 338

Location	BS in ppm	SS in ppm
1A	59.1	183
1B	39.1	164
1C		215
1D	37.6	126
2A	39.3	94.9
2B		108
2C	28.9	132
3A	29	81.9
3B	39.2	86.3
4A		



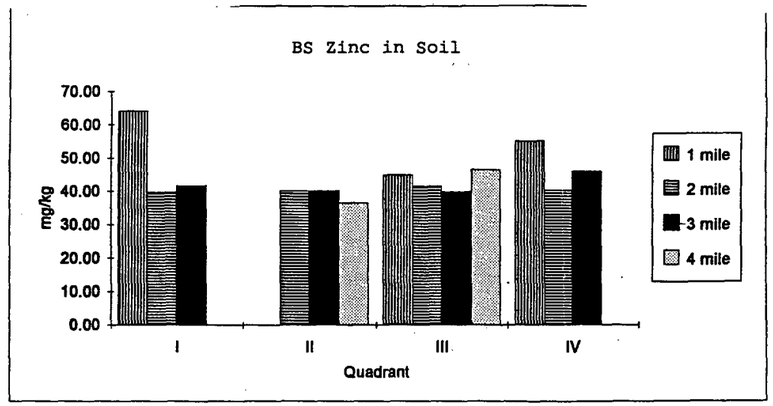


Zinc, total

Surface Sample (SS)

Quadrant

Distance	I	II	III	IV
1 mile	433.79	no data	209.00	544.28
2 mile	103.27	68.36	144.82	91.64
3 mile	73.40	68.36	79.29	69.15
4 mile	no data	59.80	66.80	no data



Zinc, total

Below Surface Sample (BS)

Quadrant

Distance	I	II	III	IV
1 mile	64.16	no data	45.00	55.00
2 mile	39.75	40.06	41.63	40.26
3 mile	41.43	40.03	39.68	45.79
4 mile	no data	36.50	46.48	no data

Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Zinc in Relationship with Distance from Site, NW Quadrant

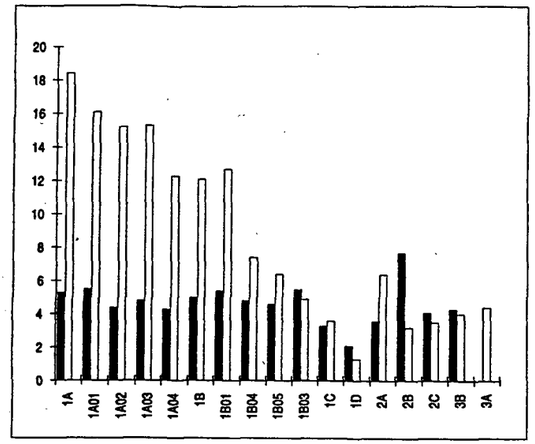
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-35	

93-1477b.259
12-6-93 /vk : 0

Arsenic in Offsite Soils

Bearing 293

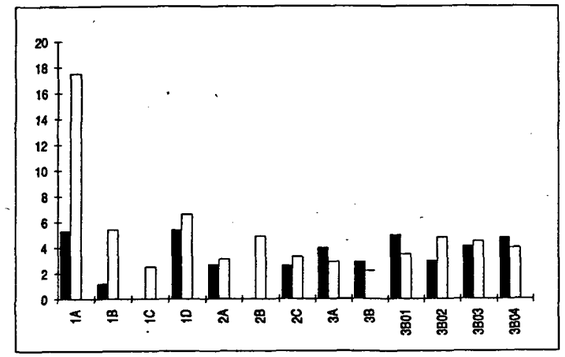
Location	BS in ppm	SS in ppm
1A	5.3	18.4
1A01	5.5	16.1
1A02	4.4	15.2
1A03	4.8	15.3
1A04	4.3	12.3
1B	5	12.1
1B01	5.4	12.7
1B04	4.8	7.4
1B05	4.6	6.4
1B03	5.5	4.9
1C	3.3	3.6
1D	2.1	1.3
2A	3.6	6.4
2B	7.7	3.2
2C	4.1	3.5
3B	4.3	4
3A		4.4



Arsenic in Offsite Soils

Bearing 315

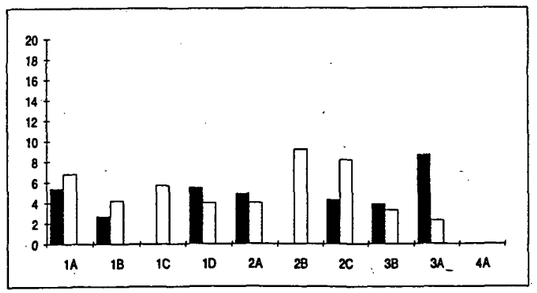
Location	BS in ppm	SS in ppm
1A	5.3	17.5
1B	1.2	5.4
1C		2.5
1D	5.4	6.6
2A	2.7	3.1
2B		4.9
2C	2.6	3.3
3A	4	2.9
3B	2.9	2.2
3B01	5	3.5
3B02	3	4.8
3B03	4.1	4.5
3B04	4.8	4

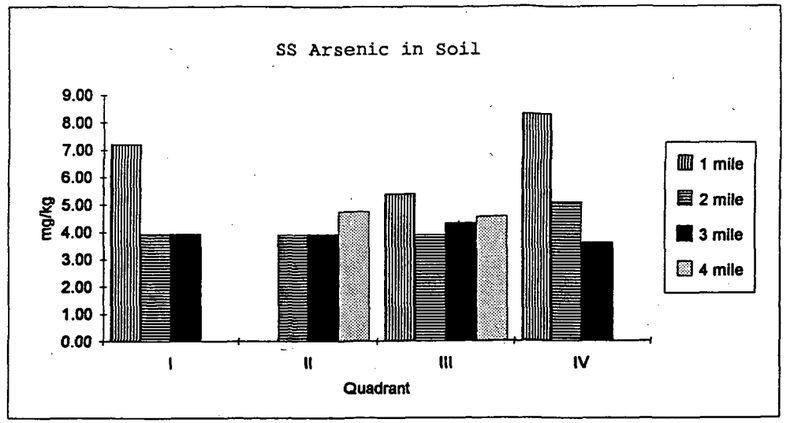


Arsenic in Offsite Soils

Bearing 338

Location	BS in ppm	SS in ppm
1A	5.4	6.8
1B	2.7	4.2
1C		5.7
1D	5.5	4
2A	4.9	4
2B		9.2
2C	4.3	8.2
3B	3.9	3.3
3A	8.7	2.3
4A		



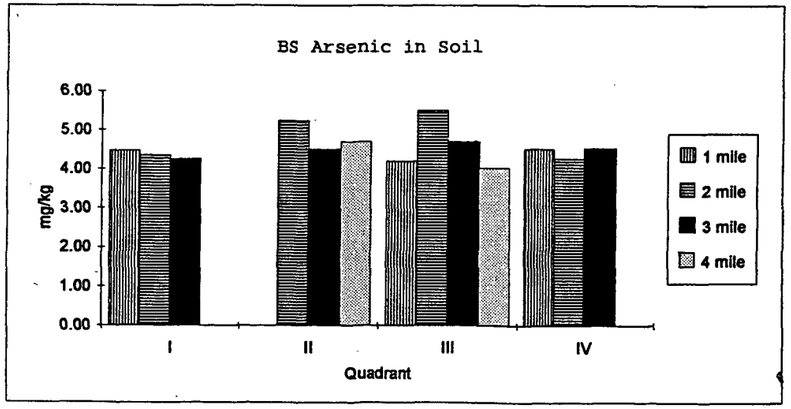


Arsenic, total

Surface Sample (SS)

Quadrant

Distance	I	II	III	IV
1 mile	7.21	no data	5.40	8.28
2 mile	3.94	3.90	3.90	5.09
3 mile	3.91	3.90	4.31	3.59
4 mile	no data	4.75	4.55	no data



Arsenic, total

Below Surface Sample BS)

Quadrant

Distance	I	II	III	IV
1 mile	4.48	no data	4.20	4.52
2 mile	4.36	5.24	5.50	4.27
3 mile	4.24	4.50	4.69	4.52
4 mile	no data	4.70	4.03	no data

Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Relative Concentrations of Arsenic in Relationship with Distance from Site, NW Quadrant

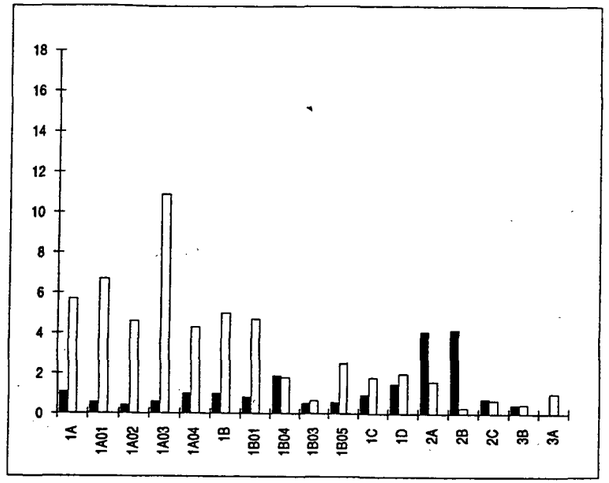
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-36	

93-1477b.270
12-9-93 /Alt : 1

Selenium in Offsite Soils

Bearing 293

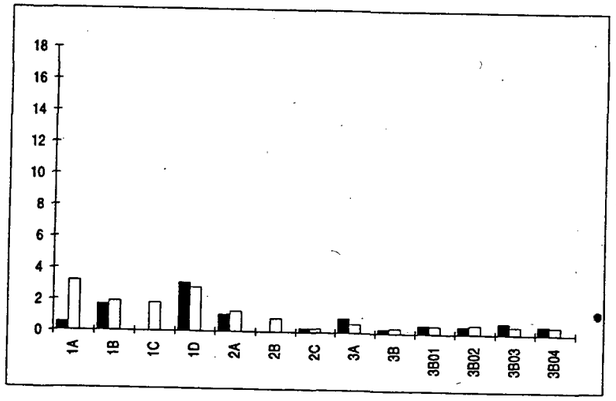
Location	BS in ppm	SS in ppm
1A	1.1	5.7
1A01	0.58	6.7
1A02	0.43	4.6
1A03	0.6	10.9
1A04	1	4.3
1B	1	5
1B01	0.83	4.7
1B04	1.9	1.8
1B03	0.53	0.65
1B05	0.57	2.5
1C	0.96	1.8
1D	1.5	2
2A	4.1	1.6
2B	4.2	0.27
2C	0.75	0.67
3B	0.45	0.46
3A		1



