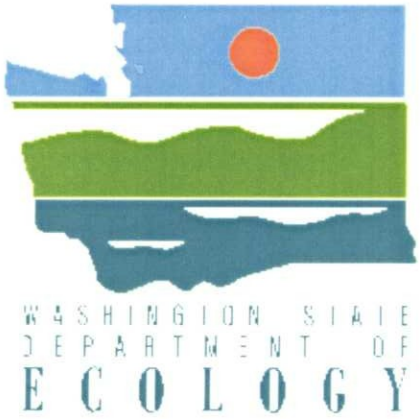

Area-wide Soil Contamination Project
Task 3.12: Manson Area Data Analysis

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TASK 3.12: MANSON AREA DATA ANALYSIS

Executive Summary

Background and Objectives

Elevated concentrations of arsenic and lead have been attributed to historical (pre 1948) use of lead arsenate pesticide, particularly on apple and pear orchards in Eastern Washington. The Washington State Department of Ecology (Ecology), through the multi-agency Area-Wide Soil Contamination Project, has proposed developing a tool, based on 1948 era land use, to assess the potential for orchard-related soil contamination. In this report a proposed tool, based on historical orchard land use characterization from historical aerial photographic analysis and arsenic soil concentration data, is evaluated and presented. The evaluation was conducted for the Manson area of Chelan County, Washington. The analysis was used to address the primary project objective: to evaluate the adequacy and accuracy of using historical aerial photographs and geographic information system (GIS) mapping to predict areas within Washington State where lead and arsenic are elevated in soil due to historical orchard land use. The Manson area was chosen primarily because of the availability of existing, relatively high quality arsenic soil data and the availability of high-resolution 1947 aerial photographs.

Existing Data Sets

Up until about 1948, lead arsenate was used extensively in Washington State orchards, primarily to control codling moth infestations on apples and pears. After 1948, lead arsenate use was essentially phased out and replaced by the organic pesticide DDT. One of the documented side effects of lead arsenate use was phytotoxicity to shallow rooted crops including replanted orchards. This phytotoxicity was attributed to the buildup of arsenic soil concentrations from the application of lead arsenate. In the period following 1946, a large percentage of historical apple orchards in the Manson area of Chelan County were removed and replanted. Many of the new trees showed reduced productivity. The Manson project was designed by United States Bureau of Reclamation (USBR) to evaluate problems with apple re-establishment and replanting failure as part of a larger project to renovate the Lake Chelan Irrigation District. In the spring of 1968, the USBR collected 1,600 soil samples at four different depths (0 to 12 inches; 12 to 18 inches, 18 to 24 inches and 24 to 36 inches) from irrigable lands within the Manson Unit of the Lake Chelan Irrigation District. The purpose of the soil sampling was to test for a number of parameters that could be contributing to replanting failure. The parameters included total arsenic (As), which was of particular interest because of high rates of use of lead arsenate to control the coddling moth. Lead was not analyzed for, presumably because its presence is not a particular phytotoxicity concern. The USBR soil sample locations were identified by tract or property. The study included a detailed map showing the location of each tract.

Aerial photographic analysis has proven to be a useful tool to identify historical orchards in Eastern Washington. The Yakima County GIS Department completed an extensive analysis of historical orchards based on 1948 and 1949 aerial photographs in 2000. That study used GIS mapping techniques to categorize and inventory historical orchards. This Manson area project used a similar GIS mapping approach to that used by Yakima County. The 1947 aerial

photographs for the Manson area were located at the National Archives. The photographs were obtained from the archives through a private contractor. Eleven separate photographs were obtained with resolution sufficient to discern orchards and other land use activities. The current Manson area project described in this report combined land use information discerned from the aerial photographs with arsenic soil data from the 1968 USBR study to produce a database of arsenic soil concentrations for different land uses.

Data Evaluation

Arsenic data in the 1968 USBR study was classified by depth and tract location. Data evaluation during the current project consisted primarily of classifying each tract by land use based on the percentage of orchard production identified from 1947 aerial photographs. Each tract was classified into one of three categories: orchard, non-orchard, and mixed (partial orchard and other land uses). Orchard designated tracts were those identified on the 1947 aerial photo to be covered by approximately 90 percent or greater orchard; mixed designated tracts were those covered by 90 to 10 percent orchard; and non-orchard designated tracts were those covered by approximately 10 percent or less orchard. Because sample locations were only identified at the tract level, it was only possible to correlate sample concentration with land use at the tract level. Separating out a "mixed" land use allowed a comparison between orchard and non-orchard land use tracts with a higher degree of certainty in the sample land use association.

After the land use of each tract was determined, the tract land use classification was used to associate a land use attribute with each arsenic analytical result based on the tract where the arsenic data were collected. Arsenic data trends and characteristics were defined qualitatively through graphical analysis and quantitatively through summary statistics. A statistical test was used to quantify the difference associated with "orchard" versus "non-orchard" land use types.

Results and Conclusions

The characteristics of the USBR data followed similar patterns observed for other arsenic data sets collected at historical orchard sites and the concentrations typically closely followed a lognormal distribution. The range in arsenic concentrations, with a single exception, was between non-detect and 441 mg/kg, within the range expected for foliar spray application associated with historical production of apples prior to 1948. A single reported arsenic concentration of 1,100 mg/kg may be associated with arsenic mixing or a release from a distribution system. Arsenic concentration was highest in the shallowest sampling interval and decreased with depth.

Graphical analysis of the data indicated that there was a significant difference in arsenic concentration between orchard and non-orchard land use classifications. This difference was quantified using a statistical ANOVA analysis. These results indicate that historical aerial photographic analysis can be used to identify the relative degree of arsenic (and lead assuming the two substances are correlated) impact from historical pesticide use in the Manson area.

The Manson unit of the Chelan Irrigation District appears to have been a relatively densely developed apple orchard production area in 1947. Interpretation of the results of this study

should reflect the assumptions that the area was primarily an apple-growing region that was near peak production in 1947. These assumptions will not necessarily apply to other orchard areas of the state. General application of the results of this study should consider the following potential general limitations of aerial photographic evaluation:

- Arsenic and lead impacts can occur from other sources besides direct application of pesticides. Aerial photographic analysis of orchard land use will not likely identify these other sources.

- Aerial photographic evaluation can not easily distinguish between types of orchard production. Lead arsenate was used extensively on apple and pear orchards but not necessarily on other orchard crops such as cherry and apricot. These stone fruits were grown extensively in some portions of the state. Consequently, aerial photographic analysis will likely have to be supplemented by additional information to verify that identified orchards are associated with significant lead arsenate use.

- Apparently, the degree of codling moth infestation of apples and pears was less west of the Cascades. Consequently, the correlation of pre-1948 apple and pear orchard production with soil arsenic concentration may not be valid west of the Cascades.

- Apple and pear production on a countywide basis typically peaked prior to 1930 for most counties. Analysis of multiple pre-1948 era aerial photographs will be necessary to develop a reasonably high confidence that significant orchard areas have been identified on a parcel level.

- Soil disturbance has been shown to affect shallow soil arsenic and lead concentrations. Land use that results in soil disturbance after the period of historical pre-1948 era lead arsenate use could cause arsenic soil concentrations to decline from peak values. Analysis of multiple post-1948 era aerial photographs and/or actual soil sampling may be necessary to develop a reasonably high confidence that historical apple and pear orchard use correlates with high arsenic and lead soil concentrations today.

Within the context of these limitations, aerial photographic analysis is likely to be a useful screening tool to evaluate areas where elevated lead and arsenic concentrations in soil may be likely to occur due to historical orchard production. The scale of applicability (i.e. tract versus regional definition) will depend on availability and quality of aerial photographs and additional supplemental information. The utility of this method is also likely to vary on a region by region basis to the extent that land use (trends in zoning and development) and agricultural practices (type of orchard, density of orchard, persistence of codling moth as a pest) varied.

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1.0 Introduction

Elevated concentrations of arsenic and lead have been attributed to historical use of lead arsenate pesticide, particularly on apple and pear orchards in Eastern Washington. Lead arsenate was used extensively in Eastern Washington prior to 1948 as an orchard pesticide. The Washington State Department of Ecology (Ecology), through the multi-agency Area-Wide Soil Contamination Project, has proposed developing a tool, based on 1948-era land use, to assess the potential for orchard-related soil contamination. This report presents an evaluation of the adequacy and accuracy of using historical orchard land use characterization from historical aerial photograph analysis to predict arsenic soil concentration. The historical orchard contamination assessment tool evaluation was accomplished for Ecology under Task 3.6 of the Area-Wide Soil Contamination Project.

1.1 Background Information

Lead arsenate was commonly used as an insecticide from the late 1800s through the late 1940s (Whorton 1974, National Academy of Science 1977, Peryea 1998). In particular, lead arsenate was used extensively in Washington State orchards to control the codling moth and other pests; beginning in about 1948, lead arsenate use abruptly declined due to the introduction of DDT (Peryea 1998). During the period of lead arsenate use, resulting lead and arsenic soil impacts were well known and documented in a number of studies in the context of phytotoxicity of shallow rooted crops (Overley and Overholser 1934; Vandecaveye, Horner and Keaton 1936; Jones and Hatch 1937). Both lead (Pb) and arsenic (As) are persistent and relatively immobile under typical soil and land use conditions (Peryea and Creger 1994). Consequently, recent studies have continued to document elevated (above natural background) lead and arsenic concentrations in soil attributed to historic orchard spray applications approximately 50 years after lead arsenate was phased out of use in Washington (USBR 1968, Creger and Peryea 1992, GeoEngineers 1995, Hammond Collier & Wade – Livingstone Associates 1996, Fulcrum Environmental 2000). Maximum concentrations of lead and arsenic in soil attributed to foliar spray applications are typically less than 500 mg/kg, however, concentrations associated with mixing and distribution systems can exceed 1500 mg/kg. Elevated levels of lead in soil have been correlated with elevated levels of arsenic resulting from historical lead arsenate use. Lead arsenate formulations generally were not standardized and were typically mixed by individual farmers. There is some information that indicates the formulations became more standardized over time (Peryea 1998). A typical configuration consisted of a tank to mix and store the lead arsenate solution with hoses to distribute it to the individual trees (Losey 2002). The mixing tanks were either stationary or mobile. When a mobile tank was used, lead arsenate was typically mixed at a water source (e.g. an irrigation ditch weir) after which the tank was transported through the orchard. Stationary tanks were connected to permanent piping and riser systems to distribute the pesticide mixture. The insecticide was typically applied as a foliar spray using spray guns throughout the crown of the tree (Melander and Heald 1916, Morris 1924, Veneman et.al. 1983). Applications typically occurred at multiple times during the year, with the frequency and strength reportedly increasing as pest resistance developed (Peryea 1998). A typical orchard lasts for about 20 or 30 years; consequently, mature orchards that existed prior to about 1948 probably experienced the heaviest loading of lead arsenate.

Soil contamination from insecticide use occurred from spray drippage from individual trees, and releases from transmission lines and within storage and mixing areas. Concentration patterns around individual trees (Veneman et. al. 1983) have indicated the highest soil concentrations at the drip line (at the outer extent of the crown). This soil loading model would have resulted in variable arsenic and lead concentrations across orchard properties.

1.2 Objectives

Aerial photographic analysis has proven to be a useful tool to identify historical orchards in Eastern Washington. The Yakima County Geographical Information System (GIS) Department completed an extensive analysis of historical orchards based on 1948 and 1949 aerial photographs (Yakima County 2000). That study used GIS mapping techniques to categorize and inventory historical orchards but did not include an evaluation of current soil quality in the orchards. Task 3.6 of the Area-Wide Contamination Project was developed to combine an analysis of historical aerial photographs, using the methodology developed by Yakima County, with an evaluation of arsenic soil concentration using existing data.

A number of studies document elevated levels of lead and arsenic in orchard soil. In Washington, the most extensive of these existing data sets appears to be the United States Bureau of Reclamation (USBR) 1968 sampling project of the Manson area of Chelan County (Manson project). The location of the Manson area is shown on Figure 1-1. The Manson project was initiated by USBR to identify possible causes of failure in apple re-establishment in old orchard areas through an extensive data collection effort that included 1,600 analyses of arsenic in shallow soil. This fairly well documented study was identified as an appropriate data set to meet the primary Task 3.6 Area-Wide Contamination Project objective: to evaluate the adequacy and accuracy of using historical aerial photographs and GIS mapping to predict areas within Washington State where lead and arsenic are elevated in soil due to historical orchard land use. To meet this objective, 1947 aerial photographs were used to assign land use to individual parcels or tracts in the Manson area of Chelan County. Tract designations were then associated with existing arsenic soil data from the Manson project. The 1947 photographs of the Manson area were used, based on their availability through the National Archives. A GIS was used to compile the data and a statistical evaluation of the compiled data was conducted to evaluate the correlation of arsenic concentration with land use identified in the aerial photographs.

2.0 Original Manson Study

In the period following 1946, a large percentage of historical orchards in the Manson area of Chelan County were removed and replanted to apples. Aging orchards that no longer produced apples, and varieties that no longer sold well, were removed and new trees were planted. Healthy trees would be expected to be productive in their eighth season; however, a substantial percentage of the new trees did not grow satisfactorily and were not productive as late as their sixteenth season (USBR 1968). The Manson project was designed by USBR to evaluate problems with apple re-establishment and replanting failure as part of a larger project to renovate the Lake Chelan Irrigation District.

2.1 Existing Data

In the spring of 1968, the USBR collected 1,600 soil samples from irrigable lands within the Manson Unit of the Lake Chelan Irrigation District to test for a number of parameters that could be contributing to replanting failure. The parameters included saturation moisture percentage, electrical conductivity of the saturation extract, pH, lime content, total arsenic (As), and nitrate (NO_3). Arsenic, in particular, was of interest because of high rates of lead arsenate use locally as a pesticide to control the coddling moth. Lead was not analyzed for, presumably because its presence is not a particular phytotoxicity concern.

The study area lies along the north shore of Lake Chelan in Chelan County, Washington, primarily within Township 28 North, Range 21 East. The USBR sampled soil based on a system of tax lots (tracts). Each tract was identified by section number and sequential numerical designation. For example, the fourth tract in Section 25 was designated 25-4. Finally, each sample within a tract was given a letter designation (i.e. A, B, C etc.).

The USBR identified 305 tracts, however only 253 were sampled. The locations of all 305 tracts identified by the USBR are shown on Figure 2-1. Tracts where no samples were collected were given a "0' designation. For example, 25-0 represents a tract in Section 25 where no samples were collected.

USBR (1968) originally collected 1600 samples of which 1592 contained arsenic results that could be correlated to a specific tract. The 1,592 samples were collected from 815 locations within 253 separate Manson-area tracts. The original USBR data set is presented in Appendix A. The final arsenic data set used for statistical analysis is presented in Appendix B. Any irregularities noted in the data set are documented as notes in Appendix B.

At each sample location, soil samples generally were taken from four different depth intervals. The standard depth ranges were identified as:

- 0 to 12 inches below ground surface (BGS)
- 12 to 18 inches BGS
- 18 to 24 inches BGS

- 24 to 36 inches BGS.

On each tract, typically three to four but up to 30 samples were collected from the uppermost depth, and a single sample was typically collected from each of the three deeper sampling intervals. The final data set includes:

- 815 samples from the 0 to 12 inch interval
- 318 samples from the 12 to 18 inch interval
- 250 samples from the 18 to 24 inch interval
- 209 samples from the 24 to 36 inch interval.

The USBR soil samples were analyzed by the "Gutzeit" method for total arsenic, which uses hydrochloric acid (HCl) as an extractant. HCl extraction was a relatively common and inexpensive procedure for evaluating arsenic in agricultural soils and was a recommended procedure for arsenic analysis by Washington State University. Current analytical methods recommended by the United States Environmental Protection Agency (EPA) use a nitric acid digestion (EPA Method 3050). Evidence suggests that HCl extraction slightly under-estimates arsenic concentrations relative to EPA method 3050 (Peryea 2002) for sample concentrations below about 100 mg/kg.

2.2 Sampling Results

The USBR Manson study concluded that of the five parameters tested for in the USBR study, it was determined that only arsenic concentration was a factor in replanted tree conditions. Surface soil (0 to 12 inches BGS) was shown to have the highest concentrations of arsenic. The study also concluded that arsenic had migrated downward in the soil column. The distribution of the appended USBR data set is shown graphically by depth interval in Figure 2-2. The figure presents a plot of soil arsenic concentration by sample data percentile. The sample data percentile was calculated by ranking the data by concentration from lowest to highest within each interval and assigning a percentile (from 0 to 1) to each sample based on its rank.

All but one of the original concentration analysis results was within the concentration range of 0 to 441 mg/kg. This range is consistent with concentration ranges from other studies in Washington State that documented arsenic soil impacts associated with historical orchard production. The maximum value in the data set was 1,100 mg/kg. This single value may be indicative of pesticide mixing or a release from a distribution system.

3.0 Current Manson Assessment

The current project included developing a GIS database that was used to classify arsenic concentration data by land use. The arsenic data were also classified by soil type. The statistical characteristics of the data were then analyzed by land use and depth categories.

3.1 GIS Database

The GIS database was developed to superimpose the USBR arsenic concentration data onto 1947 land use maps. After the GIS database was developed, land use and soil type attributes were assigned to each tract. Arsenic concentration was then correlated to land use or soil type at the tract level. The resulting database includes the following elements:

- Tracts identified and sampled in the 1968 BLM study
- 1947 aerial photographs
- A U.S. Geological Survey (USGS) seamless quadratic map (created with All Topo Maps software for Washington State 10/22/02)
- Soil types as recorded in the SSURGO database (from the USDA-NRCS database at http://www.ftw.nrcs.usda.gov/ssur_data.html, obtained 8/27/02)
- 1998 USGS digital orthophotographic quadratic sheets (from the USGS at http://www.usgs.gov/)
- Roads and hydrologic features as provided by the Washington State Department of Transportation (WSDOT, http://www.wsdot.wa.gov/mapsdata/geodatacatalog/default.htm, obtained 8/23/02)
- Lakes as provided by the Washington State Department of Ecology (Ecology, http://www.ecy.wa.gov/services/gis/data/data.htm, obtained 8/22/02)
- Current zoning as provided by Chelan County (obtained 10/03/02).

The 1947 aerial photographs were obtained from the National Archives through a private contractor, Double Delta Industries (located in Woodbine, MD). Eleven separate photographs were obtained at 1200 dots per inch resolution. The photographs were obtained for the following townships and ranges:

- Township 28 North, Range 21 East
- Township 28 North, Range 22 East
- Township 27 North, Range 22 East.

The aerial photographs were adjusted (geo-referenced) to match the coordinate system of the USGS seamless quadratic map, and the WSDOT, Ecology, and Chelan County references. The process, often referred to as "rubber sheeting," was completed within AutoCAD 2002 by using known geo-referenced points from the reference maps, and then stretching the photographs until the features of the photographs matched the reference map features.

3.1.1 Land Use And Soil Type Classification

Historical orchards were identified from 1947 aerial photographs. The photographs are high resolution, allowing identification of significant orchard areas within a tract. The outline of orchard land use was traced over the 1947 aerial photographs on screen after the photographs were rubber sheeted. Aerial photographic review was able to distinguish orchards but not the difference between apple and pear orchards and stone fruit orchards. This distinction is potentially significant, because in general, application rates of lead arsenate were highest on apples relative to other fruit species such as stone fruit, like apricot and peach (Peryea and Creger 1994). Based on the narrative in the USBR 1968 report, the majority, if not all, of the orchards are assumed to be apple. Figure 3-1 presents historical orchard designations in the study area.

After historical orchards were identified, each tract was classified into one of three categories: orchard, non-orchard, and mixed (partial orchard and other land uses). Orchard designated tracts were those identified on the 1947 aerial photo to be covered by approximately 90 percent or greater orchard; mixed designated tracts were those covered by 90 to 10 percent orchard; and non-orchard designated tracts were those covered by approximately 10 percent or less orchard. Because sample locations were only identified at the tract level, it was only possible to correlate sample concentration with land use at the tract level. Separating out a "mixed" land use allows a comparison between orchard and non-orchard land use tracts with a higher degree of certainty in the sample land use association. The specific land use category assigned to each tract is listed in Appendices B and C.

Soil types were identified throughout the study area using information from the United States Department of Agriculture Soil Survey Geographic SSURGO database (USDA 1995). Each tract was classified based on the minor and major soil type. Four soil series (types) exist in the Manson area:

- Antilon series: gravelly sandy loam
- Chelan series: gravelly to bouldery sandy loam.
- Entiat series: rock outcrop complex
- Quincy series: loamy fine sand.

Soil classifications assigned within the GIS database were limited to the Antilon and Chelan soil series and were identified on the basis of the predominant soil type in those tracts. Quincy and Entiat soil series are also present within the study area; however, these soil groups represent a small percentage of the total area within tracts that were sampled. Soil type classifications

assigned to each tract are presented in Appendix C. Figure 3-2 presents the soil series distribution throughout the study area.

3.1.2 Arsenic Data

The USBR soil sample locations were only identified by tract in the USBR study. This required spatial analysis of arsenic concentrations at the tract level. Prior to performing this analysis, data for a given depth interval was averaged within a tract. Typically only multiple samples were collected from the shallowest interval (0 to 12 inches); consequently, averaging only affected the shallow data set. Average soil concentration data assigned to each tract are presented in Appendix C.

3.2 Data Analysis

Data analysis consisted of evaluating statistics associated with the arsenic data set by land use categories. Land use statistics were calculated for each separate depth interval. Arsenic concentrations were compared to background soil concentrations and regulatory standards. Background soil arsenic concentrations were assumed to be 5 mg/kg (value reported for Yakima Basin, Ecology 1994); the regulatory standard chosen for comparison was 20 mg/kg (WAC 173-340-740). The calculated statistics were evaluated to draw some general conclusions concerning the data set and the use of this predictive tool. Finally, average arsenic concentrations were plotted by tract.

3.2.1 Statistical Summary of Arsenic Data for Various Land Use Types

Summary statistics for each land use and depth interval were calculated for each land use type by depth interval. Category summary statistics for the mean, geometric mean, best fit distribution, distributional correlation statistic (using the probability plot r^2 value), and 95th upper confidence limit on the mean (UCL 95), were calculated using the MTCAStat software program developed by Ecology (http://www.ecy.wa.gov/programs/tcp/tools/toolmain.html). Of these, the mean, geometric mean and UCL 95 statistics are calculated in MTCAStat directly from the best fit distribution (not from the original data set). The best-fit distribution was selected based on procedures documented in MTCAStat. For the statistical calculations, all concentration values of 0 mg/kg were assumed to be not detected at a detection limit of 1 mg/kg. Percentiles and maximum value statistics were summarized directly from the data set. Arsenic summary statistics by land use category and depth interval are presented in Table 3-1.

Within the shallowest depth interval (0 to 12 inches), arsenic concentrations in the orchard land use category range from non-detect to 1100 mg/kg. Approximately 95 percent of the 480 samples exceed 5 mg/kg (the assumed background concentration); 82 percent of the samples exceed the regulatory standard (20 mg/). The median (50th percentile) and mean (average) concentrations are 59 mg/kg and 77 mg/kg, respectively. Concentrations are somewhat lower for mixed and non-orchard land use categories. For non-orchards, approximately 75 percent of the 81 samples exceed the background concentration level of 5 mg/kg; only 43 percent of the samples exceed 20 mg/kg. The data for all three land use types are summarized graphically in Figure 3-3. Shallow arsenic data for each land use category, closely (r^2 values greater than 0.9)

approximate a lognormal distribution as is typical for soil concentration data. The UCL 95 for each land use type exceeds 50 mg/kg.

Within the second depth interval (12 to 18 inches), arsenic concentrations in the orchard land use category range from non-detect to 122 mg/kg. Approximately 94 percent of the 177 samples exceed 5 mg/kg background concentration; 69 percent of the samples exceed the regulatory standard of 20 mg/kg. The median (50th percentile) and mean (average) concentrations are 33 mg/kg and 35 mg/kg respectively. For non-orchards, approximately 57 percent of the 29 samples exceed the background concentration level of 5 mg/kg; 33 percent of the samples exceed 20 mg/kg. These statistics reflect a decline in concentration from the shallowest depth interval. The data for all three land use types are summarized graphically in Figure 3-4. Interestingly, the detection frequency above a concentration of about 45 mg/kg is similar for all three land use types. The arsenic data in the 12 to 18 inch depth interval for each land use category, also closely (r^2 values greater than 0.9) approximate a lognormal distribution. The UCL 95 for each land use type exceeds 38 mg/kg. The UCL 95 was highest for non-orchard land use even though the summary statistics were lower, reflecting the relatively small sample size for this category.

Within the deepest two depth intervals (18 to 24 inches and 24 to 36 inches), there is not a clear distinction in the arsenic concentrations between the orchard and mixed land use types, but the concentrations in soil in the non-orchard land use type is distinctly lower. At higher concentrations, the frequency of detection was similar for all three land use types, similar to the trend observed for the 12 to 18 inch depth interval. These data relationships are reflected graphically on Figure 3-5 and 3-6. With one exception, the arsenic data for each land use category closely (r^2 values greater than 0.9) approximate a lognormal distribution. The exception is the arsenic data within the orchard land use type in the 18 to 24 inch depth interval, which more closely approximate a normal distribution. The UCL 95 for all land use types for both deeper intervals exceed 20 mg/kg.

As expected, the 0 to 12 inch depth interval for the orchard land use type had the highest concentrations reflecting both likely higher rates of historical lead arsenate applications in orchards and the relatively immobile nature of arsenic within the soil column. There was a distinct difference in concentration trends between the orchard and non-orchard land use types. This distinction indicates that historical land use categorization using aerial photographic analysis can be used as a relative soil concentration indicator in orchard growing areas of the Manson area.

Orchard and mixed land use categories appeared distinctly different in the shallowest depth interval, however this distinction tends to disappear below about 12 inches, especially at the upper end of the sample distribution (above the median). It is difficult to draw definitive conclusions about these correlations without further refining the characteristics of the mixed land use category.

Arsenic concentrations appeared to be elevated above background for all depth intervals for all land use categories, even the non-orchard land use category. Furthermore, the UCL 95, a commonly used statistic in regulatory compliance, is above the regulatory standard of 20 mg/kg for all land use categories for all depth intervals. The elevated arsenic concentrations across land

use categories is an unexpected finding, which could be attributable to pre-1947 orchard use that was not evident on the 1947 photographs, impacts from pesticide mixing and distribution on non-orchard lands, or impacts from drift of foliar spray mist across property lines.

Arsenic concentrations were highest within the 0 to 12 inch depth interval and declined with depth for all land use categories. This is demonstrated for all summary statistics (with the exception of the UCL 95) presented in Table 3-1. This is consistent with pesticide spray application practices (as a foliar spray) and the relatively limited mobility of arsenic in the soil column. This is also consistent with observations from other studies. For example, Peryea and Creger (1994) found that maximum arsenic and lead concentrations occurred between about 4 inch and 12 inch depths in each of six plots where historical orchard use was suspected. Figure 3-7 presents a summary of median arsenic concentration with depth for each of the three land use categories.

3.2.2 Statistical Analysis Between Land Use Types

The statistical analyses presented in Section 3.2.1 indicate a distinct difference in arsenic concentrations between orchard and non-orchard land use categories. To evaluate whether the difference is statistically significant, a one-factor analysis of variance (ANOVA) was performed on data from the shallowest depth internal. The one-factor ANOVA tests for a statistically significant difference in the mean concentration of a data set due to a single factor (in this case, land use) (Helsel and Hirsch 1992). Because the arsenic concentration data closely fits a lognormal distribution, the data were transformed prior to performing the statistical test. The test is structured as follows:

- Null hypothesis: the means are identical
- Alternate hypothesis: the means are different
- Significance level of 0.05.

The results of an ANOVA include an F-statistic and a p-value. If the F-statistic exceeds the critical F value (at a significance level of 0.05), then the null hypothesis is rejected and there is 95 percent confidence that the two meanings are different.

The results of the one-factor ANOVA between orchard and non-orchard land use are presented in Table 3-2. This table includes standard ANOVA statistics, the sum-of-square (SS), the mean square (MS), and the degrees of freedom (df). These statistics are used to calculate the F-statistic and the critical F value. The calculated F-statistic is 29.7, much greater than the critical F value of 3.8. Consequently, the null hypothesis is rejected and the alternate hypothesis is accepted; that there is a statistically significant difference between the means of the orchard and non-orchard data sets at the shallowest depth interval. The fact that the "p-value," which may be considered a measure of the believability of the null hypothesis (Helsel and Hirsch 1992), is so low, indicates that the difference between the two data sets is very strong. This statistical evaluation helps quantify the results of the graphical analysis presented in Section 3.2.2.

3.2.3 Spatial Presentation of Arsenic Data

Because sample locations were only identified at the tract level, arsenic concentrations were averaged over a tract for the shallowest interval (0 to 12 inches) to evaluate spatial trends. Average tract concentrations (presented in Appendix C) were plotted for three concentration ranges:

- Less than or equal to 5 mg/kg
- 5 mg/kg to 20 mg/kg
- Greater than 20 mg/kg.

The spatial distribution for average arsenic concentrations are plotted by tract on Figure 3-8. In general, concentrations appear to be lower in the northwest portion of the study area (Section 22) and in fringe areas away from the water. This trend may reflect agricultural development patterns where tracts in the central and southeast portions of the study area may have been developed first and have been in production longer. More prolonged orchard production at a property (in the period prior to 1948) should correlate with a longer period of lead arsenate use, higher loading rates and, therefore, higher soil arsenic concentrations.

4.0 Summary and Conclusions

The use of GIS proved to be a useful tool to summarize various attributes of the study area. High resolution 1947 aerial photographs were readily available for the rural area of Chelan County that comprised the study area. The photographs were incorporated into the GIS database and successfully referenced to other map attributes available from the USBR, Ecology, USGS, Chelan County, and DOT. GIS was also used to develop and manage land use attributes interpreted from 1947 aerial photographs. Orchards were readily observable on the 1947 aerial photographs. The orchard areas were digitized and an orchard land use attribute assigned in the GIS database. The orchard data were combined with tract or parcel data in GIS to categorize each tract into one of three land use categories depending on the percentage of orchard land within a given parcel.

Arsenic soil concentration data were collected by the USBR in 1968 in the Manson area. The USBR included over 1,500 analyses at 815 locations at four different depth intervals. The characteristics of the USBR data followed similar patterns observed for other arsenic data sets collected at historical orchard sites and the concentrations typically closely followed a lognormal distribution. The range in arsenic concentrations, with a single exception, was between non-detect and 441 mg/kg, within the range expected for foliar spray application associated with historical production of apples prior to 1948. A single reported arsenic concentration of 1,100 mg/kg may be associated with arsenic mixing or a release from a distribution system. Arsenic concentration was highest in the shallowest sampling interval and decreased with depth.

Even though the USBR sample data were only located by tract in the original study, the data could be categorized by land use for the purposes of this study. Graphical analysis of the data indicated that there was a significant difference in arsenic concentration between orchard and non-orchard land use classifications. This difference was quantified using a statistical ANOVA analysis. These results indicate that historical aerial photographic analysis can be used to identify the relative degree of arsenic (and lead assuming the two substances are correlated) impact from historical pesticide use in the Manson area. These conclusions are substantiated by the data even though the original study was designed to evaluate lead arsenate phytotoxicity not arsenic soil concentration correlation with land use.

Arsenic was analyzed by the Gutzeit method, which includes an HCL extraction. The HCL extraction apparently results in slightly lower concentration results at lower arsenic soil concentrations. If an alternative extraction method was used for sample analysis in the USBR study, the statistical and graphical differences between land use and depth categories may have been somewhat less than the differences implied in this study.

An interesting conclusion of this study is that mixed orchard and even non-orchard tracts showed elevated arsenic concentrations. These results highlight some limitations of this study. Possible factors that may affect the concentration of arsenic in soil at mixed or non-orchard tracts include:

- Changes in land use practices over time including removal of historical orchards prior to the date of the photograph (e.g. 1947). The development history of the Manson area prior to 1947 was not characterized in this study.

- Impacts from arsenic and lead sources other than direct application of pesticide
- Drift of pesticides across tract boundaries during spraying.

Evaluation of aerial photographs from multiple time periods may reduce the limitations associated with these factors.

The Manson unit of the Chelan Irrigation District appears to have been a relatively densely developed apple orchard production area in 1947. Interpretation of the results of this study should reflect the assumptions that the area was primarily an apple-growing region that was near peak production in 1947. These assumptions will not necessarily apply to other orchard areas of the state. General application of the results of this study should consider the following potential general limitations of aerial photographic evaluation;

- Aerial photographic evaluation can not easily distinguish between types of orchard production. Lead arsenate was used extensively on apple and pear orchards but not necessarily on other orchard crops such as cherry and apricot. These stone fruits were grown extensively in some portions of the state. Consequently, aerial photographic analysis will likely have to be supplemented by additional information to verify that identified orchards are associated with significant lead arsenate use.

- Apparently, the degree of codling moth infestation of apples and pears was less west of the Cascades. Consequently, the correlation of pre-1948 apple and pear orchard production with soil arsenic concentration may not be valid west of the Cascades.

- Apple and pear production on a countywide basis typically peaked prior to 1930 for most counties. Analysis of multiple pre-1948 era aerial photographs will be necessary to develop a reasonably high confidence that significant orchard areas have been identified on a parcel level.

- Soil disturbance has been shown to affect shallow soil arsenic and lead concentrations. Land use that results in soil disturbance after the period of historical pre-1948 era lead arsenate use could cause arsenic soil concentrations to decline from peak values. Analysis of multiple post-1948 era aerial photographs and/or actual soil sampling may be necessary to develop a reasonably high confidence that historical apple and pear orchard use correlates with high arsenic and lead soil concentrations today.

Within the context of these limitations, aerial photographic analysis is likely to be a useful screening tool to evaluate areas where elevated lead and arsenic concentrations in soil may be likely to occur due to historical orchard production. The scale of applicability (i.e. tract versus regional definition) will depend on availability and quality of aerial photographs and additional supplemental information. The utility of this method is also likely to vary on a region by region basis to the extent that land use (trends in zoning and development) and agricultural practices (type of orchard, density of orchard, persistence of codling moth as a pest) varied.

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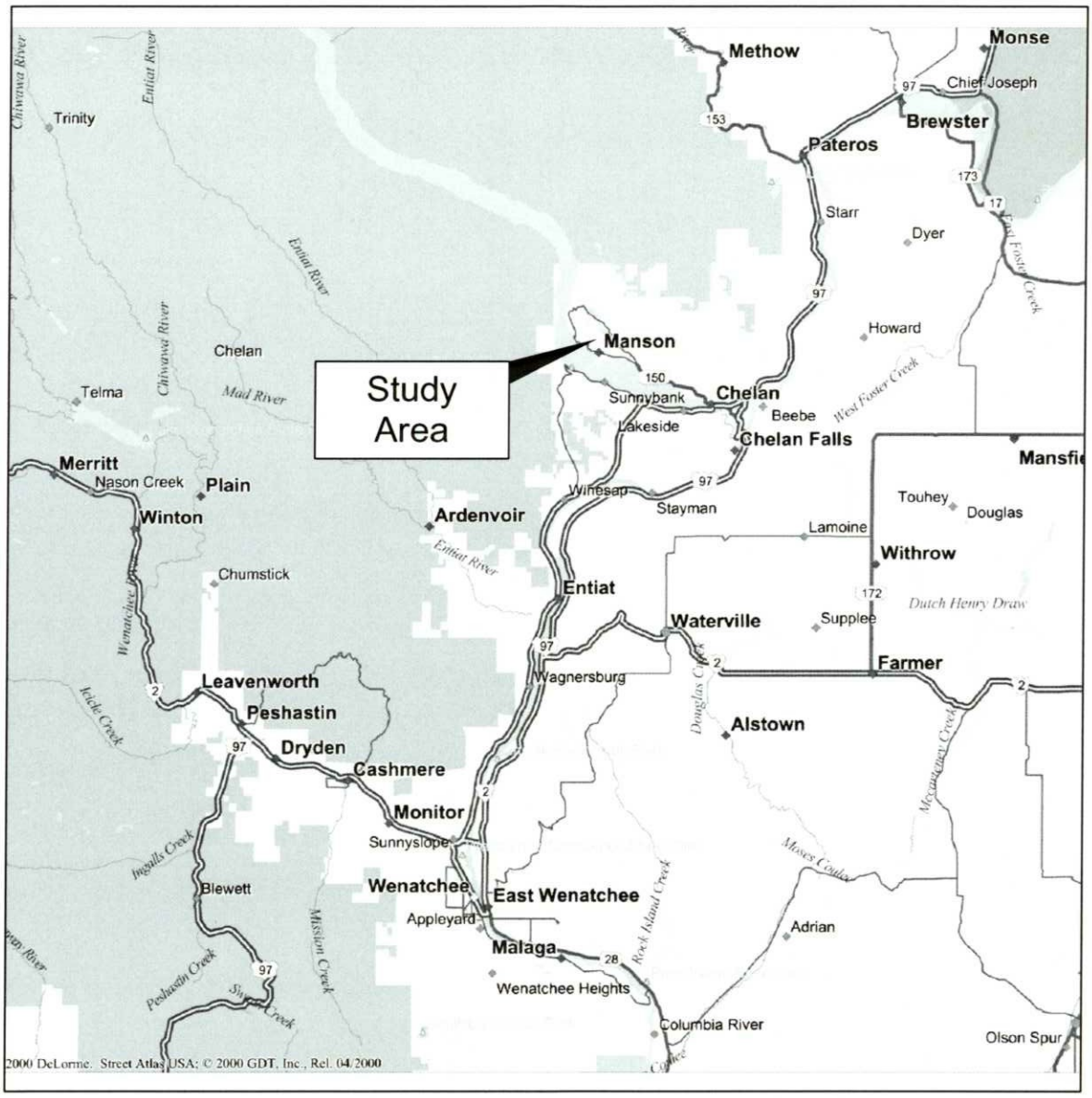
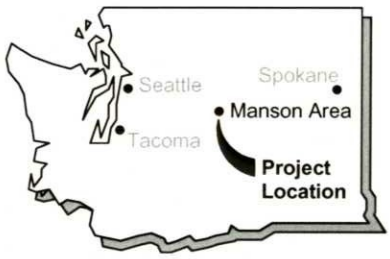