Selenium in Offsite Soils

Bearing 315

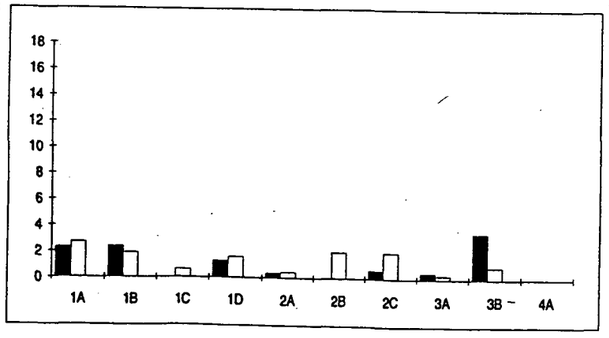
Location	BS in ppm	SS in ppm
1A	0.55	3.2
1B	1.7	1.9
1C		1.8
1D	3.1	2.8
2A	1.1	1.3
2B		0.87
2C	0.27	0.25
3A	0.94	0.57
3B	0.27	0.33
3B01	0.56	0.5
3B02	0.51	0.57
3B03	0.75	0.5
3B04	0.57	0.5

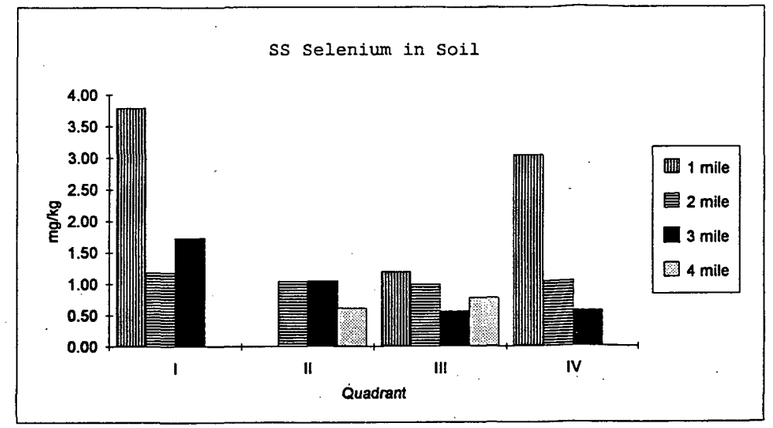


Selenium in Offsite Soils

Bearing 338

Location	BS in ppm	SS in ppm
1A	2.3	2.7
1B	2.4	1.9
1C		0.62
1D	1.3	1.6
2A	0.37	0.43
2B		2
2C	0.64	2
3A	0.48	0.28
3B	3.5	0.93
4A		



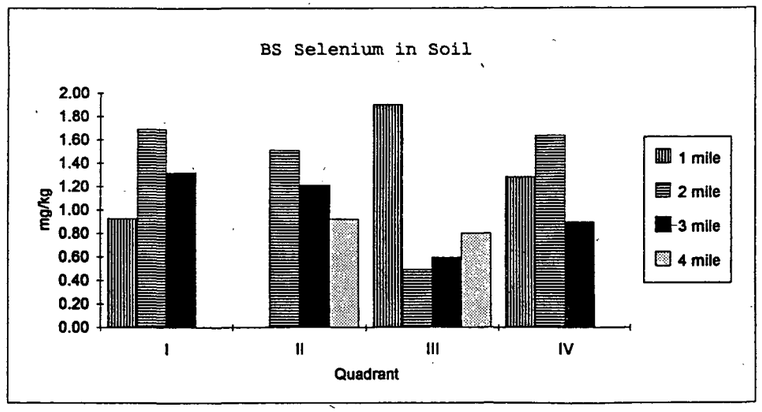


Selenium, total

Surface Sample (SS)

Quadrant

Distance	I	II	III	IV
1 mile	3.79	no data	1.20	3.04
2 mile	1.19	1.04	1.00	1.04
3 mile	1.73	1.04	0.56	0.56
4 mile	no data	0.62	0.77	no data



Selenium, total

Below Surface Sample (BS)

Quadrant

Distance	I	II	III	IV
1 mile	0.93	no data	1.90	1.28
2 mile	1.69	1.51	0.49	1.63
3 mile	1.31	1.21	0.59	0.89
4 mile	no data	0.92	0.80	no data

Legend:

- Below surface concentration in ppm
- Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Concentration of Selenium in Relationship with Distance from Site, NW Quadrant

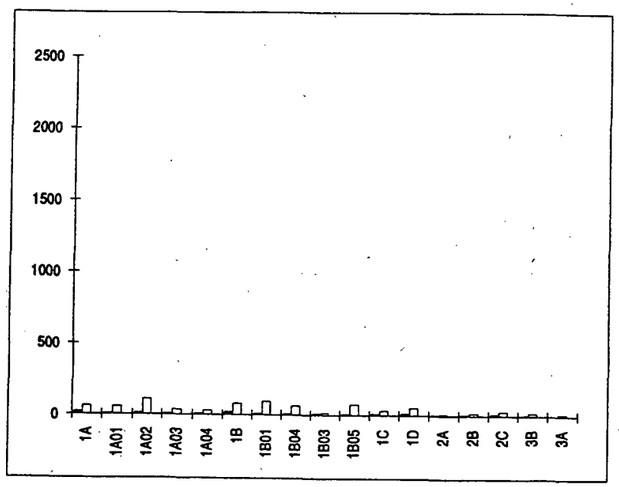
JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-37	

83-1477b.260
12-8-93 MK:1

Lead in Offsite Soils

Bearing 293

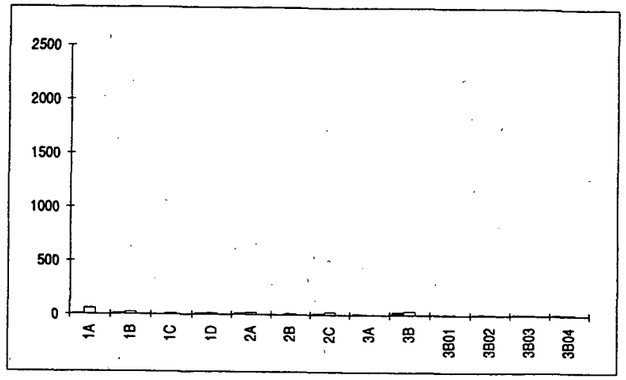
Location	BS in ppm	SS in ppm
1A	21.3	60.9
1A01	9	55.8
1A02	10.8	109
1A03	8.8	35.8
1A04	9.2	30.5
1B	21.6	80.1
1B01	10.7	94.6
1B04	8.7	63.9
1B03	9.7	14.3
1B05	9.1	76.1
1C	12.7	33.2
1D	14.2	54.3
2A	6.3	9.3
2B	7.6	17.7
2C	11.1	29.8
3B	5	19
3A		12.3



Lead in Offsite Soils

Bearing 315

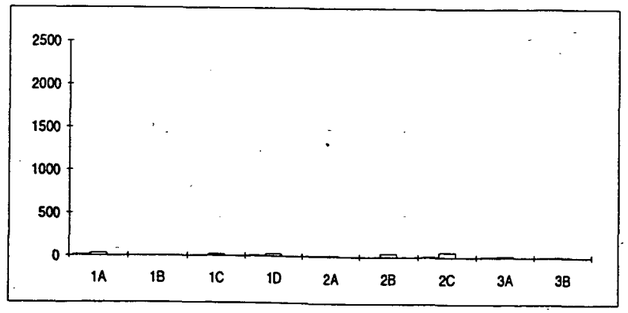
Location	BS in ppm	SS in ppm
1A	7.9	57.6
1B	12.1	23.1
1C		12.6
1D	13.7	15.7
2A	15.6	19.9
2B		12.7
2C	14.5	26.2
3A	9.9	4.6
3B	29.9	36.2
3B01	8.9	11.6
3B02	10.6	7.3
3B03	12.6	10.1
3B04	9.2	12.1

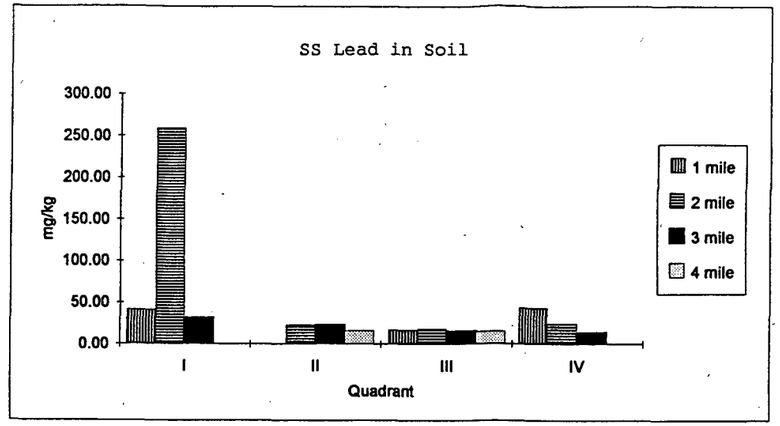


Lead in Offsite Soils

Bearing 338

Location	BS in ppm	SS in ppm
1A	11.4	27.1
1B	3	0.86
1C		20.3
1D	10.1	26.6
2A	6.9	13.2
2B		40.8
2C	9	54.4
3A	7	14.8
3B	1.3	9.8



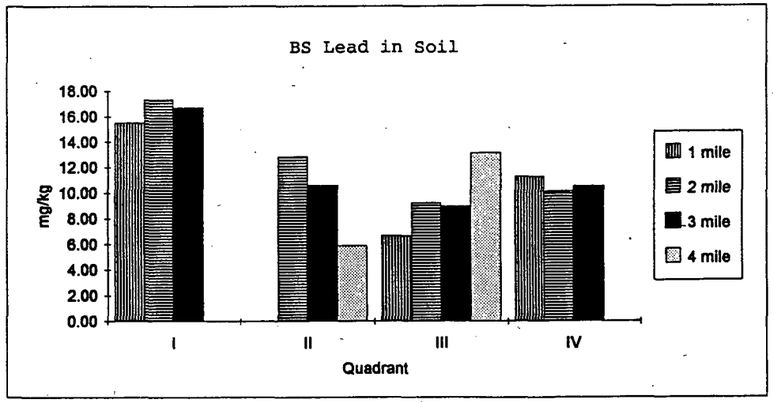


Lead, total

Surface Sample (SS)

Quadrant

Distance	I	II	III	IV
1 mile	41.50	no data	16.80	43.30
2 mile	259.44	23.13	18.23	24.89
3 mile	31.72	23.13	15.76	13.78
4 mile	no data	16.15	15.10	no data



Lead, total

Below Surface Sample (BS)

Quadrant

Distance	I	II	III	IV
1 mile	15.52	no data	6.70	11.30
2 mile	17.34	12.86	9.23	10.14
3 mile	16.68	10.55	8.94	10.49
4 mile	no data	5.90	13.13	no data

Legend:

Below surface concentration in ppm

Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

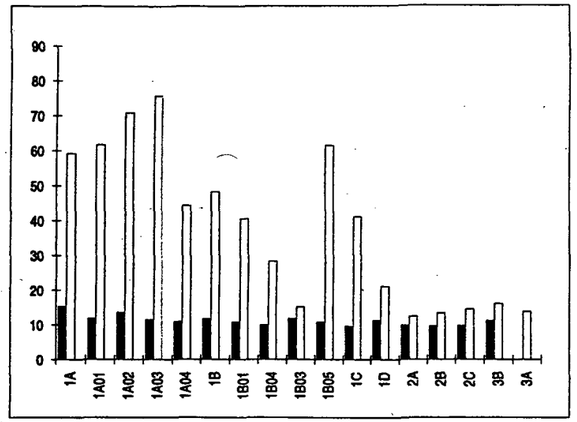
Relative Concentrations of Lead in Relationship with Distance from Site, NW Quadrant

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-38	

93-1477b.271
12-8-93 /M:0

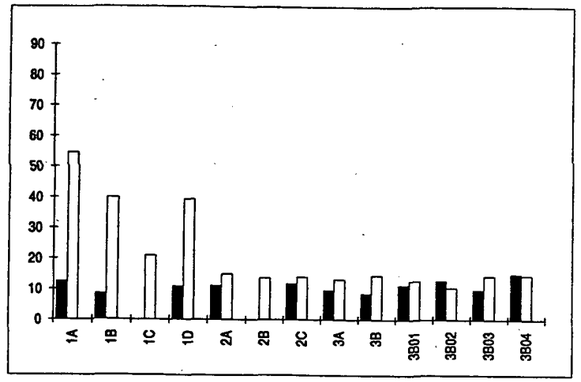
Copper in Offsite Soils
Bearing 293

Location	BS in ppm	SS in ppm
1A	15.4	59.2
1A01	12	61.7
1A02	13.7	70.9
1A03	11.6	75.7
1A04	11	44.3
1B	11.8	48.3
1B01	10.9	40.5
1B04	10	28.3
1B03	11.9	15.2
1B05	10.9	61.5
1C	9.7	41.1
1D	11.4	21.1
2A	10	12.4
2B	9.7	13.4
2C	9.8	14.5
3B	11.3	16.1
3A		13.9



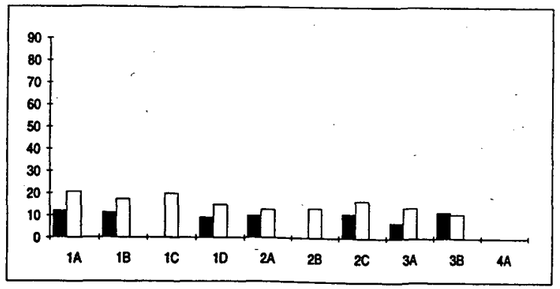
Copper in Offsite Soils
Bearing 315

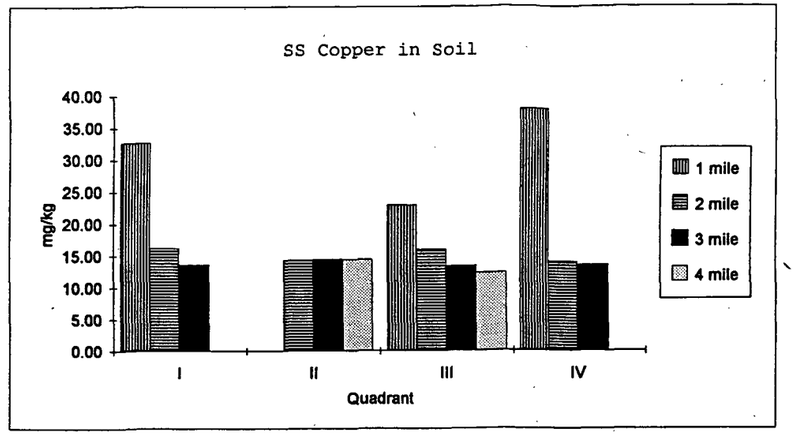
Location	BS in ppm	SS in ppm
1A	12.6	54.5
1B	8.6	40
1C		21
1D	10.9	39.3
2A	11.2	14.9
2B		13.7
2C	11.8	14
3A	9.7	13.2
3B	8.6	14.5
3B01	11.4	12.8
3B02	12.8	10.5
3B03	9.8	14.3
3B04	15	14.5



Copper in Offsite Soils
Bearing 338

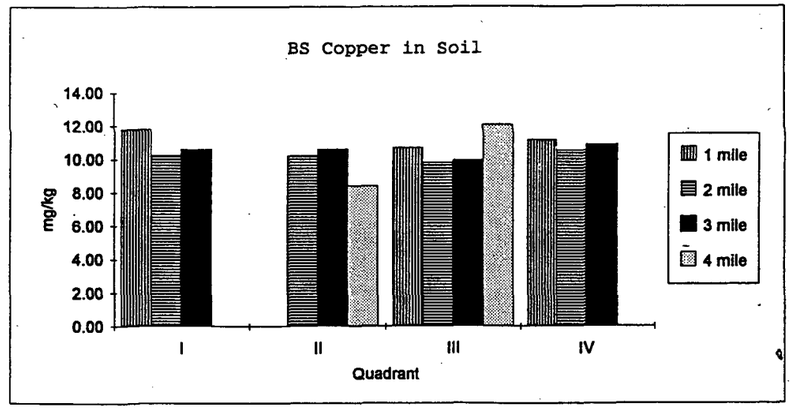
Location	BS in ppm	SS in ppm
1A	12.2	20.7
1B	11.3	17.3
1C		19.9
1D	9.3	14.9
2A	10.1	12.8
2B		13.4
2C	11	16.8
3A	7.2	13.8
3B	11.8	10.9
4A		





Copper, total
Surface Sample (SS)
Quadrant

Distance	I	II	III	IV
1 mile	32.74	no data	23.00	37.90
2 mile	16.20	14.37	16.00	13.99
3 mile	13.56	14.37	13.32	13.45
4 mile	no data	14.45	12.25	no data



Copper, total
Below Surface Sample (BS)
Quadrant

Distance	I	II	III	IV
1 mile	11.81	no data	10.70	11.16
2 mile	10.25	10.21	9.80	10.51
3 mile	10.56	10.57	9.89	10.84
4 mile	no data	8.40	12.05	no data

Legend:

■ Below surface concentration in ppm

□ Surface soil concentration in ppm

Notes:
BS – below surface
SS – surface soil

In the tables accompanying the bar charts, locations listed with no concentration given mean that the constituent was not analyzed at that location or that no sample was taken.

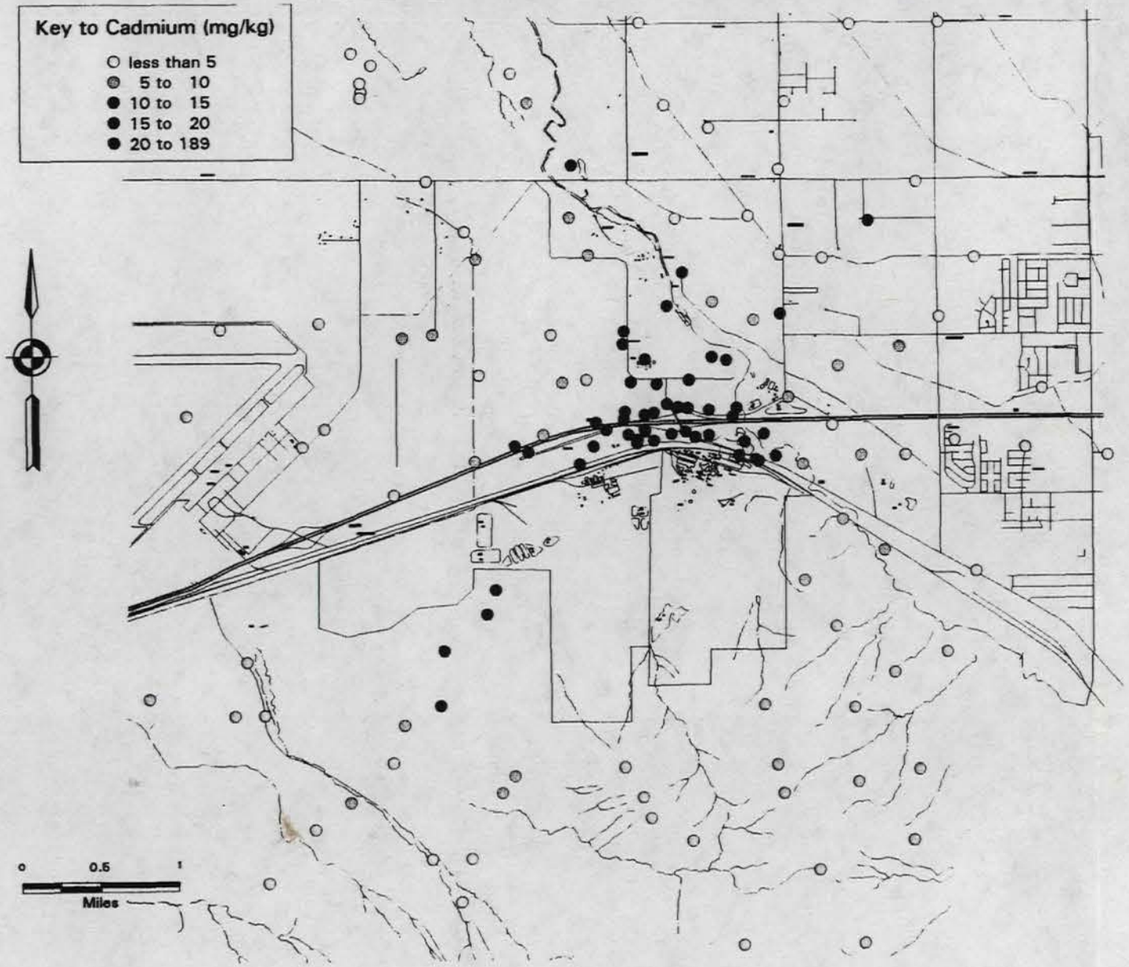
BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