Map from DeLorme Street Atlas USA 2002



0 10 20

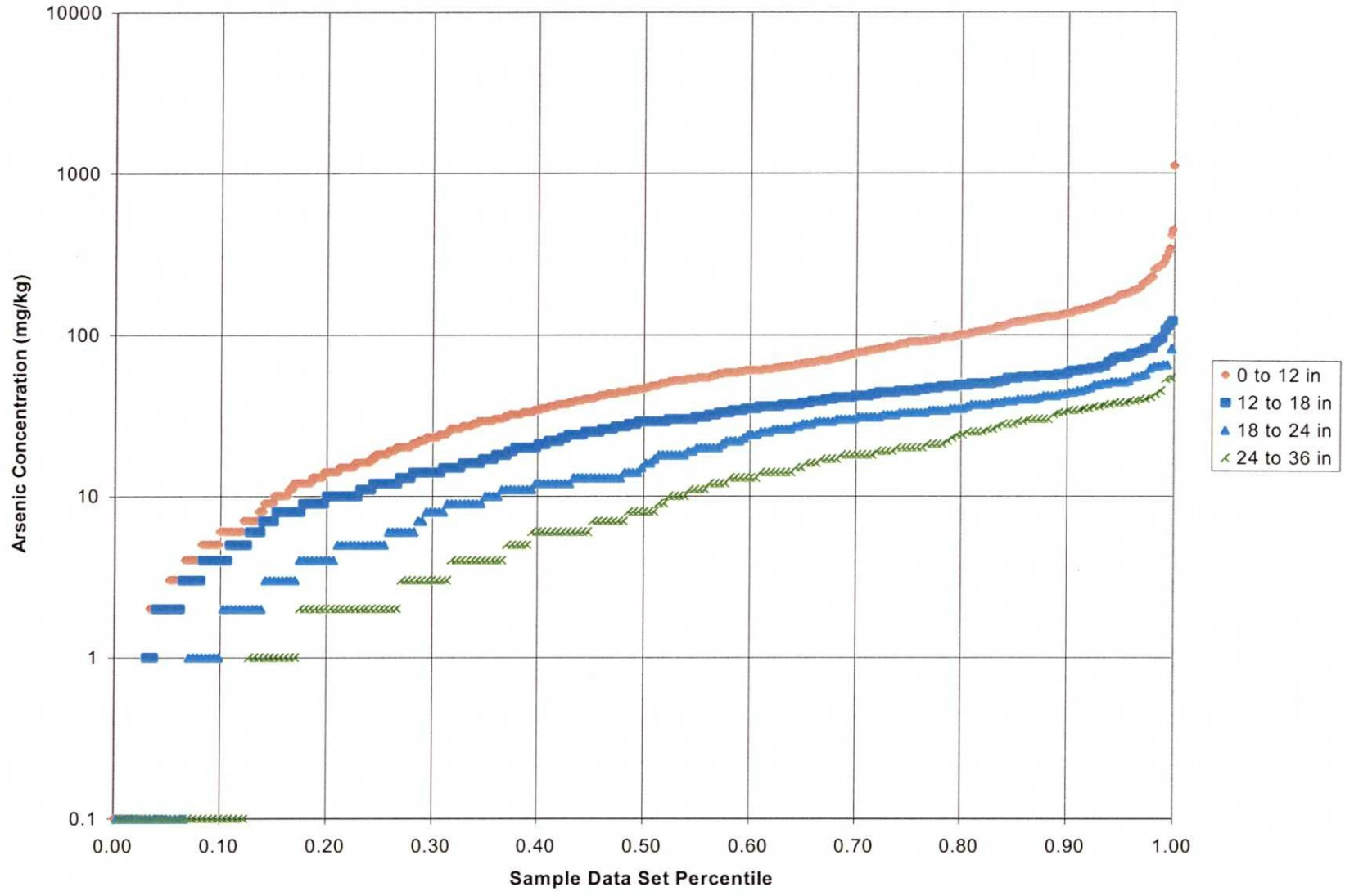
Scale in Miles

Vicinity Map

Figure 1-1

Tract Locations

Figure 2-1



Arsenic Soil Concentration Data Summary by Sample Depth Interval

Figure 2-2

N

9-47

15 14 13

16

21 22 23 24

19 20

28

27 26 25

30 29

34

35 36 31 32

5

Legend

1947 Orchard

Historical Orchard Distribution

Figure 3-1

N

16 15 14 13

21 22 23 24 19 20

28

27 26 25 30 29

34 35 36 31 32

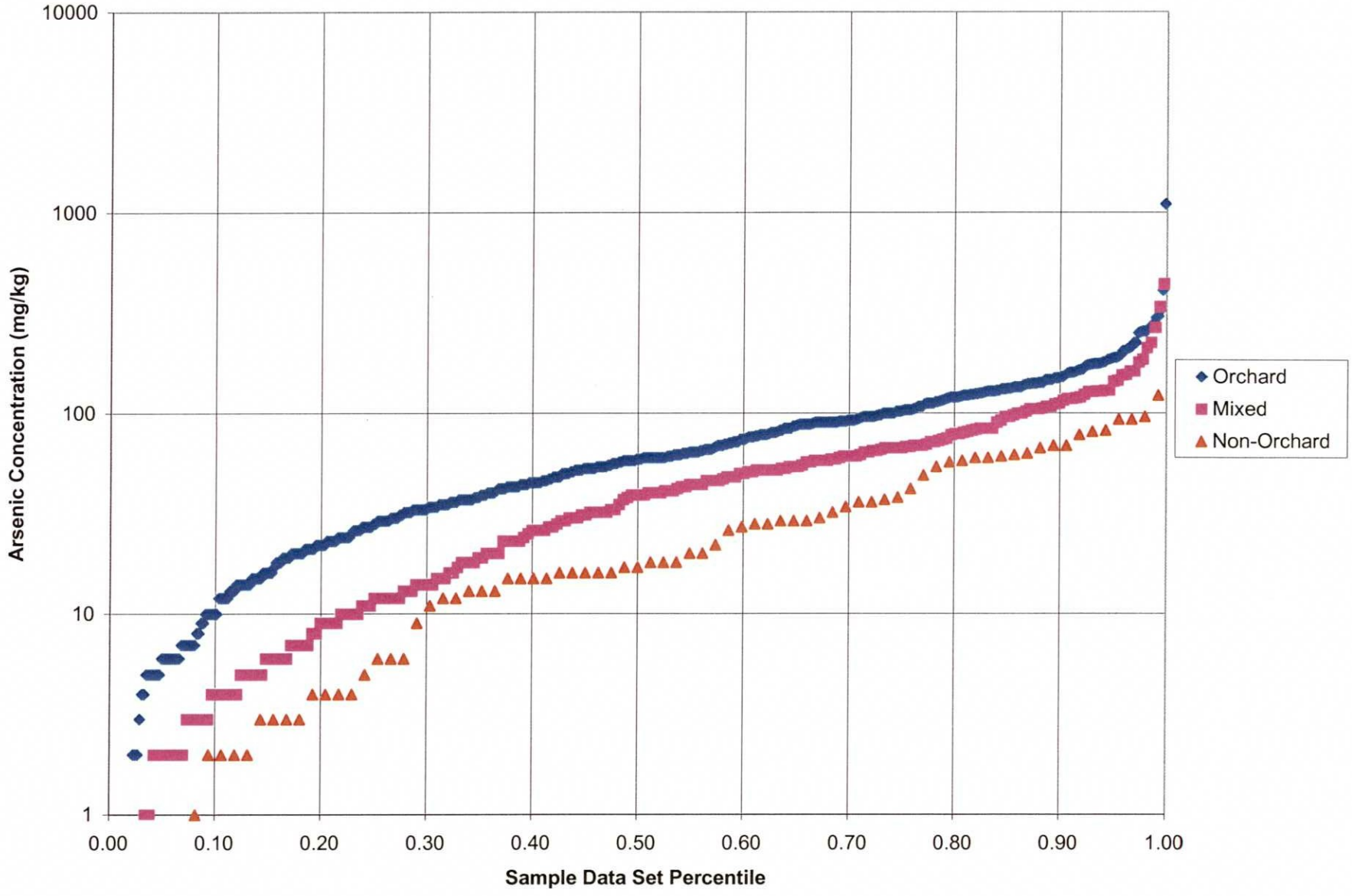
5

Legend

- Chelan Soil
- Antilon Soil
- Entiat Soil
- Quincy Soil

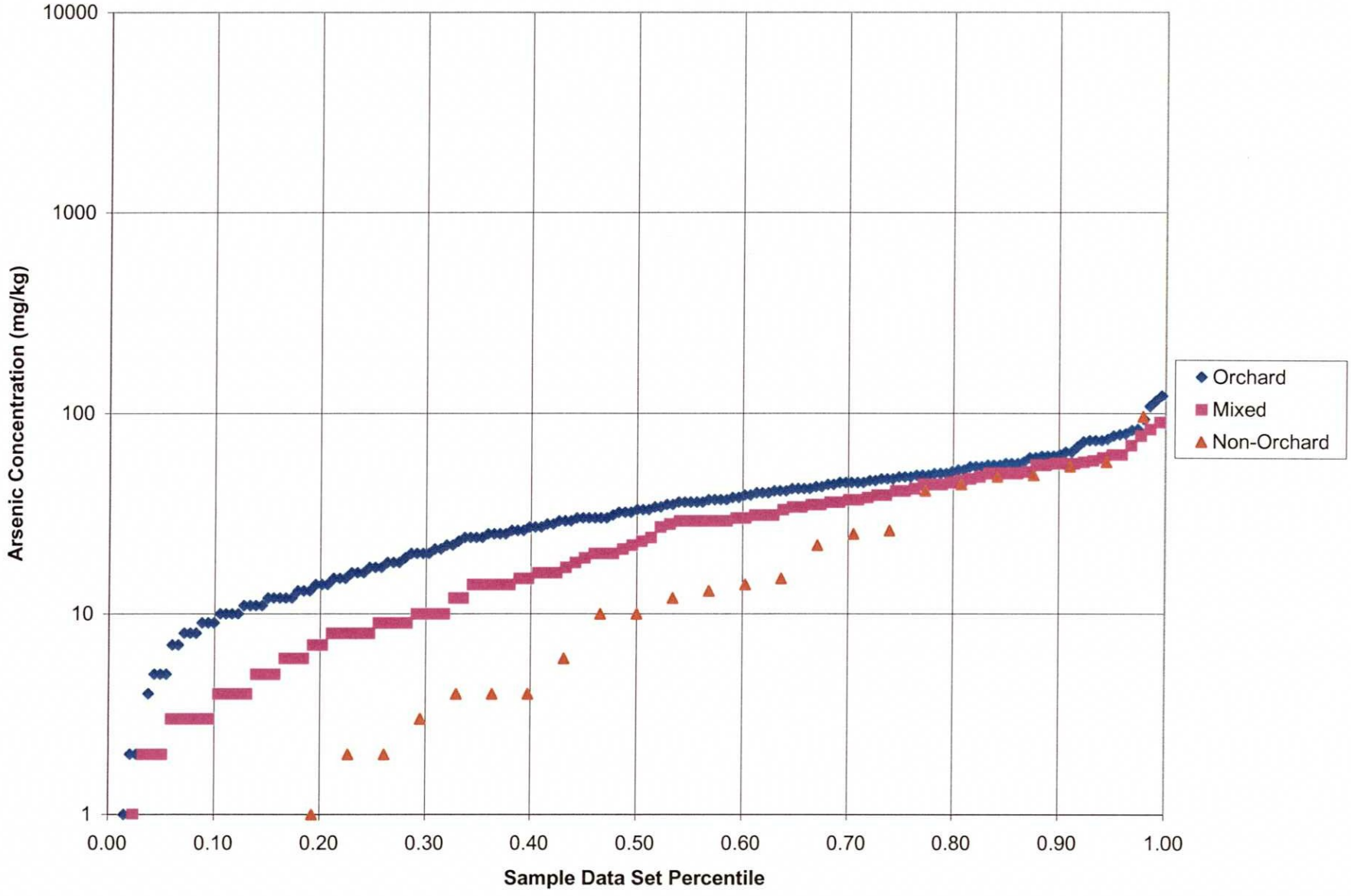
Soil Series Distribution

Figure 3-2



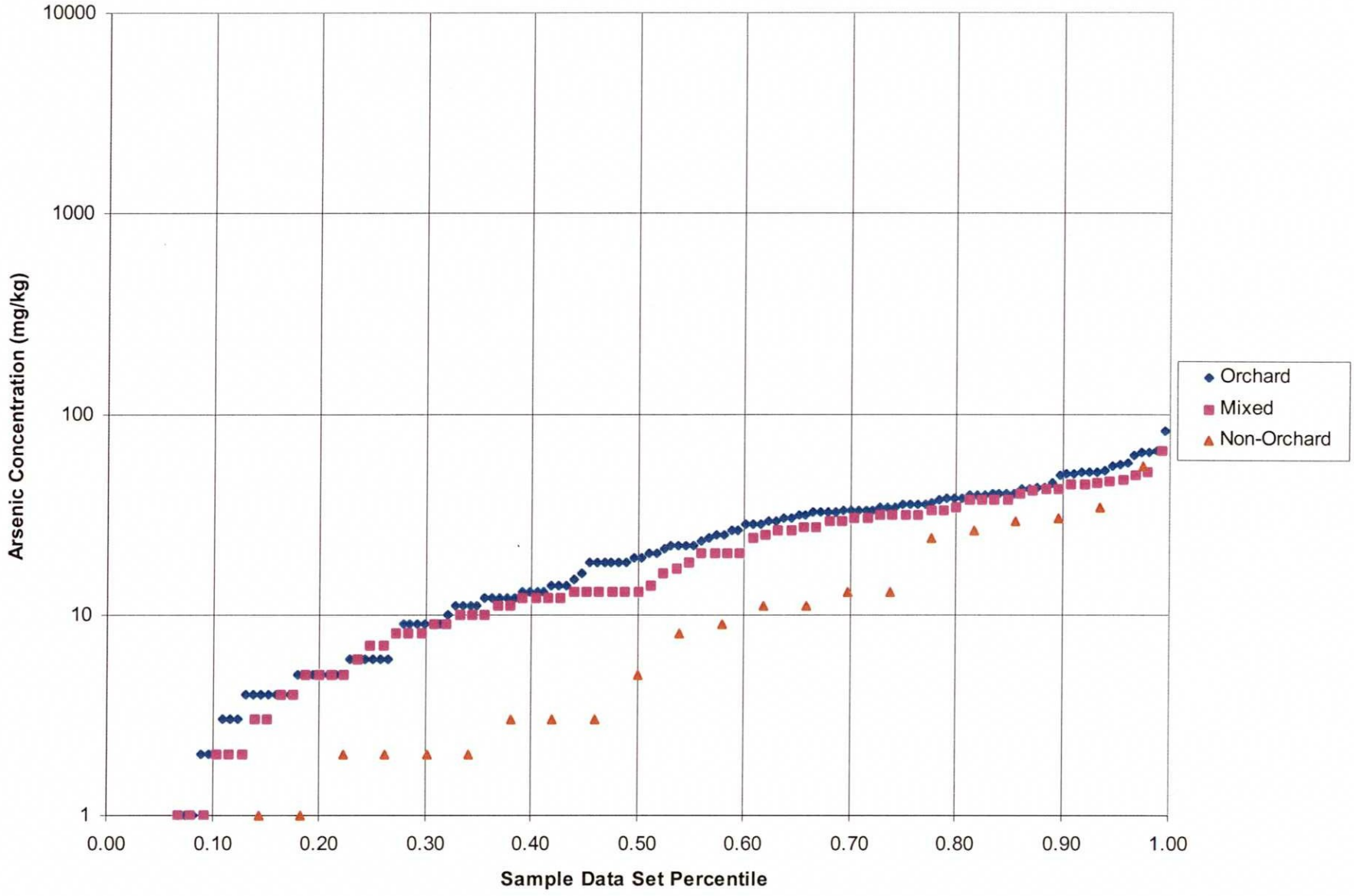
Arsenic Soil Concentration for 0 to 12 inch Interval by Land Use

Figure 3-3



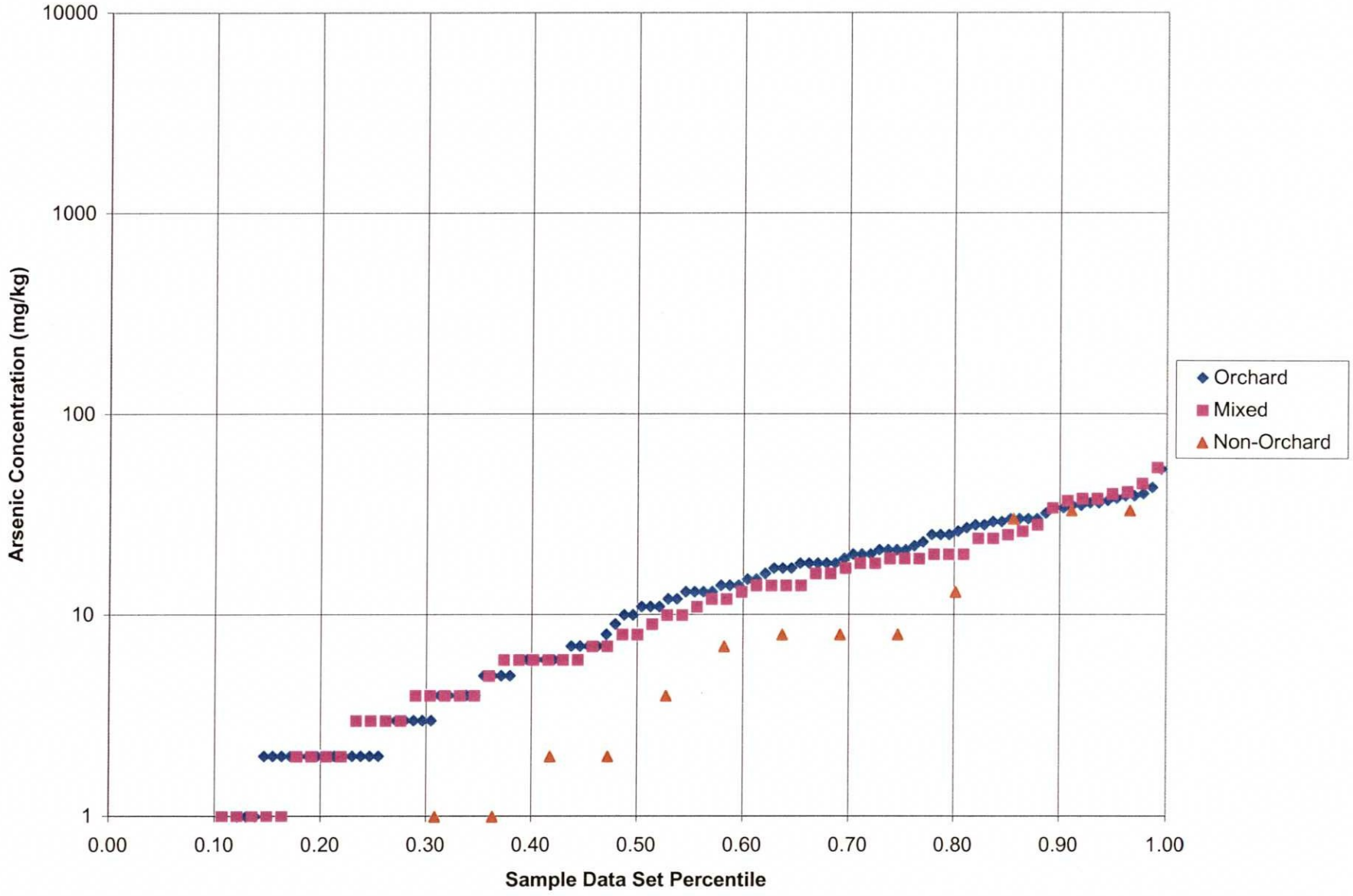
Arsenic Soil Concentration for 12 to 18 inch Interval by Land Use

Figure 3-4



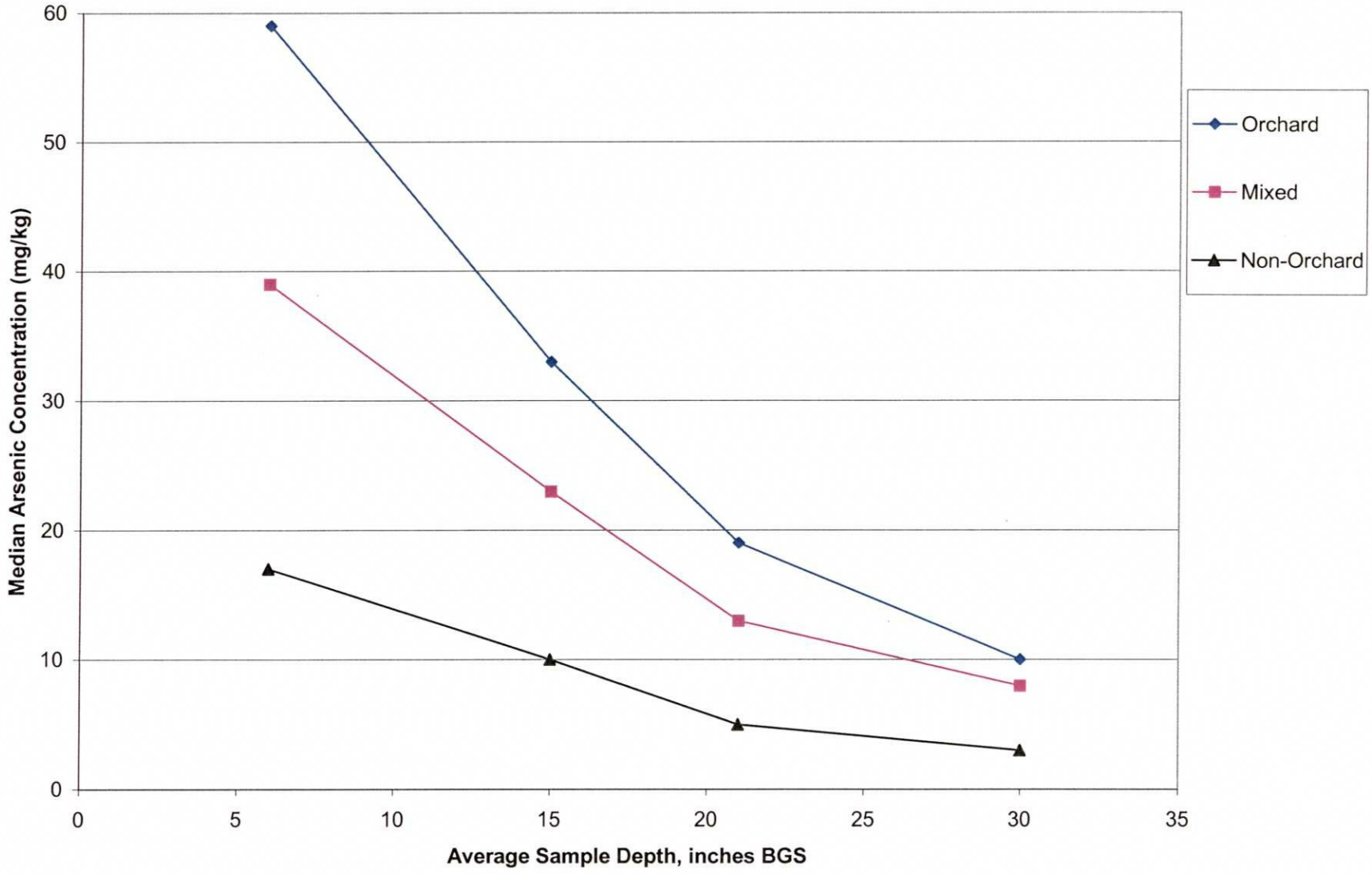
Arsenic Soil Concentration for 18 to 24 inch Interval by Land Use

Figure 3-5



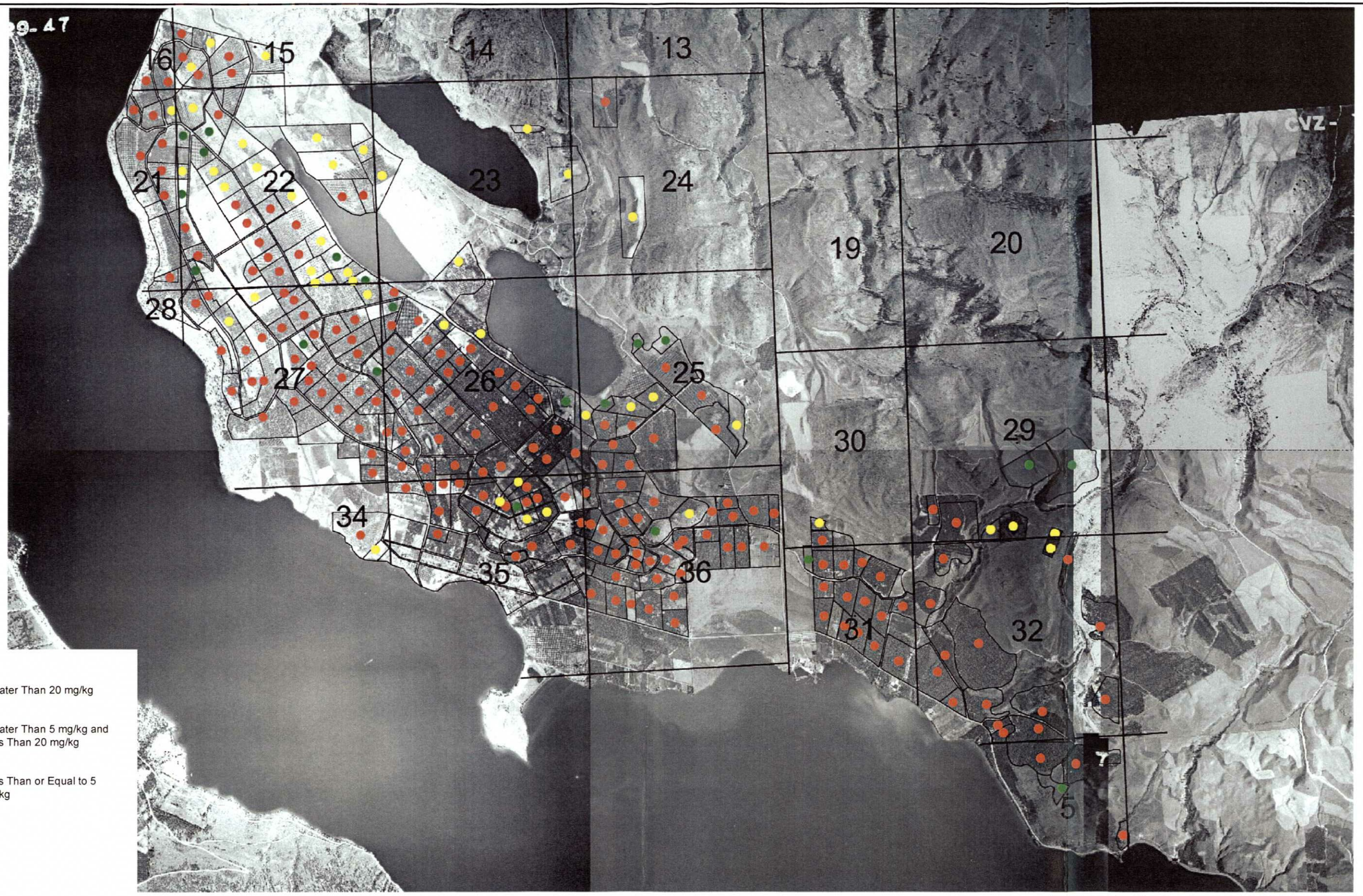
Arsenic Soil Concentration for 24 to 36 inch Interval by Land Use

Figure 3-6



Median Arsenic Soil Concentration Variation with Depth

Figure 3-7



Note

Each dot reflects average arsenic concentrations within a tract.

Average Arsenic Concentration Distribution 0 to 12-inch Interval

Figure 3-8

TABLE 3-1
SOIL ARSENIC CONCENTRATION STATISTICS (mg/kg)

0 TO 12 INCH DEPTH

	NUMBER OF SAMPLES	PERCENTILES 25	50	75	MEAN	GEOMETRIC MEAN	MAXIMUM	BEST FIT DISTRIBUTION	PROBABILITY PLOT R^2 VALUE	UCL 95
Orchard	480	28	59	103	77	84	1100	Lognormal	0.945	100
Mixed	254	11	39	67	51	61	441	Lognormal	0.943	78
Non-orchard	81	6	17	38	30	35	123	Lognormal	0.925	54

12 TO 18 INCH DEPTH

	NUMBER OF SAMPLES	PERCENTILES 25	50	75	MEAN	GEOMETRIC MEAN	MAXIMUM	BEST FIT DISTRIBUTION	PROBABILITY PLOT R^2 VALUE	UCL 95
Orchard	177	17	33	48	35	38	122	Lognormal	0.905	45
Mixed	112	8	23	41	27	30	90	Lognormal	0.930	39
Non-orchard	29	2	10	27	23	27	96	Lognormal	0.930	103

18 TO 24 INCH DEPTH

	NUMBER OF SAMPLES	PERCENTILES 25	50	75	MEAN	GEOMETRIC MEAN	MAXIMUM	BEST FIT DISTRIBUTION	PROBABILITY PLOT R^2 VALUE	UCL 95
Orchard	142	6	19	35	24	27	82	Normal	0.976	25
Mixed	83	7	13	31	21	24	65	Lognormal	0.968	22
Non-orchard	25	2	5	13	13	15	55	Lognormal	0.953	28

24 TO 36 INCH DEPTH

	NUMBER OF SAMPLES	PERCENTILES 25	50	75	MEAN	GEOMETRIC MEAN	MAXIMUM	BEST FIT DISTRIBUTION	PROBABILITY PLOT R^2 VALUE	UCL 95
Orchard	120	2	10	21	15	17	53	Lognormal	0.901	21
Mixed	71	3	8	19	14	16	54	Lognormal	0.933	21
Non-orchard	18	0	3	8	12	13	33	Lognormal	0.912	63

TABLE 3-2
ANOVA TABLE FOR EVALUATION
ORCHARD AND NON-ORCHARD DATA FROM
0 TO 12-INCH INTERVAL

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Orchard	480	36212	75	5930
Non-orchard	81	2289	28	787

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F Statistic*	*P-value*	*F crit*
Between Groups	154285	1	154285	29.7	7.57E-08	3.8
Within Groups	2903792	559	5194			
Total	3058077	560				

1) SS = sum of squares
2) MS = mean squares

APPENDIX A

Original U.S. Bureau of Land Management Report Data

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
5	1	A	0-12	50.0	0.28	5.96	6.34	0	90	-
			12-18	44.0	0.15	5.52	5.92	0	60	-
			18-24	41.0	0.10	5.80	6.08	0	45	-
			24-36	31.5	0.09	6.58	7.00	0	19	-
		B	0-12	47.5	0.27	5.14	5.52	0	65	-
		C	0-12	45.5	0.19	6.08	6.36	0	104	-
	2	A	0-12	40.0	0.60	4.90	5.14	0	52	-
			12-18	38.0	1.27	4.88	5.16	0	39	4.40
			18-24	34.0	1.05	5.34	5.48	0	11	4.60
		B	0-12	38.5	0.41	6.36	6.56	0	42	-
		C	0-12	45.5	0.32	6.66	7.06	0	174	-
	2	A	0-12	53.5	0.59	5.58	6.34	0	205	-
			12-18	43.5	0.47	6.04	6.28	0	56	-
			18-24	41.0	0.21	6.26	6.36	0	35	-
			24-36	33.5	0.16	6.32	6.56	0	32	-
		B	0-12	45.0	0.12	6.06	6.34	0	37	-
		C	0-12	47.0	0.85	5.44	5.56	0	166	-
	3	A	0-12	34.0	0.19	6.66	6.60	0	6	-
			12-18	33.0	0.18	6.52	6.46	0	4	-
			18-24	31.5	0.17	6.56	6.64	0	3	-
		B	0-12	40.0	0.19	7.28	7.26	0	0	-
	5	A	0-12	50.0	0.67	4.94	5.18	0	65	-
			12-18	46.5	0.35	5.62	5.74	0	41	-
			18-24	43.5	0.34	6.00	6.10	0	42	-
			24-36	45.0	0.17	5.98	6.04	0	40	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
5	5	B	0-12	38.0	0.20	5.36	5.66	0	54	-
		C	0-12	42.0	0.19	6.42	6.56	0	61	-
15	2	A	0-12	44.5	0.37	6.46	6.56	0	65	-
			12-18	37.0	0.26	6.50	6.64	0	26	-
			18-24	36.0	0.29	6.54	6.66	0	31	-
			24-36	28.0	0.42	6.48	6.56	0	20	-
		B	0-12	40.5	0.96	5.48	5.74	0	28	-
		C	0-12	44.5	0.87	4.28	4.58	0	62	-
		D	0-12	45.5	0.27	5.56	5.70	0	36	-
	3	A	0-12	45.0	0.17	6.66	6.60	0	6	-
			12-18	35.0	0.12	6.84	6.76	0	45	-
			18-24	48.0	0.11	6.98	6.82	0	0	-
			24-36	33.0	0.17	6.98	6.90	0	3	-
		B	0-12	50.0	0.19	5.68	6.00	0	14	-
	4	A	0-12	45.0	0.96	4.91	5.40	0	18	-
			12-18	38.0	0.26	4.76	4.96	0	15	-
			18-24	38.0	0.22	5.28	5.45	0	9	-
			24-36	40.0	0.12	5.80	5.95	0	4	-
		B	0-12	48.0	0.92	5.41	5.56	0	36	-
		C	0-12	46.0	1.54	5.11	5.35	0	28	-
	5	A	0-12	46.0	0.13	6.60	6.72	0	33	-
			12-18	39.0	0.14	6.78	6.72	0	25	-
			18-24	31.0	0.20	6.70	6.90	0	11	-
			24-36	37.0	0.16	7.22	7.22	0	2	-

E.C., pH, Lime, senic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
15	5	B	0-12	41.0	2.94	5.10	5.92	0	29	-
		C	0-12	57.0	0.19	6.00	6.40	0	23	-
	6	A	0-12	46.0	0.26	5.48	5.80	0	18	-
			12-18	42.0	0.30	5.88	6.22	0	9	-
			18-24	33.0	0.28	6.04	6.56	0	8	-
			24-36	31.0	0.32	6.38	6.68	0	3	-
		B	0-12	57.0	2.51	3.76	3.98	0	32	-
		C	0-12	46.0	0.56	4.18	4.60	0	14	-
		D	0-12	47.0	0.30	5.30	5.72	0	12	-
	7	A	0-12	43.0	0.14	6.56	6.60	0	42	-
			12-18	39.0	0.14	6.38	6.54	0	26	-
			18-24	37.0	0.13	6.48	6.32	0	11	-
			24-36	33.0	0.10	6.52	6.76	0	0	-
		B	0-12	44.0	0.24	5.22	5.48	0	32	-
		C	0-12	46.0	0.14	5.00	5.30	0	17	-
	8	A	0-12	47.5	0.22	6.93	7.20	0	12	-
			12-18	45.5	0.13	7.03	6.98	0	17	-
			18-24	42.0	0.13	6.60	6.90	0	0	-
			24-36	41.5	0.11	6.50	6.97	0	0	-
		4HC B	0-14	44.0	0.25	6.95	7.10	0	0	-

E.C., pH, Lime, ...senic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
15	9	A	0-12	46.0	0.23	6.00	6.08	0	53	-
			12-18	44.0	0.15	6.36	6.42	0	61	-
			18-24	39.0	0.16	6.60	6.76	0	35	-
			24-36	47.0	0.13	6.96	6.90	0	7	-
		B	0-12	48.0	0.33	6.52	6.70	0	61	-
			12-18	47.0	0.40	6.38	6.52	0	37	-
		C	0-12	53.0	0.18	5.68	6.16	0	29	-
16	1	A	0-12	49.0	2.96	4.78	5.18	0	23	-
			12-18	44.0	2.29	5.16	5.48	0	24	-
			18-24	38.0	1.68	5.80	5.98	0	14	-
			24-36	29.0	1.45	6.14	6.18	0	6	-
		B	0-12	38.0	2.20	4.30	4.56	0	24	-
		C	0-12	60.0	3.16	5.80	5.82	0	35	-
21	1	A	0-12	38.0	0.25	6.14	6.52	0	9	-
			12-18	39.0	0.15	6.14	6.56	0	9	-
			18-24	35.0	0.16	6.78	6.82	0	5	-
			24-36	38.0	0.17	6.72	6.98	0	0	-
		B	0-12	43.0	0.85	4.36	4.60	0	16	-
		C	0-12	47.0	0.35	5.56	5.82	0	5	-
	2	A	0-12	53.0	0.49	6.26	6.22	0	45	-
			12-18	50.0	0.41	7.02	6.88	0	42	-
			18-24	48.0	0.29	6.92	6.98	0	32	-
			24-36	46.0	0.20	6.56	6.72	0	13	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm.	NO3 me/l
21	2	B	0-12	48.0	0.32	5.56	5.98	0	10	-
	3	A	0-12	47.0	0.18	6.50	6.56	0	34	-
			12-18	43.0	0.14	6.78	6.84	0	25	-
			18-24	42.0	0.14	6.82	6.92	0	9	-
			24-36	37.0	0.10	6.78	6.90	0	0	-
		B	0-12	57.0	0.29	4.34	4.70	0	22	-
	4	A	0-12	49.0	0.11	5.12	5.00	0	20	-
			12-18	40.0	0.08	5.00	5.02	0	32	-
			18-24	38.0	0.08	5.32	5.40	0	12	-
			24-36	41.0	0.09	6.62	6.22	0	2	-
		B	0-12	37.0	0.40	5.86	6.00	0	33	-
		C	0-12	40.0	0.14	5.96	5.90	0	53	-
		D	0-12	45.0	0.12	6.38	6.30	0	45	-
		E	0-12	50.0	0.15	6.00	6.12	0	52	-
		F	0-12	43.0	0.21	6.20	6.12	0	43	-
	7	A	0-12	54.0	0.18	5.92	5.80	0	14	-
			12-18	56.0	0.13	5.98	6.40	0	18	-
			18-24	44.0	0.07	6.82	6.78	0	12	-
			24-36	38.0	0.07	6.74	6.94	0	2	-
		B	0-12	53.0	0.54	4.48	4.84	0	41	-
		C	0-12	56.0	0.40	5.80	5.92	0	46	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/1
21	8	A	0-12	59.0	0.25	6.20	6.30	0	17	-
			12-18	54.0	0.16	6.70	6.62	0	12	-
			18-24	53.0	0.12	6.78	6.90	0	9	-
			24-36	48.0	0.10	6.88	6.92	0	1	-
		B	0-12	55.0	0.19	6.50	6.56	0	6	-
		C	0-12	58.0	0.19	5.58	5.72	0	71	-
	9	A	0-12	68.0	0.13	6.10	6.28	0	32	-
			12-18	64.0	0.12	6.48	6.56	0	22	-
			18-24	53.0	0.10	6.20	6.62	0	14	-
			24-36	51.0	0.09	6.00	6.42	0	2	-
		B	0-12	56.0	0.22	5.75	6.52	0	55	-
	10	A	0-12	43.0	0.16	5.80	5.92	0	28	-
			12-18	42.0	0.17	5.75	5.38	0	19	-
			18-24	35.0	0.11	5.98	5.50	0	4	-
			24-36	33.0	0.07	6.18	5.42	0	3	-
		B	0-12	58.0	0.16	5.70	6.42	0	102	-
		C	0-12	59.0	0.17	5.68	6.90	0	91	-
	11	A	0-12	51.0	0.18	5.48	6.72	0	123	-
			12-18	47.0	0.14	5.72	6.58	0	61	-
			18-24	48.0	0.09	5.80	6.72	0	9	-
			24-36	48.0	0.08	5.92	6.36	0	1	-
		B	0-12	50.0	0.14	5.82	6.52	0	76	-
		C	0-12	48.0	0.16	5.80	6.68	0	47	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
22	1	A	0-12	44.5	0.23	5.28	5.63	0	5	-
			12-18	39.5	0.20	5.65	5.99	0	32	-
			18-24	38.5	0.53	5.53	5.80	0	0	-
		B	0-12	47.5	0.61	6.10	6.35	0	0	-
		C	0-12	39.0	1.50	4.43	4.95	0	0	0.10
	3	A	0-12	54.0	0.21	5.64	6.20	0	42	-
			12-18	51.0	0.11	5.92	6.18	0	22	-
			18-24	53.0	0.09	6.30	6.42	0	3	-
		B	0-12	55.0	0.20	6.42	6.48	0	14	-
		C	0-12	50.0	0.56	5.16	5.52	0	5	-
	4	A	0-12	52.0	0.32	6.64	6.56	0	0	-
			12-18	53.0	0.34	6.62	6.76	0	4	-
			18-24	48.0	0.17	7.12	7.18	0	3	-
			24-36	54.0	0.14	7.20	7.40	0	2	-
		B	0-12	52.0	0.36	6.34	6.70	0	5	-
	5	A	0-12	42.0	0.30	6.36	6.76	0	25	-
			12-18	35.5	0.14	6.46	6.78	0	22	-
			18-24	36.0	0.12	6.98	7.00	0	20	-
			24-36	29.5	0.12	7.14	7.16	0	14	-
		B	0-12	41.5	0.15	6.46	6.84	0	57	-
		C	0-12	52.5	0.28	6.72	7.00	0	4	-

E.C., pH, lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
22	6A	3HC								
		B	0-14	37.0	0.10	6.87	7.20	16	0	-
	6	A	0-12	47.0	0.15	6.70	6.96	0	50	-
			12-18	43.0	0.14	6.08	6.56	0	29	-
			18-24	38.0	0.09	6.72	6.00	0	1	-
			24-36	40.0	0.07	5.90	5.98	0	2	-
		B	0-12	53.0	0.47	6.28	6.60	0	37	-
		C	0-12	47.0	0.25	5.58	5.96	0	7	-
	7	A	0-12	54.0	0.46	6.68	6.94	0	33	-
			12-18	40.0	0.26	7.04	7.10	0	16	-
			18-24	40.0	0.20	7.28	7.20	0	3	-
			24-36	40.0	0.17	7.18	7.22	0	0	-
		B	0-12	53.0	0.31	6.28	6.22	0	98	-
		C	0-12	43.0	0.39	7.02	7.08	0	105	-
	8	A	0-12	40.5	0.15	5.70	6.18	0	48	-
			12-18	39.0	0.11	6.28	6.49	0	24	-
			18-24	33.0	0.13	6.43	6.87	0	1	-
			24-36	35.0	0.13	6.70	7.00	0	0	-
		10HC								
		B	0-18	41.0	0.31	5.75	6.15	0	38	-
	9	A	0-12	41.0	0.12	5.04	5.58	0	70	-
			12-18	37.5	0.11	5.94	6.02	0	37	-
			18-24	37.5	0.36	5.42	5.84	0	8	-
			24-36	30.0	0.46	6.12	6.40	0	1	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
22	9	B	0-12	47.5	0.51	5.32	5.64	0	37	-
	10	A	0-12	41.0	1.06	4.93	5.46	0	26	7.30
			12-18	36.5	0.15	5.71	6.08	0	27	-
			18-24	33.0	0.58	5.82	6.22	0	26	-
			24-36	29.0	0.28	6.73	6.88	0	13	-
		B	0-12	47.0	0.27	6.53	6.70	0	67	-
		C	0-12	43.5	0.30	4.81	5.30	0	39	-
	11	A	0-12	38.0	0.17	6.38	6.58	0	23	-
			12-18	35.0	0.11	6.82	6.52	0	18	-
			18-24	29.0	0.22	6.56	6.70	0	16	-
		B	0-12	45.0	0.79	4.24	4.58	0	64	-
	12	A	0-12	43.0	0.14	6.30	6.42	0	31	-
			12-18	38.0	0.14	6.86	7.02	0	45	-
			18-24	46.0	0.10	6.60	6.88	0	25	-
			24-36	39.0	0.08	6.50	6.76	0	6	
		B	0-12	52.0	0.14	5.46	5.60	0	18	-
		C	0-12	43.0	2.33	5.58	5.92	0	11	-
	13	A	0-12	50.0	0.24	5.98	6.23	0	12	-
			12-18	41.0	0.14	5.45	5.77	0	15	-
			18-24	38.5	0.15	5.35	5.37	0	6	-
			24-36	40.0	0.09	5.16	5.45	0	2	-
		B	0-12	44.0	0.10	5.60	5.99	0	5	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
22	13	C	0-12	42.0	0.13	6.37	6.53	0	44	-
	14	A	0-12	47.5	0.18	5.60	6.28	0	14	-
			12-18	41.5	0.19	5.72	6.21	0	0	-
			18-24	39.0	0.12	5.63	6.20	0	4	-
			24-36	34.5	0.10	5.62	6.18	0	0	-
		B	0-12	45.0	2.23	5.25	5.60	0	0	13.60
		C	0-12	48.0	0.51	5.25	5.73	0	0	-
	15	A	0-12	55.0	0.32	5.90	6.16	0	0	-
			12-18	50.0	0.21	6.85	7.10	0	0	-
			18-24	44.5	0.30	7.02	7.20	0	0	-
		B	0-12	46.5	0.78	4.78	5.15	0	0	-
		C	0-12	50.0	0.82	4.90	5.26	0	0	-
	16	A	0-12	55.0	0.90	5.74	5.98	0	58	-
			12-18	50.0	0.50	6.18	6.38	0	49	-
			18-24	47.0	0.32	6.10	6.48	0	24	-
			24-36	48.0	0.21	5.82	6.22	0	5	-
		B	0-12	53.0	1.51	4.10	4.48	0	20	-
		C	0-12	50.0	0.85	4.02	4.58	0	43	-
	17	A	0-12	51.5	0.18	6.62	6.83	0	16	-
			12-18	44.5	0.18	6.77	6.87	0	14	-
			18-24	47.0	0.49	6.60	6.90	0	10	-
			24-36	47.5	0.13	6.62	6.80	0	2	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
22	17	B	0-12	46.5	0.12	5.18	5.74	0	2	-
		C	0-12	46.5	0.12	5.40	5.79	0	2	-
	19	A	0-12	44.0	0.14	6.58	6.50	0	12	-
			12-18	44.0	0.10	6.66	6.56	0	15	-
			18-24	41.0	0.09	6.78	6.72	0	13	-
			24-36	40.0	0.09	6.86	6.72	0	5	-
		B	0-12	48.0	0.74	4.72	5.18	0	3	-
		C	0-12	53.0	0.27	5.12	5.44	0	2	-
	21	A	0-12	54.0	0.13	6.42	6.46	0	47	-
			12-18	47.0	0.12	6.68	6.60	0	46	-
			18-24	48.0	0.11	6.78	6.70	0	11	-
			24-36	49.0	0.08	6.56	6.88	0	3	-
		B	0-12	45.0	0.17	6.92	6.96	0	38	-
		C	0-12	49.0	0.20	6.38	6.42	0	21	-
	22	A	0-12	50.0	0.15	5.98	5.92	0	4	-
			12-18	46.0	0.24	6.06	6.00	0	8	-
			18-24	45.0	0.92	5.36	5.62	0	8	-
			24-36	46.0	1.40	5.38	5.56	0	3	-
		B	0-12	48.0	0.32	6.38	6.60	0	12	-
	23	A	0-12	54.0	0.67	6.06	6.30	0	29	-
			12-18	48.0	0.35	6.56	6.60	0	1	-
			18-24	50.0	0.15	6.72	6.78	0	0	-
			24-36	40.5	0.21	6.74	6.80	0	0	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
22	23	B	0-18	47.5	0.34	6.64	6.76	0	34	-
	24	A	0-12	47.0	0.27	6.16	6.12	0	59	-
			12-18	41.0	0.13	7.20	6.68	0	26	-
			18-24	38.0	0.11	6.92	6.66	0	4	-
		B	0-12	53.0	0.28	4.98	5.18	0	37	-
	25	A	0-12	46.0	0.35	5.68	5.90	0	54	-
			12-18	42.0	0.79	6.56	6.30	0	35	-
			18-24	34.0	0.96	5.68	6.38	0	37	-
		B	0-12	44.0	0.30	6.82	6.72	0	23	-
		C	0-12	50.0	0.53	5.82	6.48	0	26	-
	26	A	0-12	45.0	0.34	6.30	6.58	0	10	-
			12-18	41.0	0.15	6.88	6.82	0	9	-
			18-24	37.0	0.14	6.92	6.80	0	10	-
			24-36	36.0	0.22	6.70	7.18	0	9	-
		B	0-12	50.0	0.29	6.82	7.00	0	5	-
		C	0-12	51.0	0.37	5.56	6.00	0	3	-
	27	A	0-12	46.0	0.20	6.94	7.22	0	12	-
			12-18	48.0	0.13	7.02	6.92	0	12	-
			18-24	42.0	0.14	6.92	7.04	0	13	-
		B	0-12	39.0	0.16	6.88	7.06	0	7	-
			12-18	35.0	0.12	7.32	6.98	0	4	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
22	27	C	0-12	33.0	0.24	6.70	6.72	0	2	-
	28	A	0-12	57.0	0.20	6.86	6.80	0	11	-
			12-18	45.0	0.23	6.66	6.76	0	8	-
			18-24	38.0	0.14	6.98	7.02	0	3	-
			24-36	31.0	0.11	7.30	7.26	0	1	-
		B	0-12	46.0	0.16	5.18	7.28	0	2	-
		C	0-12	52.0	0.33	6.02	6.08	0	3	-
	29	A	0-12	39.0	0.15	5.08	5.60	0	7	-
			12-18	38.0	0.13	5.38	5.52	0	12	-
			18-24	39.0	0.12	6.10	6.08	0	6	-
			24-36	42.0	0.11	6.52	6.38	0	3	-
	30	A	0-12	37.0	1.62	5.40	5.12	0	9	-
			12-18	32.0	1.07	5.36	5.50	0	17	-
			18-24	31.0	0.90	6.00	5.78	0	15	-
			24-36	34.0	0.55	5.70	6.00	0	10	-
		B	0-12	45.0	0.16	6.22	6.52	0	6	-
		C	0-12	42.0	0.21	5.76	6.36	0	7	-
	31	A	0-12	46.0	1.47	5.98	6.82	0	22	-
			12-18	37.0	0.84	6.12	6.68	0	20	-
			18-24	48.0	0.80	6.88	7.02	0	9	-
			24-36	48.0	1.12	7.50	7.92	1	4	-
		B	0-12	49.0	0.73	4.22	5.20	0	6	-
		C	0-12	43.0	0.65	5.26	6.22	0	12	-