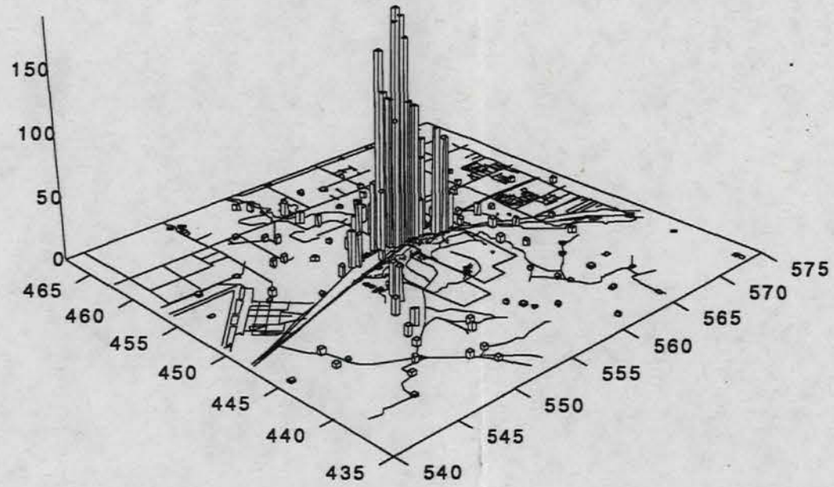
EASTERN MICHAUD FLATS
POCATELLO, IDAHO

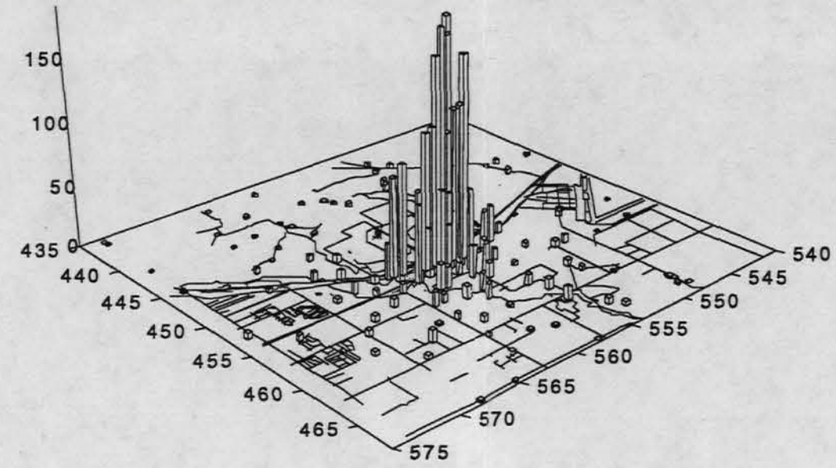
Concentration of Copper in Relationship with Distance from Site, NW Quadrant

JOB No.	DRAWING No.	REV.
21372	FIGURE 4.3-39	

83-1477b.261
12-8-83 NK: 1





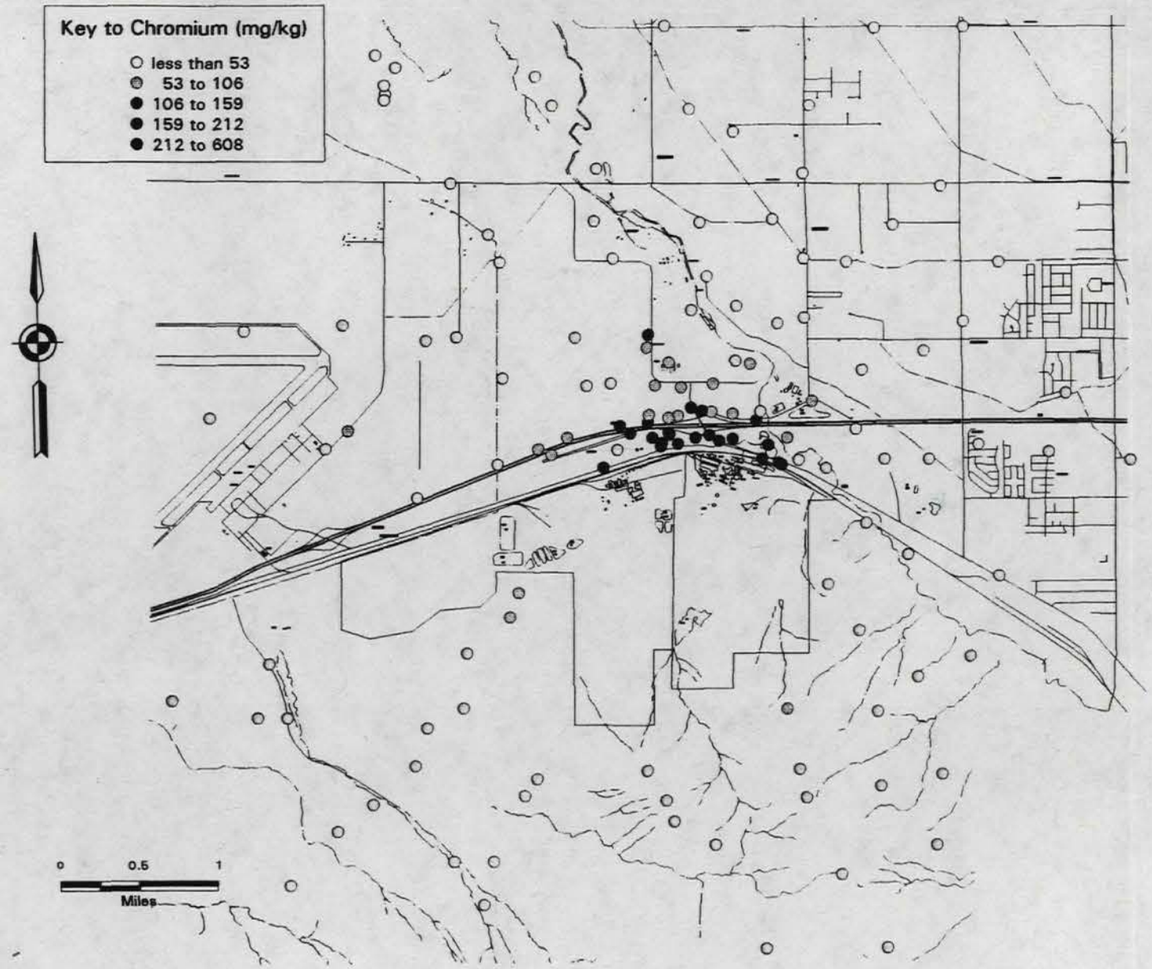


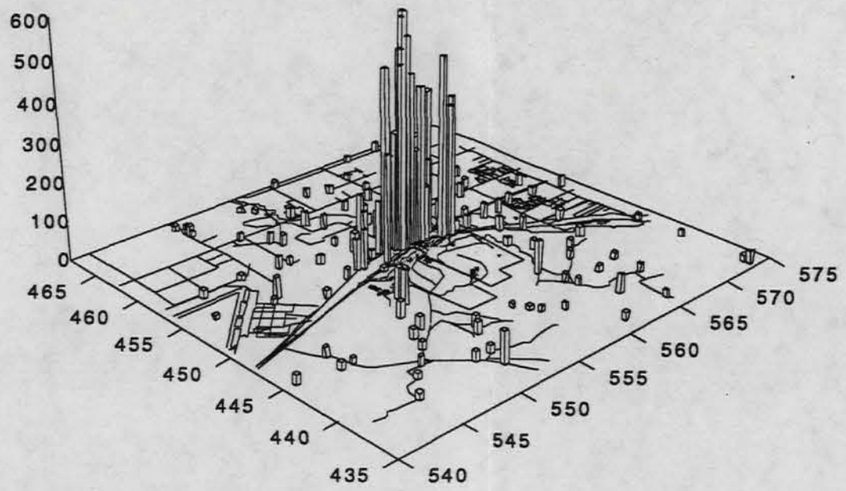
BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Relative Concentrations of Cadmium with Distance from Site			
BECHTEL	JOB No.	DRAWING No.	REV.
	21372	FIGURE 4.3-40	

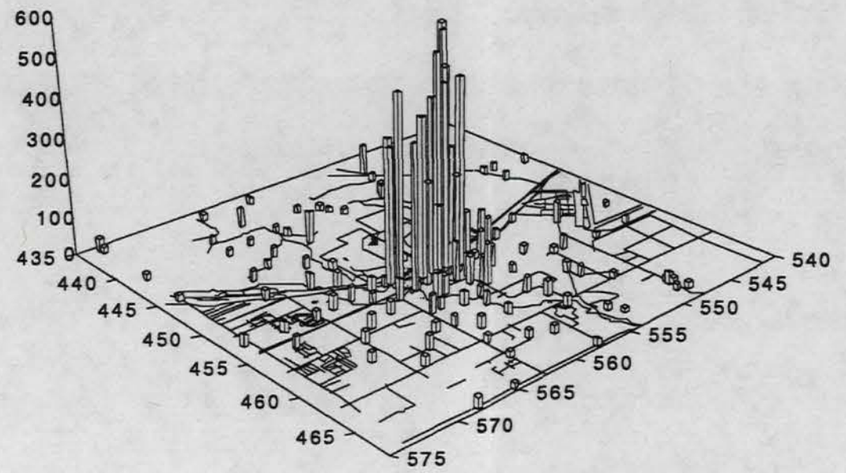
93-1477b.262
12-8-93 /vk : 1

Key to Chromium (mg/kg)