E.C., pH, Lime, . Senic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
22	32	A	0-12	58.0	0.94	5.54	5.54	0	12	-
			12-18	50.0	0.63	5.30	5.52	0	11	-
			18-24	45.0	0.57	6.12	6.22	0	5	-
			24-36	49.0	0.45	6.98	7.10	0	7	-
		B	0-12	55.0	0.66	5.98	6.30	0	7	-
	33	A	0-12	55.0	0.37	6.16	6.68	0	9	-
			12-18	39.0	0.34	6.64	7.00	0	5	-
			18-24	40.0	0.35	7.26	7.42	0	7	-
			24-36	36.0	0.33	7.76	7.86	0	6	-
		B	0-12	38.0	4.48	5.46	5.98	0	0	-
			12-18	47.0	3.88	5.84	6.08	0	3	-
	34	A	0-12	55.0	1.67	5.86	5.26	0	29	-
			12-18	50.0	0.73	6.58	6.44	0	13	-
			18-24	51.0	0.78	6.80	6.68	0	4	-
			24-36	46.0	0.25	7.10	6.98	0	4	-
		B	0-12	47.0	0.48	4.76	4.92	0	19	-
		C	0-12	49.0	0.29	7.12	6.68	0	20	-
	35	A	0-12	48.0	0.21	6.98	6.78	0	32	-
			12-18	42.0	0.15	6.88	7.00	0	18	-
			18-24	53.0	0.14	7.28	6.98	0	12	-
			24-36	38.0	0.15	6.84	6.88	0	7	-
		B	0-12	43.0	0.25	6.84	6.68	0	18	-
	36	A	0-12	45.0	0.16	5.00	5.12	0	21	-
			12-18	42.0	0.16	5.26	5.30	0	13	-
			18-24	40.0	0.22	5.50	5.68	0	13	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
22	36	B	0-12	47.0	0.92	4.08	4.52	0	10	-
		C	0-12	57.0	0.35	5.62	6.02	0	7	-
	37	A	0-12	41.0	0.20	6.88	7.10	0	11	-
			12-18	42.0	0.14	7.08	7.40	0	9	-
			18-24	38.0	0.15	7.28	7.40	0	7	-
			24-36	42.0	0.51	8.06	8.44	1	3	-
		B	0-12	45.0	0.22	5.88	7.22	0	18	-
		C	0-12	49.0	0.44	5.12	6.02	0	13	-
			12-18	38.0	0.29	6.56	7.02	0	8	-
		D	0-12	50.0	1.78	6.00	5.72	0	4	-
	38	A	0-12	54.0	0.28	7.02	6.68	0	39	-
			12-18	52.0	0.14	6.80	6.80	0	5	-
			18-24	53.0	0.11	6.42	6.90	0	3	-
			24-36	48.0	0.11	7.28	7.06	0	2	-
		B	0-12	52.0	2.50	6.50	6.86	0	0	-
		C	0-12	52.0	0.29	7.58	7.32	0	10	-
		D	0-12	49.0	1.12	5.62	6.02	0	0	-
	39	A	0-12	42.0	0.17	5.24	5.56	0	16	-
			12-18	42.0	0.14	5.88	6.66	0	14	-
			18-24	35.0	0.17	5.90	6.88	0	1	--
			24-36	62.0	0.16	6.04	6.72	0	1	-
		B	0-12	50.0	0.43	5.76	6.42	0	14	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
22	39	C	0-12	57.0	0.17	6.28	6.56	0	10	-
	41	A	0-12	41.0	0.17	7.06	6.94	0	4	-
			12-18	36.0	0.14	6.98	7.00	0	4	-
			18-24	35.0	0.13	7.18	7.10	0	0	-
		B	0-12	47.0	0.17	6.92	7.16	0	3	-
		C	0-12	47.0	0.16	6.64	7.32	0	3	-
		A	0-12	48.0	0.25	5.34	6.02	0	34	-
			12-18	50.0	0.45	5.62	6.02	0	14	-
			18-24	54.0	0.48	5.64	6.40	0	13	-
			24-36	52.0	0.15	6.38	6.90	0	13	-
		B	0-12	48.0	0.19	6.02	6.70	0	13	-
		C	0-12	54.0	0.73	4.92	5.74	0	15	-
23	1	A	0-12	46.0	0.23	6.92	7.08	0	7	-
			12-18	38.0	0.15	7.14	7.40	0	6	-
			18-24	41.0	0.12	7.26	7.28	0	4	-
		B	0-12	45.5	1.84	4.10	4.52	0	5	-
			12-18	42.5	1.19	4.82	5.20	0	2	-
		C	0-12	50.0	1.00	5.36	5.78	0	6	-
	2	A	0-12	46.5	0.26	7.06	7.12	0	10	-
			12-18	44.0	0.19	7.04	7.08	0	10	-
			18-24	36.5	0.12	7.08	7.00	0	12	-
			24-36	38.0	0.23	6.82	7.10	0	12	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
23	2	B	0-12	41.0	0.94	4.42	4.82	0	12	-
		C	0-12	45.0	0.59	5.10	5.49	0	24	-
	3	A	0-12	41.0	0.55	5.74	6.10	0	4	-
			12-18	37.5	0.64	6.28	6.46	0	7	-
			18-24	33.5	0.82	6.18	6.48	0	4	-
			24-36	33.0	0.90	6.10	6.48	0	5	-
		B	0-12	55.5	0.29	5.28	5.50	0	3	-
			12-18	54.5	0.17	5.74	5.98	0	2	-
		C	0-12	32.5	0.12	5.10	5.38	0	13	-
		D	0-12	40.0	0.19	7.18	7.20	0	4	-
	4	A	0-12	50.0	0.59	6.36	6.72	0	9	-
			12-18	48.0	0.47	6.68	6.96	0	8	-
			18-24	37.0	0.62	6.88	7.06	0	13	-
			24-36	36.5	0.74	6.90	7.08	0	10	-
		B	0-12	59.0	1.06	4.82	5.26	0	13	-
			12-18	53.5	2.23	5.28	5.66	0	14	-
		C	0-12	42.0	0.40	4.80	5.14	0	6	-
			12-18	42.5	0.14	6.68	6.72	0	3	-
24	1	A	0-12	50.0	0.25	6.50	6.90	0	13	-
			12-18	46.5	0.19	6.46	6.72	0	15	-
			18-24	44.5	0.17	6.44	6.62	0	12	-
			24-32	40.0	0.27	5.98	6.30	0	4	-
		B	0-12	50.0	0.99	5.10	5.64	0	52	-
			12-18	50.0	1.45	5.86	6.12	0	24	-

E.C., pH, Lime, . senic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
24	1	C	0-12	52.0	0.25	5.38	5.78	0	30	-
	2	A	0-12	43.0	0.39	5.90	6.26	0	7	-
			12-18	39.5	0.17	6.28	6.40	0	7	-
			18-24	36.5	0.13	6.54	6.60	0	9	-
			24-36	41.0	0.14	6.82	6.84	0	8	-
		B	0-12	39.0	0.36	6.22	6.50	0	7	-
			12-18	29.0	0.13	6.36	6.68	0	4	-
		C	0-12	55.0	0.28	6.20	6.52	0	6	-
25	1	A	0-12	54.0	0.36	6.56	7.00	0	27	-
			12-18	60.0	0.30	6.82	7.28	0	16	-
			18-24	56.0	0.18	7.14	7.62	0	14	-
			24-36	55.0	0.17	7.08	7.52	0	14	-
		B	0-12	48.0	1.91	5.58	6.12	0	15	-
		C	0-12	48.0	1.56	5.80	6.40	0	18	-
	3	A	0-12	44.0	1.97	6.56	6.88	0	39	-
			12-18	45.5	0.88	6.60	6.88	0	20	-
			18-24	41.5	0.36	6.82	6.96	0	18	-
			24-36	39.0	0.24	7.32	7.46	0	15	-
		B	0-12	49.0	2.22	5.16	5.44	0	96	-
		C	0-12	53.0	0.88	5.28	5.54	0	111	-
	4	A	0-12	48.0	0.17	7.20	7.40	0	26	-
			12-18	39.0	0.12	7.22	7.36	0	17	-
			18-24	35.0	0.12	7.44	7.26	0	11	-
			24-36	36.0	0.11	8.02	7.42	0	4	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
25	4	B	0-12	44.0	0.68	6.66	6.62	0	19	-
			12-18	40.0	0.86	6.80	7.20	0	16	-
		C	0-12	48.0	1.26	3.90	4.62	0	77	-
			12-18	46.0	0.81	4.92	5.22	0	57	-
	5	A	0-12	55.5	1.89	7.28	7.61	0	24	0.20
			12-18	45.5	1.82	7.97	8.29	0	10	0.28
			18-24	43.0	1.00	7.95	8.33	0	0	0.68
			24-36	37.0	0.49	7.98	8.34	0	0	-
		B	0-12	47.0	0.24	4.55	5.01	0	18	-
			12-18	40.0	0.21	4.90	5.37	0	28	-
		C	0-12	50.0	0.44	5.40	5.87	0	39	-
	6	A	0-12	50.0	0.27	6.56	6.72	0	59	-
			12-18	45.0	0.17	6.72	7.02	0	31	-
			18-24	45.0	0.17	7.20	7.20	0	27	-
			24-36	43.0	0.18	6.98	7.38	0	6	-
		B	0-12	46.0	1.76	4.10	4.54	0	73	-
			12-18	44.0	1.24	4.56	5.02	0	31	-
		C	0-12	41.0	2.17	4.48	4.76	0	53	-
	7	A	0-12	45.0	0.41	5.78	6.38	0	21	-
			12-18	40.0	0.34	6.40	6.98	0	13	-
			18-24	40.0	0.39	6.60	7.10	0	14	-
		B	0-12	47.0	1.94	5.56	6.08	0	27	-
		C	0-12	45.0	0.93	3.98	4.70	0	33	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
25	8	A	0-12	42.0	0.31	6.62	7.10	0	4	-
			12-18	46.0	0.14	6.62	7.26	0	3	-
			18-24	33.0	0.17	6.72	7.52	0	3	-
			24-36	31.0	0.15	7.46	8.04	0	1	-
		B	0-12	40.0	0.55	5.98	6.60	0	3	-
			12-18	35.0	0.29	6.64	7.20	0	0	-
			18-24	34.0	0.32	6.80	7.20	0	2	-
			24-36	32.0	0.15	7.00	7.48	0	0	-
	9	A	0-12	46.0	0.26	6.46	6.68	0	12	-
			12-18	40.0	0.20	7.00	6.98	0	6	-
			18-24	42.0	0.22	7.04	7.26	0	2	-
			24-36	36.5	0.25	7.04	7.36	0	0	-
		B	0-12	43.0	0.56	4.42	4.60	0	6	-
		C	0-12	50.0	2.14	4.86	5.02	0	17	-
	10	A	0-12	47.5	0.22	6.78	6.96	0	6	-
			12-18	38.0	0.19	6.96	7.12	0	5	-
			18-24	37.5	0.14	6.94	7.30	0	0	-
			24-36	44.0	0.23	7.32	7.94	0	2	-
		B	0-12	40.0	0.20	5.02	5.44	0	21	-
			12-18	35.5	0.17	5.68	6.10	0	18	-
		C	0-12	47.0	0.36	5.96	6.26	0	20	-
	11	A	0-12	47.5	0.45	6.76	6.86	0	155	-
			12-18	44.0	0.24	7.14	7.16	0	74	-
			18-24	45.0	0.15	7.36	7.36	0	57	-
			24-36	42.0	0.19	7.32	7.50	0	27	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
25	11	B	0-12	44.0	0.24	7.26	7.42	0	102	-
	12	A	0-12	65.0	0.40	5.90	6.26	0	2	-
			12-18	41.0	0.19	6.42	6.62	0	2	-
			18-24	47.5	0.21	6.66	6.84	0	1	-
			24-36	50.0	0.14	6.82	6.88	0	0	-
		B	0-12	35.5	0.15	5.96	6.18	0	2	-
			12-18	26.5	0.13	6.62	6.76	0	1	-
			18-24	27.5	0.12	6.82	6.92	0	2	-
	13	A	0-12	44.0	0.30	5.86	6.20	0	4	-
			12-18	46.0	0.16	6.24	6.84	0	3	-
			18-24	44.0	0.19	6.86	7.44	0	2	-
			24-36	40.0	0.19	6.90	7.68	0	1	-
		B	0-12	55.0	0.30	6.78	7.20	0	5	-
		C	0-12	48.0	0.34	6.52	6.76	0	2	-
			12-18	46.0	0.18	6.92	6.98	0	4	-
	14	A	0-12	43.0	0.29	6.64	6.82	0	30	-
			12-18	40.0	0.26	6.60	6.88	0	15	-
			18-24	32.0	0.13	6.98	7.10	0	9	-
			24-36	36.0	0.11	7.20	7.10	0	6	-
		B	0-12	41.0	0.78	5.96	6.50	0	26	-
		C	0-12	41.0	0.24	6.00	6.86	0	6	-
			12-18	50.0	0.13	6.80	7.20	0	11	-
	15	A	0-12	40.0	0.35	6.74	7.22	0	23	-
			12-18	43.0	0.21	7.26	7.12	0	12	-
			18-24	38.0	0.18	7.52	7.36	0	12	-
			24-36	39.0	0.16	7.04	7.52	0	14	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
25	15	B	0-12	36.0	0.60	6.70	7.12	0	52	-
			12-18	38.0	0.42	6.24	6.60	0	50	-
		C	0-12	49.0	1.01	4.96	5.58	0	119	-
	16	A	0-12	40.0	0.55	7.24	7.32	0	45	-
			12-18	41.0	0.34	7.80	7.82	0	48	-
			18-24	45.0	0.18	7.72	7.76	0	28	-
			24-36	35.0	0.28	7.20	7.38	0	12	-
		B	0-12	43.0	0.30	7.08	7.32	0	53	-
			12-18	42.0	0.19	7.46	7.56	0	27	-
		C	0-12	45.0	0.46	6.72	7.20	0	90	-
			12-18	50.0	0.17	7.22	7.48	0	36	-
	17	A	0-12	46.0	0.35	6.68	7.12	0	3	-
			12-18	40.0	0.15	6.72	7.10	0	2	-
			18-24	39.0	0.12	6.78	7.20	0	2	-
			24-36	39.0	0.11	6.30	7.02	0	1	-
		B	0-12	53.0	0.12	5.64	6.12	0	12	-
			12-18	58.0	0.11	6.42	6.70	0	10	-
		C	0-12	44.0	2.44	3.78	4.56	0	4	-
26	2	A	0-12	47.5	0.20	5.96	6.40	0	16	-
			12-18	36.5	0.14	6.10	6.38	0	10	-
		B	0-12	44.0	0.14	6.10	6.48	0	60	-
		C	0-12	55.5	0.26	6.04	6.28	0	96	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
26	3	A	0-12	42.0	0.29	5.40	5.88	0	133	-
			12-18	38.0	0.15	5.44	5.90	0	41	-
			18-24	35.0	0.11	5.66	5.92	0	19	-
			24-36	34.0	0.11	6.08	6.60	0	7	-
		B	0-12	49.0	0.18	5.82	6.22	0	129	-
		C	0-12	43.0	0.37	5.06	5.98	0	31	-
	4	A	0-12	51.5	0.35	5.56	5.84	0	267	-
			12-18	40.0	0.32	5.78	6.08	0	82	-
			18-24	41.5	0.28	5.88	6.14	0	62	-
			24-36	35.5	0.32	6.50	6.76	0	35	-
		B	0-12	42.5	0.13	5.38	5.54	0	33	-
		C	0-12	52.0	0.47	5.48	5.76	0	152	-
	5	A	0-12	44.5	0.37	6.18	6.36	0	129	-
			12-18	37.5	0.20	6.66	6.66	0	62	-
			18-24	40.5	0.14	6.86	6.88	0	82	-
		B	0-12	40.5	0.94	5.48	5.76	0	61	-
		C	0-12	43.0	0.19	5.98	6.28	0	96	-
	6	A	0-12	42.5	1.04	6.26	6.64	0	64	-
			12-18	35.0	0.43	6.64	6.80	0	41	-
			18-24	33.5	0.15	7.00	6.98	0	28	-
		B	0-12	49.0	1.53	4.54	4.92	0	100	-
		C	0-12	40.5	0.63	5.10	5.56	0	51	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
26	7	A	0-12	48.0	0.28	6.76	6.78	0	84	-
			12-18	46.5	0.33	6.88	7.02	0	20	-
			18-24	45.0	0.40	6.86	7.00	0	5	-
			24-36	39.5	0.37	6.78	6.82	0	4	-
		5HC B	0-12	40.0	0.84	5.48	5.78	0	46	-
	8	A	0-12	51.0	0.22	6.98	7.30	0	128	-
			12-18	41.0	0.19	6.92	7.24	0	46	-
			18-24	39.0	0.14	7.56	7.46	0	17	-
		B	0-12	58.0	1.09	6.02	6.16	0	108	-
		C	0-12	48.0	2.22	5.12	5.28	0	40	-
	9	A	0-12	57.0	1.16	4.80	5.18	0	51	-
			12-18	55.0	0.79	5.54	5.88	0	57	-
			18-24	48.0	0.35	6.34	6.52	0	40	-
			24-36	43.0	0.24	6.42	6.48	0	0	-
		B	0-12	55.0	0.84	4.92	5.32	0	112	-
		C	0-12	50.0	1.04	5.08	5.40	0	58	-
	10	A	0-12	48.0	0.83	6.72	6.98	0	19	-
			12-18	48.0	0.36	6.94	7.02	0	12	-
			18-24	47.0	0.22	7.10	7.08	0	13	-
			24-36	45.0	0.19	7.48	7.20	0	25	-
		B	0-12	50.0	0.66	5.86	6.10	0	44	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
26	10	C	0-12	48.0	0.77	6.62	6.76	0	15	-
	11	A	0-12	41.0	0.32	6.74	7.08	0	0	-
			12-18	37.0	0.19	6.98	6.98	0	0	-
			18-24	38.5	0.16	7.24	7.08	0	0	-
			24-36	37.5	0.16	7.28	7.26	0	0	-
		B	0-12	55.0	0.27	6.86	7.00	0	1	-
		C	0-12	47.5	0.26	6.82	6.98	0	0	-
	12	A	0-12	52.0	0.30	6.78	6.82	0	40	-
			12-18	44.0	0.20	7.12	7.04	0	24	-
			18-24	52.0	0.19	7.12	7.22	0	25	-
			24-36	47.0	0.17	7.26	7.40	0	25	-
		B	0-12	55.0	0.58	6.58	6.80	0	16	-
		C	0-12	45.0	0.74	5.92	6.32	0	35	-
	13	A	0-12	47.5	0.31	6.68	7.02	0	8	-
			12-18	41.5	0.21	6.84	7.08	0	8	-
			18-24	43.5	0.14	6.96	7.24	0	5	-
			24-36	35.5	0.11	7.32	7.26	0	12	-
		B	0-12	44.5	0.30	6.18	6.56	0	23	-
		C	0-12	41.0	0.31	5.92	6.32	0	48	-
	14	A	0-12	50.0	0.20	6.68	6.91	0	59	-
			12-18	45.0	0.10	6.70	6.81	0	33	-
		B	0-12	44.0	1.14	4.79	5.17	0	147	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
26	14	C	0-12	50.0	0.17	5.72	6.10	0	125	-
	15	A	0-12	50.0	0.19	6.78	6.86	0	135	-
			12-18	40.0	0.14	6.68	6.88	0	64	-
			18-24	40.5	0.13	6.54	6.64	0	56	-
			24-36	37.0	0.12	5.92	6.18	0	4	-
		5HC B	0-18	45.5	1.12	5.52	5.84	0	53	-
	16	A	0-12	42.5	0.24	6.56	6.78	0	12	-
			12-18	37.5	0.20	6.34	6.42	0	8	-
			18-24	36.5	0.16	6.68	6.36	0	5	-
			24-36	35.5	0.13	6.60	6.66	0	2	-
		B	0-12	47.5	0.28	6.38	6.56	0	88	-
		C	0-12	44.5	0.36	7.22	7.42	0	30	-
	17	A	0-12	53.0	0.35	7.30	7.36	0	15	-
			12-18	43.0	0.16	7.44	7.24	0	9	-
			18-24	40.0	0.18	7.52	7.28	0	6	-
			24-36	43.0	0.25	7.32	7.42	0	2	-
		B	0-12	56.0	0.39	7.02	7.14	0	7	-
			12-18	54.0	0.24	7.14	7.24	0	10	-
		C	0-12	48.0	0.60	4.22	4.48	0	21	-
	18	A	0-12	48.0	0.45	6.30	6.40	0	61	-
			12-18	38.0	0.41	6.08	6.52	0	31	-
			18-24	42.0	0.43	6.42	6.42	0	29	-
			24-36	45.0	0.14	7.56	7.22	0	10	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
26	18	B	0-12	55.0	1.22	5.08	5.48	0	72	-
		C	0-12	53.0	1.94	4.44	4.80	0	108	-
	19	A	0-12	52.0	0.41	6.66	6.82	0	30	-
			12-18	43.0	0.17	6.98	6.98	0	7	-
			18-24	45.0	0.14	7.60	6.98	0	5	-
			24-36	46.0	0.16	7.58	7.36	0	4	-
		B	0-12	43.0	0.61	6.88	7.08	0	33	-
		C	0-12	51.0	1.07	5.40	5.62	0	186	-
			12-18	43.0	0.45	6.76	6.88	0	39	-
	20	A	0-12	47.0	0.42	6.58	6.88	0	76	-
			12-18	45.0	0.20	6.52	7.18	0	30	-
			18-24	39.0	0.17	6.74	7.30	0	5	-
			24-36	43.0	0.12	6.82	7.30	0	2	-
		B	0-12	52.0	0.79	5.92	6.60	0	90	-
		C	0-12	58.0	0.38	6.48	6.86	0	90	-
	21	A	0-12	53.0	1.94	5.72	6.22	0	56	-
			12-18	55.0	2.07	5.80	6.42	0	33	-
			18-24	44.0	0.52	7.02	7.50	0	18	-
			24-36	49.0	0.38	7.08	7.56	0	11	-
		B	0-12	52.0	0.56	6.10	6.52	0	56	-
		C	0-12	51.0	0.26	6.98	7.08	0	50	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
26	22	A	0-12	50.0	0.37	6.42	6.66	0	84	-
			12-18	47.0	0.24	6.68	6.78	0	73	-
			18-24	43.0	0.38	6.88	7.00	0	51	-
		A1	0-12	48.0	0.38	6.52	6.66	0	80	-
		B	0-12	51.5	0.50	6.40	6.76	0	162	-
		C	0-12	49.0	0.68	7.04	7.30	0	135	-
	23	A	0-12	46.0	0.17	6.30	6.64	0	152	-
			12-18	42.0	0.15	6.58	6.77	0	40	-
			18-24	31.0	0.12	6.77	6.92	0	38	-
			24-36	30.0	0.10	7.11	6.99	0	36	-
		B	0-12	57.5	1.10	6.60	7.07	0	140	-
		C	0-12	41.0	1.15	6.16	6.48	0	125	-
	24	A	0-12	46.5	1.99	5.74	6.04	0	45	-
			12-18	41.5	0.70	6.32	6.56	0	60	-
			18-24	43.5	0.28	6.74	6.90	0	42	-
			24-36	37.0	0.14	6.96	7.02	0	10	-
		5HC B	0-18	41.0	0.29	5.94	6.06	0	69	-
	24	A	0-12	48.0	0.41	5.50	6.20	0	181	-
			12-18	43.0	0.34	5.96	6.48	0	55	-
			18-24	43.0	0.21	6.38	6.58	0	32	-
			24-36	47.0	0.18	6.60	7.02	0	13	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
26	24	B	0-12	43.0	2.02	4.88	5.42	0	74	-
		C	0-12	46.0	0.65	4.78	5.32	0	64	-
	25	A	0-12	45.0	0.33	6.68	6.80	0	20	-
			12-18	37.0	0.35	6.70	6.92	0	12	-
			18-24	44.0	0.63	6.50	6.70	0	16	-
			24-36	46.0	0.18	6.70	6.74	0	11	-
		B	0-12	53.0	0.16	6.90	6.86	0	37	-
		C	0-12	52.0	1.85	4.58	5.02	0	22	-
			12-18	40.0	1.56	5.18	5.30	0	14	-
	26	A	0-12	56.0	0.29	6.22	6.58	0	37	-
			12-18	43.0	0.22	6.30	6.60	0	30	-
			18-24	44.0	0.36	7.00	7.14	0	20	-
			24-36	38.0	0.59	7.30	7.50	0	9	-
		B	0-12	44.0	0.41	5.02	5.60	0	57	-
			12-18	39.0	0.25	5.66	5.72	0	56	-
		C	0-12	44.0	0.48	5.02	5.24	0	27	-
	27	A	0-12	47.0	0.34	7.12	7.10	0	147	-
			12-18	43.0	0.19	7.46	7.44	0	47	-
			18-24	42.0	0.19	7.60	7.66	0	34	-
			24-36	38.0	0.16	7.56	7.50	0	17	-
		B	0-12	41.0	0.50	6.68	6.68	0	36	-
			12-18	35.0	0.21	6.70	6.82	0	14	-
		C	0-12	47.0	0.46	7.06	7.28	0	60	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
26	28	A	0-12	34.5	0.29	5.14	5.58	0	23	-
			12-18	37.5	0.22	6.12	6.26	0	8	-
			18-24	29.0	0.50	7.18	7.56	0	8	-
		5HC B	0-18	43.5	0.21	6.16	6.28	0	24	-
	29	A	0-12	51.0	0.31	6.56	6.82	0	160	-
			12-18	48.0	0.19	7.20	7.10	0	48	-
			18-24	48.0	0.18	7.30	7.42	0	50	-
			24-36	48.0	0.31	7.68	7.70	0	20	-
		B	0-12	51.0	0.31	5.50	6.02	0	46	-
		C	0-12	52.0	0.59	7.32	7.40	0	60	-
	30	A	0-12	49.0	0.43	5.22	5.68	0	6	-
			12-18	45.0	1.44	6.32	6.98	0	9	-
			18-24	44.0	0.38	7.40	7.96	0	9	-
			24-36	41.0	0.46	9.34	8.50	0	6	-
		B	0-12	44.0	0.43	6.80	7.10	0	4	-
		C	0-12	52.0	1.68	5.88	6.22	0	3	-
	31	A	0-12	47.0	0.48	6.88	6.72	0	84	-
		B	0-12	47.0	0.19	5.76	6.32	0	35	-
		C	0-12	52.0	1.24	4.46	4.70	0	40	-
			12-18	35.0	1.28	4.70	5.12	0	36	-
		D	0-12	45.0	0.85	4.92	5.42	0	124	-
			12-18	42.0	0.38	5.72	6.18	0	33	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
26	33	A	0-12	47.0	0.17	6.50	6.56	0	58	-
			12-18	38.0	0.16	6.58	6.72	0	42	-
			18-24	38.0	0.18	5.80	6.20	0	6	-
			24-36	36.0	0.18	6.60	6.62	0	34	-
		5HC B	0-18	49.0	0.67	6.26	6.38	0	35	-
	34	A	0-12	48.0	0.44	6.46	6.80	0	44	-
			12-18	41.0	0.39	6.08	6.50	0	20	-
			18-24	37.0	0.15	6.52	6.96	0	20	-
			24-36	41.0	0.15	6.50	7.16	0	18	-
		B	0-12	56.0	1.76	4.52	4.82	0	75	-
		C	0-12	50.0	0.46	6.56	6.82	0	39	-
	35	A	0-12	55.0	0.81	6.52	6.84	0	5	-
			12-18	48.0	0.48	6.70	7.02	0	2	-
			18-24	46.0	0.28	7.00	7.30	0	2	-
			24-36	45.0	0.15	7.12	7.34	0	1	-
		B	0-12	50.0	0.61	5.62	6.02	0	5	-
		C	0-12	56.0	0.40	6.26	6.40	0	40	-
	36	A	0-12	52.0	0.35	6.84	7.32	0	82	-
			12-18	38.0	0.22	6.94	7.20	0	29	-
			18-24	36.0	0.22	6.88	7.16	0	31	-
			24-36	32.5	0.20	7.06	7.12	0	19	-
		B	0-12	44.0	0.58	6.68	6.94	0	14	-
		C	0-12	56.5	0.43	6.28	6.52	0	80	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
26	37	A	0-12	43.0	0.29	6.44	6.82	0	59	-
			12-18	45.0	0.23	5.94	6.20	0	26	-
			18-24	40.0	0.25	5.78	7.30	0	6	-
			24-36	41.0	0.20	6.62	6.92	0	2	-
		B	0-12	43.0	0.52	4.90	5.12	0	70	-
		C	0-12	58.0	1.64	5.02	5.32	0	34	-
	38	A	0-12	43.0	0.25	6.30	6.48	0	90	-
			12-18	38.0	0.17	6.42	6.72	0	51	-
			18-24	33.0	0.15	6.52	6.90	0	34	-
		A1	0-12	41.0	0.33	6.88	7.14	0	60	-
		A2	0-12	42.0	0.36	6.48	6.68	0	102	-
		A3	0-12	44.0	0.31	6.72	6.88	0	63	-
		A4	0-12	49.0	0.16	6.24	6.60	0	58	-
		B1	0-12	42.0	0.18	5.98	6.32	0	100	-
		B2	0-12	37.0	0.34	6.60	6.62	0	80	-
		B3	0-12	38.0	0.24	7.08	6.92	0	69	-
		B4	0-12	37.0	0.37	6.58	6.48	0	72	-
	39	A	0-12	56.0	0.50	6.62	6.70	0	8	-
			12-18	45.0	0.17	6.72	6.94	0	4	-
			18-24	47.0	0.31	6.68	7.10	0	3	-
			24-36	44.0	0.29	7.02	7.38	0	1	-
		B	0-12	47.0	0.43	5.58	6.12	0	9	-
			12-18	37.0	0.36	5.84	6.28	0	5	-
		C	0-12	44.0	0.30	6.08	6.30	0	15	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
27	1	A	0-12	50.0	0.14	6.00	6.70	0	78	-
			12-18	40.0	0.13	6.66	6.99	0	39	-
			18-24	36.5	0.10	7.07	7.00	0	13	-
			24-36	34.5	0.09	6.97	7.01	0	2	-
		B	0-12	42.0	0.17	6.13	6.34	0	65	-
		C	0-12	43.0	0.14	5.92	6.25	0	51	-
	2	A	0-12	52.0	0.65	6.20	6.57	0	49	-
			12-18	45.5	0.36	6.78	6.95	0	54	-
			18-24	41.5	0.18	6.99	7.01	0	24	-
			24-36	42.0	0.13	7.03	7.08	0	8	-
		B	0-12	39.5	0.18	6.92	7.01	0	12	-
		C	0-12	45.5	0.19	6.59	6.74	0	26	-
	3	A	0-12	46.5	0.13	6.62	6.62	0	12	-
			12-18	39.0	0.13	6.58	6.80	0	10	-
			18-24	40.0	0.11	6.72	7.02	0	11	-
			24-36	38.0	0.11	6.90	7.02	0	3	-
		B	0-12	42.5	0.12	6.60	6.75	0	47	-
		C	0-12	39.5	0.11	6.90	6.95	0	40	-
	4	A	0-12	51.5	0.11	6.67	6.70	0	29	-
			12-18	48.5	0.08	6.88	6.90	0	29	-
			18-24	46.0	0.09	6.98	6.99	0	29	-
			24-36	42.5	0.09	7.00	7.01	0	17	-
	5	B	0-12	44.0	0.13	6.23	6.49	0	53	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
27	5	C	0-12	48.5	0.14	6.60	6.78	0	105	-
	6	A	0-12	50.0	0.16	6.64	6.72	0	40	-
			12-18	47.5	0.13	6.86	6.86	0	23	-
			18-24	49.5	0.11	6.92	6.96	0	13	-
			24-36	46.0	0.09	6.92	6.96	0	4	-
		B	0-12	37.5	0.51	5.34	5.64	0	19	-
		C	0-12	44.5	0.45	5.44	5.66	0	14	-
	7	A	0-12	44.07	0.13	6.70	6.95	0	116	-
			12-18	42.19	0.14	6.88	6.95	0	37	-
			18-24	37.48	0.12	6.96	7.12	0	13	-
			24-36	37.07	0.14	7.14	7.25	0	2	-
		B	0-12	44.46	0.17	6.02	6.15	0	15	-
		C	0-12	47.21	0.13	6.18	6.30	0	32	-
	7	A	0-12	39.14	0.14	6.86	6.80	0	68	-
			12-18	36.22	0.08	6.87	6.88	0	14	-
			18-24	28.93	0.10	6.94	6.96	0	4	-
		10HC B	0-18	34.79	0.30	6.24	6.50	0	32	-
	8	A	0-12	50.5	0.15	6.54	6.72	0	7	-
			12-18	48.5	0.12	6.82	6.96	0	5	-
			18-24	42.5	0.10	7.08	7.18	0	6	-
			24-36	40.0	0.12	7.16	7.30	0	3	-
		B	0-12	55.5	0.14	6.88	6.16	0	2	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
27	8	C	0-12	47.0	0.12	6.54	6.62	0	8	-
	10	A	0-12	46.10	0.14	7.08	7.20	0	32	-
			12-18	40.63	0.13	7.38	7.40	0	0	-
			18-24	36.97	0.09	7.40	7.40	0	2	-
			24-36	38.36	0.13	6.96	7.30	0	0	-
		B	0-12	43.67	0.17	5.68	5.92	0	38	-
		C	0-12	57.40	0.15	5.18	5.52	0	24	-
	13	B	0-12	48.44	0.18	6.72	7.00	0	93	-
		C	0-12	48.61	0.14	6.80	6.95	0	63	-
	14	A	0-12	47.23	0.14	7.15	7.27	0	91	-
			12-18	50.81	0.14	7.10	7.30	0	48	-
			18-24	39.78	0.13	7.30	7.47	0	5	-
			24-36	37.80	0.12	7.22	7.34	0	2	-
		B	0-12	47.17	0.10	6.05	6.30	0	90	-
		C	0-12	45.08	0.19	6.74	6.90	0	140	-
	15	A	0-12	44.89	0.20	6.85	7.07	0	92	-
			12-18	40.80	0.15	7.12	7.20	0	52	-
			18-24	38.35	0.16	7.20	7.15	0	2	-
			24-36	33.85	0.12	7.05	7.21	0	3	-
		B	0-12	47.03	0.42	5.70	6.00	0	60	-
		C	0-12	47.24	0.32	5.70	6.25	0	71	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
27	16	A	0-12	45.5	0.15	6.56	6.56	0	81	-
			12-18	36.0	0.14	6.64	6.66	0	50	-
			18-24	35.0	0.13	6.94	6.98	0	26	-
			24-36	41.0	0.11	7.02	7.22	0	14	-
		B	0-12	51.5	0.19	6.64	6.74	0	112	-
		C	0-12	47.0	0.14	6.66	6.72	0	88	-
	17	A	0-12	57.46	0.18	5.55	5.95	0	20	-
			12-18	50.00	0.17	6.00	6.23	0	2	-
			18-24	48.44	0.15	6.33	6.50	0	5	-
			24-36	44.00	0.12	6.48	6.75	0	8	-
		B	0-12	50.87	0.29	6.17	6.58	0	44	-
		C	0-12	39.32	1.83	5.23	5.59	0	38	6.40
	18	A	0-12	54.65	0.34	4.85	5.27	0	4	-
			12-18	44.07	0.30	5.10	5.42	0	1	-
			18-24	38.13	0.38	6.25	6.30	0	0	-
			24-36	37.72	0.24	6.85	7.13	0	0	-
		B	0-12	48.96	0.23	6.24	6.70	0	0	-
		C	0-12	47.67	1.07	6.10	6.50	0	2	7.40
	19	A	0-12	48.80	0.53	4.98	5.22	0	24	-
			12-18	44.58	0.25	6.05	6.12	0	9	-
			18-24	45.33	1.96	6.22	6.40	0	1	0.48
			24-36	44.30	1.95	6.20	6.45	0	0	2.28

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
27	19	B	0-12	42.29	0.20	5.50	5.92	0	15	-
		C	0-12	46.18	0.33	5.76	6.12	0	60	-
	20	A	0-12	49.54	0.28	6.61	6.96	0	44	-
			12-18	46.37	0.30	7.00	7.60	0	50	-
			18-24	42.20	0.26	7.46	8.05	0	31	-
			24-36	37.00	0.18	7.06	7.50	0	14	-
		B	0-12	46.59	0.48	5.06	5.42	0	50	-
		C	0-12	62.74	0.34	6.93	7.16	0	2	-
	21	A	0-12	46.30	1.60	5.12	5.44	0	90	9.80
			12-18	35.54	0.90	5.46	5.76	0	12	-
			18-24	36.30	0.36	5.94	6.25	0	31	-
		B	0-12	41.51	1.33	5.22	5.64	0	70	8.30
		C	0-12	39.89	1.85	4.06	4.42	0	190	11.20
	22	A	0-12	53.5	0.48	6.18	6.64	0	67	-
			12-18	49.0	0.32	6.58	6.86	0	33	-
			18-24	42.0	0.22	6.68	6.98	0	33	-
			24-36	48.0	0.15	6.68	6.98	0	5	-
		C	0-12	57.5	0.82	6.54	6.84	0	150	-
		C	0-12	48.0	1.64	4.42	4.84	0	186	12.60
	23	A	0-12	40.29	1.15	4.08	4.44	0	88	8.00
			12-18	34.93	0.80	4.78	5.22	0	32	-
			18-24	35.00	1.06	5.18	5.52	0	30	2.36
			24-36	39.83	1.50	4.68	4.92	0	53	6.00