- ○ less than 53
- ◎ 53 to 106
- ● 106 to 159
- ● 159 to 212
- ● 212 to 608

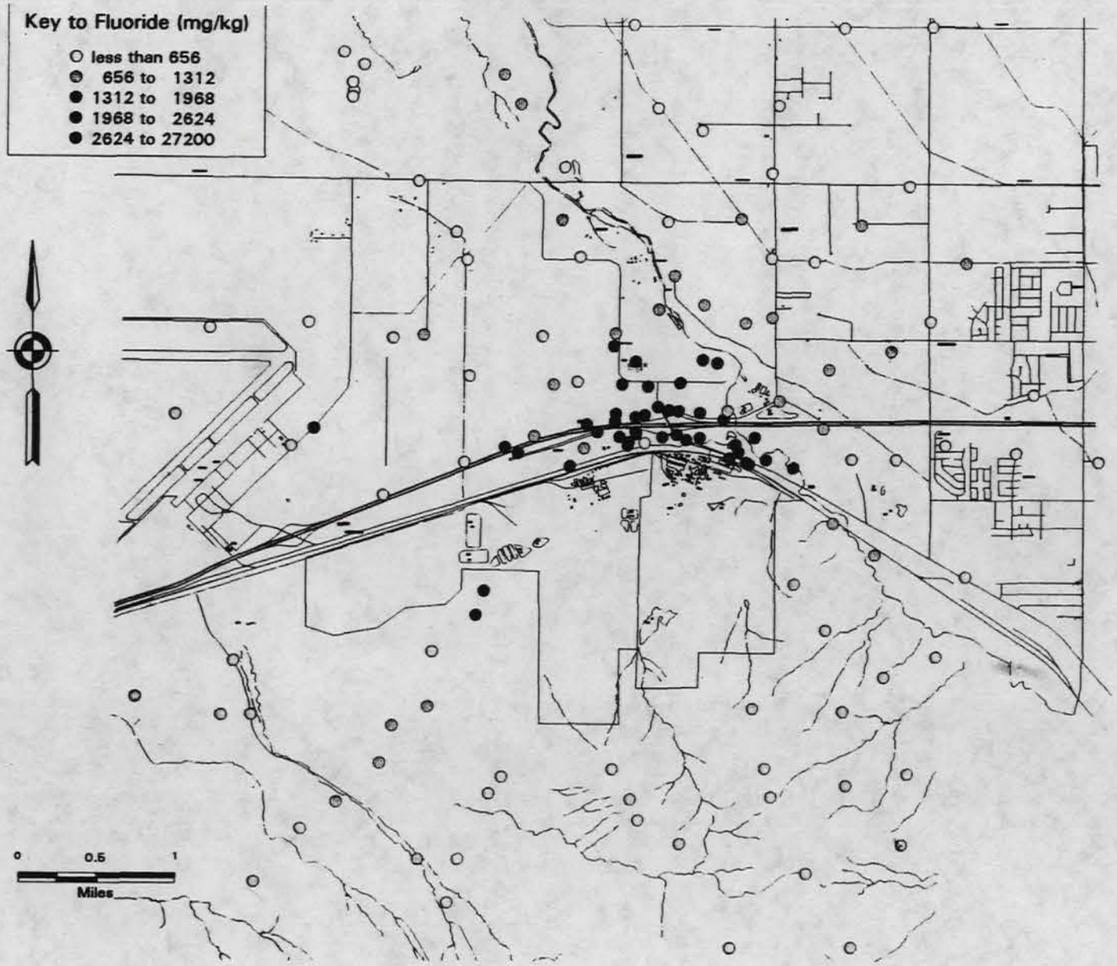


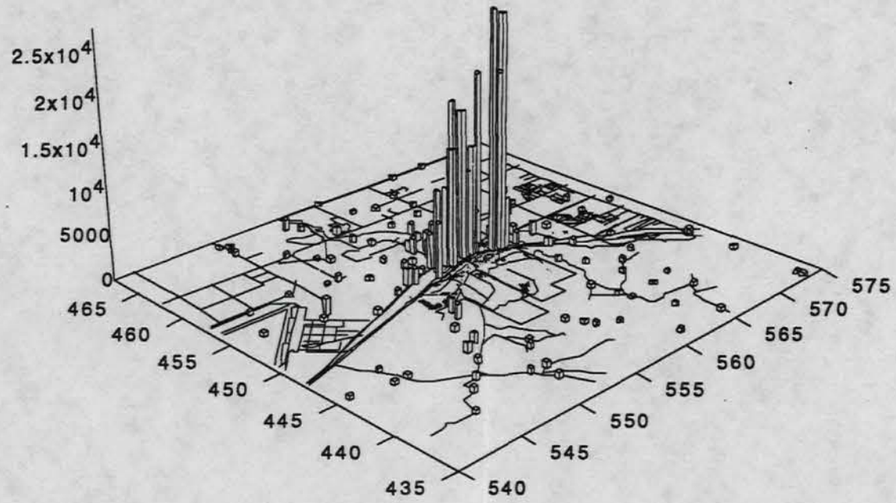


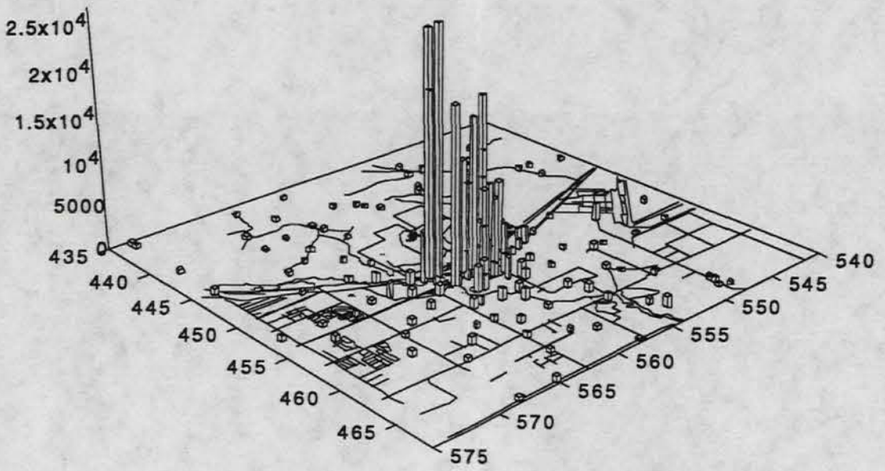


BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Relative Concentrations of Chromium with Distance from Site			
BECHTEL	JOB No.	DRAWING No.	REV.
	21372	FIGURE 4.3-41	

93-1477b.263
12-8-93 /vk : 1

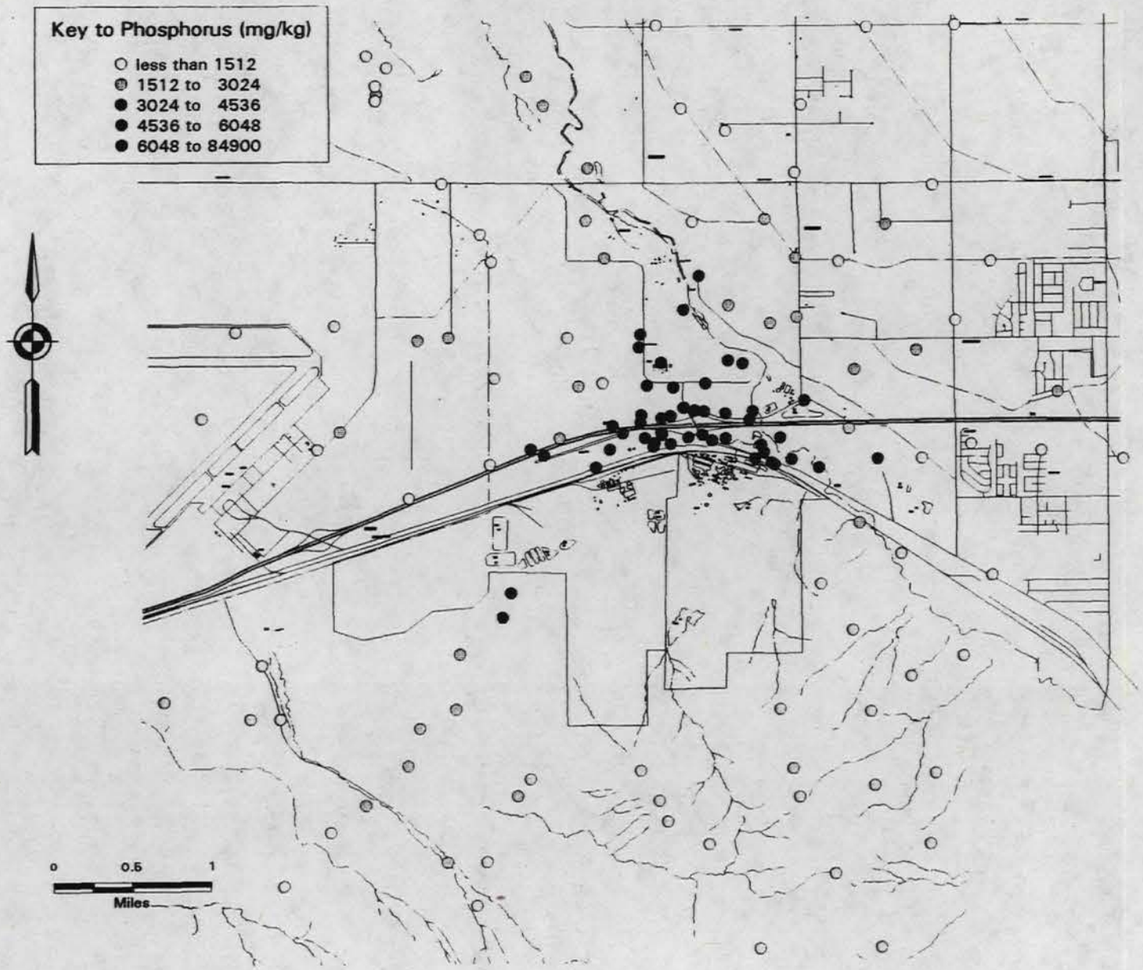


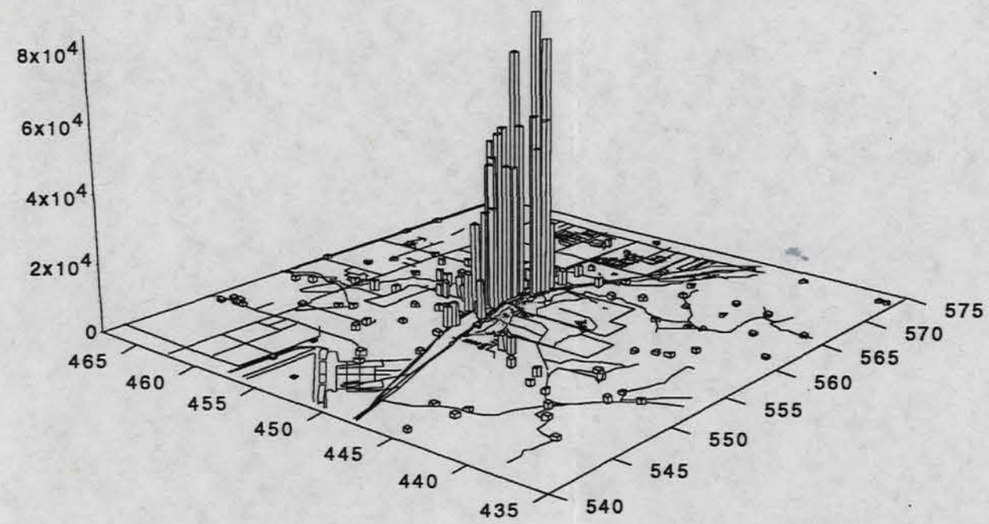




BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO	
EASTERN MICHAUD FLATS POCATELLO, IDAHO	
Relative Concentrations of Fluoride with Distance from Site	
JOB No. 21372	DRAWING No. FIGURE 4.3-42 REV.