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
27	23	B	0-12	48.31	1.73	4.70	5.04	0	126	14.00
		C	0-12	48.67	0.49	4.88	5.18	0	120	-
	26	A	0-12	45.40	2.12	4.22	4.58	0	48	8.40
			12-18	43.11	1.24	4.16	4.54	0	38	2.36
			18-24	35.70	0.28	5.08	5.24	0	13	-
			24-36	34.38	1.02	5.38	5.64	0	18	5.20
		B	0-12	37.27	0.27	6.44	6.48	0	94	-
		C	0-12	45.60	1.55	4.16	4.38	0	90	8.00
	27	A	0-12	44.80	0.23	5.46	5.68	0	30	-
			12-18	44.73	0.10	5.84	6.00	0	44	-
			18-24	42.39	0.11	6.14	6.38	0	26	-
			24-36	40.52	0.11	6.68	6.72	0	7	-
		B	0-12	49.20	0.51	5.64	6.04	0	32	-
		C	0-12	58.27	1.36	4.10	4.38	0	92	7.20
	28	A	0-12	43.0	0.17	6.68	6.76	0	32	-
			12-18	40.0	0.13	6.92	7.06	0	24	-
			18-24	36.5	0.15	7.04	7.18	0	20	-
			24-36	36.5	0.17	7.16	7.26	0	21	-
		B	0-12	56.0	3.10	4.42	4.64	0	142	6.12
		C	0-12	50.0	0.90	5.84	6.18	0	26	-
	29	A	0-12	39.0	0.17	6.42	7.00	0	42	-
			12-18	35.5	0.14	6.65	7.02	0	29	-
			18-24	34.5	0.15	6.58	7.03	0	35	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
27	29	B	0-12	47.5	1.12	4.74	5.09	0	176	5.80
		C	0-12	48.0	0.51	4.92	5.33	0	88	-
	30	A	0-12	35.0	0.15	5.46	5.78	0	14	-
			12-18	35.0	0.16	6.72	6.76	0	10	-
			18-24	34.0	0.11	6.66	6.96	0	0	-
			24-36	30.0	0.24	6.52	6.64	0	2	-
		B	0-12	55.0	0.22	6.44	6.66	0	100	-
		C	0-12	43.5	0.19	5.82	6.10	0	106	-
	31	A	0-12	52.5	0.19	6.48	6.76	0	86	-
			12-18	43.5	0.10	6.52	6.82	0	43	-
			18-24	43.5	0.09	6.64	6.88	0	38	-
			24-36	39.0	0.08	7.12	7.06	0	26	-
		B	0-12	42.0	0.12	6.26	6.50	0	64	-
		C	0-12	50.0	1.40	6.14	6.42	0	52	9.70
	32	A	0-12	44.5	0.24	5.50	5.88	0	142	-
			12-18	40.5	0.20	5.63	6.01	0	93	-
			18-24	39.0	0.12	5.57	5.98	0	42	-
			24-36	31.0	0.12	5.68	5.90	0	30	-
		B	0-12	43.0	2.03	4.02	4.48	0	34	-
		C	0-12	50.0	0.91	4.50	4.90	0	46	-
	33	A	0-12	46.0	0.17	6.70	6.83	0	22	-
			12-18	41.5	0.21	6.72	7.08	0	30	-
			18-24	37.0	0.21	6.77	7.20	0	13	-
			24-36	36.5	0.16	6.88	7.30	0	6	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
27	33	B	0-12	50.0	0.26	5.80	6.17	0	22	-
		C	0-12	55.5	2.69	5.92	6.29	0	48	10.00
	34	A	0-12	59.0	1.69	5.68	5.98	0	7	-
			12-18	50.0	0.30	6.95	7.10	0	14	-
			18-24	42.5	0.61	6.80	7.02	0	1	-
			24-36	36.5	1.71	6.78	7.00	0	0	-
		B	0-12	57.0	0.50	5.43	5.68	0	3	-
		C	0-12	63.5	0.59	7.28	7.43	0	5	-
	35	A	0-12	45.0	0.16	6.68	6.72	0	60	-
			12-18	44.0	0.13	6.90	6.96	0	50	-
		B	0-12	47.0	2.37	4.50	4.88	0	158	18.00
		C	0-12	39.5	4.51	4.08	4.28	0	68	41.50
		D	0-12	35.0	0.34	6.80	6.76	0	91	-
			12-18	38.5	0.15	7.12	7.24	0	29	-
			18-24	30.0	0.14	7.10	7.36	0	5	-
			24-36	47.5	0.14	7.48	7.48	0	0	-
		E1	0-12	48.0	0.18	6.56	6.76	0	124	-
		2	0-12	45.5	0.17	6.82	6.84	0	132	-
		3	0-12	47.5	0.15	5.84	6.06	0	72	-
		4	0-12	49.5	0.19	6.34	6.46	0	100	-
		5	0-12	49.0	0.18	6.52	6.58	0	188	-
		6	0-12	47.0	0.22	6.36	6.46	0	119	-
		7	0-12	46.0	0.29	6.00	6.34	0	126	-
		8	0-12	50.0	0.20	6.56	6.66	0	128	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
27	35	E9	0-12	50.0	0.20	5.92	6.16	0	150	-
		10	0-12	46.5	0.23	6.46	6.60	0	66	-
		11	0-12	48.0	0.19	6.58	6.68	0	120	-
		12	0-12	45.5	0.23	6.64	6.74	0	108	-
		13	0-12	44.5	0.22	5.79	6.00	0	112	-
		14	0-12	44.5	0.31	6.30	6.52	0	62	-
		15	0-12	43.0	0.24	5.50	5.77	0	66	-
		16	0-12	44.0	0.23	6.42	6.48	0	44	-
		17	0-12	44.0	0.23	6.23	6.50	0	45	-
			12-28	36.5	0.15	6.89	6.85	0	21	-
	37	A	0-12	46.0	0.14	5.99	6.28	0	62	-
			12-18	48.5	0.10	6.33	6.49	0	48	-
			18-24	42.0	0.10	6.60	6.67	0	31	-
			24-36	38.5	0.10	6.70	6.80	0	7	-
		B	0-12	41.5	0.49	4.78	5.16	0	98	-
		C	0-12	43.5	1.09	4.77	5.20	0	162	7.50
	40	A	0-12	42.0	0.19	6.96	6.98	0	20	-
			12-18	38.0	0.14	7.16	7.04	0	6	-
			18-24	40.0	0.12	7.14	7.10	0	0	-
			24-36	43.0	0.11	7.16	7.06	0	0	-
		B	0-12	43.5	0.78	4.60	4.86	0	20	-
		C	0-12	47.0	2.25	4.42	4.72	0	44	16.80
	41	A	0-12	45.0	0.14	6.40	6.70	0	58	-
			12-18	44.5	0.16	6.69	6.94	0	61	-
			18-24	42.5	0.17	6.83	7.10	0	51	-
			24-36	40.0	0.17	6.97	7.39	0	21	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
27	41	B	0-12	47.0	0.59	5.53	6.00	0	27	-
		C	0-12	45.5	1.34	4.01	4.48	0	6	9.40
	42	A	0-12	50.0	0.17	6.76	7.12	0	2	-
			12-18	40.5	0.13	7.08	7.16	0	2	-
			18-24	35.0	0.10	7.06	7.12	0	0	-
			24-36	38.0	0.11	6.90	6.96	0	0	-
		B	0-12	44.5	0.22	6.32	6.46	0	0	-
		C	0-12	45.5	0.16	6.24	6.36	0	16	-
	46	A	0-12	48.0	0.23	6.80	7.05	0	10	-
			12-18	48.0	0.26	6.65	7.02	0	4	-
			18-24	44.5	0.21	6.92	7.19	0	5	-
			24-36	48.5	0.38	6.82	7.11	0	13	-
		B	0-12	47.0	0.37	6.02	6.49	0	6	-
		C	0-12	53.5	0.26	6.40	6.79	0	10	-
	47	A	0-12	44.0	0.11	6.16	6.48	0	68	-
			12-18	45.0	0.14	6.12	6.42	0	30	-
			18-24	43.5	0.11	6.46	6.64	0	37	-
			24-36	41.5	0.10	6.64	6.86	0	37	-
		B	0-18	41.0	0.18	5.06	5.46	0	54	-
	50	A	0-12	35.0	0.15	6.32	6.62	0	16	-
			12-18	33.0	0.13	6.34	6.58	0	13	-
			18-24	33.5	0.11	6.80	6.84	0	8	-
			24-36	29.0	0.09	6.90	6.90	0	8	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
27	50	B1	0-12	34.0	0.12	6.72	6.92	0	11	-
			12-18	35.5	0.13	7.20	7.30	0	10	-
		2	0-12	37.5	0.14	7.00	7.10	0	15	-
		C1	0-12	38.0	0.25	4.96	5.50	0	16	-
		2	0-12	45.5	0.13	6.30	6.52	0	17	-
		3	0-18	35.0	0.26	6.00	6.34	0	15	-
		D1	0-12	36.5	0.15	6.44	6.80	0	22	-
		2	0-12	33.5	0.10	6.16	6.52	0	15	-
		3	0-12	30.0	0.11	6.30	6.60	0	16	-
		E1	0-18	35.5	0.16	6.20	6.46	0	20	-
		2	0-18	40.0	0.17	5.66	6.04	0	27	-
		3	0-12	40.0	0.16	6.40	6.60	0	29	-
28	1	A	0-12	43.5	0.26	5.98	6.40	0	79	-
			12-18	40.0	0.12	6.18	6.58	0	38	-
			18-24	36.0	0.11	6.32	6.60	0	1	-
			24-36	32.5	0.11	6.70	6.76	0	0	-
		B	0-12	45.0	0.12	6.46	6.42	0	41	-
			12-18	41.0	0.12	6.48	6.70	0	19	-
29	1	A	0-12	39.5	0.12	6.58	6.87	0	2	-
			12-18	39.5	0.09	6.62	6.90	0	0	-
			18-24	30.0	0.09	6.85	6.85	0	0	-
		5HC B	0-18	42.5	0.31	6.55	6.81	0	1	-
	2	A	0-12	46.0	0.21	6.22	6.64	0	0	-
			12-18	35.0	0.14	6.48	6.82	0	0	-
			18-24	41.0	0.14	6.46	6.80	0	0	-
			24-36	32.0	0.13	6.84	7.02	0	0	-
		3HC B	0-12	37.0	0.32	6.78	7.04	0	0	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
29	3	A	0-12	41.0	0.20	6.10	6.38	0	9	-
			12-18	40.0	0.20	6.74	6.88	0	6	-
			18-24	37.5	0.29	6.84	6.70	0	5	-
		B	0-12	36.0	3.25	4.96	5.38	0	6	-
	4	A	0-12	36.0	0.19	4.90	5.48	0	6	-
			12-18	37.5	0.41	5.32	5.62	0	15	-
			18-24	37.5	0.99	5.60	5.88	0	4	-
			24-36	29.5	1.59	5.52	5.86	0	2	-
		B	0-12	30.0	0.24	5.90	6.22	0	13	-
		C	0-12	38.5	0.15	6.30	6.58	0	3	-
	5	A	0-12	47.5	0.23	4.64	4.84	0	15	-
			12-18	44.5	0.28	5.20	5.62	0	11	-
			18-24	44.0	0.24	6.16	6.50	0	9	-
			24-36	35.0	0.34	6.60	6.80	0	6	-
	7	A	0-12	47.0	0.19	6.10	6.38	0	58	-
			12-18	37.5	0.13	6.18	6.50	0	21	-
			18-24	32.5	0.14	6.80	6.84	0	10	-
			24-36	38.5	0.14	6.40	6.64	0	18	-
		B	0-12	48.5	0.36	6.56	6.70	0	63	-
		C	0-12	49.0	0.17	6.54	6.62	0	29	-
		D	0-12	50.0	0.36	5.22	5.60	0	33	-
	8	A	0-12	50.0	0.14	5.24	5.40	0	61	-
			12-18	46.0	0.12	4.72	5.00	0	56	-
			18-24	41.0	0.12	4.92	5.30	0	47	-
			24-36	43.0	0.10	5.10	5.74	0	45	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
29	8	B	0-12	50.0	0.17	5.70	6.02	0	9	-
30	1	A	0-12	45.0	0.21	6.82	6.98	0	13	-
			12-18	43.5	0.15	6.78	6.80	0	10	-
			18-24	45.0	0.10	6.58	6.70	0	12	-
			24-36	37.5	0.11	6.70	6.72	0	15	-
		B	0-12	41.5	0.25	6.62	6.78	0	14	-
	2	A	0-12	41.0	0.36	6.90	7.12	0	58	-
			12-18	37.0	0.26	6.98	7.16	0	23	-
			18-24	37.0	0.19	7.12	7.18	0	18	-
			24-36	31.0	0.15	7.30	7.28	0	11	-
		B	0-12	33.0	0.18	6.12	6.56	0	57	-
31	1	A	0-12	43.5	0.21	6.74	7.04	0	4	-
			12-18	37.5	0.17	6.96	7.20	0	0	-
			18-24	40.5	0.16	6.84	7.16	0	1	-
			24-36	35.5	0.14	6.76	7.26	0	2	-
		5HC B	0-18	40.5	0.18	6.64	7.00	0	2	-
	2	A	0-12	44.5	0.23	7.18	7.49	0	172	-
			12-18	37.5	0.17	7.42	7.54	0	37	-
			18-24	35.0	0.14	7.37	7.48	0	23	-
		A1	0-12	45.0	0.14	5.17	5.67	0	129	-
		2	0-12	41.5	0.18	6.90	7.26	0	82	-
	3	A	0-12	39.0	0.65	4.62	5.10	0	133	-
			12-18	35.0	0.30	5.82	6.30	0	37	-
			18-24	36.0	0.38	6.32	6.57	0	40	-
			24-36	35.5	0.17	6.46	6.72	0	37	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
31	3	B	0-12	40.5	0.22	4.12	4.49	0	160	-
		C	0-12	45.5	0.46	3.92	4.31	0	141	-
	4	A	0-12	50.0	0.67	6.52	6.80	0	64	-
			12-18	47.0	0.31	6.74	6.94	0	54	-
			18-24	46.5	0.29	6.72	6.96	0	43	-
			24-36	42.5	0.25	7.00	7.16	0	34	-
		5HC B	0-18	42.0	0.51	4.48	4.76	0	76	-
	6	A	0-12	44.0	0.51	6.42	6.66	0	36	-
			12-18	38.5	0.66	6.66	6.76	0	34	-
			18-24	42.5	0.32	6.72	7.02	0	22	-
			24-36	30.0	0.18	7.16	7.22	0	18	-
		5HC B	0-18	45.5	2.47	6.24	6.46	0	27	13.00
	7	A	0-12	42.0	0.70	6.76	6.90	0	36	-
			12-18	44.5	0.66	6.96	7.16	0	39	-
			18-24	34.5	0.31	7.56	7.64	0	28	-
			24-36	27.5	0.30	7.16	7.62	0	23	-
		B	0-12	44.5	0.48	6.98	7.18	0	54	-
		C	0-12	50.0	0.96	6.84	7.06	0	53	-
	8	A	0-12	54.5	0.43	6.18	6.43	0	304	-
			12-18	53.5	0.29	6.85	6.98	0	79	-
			18-24	32.5	0.20	6.84	7.20	0	40	-
			24-36	44.0	0.17	6.99	7.40	0	30	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
31	8	B	0-12	47.5	1.72	6.75	6.95	0	114	-
		C	0-12	56.0	1.15	7.05	7.26	0	215	-
	10	A	0-12	39.0	0.21	5.90	6.22	0	104	-
			12-18	37.0	0.19	6.98	7.16	0	42	-
			18-24	36.0	0.16	7.40	7.48	0	39	-
		B	0-12	55.0	1.90	6.18	6.30	0	66	-
		C	0-12	42.0	0.34	6.60	6.70	0	96	-
		D	0-12	50.0	0.99	5.58	5.88	0	118	-
	11	A	0-12	54.0	0.36	6.67	6.92	0	84	-
			12-18	47.0	0.45	6.58	6.70	0	36	-
			18-24	48.0	0.18	7.08	7.12	0	26	-
			24-36	41.0	0.22	7.28	7.43	0	14	-
		B	0-12	50.0	1.11	7.30	7.44	0	106	-
		C	0-12	47.0	1.40	6.50	6.73	0	114	-
	12	A	0-12	38.5	0.48	5.20	5.60	0	55	-
			12-18	39.0	0.35	4.78	5.14	0	36	-
			18-24	37.5	0.32	5.68	6.00	0	22	-
			24-36	36.0	0.26	6.40	6.54	0	18	-
		B	0-12	48.0	1.60	6.00	6.36	0	150	-
		C	0-12	46.0	0.56	6.78	6.98	0	62	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
31	13	A	0-12	42.5	0.18	6.08	6.15	0	178	-
			12-18	32.5	0.17	6.40	6.53	0	46	-
			18-24	33.0	0.14	6.48	6.77	0	40	-
			24-36	32.0	0.15	6.86	6.95	0	38	-
		B	0-12	35.0	0.24	6.65	6.82	0	92	-
		C	0-12	47.0	1.19	4.65	5.08	0	257	-
	14	A	0-12	37.5	0.28	6.00	6.32	0	282	-
			12-18	35.5	0.18	6.62	6.63	0	30	-
			18-24	38.5	0.17	6.60	6.82	0	39	-
			24-36	33.5	0.17	6.62	6.83	0	39	-
		B	0-12	34.0	0.26	6.86	6.97	0	34	-
		C	0-12	30.0	0.19	6.10	6.40	0	31	-
	15	A	0-12	50.0	0.54	6.84	7.20	0	205	-
			12-18	37.0	0.20	7.10	7.28	0	36	-
			18-24	30.0	0.16	7.50	7.46	0	32	-
			24-36	29.0	0.17	7.00	7.26	0	40	-
		A1	0-12	46.0	0.19	6.48	6.74	0	141	-
		2	0-12	41.0	0.17	6.50	6.56	0	123	-
		3	0-12	46.0	0.17	6.60	6.98	0	112	-
		4	0-12	42.0	0.19	6.90	6.88	0	177	-
		5	0-12	41.0	0.17	6.72	7.02	0	50	-
		6	0-12	40.0	0.15	6.48	6.70	0	84	-
		7	0-12	42.5	0.15	6.66	6.80	0	78	-
		8	0-12	43.5	0.17	6.64	6.72	0	87	-
		9	0-12	43.5	0.20	6.50	6.66	0	89	-
		10	0-12	44.5	0.19	6.48	6.72	0	147	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
31	15	All	0-12	45.0	0.19	6.22	6.48	0	82	-
		12	0-12	36.5	0.23	6.26	6.52	0	132	-
		13	0-12	41.0	0.24	6.50	6.74	0	5	-
		14	0-12	43.5	0.18	6.34	6.56	0	164	-
		15	0-12	38.0	0.18	6.48	6.62	0	100	-
		16	0-12	40.5	0.13	6.66	6.76	0	120	-
		17	0-12	40.5	0.18	6.58	6.72	0	132	-
		18	0-12	47.0	0.27	6.06	6.38	0	190	-
		19	0-12	42.5	0.14	6.46	6.78	0	78	-
		20	0-12	42.5	0.14	6.04	6.26	0	104	-
		21	0-12	40.0	0.16	6.56	6.86	0	88	-
		22	0-12	46.5	0.16	6.54	6.68	0	325	-
		23	0-12	45.5	0.17	6.52	6.70	0	1100	-
		24	0-12	47.0	0.20	5.72	5.96	0	212	-
		25	0-12	38.0	0.19	6.32	6.58	0	91	-
		26	0-12	43.0	0.16	5.10	5.54	0	98	-
		27	0-12	45.0	0.15	6.42	6.48	0	134	-
		28	0-12	43.0	0.17	6.62	6.66	0	43	-
		29	0-12	49.5	0.19	6.58	6.70	0	192	-
	16	A	0-12	42.0	0.20	6.02	6.26	0	43	-
			12-18	35.0	0.16	6.70	6.70	0	25	-
			18-24	34.0	0.12	6.78	6.88	0	25	-
			24-36	29.0	0.12	6.98	7.10	0	12	-
		B	0-12	36.0	0.20	5.92	6.34	0	37	-
		C	0-12	37.0	0.14	5.70	5.90	0	29	-
	17	A	0-12	41.0	1.25	6.62	6.84	0	67	4.80
			12-18	40.5	0.56	6.94	7.00	0	41	-
			18-24	38.0	0.28	7.04	7.24	0	44	-
			24-36	31.0	0.17	7.06	7.48	0	18	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
31	17	B	0-12	45.0	0.44	6.94	7.26	0	46	-
32	1	A	0-12	44.0	0.26	5.02	5.26	0	29	-
			12-18	46.0	0.18	5.52	5.90	0	17	-
			18-24	43.0	0.13	6.92	6.72	0	11	-
			24-36	36.0	0.16	6.62	6.94	0	6	-
		B	0-12	48.0	0.23	4.88	5.56	0	441	-
	2	A	0-12	42.0	0.22	5.58	6.14	0	61	-
			12-18	36.0	0.22	5.02	5.60	0	29	-
			18-24	34.0	0.20	5.40	5.90	0	27	-
			24-36	39.0	0.14	6.30	6.38	0	16	-
		B	0-12	36.0	0.43	4.02	4.32	0	43	-
		C	0-12	36.0	0.40	4.48	4.98	0	41	-
	3	A	0-12	48.0	0.31	7.00	7.04	0	46	-
			12-18	48.0	0.25	7.16	7.22	0	34	-
			18-24	46.0	0.19	7.24	7.36	0	37	-
			24-36	50.0	0.42	7.70	8.02	1	26	-
		B	0-12	33.0	0.43	5.46	5.76	0	52	-
		C	0-12	48.0	1.71	7.14	7.46	0	52	-
	4	A	0-12	68.0	0.37	6.78	6.94	0	180	-
			12-18	65.0	0.34	7.42	7.42	0	29	-
			18-24	58.0	0.56	7.14	7.48	0	65	-
			24-36	42.0	0.42	7.06	7.40	0	54	-
		B	0-12	43.0	0.42	5.70	6.10	0	43	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
32	5	A	0-12	44.0	0.49	4.56	4.70	0	59	-
			12-18	40.0	0.65	5.02	5.18	0	62	-
			18-24	40.5	0.90	6.48	6.62	0	44	-
			24-36	39.0	0.67	7.16	7.42	0	20	-
		B	0-12	36.5	0.61	6.36	6.58	0	39	-
		C	0-12	47.5	0.34	6.88	7.00	0	129	-
	6	A	0-12	42.0	0.47	5.72	6.14	0	44	-
			12-18	43.0	0.35	6.92	7.12	0	37	-
			18-24	39.0	0.26	7.20	7.18	0	22	-
		B	0-12	44.0	0.70	5.78	6.08	0	97	-
			12-18	42.0	0.37	7.04	7.10	0	47	-
	7	A	0-12	40.0	5.86	4.40	4.82	0	35	-
			12-18	41.0	3.19	5.84	6.30	0	34	-
			18-24	45.0	1.80	6.80	7.12	0	32	-
			24-36	40.0	2.71	7.18	7.32	0	21	-
		B	0-12	50.0	0.68	6.78	7.06	0	139	-
	8	A	0-12	45.0	0.31	6.16	6.57	0	135	-
			12-18	37.0	0.17	6.03	6.23	0	36	-
			18-24	36.5	0.49	5.98	6.22	0	34	-
		B	0-12	43.0	0.30	5.35	5.78	0	27	-
		C	0-12	47.5	0.95	5.15	5.46	0	48	-
	9	A	0-12	41.0	0.28	6.52	6.98	0	79	-
			12-18	39.0	0.21	6.42	6.92	0	62	-
			18-24	33.0	0.19	6.60	6.90	0	37	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
32	9	B	0-12	38.0	0.34	5.44	5.84	0	58	-
			12-18	35.0	0.23	6.50	6.72	0	36	-
		C	0-12	34.0	0.91	4.40	4.88	0	1	-
	10	A	0-12	60.0	0.21	5.90	6.28	0	300	-
			12-18	37.0	0.19	6.72	6.82	0	64	-
			18-24	35.5	0.21	7.42	7.56	0	18	-
			24-36	39.5	0.36	8.20	8.58	2	8	-
		B	0-12	49.0	0.21	4.52	4.92	0	72	-
		C	0-12	43.0	0.30	6.96	6.26	0	51	-
	12	A	0-12	46.5	0.30	6.43	6.82	0	14	-
			12-18	46.0	0.20	6.83	6.78	0	8	-
			18-24	39.5	0.13	6.38	6.66	0	0	-
			24-36	29.0	0.08	6.60	6.87	0	0	-
	13	A	0-12	46.0	0.39	5.70	6.18	0	30	-
			12-18	42.0	0.24	6.18	6.54	0	20	-
			18-24	37.5	0.15	6.26	6.80	0	0	-
			24-36	37.5	0.13	6.45	7.01	0	0	-
		B	0-12	45.5	0.27	6.63	6.90	0	29	-
	14	A	0-12	40.0	0.16	6.22	6.42	0	69	-
			12-18	37.0	0.17	7.12	7.10	0	16	-
			18-24	34.0	0.18	7.58	7.50	0	10	-
			24-36	27.0	0.14	7.70	7.72	0	6	-
		B	0-12	38.0	0.46	6.42	6.62	0	23	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
32	14	C	0-12	35.0	0.39	6.08	6.58	0	48	-
	15	A	0-12	35.0	0.35	6.08	6.80	0	50	-
			12-18	41.0	0.16	6.02	6.80	0	40	-
			18-24	43.0	0.13	6.78	6.92	0	33	-
			24-36	43.0	0.12	6.78	7.10	0	16	-
		B	0-12	43.0	1.17	4.54	5.02	0	53	-
		C	0-12	46.0	0.45	4.72	5.20	0	259	-
	16	A	0-12	46.0	0.31	7.02	7.28	0	90	-
			12-18	37.0	0.20	7.32	7.50	0	45	-
			18-24	36.0	0.20	7.24	7.52	0	50	-
			24-36	27.0	0.27	6.98	7.54	0	28	-
		B	0-12	47.0	2.07	6.58	6.72	0	60	-
		C	0-12	37.0	1.63	5.02	5.24	0	103	-
	16	A	0-12	44.0	0.51	5.92	6.32	0	120	-
			12-18	37.0	0.16	6.32	6.42	0	30	-
			18-24	38.0	0.39	5.78	6.60	0	30	-
			24-36	39.0	0.49	5.82	6.42	0	22	-
		B	0-12	45.0	0.87	5.08	5.68	0	37	-
		C	0-12	41.0	0.48	6.08	6.32	0	0	-
34	1	A	0-12	54.0	0.74	5.76	6.30	0	105	-
			12-18	47.0	0.80	6.42	6.72	0	44	-
			18-24	45.0	0.60	6.70	7.10	0	49	-
			24-36	49.0	0.59	7.36	7.82	0	34	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
34	1	B	0-12	48.0	0.19	6.50	6.60	0	96	-
		C	0-12	60.0	0.21	6.68	6.72	0	156	-
	2	A	0-12	47.0	0.17	6.56	6.82	0	16	-
			12-18	40.0	0.12	6.72	6.80	0	12	-
			18-24	28.0	0.14	6.82	7.00	0	11	-
			24-36	27.0	0.13	7.10	7.10	0	8	-
		B	0-12	46.0	0.33	6.22	6.60	0	18	-
			12-18	38.0	0.23	5.62	6.24	0	25	-
35	1	A	0-12	36.5	0.33	5.48	5.74	0	86	-
			12-18	39.0	0.29	6.70	7.00	0	41	-
			18-24	37.5	0.17	6.06	6.42	0	51	-
			24-36	35.0	0.15	6.46	6.74	0	29	-
		5HC B	0-18	50.0	0.73	7.40	7.62	0	92	-
	2X	A	0-12	54.5	0.20	6.14	6.50	0	93	-
			12-18	58.0	0.23	6.80	7.00	0	41	-
			18-24	57.5	0.23	6.82	6.98	0	26	-
			24-36	52.0	0.41	6.80	7.02	0	7	-
		B1	0-18	57.5	0.21	6.76	7.00	0	93	-
		2	0-12	52.5	0.17	7.08	7.20	0	69	-
		3	0-18	52.5	0.44	5.94	6.30	0	69	-
		C1	0-18	58.5	0.14	7.00	7.10	0	62	-
		2	0-12	57.5	0.18	6.26	6.44	0	67	-
		D1	0-12	57.5	0.15	6.86	6.96	0	61	-
		2	0-12	52.5	0.26	5.86	6.08	0	63	-
		3	0-12	60.0	0.21	6.60	6.90	0	78	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
35	2X	E1	0-12	52.0	0.51	5.60	5.80	0	57	-
		2	12-18	56.5	0.19	7.50	7.58	0	49	-
		3	0-12	61.5	0.16	6.16	6.60	0	54	-
	2	A	0-12	41.0	0.19	6.64	6.74	0	124	-
			12-18	42.0	0.40	5.90	6.02	0	115	-
		B	0-12	47.0	0.26	6.54	6.88	0	121	-
			12-18	47.0	0.41	6.60	6.68	0	45	-
		C	0-12	48.0	0.45	5.94	6.52	0	255	-
	3	A	0-12	45.0	0.56	5.18	5.32	0	57	-
			12-18	42.0	0.24	6.46	6.60	0	30	-
		B	0-12	45.0	0.37	5.92	6.42	0	46	-
		C	0-12	44.0	0.16	4.80	5.16	0	162	-
	4	A	0-12	46.0	0.29	6.58	6.52	0	69	-
			12-18	39.0	0.15	6.62	6.62	0	35	-
			18-24	45.0	0.13	6.50	6.52	0	33	-
		B	0-12	50.0	0.31	4.60	5.00	0	225	-
		C	0-12	60.0	0.37	6.62	6.92	0	66	-
	5	A	0-12	51.5	0.28	6.18	6.62	0	144	-
			12-18	49.0	0.15	5.84	6.12	0	44	-
			18-24	47.0	0.15	5.96	6.14	0	46	-
			24-36	47.0	0.18	5.82	6.06	0	38	-
		5HC B	0-18	44.0	0.21	6.02	6.28	0	58	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
35	6	A	0-12	45.0	0.19	7.02	7.08	0	10	-
			12-18	45.0	0.14	7.06	7.26	0	7	-
		B	0-12	43.0	0.16	6.86	6.98	0	19	-
		C	0-12	50.0	0.14	7.16	7.06	0	20	-
		D	0-12	56.0	0.34	6.38	6.62	0	8	-
	7	A	0-12	52.5	0.23	6.26	6.58	0	177	-
			12-18	46.5	0.18	6.54	6.88	0	49	-
			18-24	45.5	0.12	6.86	6.96	0	64	-
			24-36	46.5	0.10	6.88	7.12	0	36	-
		B	0-12	57.5	1.38	3.98	4.42	0	273	9.90
		C	0-12	43.0	0.65	4.36	4.76	0	210	-
	9	A	0-12	39.0	0.22	6.76	7.06	0	48	-
			12-18	31.0	0.33	6.92	7.16	0	50	-
			18-24	26.0	0.41	6.74	6.94	0	31	-
			24-36	23.0	0.40	6.68	7.04	0	11	-
		3HC B	0-18	37.0	0.39	7.24	7.62	0	50	-
	12	A	0-12	35.0	0.62	4.68	5.00	0	123	-
			12-18	33.0	0.29	5.42	5.76	0	48	-
			18-24	44.0	0.29	6.44	6.82	0	29	-
		A1	0-12	35.0	0.55	3.84	4.48	0	36	-
		2	0-12	35.0	0.19	6.42	6.54	0	18	-
		3	0-12	41.0	0.21	6.54	6.82	0	20	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
35	12	A4	0-12	38.0	0.27	6.10	6.62	0	13	-
		5	0-12	38.0	0.31	5.20	5.80	0	13	-
		6	0-12	43.0	0.20	5.80	6.16	0	28	-
	14	A	0-12	50.0	0.24	6.24	6.48	0	80	-
			12-18	47.5	0.27	6.64	6.72	0	40	-
		B	0-12	43.5	0.15	6.68	6.80	0	56	-
		C	0-12	39.5	1.29	5.70	5.98	0	62	0.18
	15	A	0-12	42.0	0.15	6.00	6.46	0	84	-
			12-18	36.5	0.21	5.70	6.15	0	56	-
			18-24	37.5	0.36	5.63	6.10	0	41	-
			24-36	41.5	0.59	5.60	6.13	0	38	-
		B	0-12	37.0	0.76	6.88	7.23	0	111	-
		C	0-12	50.0	0.68	7.02	7.40	0	52	-
	16	A	0-12	43.5	0.19	7.32	7.68	0	16	-
			12-18	40.0	0.17	7.51	7.87	0	0	-
			18-24	45.5	0.13	7.77	8.00	0	2	-
		B	0-12	42.0	0.15	6.68	7.10	0	0	-
		C	0-12	45.0	0.17	7.30	7.67	0	0	-
	17	A	0-12	40.5	2.31	8.13	8.69	0	26	0.26
			12-18	40.0	2.18	8.00	8.38	0	10	0.12
			18-24	36.0	1.75	7.89	8.12	0	6	0.08
			24-36	33.5	1.00	7.77	8.02	0	4	0.04