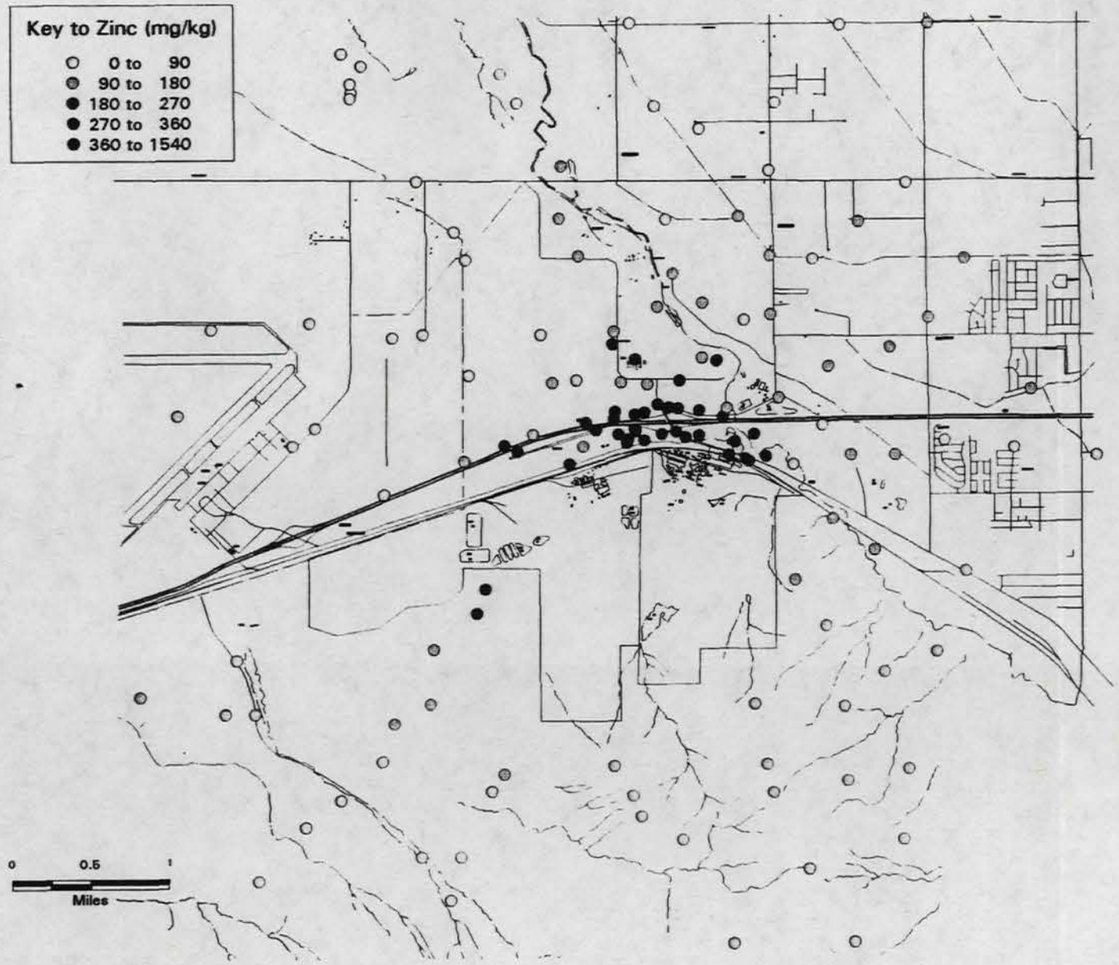
93-1477b.264
12-8-93 /kk : 1

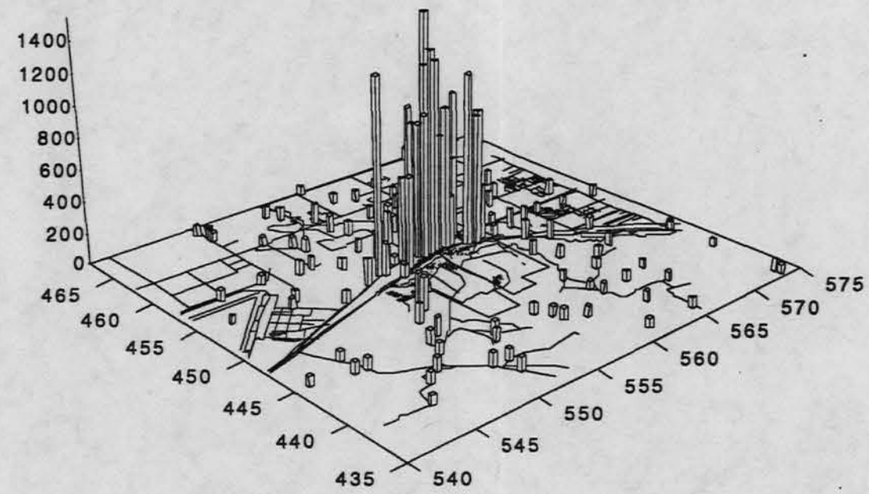


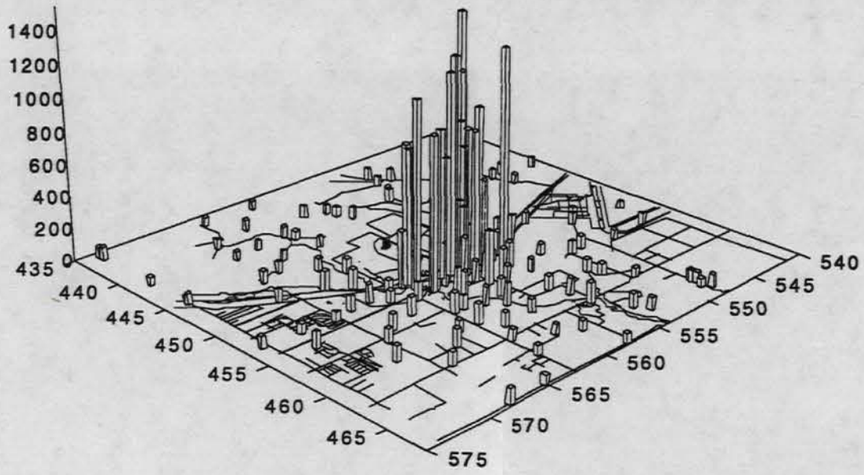


BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Relative Concentrations of Total Phosphorus with Distance from Site			
BECHTEL	JOB No. 21372	DRAWING No. FIGURE 4.3-43	REV.

93-1477b.265
12-8-93 /VK : 1

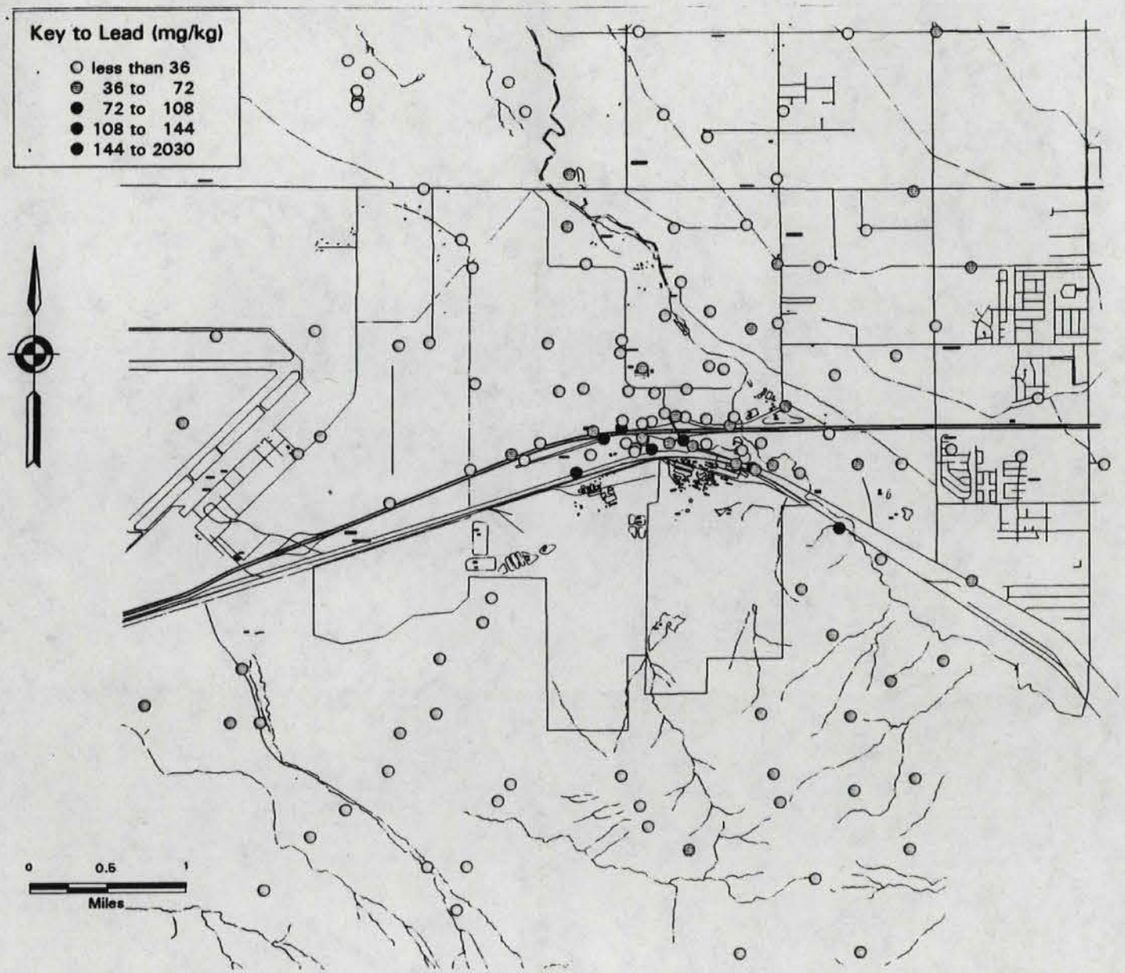


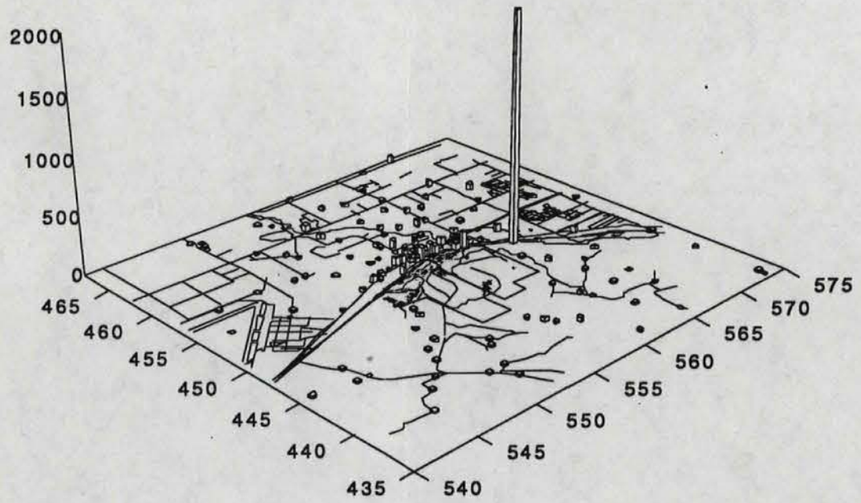


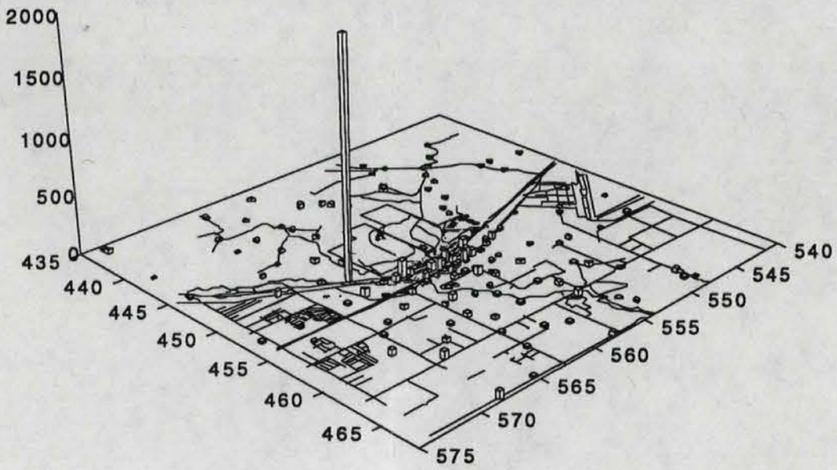


BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Relative Concentrations of Zinc with Distance from Site			
BECHTEL	JOB No.	DRAWING No.	REV.
	21372	FIGURE 4.3-44	

93-1477b.266
12-8-93 /vk : 1

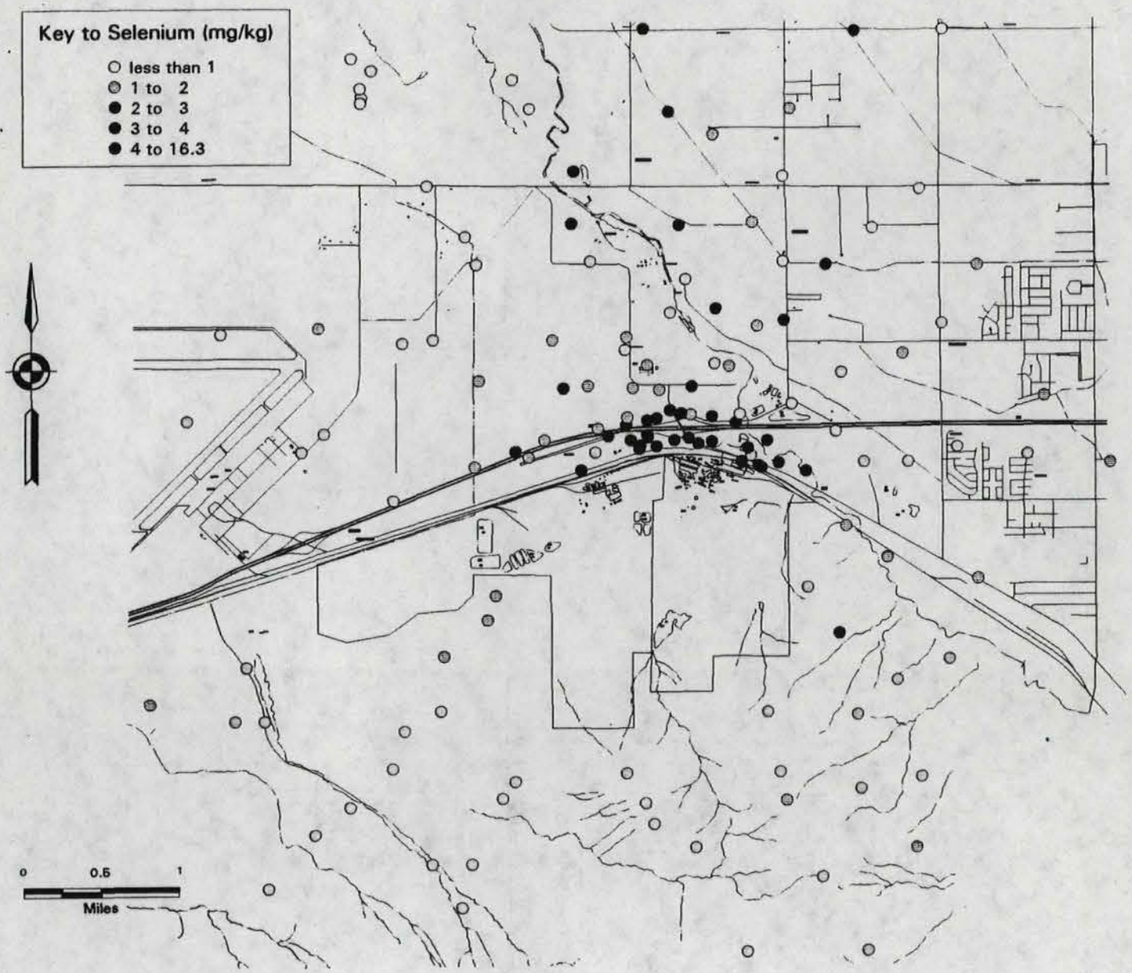


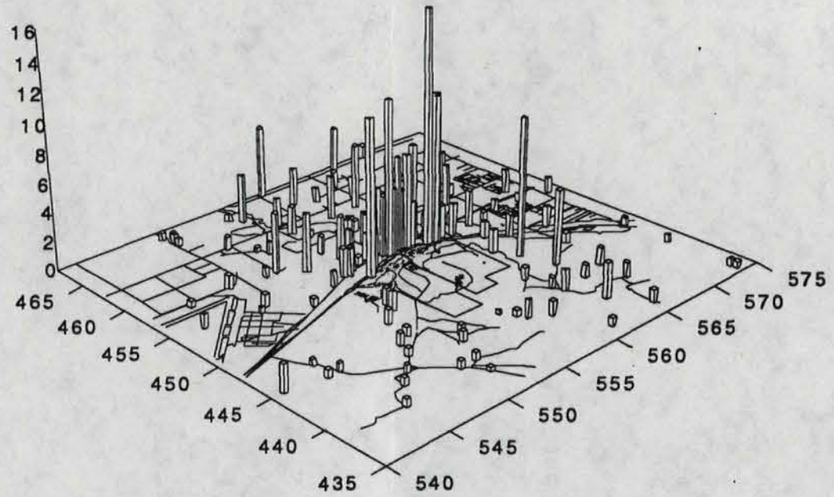


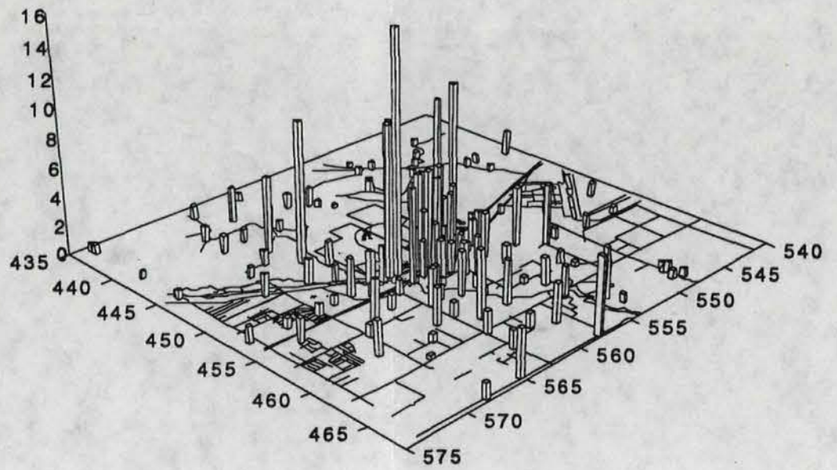


BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO	
EASTERN MICHAUD FLATS POCATELLO, IDAHO	
Relative Concentrations of Lead with Distance from Site	
JOB No. 21372	DRAWING NO. FIGURE 4.3-45
REV.	

93-1477b.315 lp 12-15-93

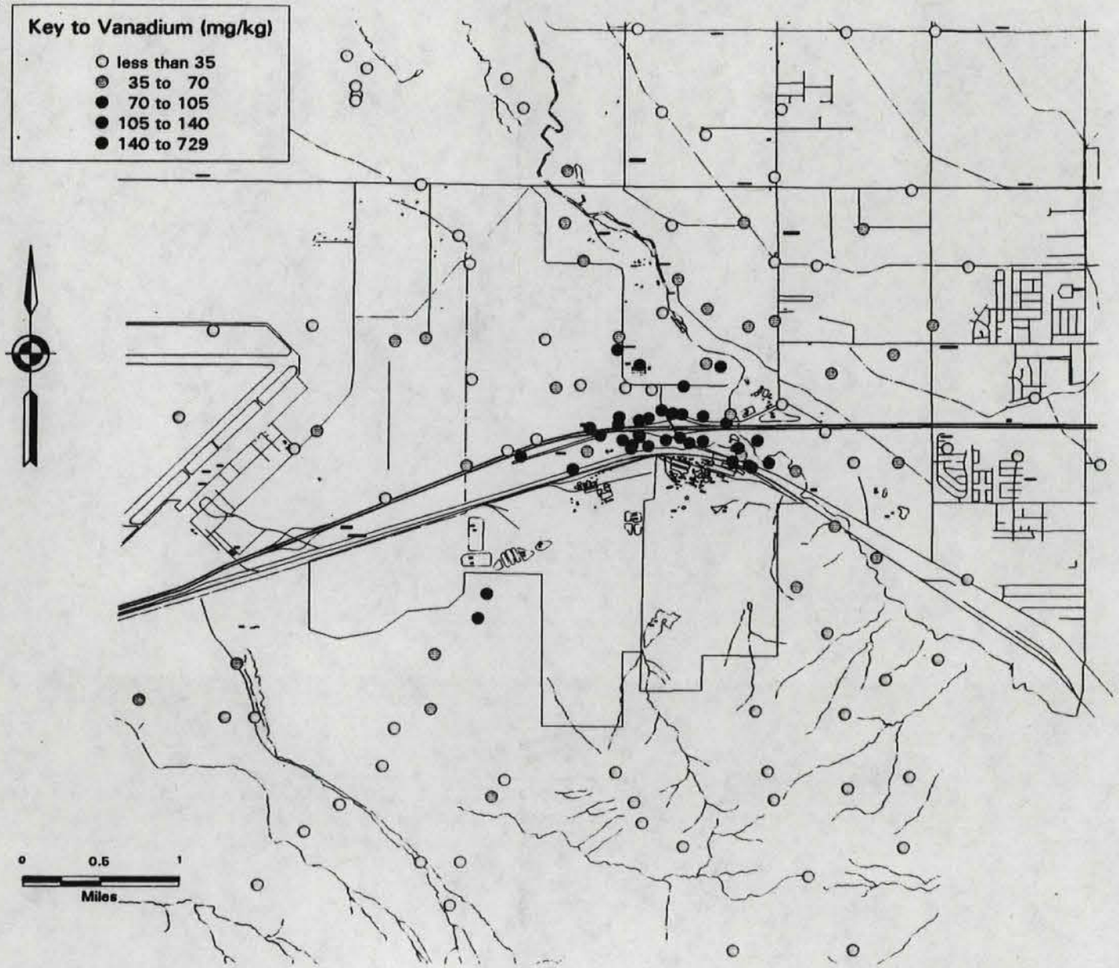


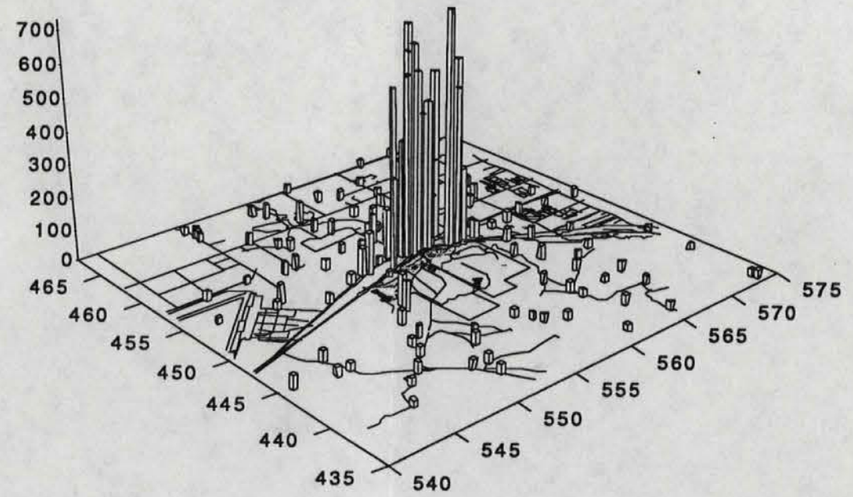


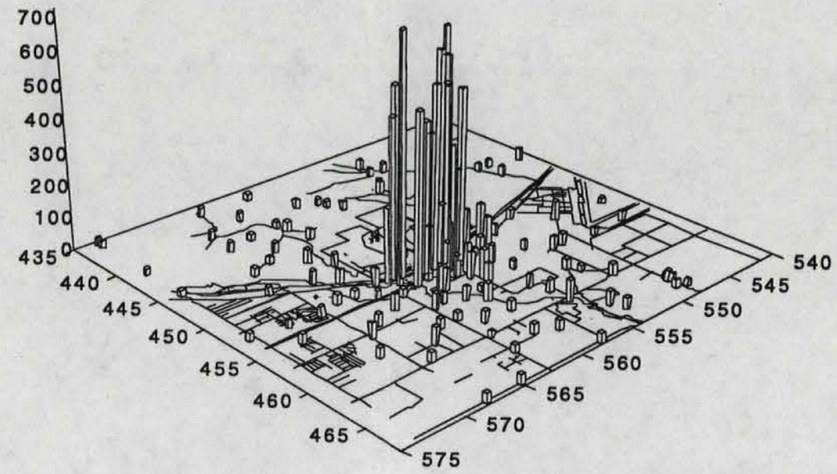


BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Relative Concentrations of Selenium with Distance from Site			
BECHTEL	JOB No. 21372	DRAWING NO. FIGURE 4.3-46	REV.

93-1477b.316 fp 12-15-93

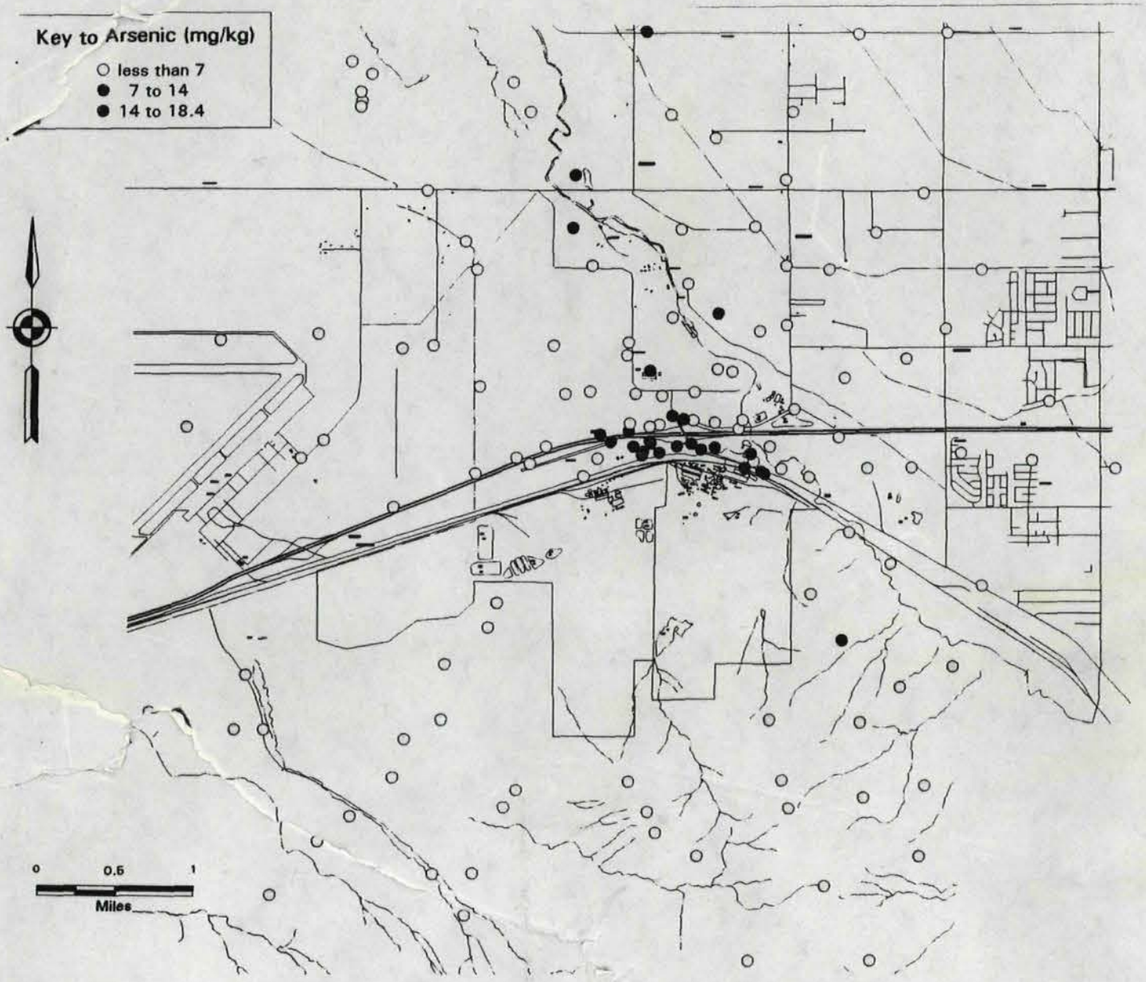


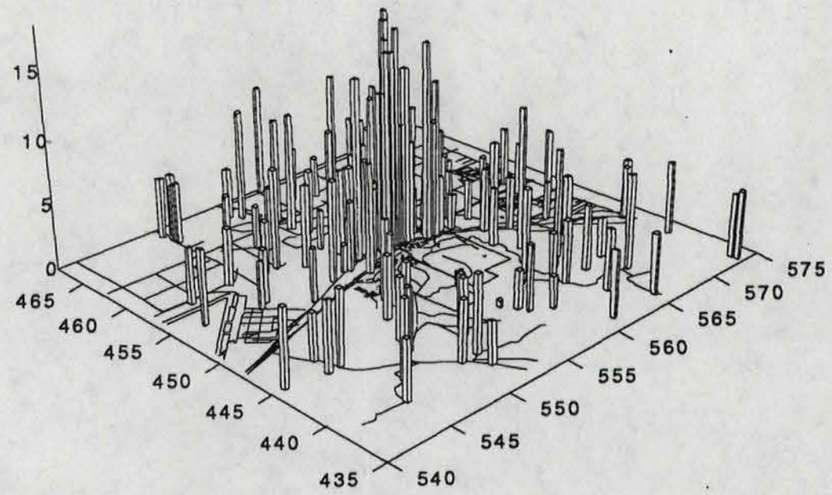


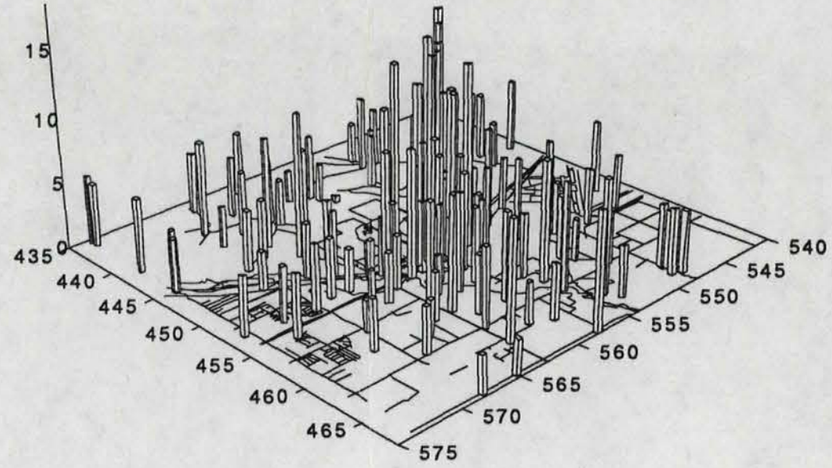


BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Relative Concentrations of Vanadium with Distance from Site			
BECHTEL	JOB No.	DRAWING NO.	REV.
	21372	FIGURE 4.3-47	

93-1477b.317 fp 12-15-93







BECHTEL ENVIRONMENTAL, INC. SAN FRANCISCO			
EASTERN MICHAUD FLATS POCATELLO, IDAHO			
Relative Concentrations of Arsenic with Distance from Site			
BECHTEL	JOB No. 21372	DRAWING NO. FIGURE 4.3-48	REV.