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
35	17	B	0-12	36.5	0.21	6.96	7.33	0	9	-
		C	0-12	38.0	0.19	6.75	7.15	0	6	-
	18	A	0-12	44.5	0.29	6.00	6.50	0	15	-
			12-18	43.5	0.85	6.10	6.47	0	14	-
			18-24	42.5	0.36	6.37	6.62	0	21	-
			24-36	41.0	0.14	6.73	6.89	0	25	-
		5HC B	0-18	36.5	0.30	6.08	6.47	0	16	-
	19	A	0-12	48.0	0.20	6.44	6.68	0	116	-
			12-18	45.0	0.11	6.52	6.56	0	35	-
			18-24	42.5	0.12	6.84	6.86	0	33	-
		B	0-12	44.0	0.29	7.38	7.58	0	2	-
		C	0-12	40.0	1.80	4.72	5.02	0	60	14.90
	20	A	0-12	39.0	0.19	6.72	7.14	0	90	-
			12-18	36.5	0.18	6.66	7.02	0	55	-
			18-24	35.5	0.20	7.02	7.22	0	30	-
		B	0-12	47.0	0.78	4.42	4.82	0	54	-
		C	0-12	39.5	0.47	6.52	6.76	0	0	-
	22	A	0-12	44.5	0.19	6.74	6.78	0	108	-
			12-18	42.5	0.16	6.64	6.64	0	52	-
			18-24	42.0	0.11	6.60	6.68	0	33	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
35	22	B	0-12	44.0	0.22	6.44	6.74	0	92	-
		C	0-12	41.0	0.32	5.14	5.46	0	74	-
	23	A	0-12	42.5	0.58	6.86	7.22	0	64	-
			12-24	40.0	0.34	7.54	7.84	0	30	-
		B	0-12	50.0	0.18	6.64	7.04	0	100	-
		C	0-12	42.5	0.16	6.82	6.86	0	40	-
	24	A	0-12	44.0	0.16	6.96	6.98	0	14	-
			12-18	42.5	0.14	6.80	7.00	0	16	-
		B	0-12	44.5	0.25	5.56	5.98	0	54	-
		C	0-12	37.5	0.14	6.72	6.78	0	44	-
36	1	A	0-12	41.0	0.56	6.52	6.84	0	39	-
			12-18	37.0	0.19	6.72	7.02	0	29	-
			18-24	39.0	0.17	6.80	7.00	0	30	-
			24-36	40.0	0.24	7.68	7.76	0	20	-
		B	0-12	50.0	0.53	4.38	4.82	0	74	-
		C	0-12	46.0	2.37	9.02	9.90	0	19	-
	2	A	0-12	50.0	0.25	6.98	7.22	0	64	-
			12-18	50.0	0.22	7.12	7.30	0	34	-
			18-24	51.0	0.23	7.30	7.28	0	37	-
			24-36	50.0	0.35	7.12	7.22	0	24	-
		B	0-12	51.0	0.23	6.12	6.44	0	26	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
36	3	A1	0-12	53.0	0.26	7.10	6.92	0	67	-
		2	0-12	56.0	0.48	7.40	7.32	0	52	-
		3	0-12	51.0	0.30	7.36	7.40	0	146	-
		4	0-12	48.0	0.53	7.82	7.90	0	67	-
		5	0-12	50.0	0.67	6.32	6.95	0	69	-
		6	0-12	49.0	1.13	6.48	6.82	0	60	-
			12-18	50.0	0.42	6.76	6.72	0	58	-
		7	0-12	50.0	2.03	5.22	5.64	0	120	-
		8	0-12	54.0	0.28	6.72	6.62	0	81	-
		9	0-12	56.0	0.42	6.12	6.46	0	118	-
		10	0-12	61.0	3.21	5.10	5.52	0	118	-
		A	0-12	54.0	2.61	5.08	5.70	0	96	-
			12-18	51.0	1.02	6.20	6.40	0	51	-
		B	0-12	49.0	2.10	5.06	5.50	0	26	-
		C	0-12	56.0	0.51	6.74	6.92	0	33	-
		D	0-12	51.0	0.23	6.46	6.78	0	41	-
	4	A	0-12	48.0	0.52	6.60	6.68	0	58	-
			12-18	39.0	0.45	6.74	6.70	0	28	-
			18-24	40.0	0.29	6.84	7.00	0	24	-
			24-36	35.0	0.29	7.08	7.26	0	20	-
		B	0-12	50.0	1.04	5.78	6.10	0	83	-
		C	0-12	61.0	0.56	5.38	5.90	0	10	-
	5	A	0-12	63.0	0.62	5.84	6.10	0	122	-
			12-18	49.0	0.22	6.70	6.72	0	54	-
			18-24	48.0	0.15	6.42	6.86	0	40	-
			24-36	44.0	0.13	6.70	7.00	0	30	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
36	5	B	0-12	49.0	0.31	4.72	5.02	0	60	-
		C	0-12	49.0	0.50	4.02	4.42	0	60	-
	6	A	0-12	52.0	0.99	7.22	7.34	0	81	-
			12-18	51.0	0.45	7.62	7.98	0	57	-
			18-24	52.0	0.40	7.62	7.88	0	30	-
			24-36	52.0	0.47	7.30	7.60	0	33	-
		B	0-12	41.0	0.33	4.82	5.36	0	58	-
		C	0-12	47.0	0.25	5.70	6.00	0	96	-
	8	A	0-12	45.0	0.32	6.42	6.72	0	177	-
			12-18	43.0	0.28	6.54	6.86	0	54	-
			18-24	40.0	0.35	6.56	6.86	0	39	-
			24-36	45.0	1.02	6.58	6.88	0	21	-
		A1	0-12	47.0	0.70	5.64	6.34	0	127	-
		2	0-12	48.0	2.26	6.00	6.70	0	225	-
		3	0-12	55.0	0.34	6.90	7.06	0	147	-
		4	0-12	50.0	0.25	6.54	6.80	0	84	-
		B1	0-12	48.0	0.38	6.76	7.00	0	96	-
		2	0-12	45.0	0.37	5.96	6.32	0	78	-
		3	0-12	50.0	0.33	6.92	7.32	0	79	-
		4	0-12	55.0	0.40	7.20	7.34	0	130	-
	9	A	0-12	50.0	0.49	6.90	7.20	0	112	-
			12-18	39.0	0.37	7.44	7.32	0	47	-
			18-24	40.0	0.32	7.14	7.48	0	33	-
			24-36	29.0	0.29	7.70	7.52	0	17	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
36	9	B	0-12	42.0	0.99	3.86	4.30	0	54	-
		C	0-12	47.0	0.40	4.50	4.74	0	69	-
	10	A	0-12	41.0	0.94	5.34	5.50	0	30	-
			12-18	32.0	0.38	6.60	6.42	0	27	-
			18-24	43.0	0.76	6.18	6.42	0	18	-
			24-36	39.0	1.92	6.22	6.20	0	6	-
		5HC B	0-18	45.0	0.28	6.04	6.50	0	54	-
	11	A	0-12	61.0	1.38	4.96	5.26	0	195	-
			12-18	59.0	1.16	4.82	5.14	0	28	-
			18-24	55.0	2.62	5.10	5.34	0	4	-
			24-36	55.0	2.90	5.84	5.96	0	4	-
		B	0-12	63.0	1.35	5.82	6.08	0	90	-
			12-18	50.0	0.67	5.72	6.08	0	43	-
		C	0-12	54.0	2.81	4.38	4.70	0	74	-
	12	A	0-12	51.0	0.83	5.44	5.80	0	18	-
			12-18	44.0	0.24	6.98	7.10	0	11	-
			18-24	50.0	0.26	7.32	7.22	0	12	-
			24-36	55.0	0.33	7.06	7.30	0	14	-
		B	0-12	61.0	1.19	4.88	5.38	0	90	-
			12-18	63.0	0.62	4.98	5.26	0	44	-
		C	0-12	61.0	0.59	5.90	6.04	0	66	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat.% Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
36	13	A	0-12	50.0	0.19	6.90	7.10	0	29	-
			12-18	47.0	0.22	7.40	7.22	0	22	-
			18-24	42.0	0.20	7.32	7.26	0	13	-
			24-36	40.0	0.17	7.40	7.52	0	0	-
		B	0-12	39.0	1.94	4.26	4.50	0	6	-
		C	0-12	40.0	0.34	7.02	6.50	0	38	-
	14	A	0-12	41.0	0.87	5.36	5.60	0	104	-
			12-18	38.0	0.51	5.60	5.84	0	73	-
			18-24	33.0	1.40	5.64	6.00	0	65	-
		B	0-12	36.0	2.34	4.10	4.50	0	43	-
		C	0-12	40.0	3.17	4.80	5.00	0	23	-
	17	A	0-12	45.0	0.44	6.54	6.32	0	165	-
			12-18	38.0	0.20	7.02	7.00	0	45	-
			18-24	35.0	0.28	7.00	7.08	0	29	-
			24-36	38.0	0.15	6.98	7.42	0	17	-
		B	0-12	43.0	0.77	4.20	4.52	0	138	-
		C	0-12	40.0	0.55	4.98	5.30	0	78	-
	18	A	0-12	43.0	0.36	6.34	6.10	0	175	-
			12-18	38.0	0.20	7.00	6.54	0	38	-
			18-24	36.0	0.17	7.00	6.76	0	22	-
		B	0-12	41.0	0.82	6.06	6.30	0	25	-
		C	0-12	40.0	0.56	5.16	5.52	0	24	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
36	19	A	0-12	47.0	2.22	4.64	5.00	0	42	-
			12-18	42.0	0.64	5.82	5.88	0	108	-
			18-24	45.0	0.54	6.10	6.04	0	52	-
			24-36	44.0	0.42	6.62	6.50	0	39	-
		B	0-12	48.0	1.69	5.18	5.10	0	108	-
			12-18	46.0	1.06	6.68	6.40	0	73	-
		C	0-12	45.0	2.22	6.84	6.80	0	123	-
	20	A	0-12	50.0	1.07	3.90	4.12	0	142	-
			12-18	45.0	0.61	5.72	5.80	0	122	-
			18-24	39.0	1.09	6.70	6.70	0	64	-
			24-36	42.0	0.97	7.08	7.14	0	43	-
		B	0-12	49.0	1.41	3.98	4.38	0	40	-
			12-18	40.0	2.44	5.18	5.42	0	45	-
		C	0-12	51.0	1.10	6.22	6.10	0	117	-
	21	A	0-12	58.0	0.49	6.98	6.50	0	82	-
			12-18	49.0	0.40	7.40	6.90	0	96	-
			18-24	41.0	0.39	7.54	7.40	0	55	-
			24-36	38.0	0.27	7.70	7.24	0	33	-
		B	0-12	52.0	0.43	6.96	6.68	0	60	-
		C	0-12	50.0	0.50	5.48	5.20	0	29	-
	22	A	0-12	52.0	0.29	6.38	6.82	0	155	-
			12-18	44.0	0.31	7.26	7.04	0	50	-
			18-24	45.0	0.42	7.34	7.14	0	33	-
			24-36	38.0	0.46	7.30	7.26	0	25	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
36	22	5HC								
		B	0-18	38.0	1.59	5.08	5.30	0	105	-
	23	A	0-12	60.0	0.40	7.36	7.12	0	267	-
			12-18	60.0	0.27	7.28	7.02	0	77	-
			18-24	51.0	0.21	7.32	7.06	0	42	-
			24-36	48.0	0.29	7.12	7.00	0	41	-
		B	0-12	46.0	1.26	6.04	6.42	0	100	-
			12-18	36.0	0.79	6.48	7.00	0	56	-
		C	0-12	50.0	3.95	4.68	5.24	0	129	-
	24	A	0-12	60.0	0.57	6.26	6.46	0	185	-
			12-18	53.0	0.31	7.26	7.26	0	78	-
			18-24	50.0	0.20	7.56	7.36	0	49	-
			24-36	47.0	0.22	7.54	7.64	0	20	-
		B	0-12	60.0	2.30	4.98	5.42	0	257	-
		C	0-12	49.0	0.54	5.92	6.24	0	141	-
			12-18	45.0	0.34	7.40	7.04	0	55	-
	25	A	0-12	55.0	0.36	7.38	7.34	0	55	-
			12-18	47.0	0.19	7.66	7.64	0	29	-
			18-24	43.0	0.17	7.68	7.72	0	20	-
			24-36	39.0	0.19	7.64	7.64	0	16	-
	26	A	0-12	57.0	0.44	6.98	7.16	0	128	-
			12-18	44.0	0.26	7.28	7.36	0	55	-
			18-24	44.0	0.19	7.56	7.42	0	45	-
			24-36	47.0	0.28	7.64	7.54	0	28	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
36	26	B	0-12	50.0	0.45	5.16	5.64	0	84	-
			12-18	50.0	0.21	4.98	5.36	0	60	-
		C	0-12	68.0	0.34	7.02	7.06	0	31	-
	27	A	0-12	60.0	0.39	6.76	7.12	0	32	-
			12-18	50.0	0.15	7.12	7.10	0	21	-
			18-24	44.0	0.16	7.02	7.04	0	18	-
			24-36	43.0	0.15	7.08	7.16	0	19	-
		B	0-12	45.0	0.18	5.36	5.84	0	23	-
		C	0-12	60.0	1.70	5.74	5.94	0	42	-
	28	A	0-12	59.0	0.34	6.68	7.26	0	212	-
			12-18	46.0	0.20	7.16	7.44	0	83	-
			18-24	47.0	0.18	7.06	7.54	0	51	-
			24-36	32.0	0.18	6.92	7.72	0	24	-
		B	0-12	59.0	0.43	6.54	6.88	0	340	-
			12-18	49.0	0.19	6.84	7.08	0	90	-
		C	0-12	63.0	0.39	5.30	6.02	0	130	-
	29	A	0-12	43.0	0.40	5.16	6.16	0	5	-
			12-18	42.0	0.17	6.00	6.44	0	5	-
			18-24	36.0	0.18	5.70	6.54	0	2	-
		B	0-12	46.0	0.24	6.02	6.74	0	4	-
			12-18	41.0	0.15	7.04	7.32	0	3	-
	30	A	0-12	45.0	0.49	6.86	6.90	0	20	-
			12-18	35.0	0.24	6.62	7.34	0	20	-
			18-24	32.0	0.16	7.22	7.44	0	12	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
36	30	B	0-12	44.0	0.36	5.04	5.90	0	3	-
			12-18	41.0	0.66	5.42	6.04	0	2	-
		C	0-12	44.0	0.69	6.50	6.88	0	27	-
		D	0-12	36.0	1.16	5.28	6.04	0	5	-
			12-18	58.0	0.28	5.30	6.34	0	3	-
	31	A	0-12	42.0	0.20	6.72	6.96	0	115	-
			12-18	44.0	0.46	7.04	7.78	0	55	-
			18-24	44.0	0.22	7.36	7.44	0	35	-
			24-36	52.0	0.17	7.06	7.52	0	5	-
		B	0-12	50.0	0.16	5.20	5.50	0	100	-
		C	0-12	41.0	0.62	5.90	6.26	0	88	-
			18-24	43.0	0.24	6.24	6.68	0	44	-
	32	A	0-12	37.0	0.24	7.18	7.34	0	28	-
			12-18	35.0	0.30	7.14	7.46	0	35	-
			18-24	38.0	0.24	7.24	7.80	0	20	-
			24-36	43.0	0.22	7.68	8.20	0	19	-
		B	0-12	42.0	0.64	5.92	6.54	0	10	-
			12-18	50.0	0.36	5.36	6.20	0	16	-
		C	0-12	50.0	0.48	6.42	6.62	0	130	-
	33	A	0-12	37.0	0.49	6.86	7.16	0	67	-
			12-18	33.0	0.30	7.30	7.13	0	42	-
			18-24	50.0	0.19	7.58	7.60	0	34	-
		B	0-12	40.0	0.19	6.20	6.60	0	102	-
			12-18	43.0	0.24	6.68	6.98	0	69	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
36	33	C	0-12	43.0	0.83	5.40	5.76	0	72	-
			12-18	33.0	0.36	5.82	6.54	0	47	-
	34	A	0-12	55.0	0.49	5.94	6.18	0	135	-
			12-18	50.0	0.32	7.32	7.32	0	77	-
			18-24	46.0	0.27	7.78	7.90	0	55	-
			24-36	41.0	0.18	7.72	7.88	0	29	-
		5HC B	0-18	45.0	0.33	6.58	6.74	0	129	-
	36	A	0-12	45.0	0.72	6.22	6.28	0	96	-
			12-18	47.0	0.23	6.78	6.92	0	49	-
			18-24	40.0	0.19	7.16	7.08	0	43	-
			24-36	39.0	0.22	7.22	7.22	0	28	-
		B	0-12	53.0	1.34	5.38	5.56	0	225	-
			12-18	50.0	0.90	6.62	6.70	0	83	-
		C	0-12	50.0	0.77	5.20	5.60	0	160	-
			12-18	38.0	0.47	6.42	6.64	0	72	-
	37	A	0-12	48.0	3.05	5.18	5.58	0	130	-
			12-18	43.0	3.33	6.38	6.56	0	50	-
			18-24	35.0	1.22	6.86	7.04	0	29	-
			24-36	43.0	0.31	7.28	7.32	0	18	-
		B	0-12	57.0	1.93	6.98	5.54	0	52	-
			12-18	57.0	0.97	6.20	6.48	0	68	-
		C	0-12	62.0	0.67	5.78	6.08	0	180	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
36	38	A	0-12	60.0	0.34	6.80	7.06	0	95	-
			12-18	45.0	0.21	7.30	7.40	0	42	-
			18-24	41.0	0.15	7.42	7.50	0	36	-
			24-36	39.0	0.12	7.50	7.54	0	30	-
		5HC								
		B	0-18	45.0	0.53	6.78	6.92	0	43	-
	39	A	0-12	42.0	0.45	6.08	6.56	0	45	-
			12-18	32.0	0.52	6.58	6.66	0	27	-
			18-24	30.0	0.14	6.96	7.04	0	19	-
			24-36	38.0	0.48	7.66	8.62	1	6	-
		B	0-12	44.0	1.06	5.18	5.84	0	77	-
		C	0-12	53.0	0.55	5.66	6.14	0	75	-
			12-18	40.0	0.29	6.32	6.36	0	31	-
	40	A	0-12	49.0	0.55	6.50	6.70	0	252	-
			12-18	41.0	0.28	6.28	6.56	0	56	-
			18-24	41.0	0.22	6.46	6.78	0	38	-
			24-36	42.0	0.18	6.56	6.76	0	35	-
		B	0-12	43.0	4.79	4.08	4.56	0	61	-
		C	0-12	39.0	7.20	5.16	5.66	0	410	-
	41	A	0-12	41.0	0.59	5.18	6.30	0	33	-
			12-18	31.0	0.16	5.88	6.76	0	20	-
			18-24	33.0	0.17	6.64	6.82	0	18	-
			24-36	27.0	0.18	7.04	7.00	0	13	-
		B	0-12	49.0	1.48	4.88	5.36	0	54	-
			12-18	37.0	0.58	5.24	5.52	0	25	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
36	41	C	0-12	41.0	0.64	4.52	4.90	0	35	-
	43	A	0-12	47.0	1.28	7.58	7.36	0	60	-
			12-18	42.0	0.85	7.56	7.72	0	41	-
			18-24	43.0	0.32	7.64	7.64	0	34	-
			24-36	36.0	0.35	7.34	7.56	0	30	-
		B	0-12	52.0	0.94	7.04	7.38	0	30	-
		C	0-12	55.0	4.39	6.08	6.42	0	37	-
New Soil			0-12	35.0	0.29	7.24	7.44	0	3	-
			12-18	35.0	0.18	7.16	7.42	0	5	-
			18-24	30.0	0.17	6.98	7.32	0	1	-
			24-36	30.0	0.24	7.26	7.26	0	1	-
29	X	A	0-12	35.0	0.19	7.26	7.56	0	5	-
			12-18	30.0	0.15	7.34	7.38	0	4	-
		B	0-12	32.0	0.15	7.02	7.24	0	4	-
			12-18	33.0	0.16	7.04	7.26	0	2	-
		C	0-12	35.0	0.19	6.58	6.92	0	4	-
			12-18	35.0	0.13	6.86	6.94	0	3	-
		D	0-12	45.0	0.15	7.00	7.04	0	7	-
			12-18	40.0	0.17	7.22	7.40	0	6	-
8F6	1	A1	0-18	37.0	0.40	6.58	7.02	0	2	-
		2	0-18	34.0	0.23	6.58	7.04	0	2	-
		3	0-18	27.0	0.27	6.74	6.94	0	2	-

E.C., pH, Lime, Arsenic, and Nitrates
Manson Unit, Chief Joseph Dam Project

Section	Tract	Sample No.	Depth Inches	Sat. % Moisture	E.C.	pH Sat.	pH 1-5	Lime	As ppm	NO3 me/l
8F6	1	B1	0-18	40.0	0.17	6.58	7.00	0	2	-
		2	0-18	38.0	0.21	6.98	7.18	0	2	-
		3	0-18	36.0	0.22	6.88	7.02	0	1	-
		C1	0-18	34.0	0.19	6.84	7.16	0	0	-
		2	0-12	41.0	0.27	6.72	7.00	0	2	-
		3	0-12	40.0	0.20	6.74	7.14	0	3	-
		D1	0-18	35.0	0.20	6.84	7.24	0	2	-
		2	0-18	36.0	0.17	6.84	7.24	0	2	-
		3	0-18	38.0	0.20	6.78	7.06	0	2	-
	2	A	0-12	32.0	0.15	7.44	7.24	0	5	-
			12-18	30.0	0.15	7.38	7.42	0	3	-
			18-24	27.0	0.15	7.36	7.48	0	4	-
		A1	0-12	28.0	0.22	7.24	7.40	0	6	-
		2	0-18	30.0	0.40	7.02	7.26	0	9	-
		3	0-18	30.0	0.22	7.34	7.46	0	13	-
		B1	0-12	28.0	0.22	7.26	7.32	0	5	-
		2	0-18	28.0	0.22	7.36	7.56	0	2	-
		3	0-18	31.0	0.19	7.32	7.50	0	2	-
		C1	0-12	29.0	0.30	7.24	7.56	0	10	-
		2	0-18	32.0	0.41	6.64	6.92	0	5	-
		3	0-18	29.0	0.24	7.12	7.16	0	5	-
		D1	0-18	30.0	0.32	6.74	6.96	0	6	-
		2	0-18	27.0	0.33	7.38	7.46	0	12	-
		3	0-12	30.0	0.47	6.98	7.18	0	14	-

APPENDIX B

Final Manson Data Set

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm) 0 to 12"	12 to 18"	18 to 24"	24 to 36"	Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
	5	1	A	90	60	45	19	**104**	O
	5	1	B	65					O
	5	1	C	104					O
	5	2	A	52	39	11		**205**	O
	5	2	B	42					O
	5	2	C	174					O
	5	2	A'	205	56	35	32		O
	5	2	B'	37					O
	5	2	C'	166					O
	5	3	A	6	4	3		**6**	M
	5	3	B	0					M
	5	5	A	65	41	42	40	**65**	OM
	5	5	B	54					OM
	5	5	C	61					OM
	15	2	A	65	26	31	20	**65**	O
	15	2	B	28					O
	15	2	C	62					O
	15	2	D	36					O
	15	3	A	6	45	0	3	**45**	O
	15	3	B	14					O
	15	4	A	18	15	9	4	**36**	M
	15	4	B	36					M
	15	4	C	28					M
	15	5	A	33	25	11	2	**33**	O
	15	5	B	29					O
	15	5	C	23					O
	15	6	A	18	9	8	3	**32**	OM
	15	6	B	32					OM
	15	6	C	14					OM
	15	6	D	12					OM
	15	7	A	42	26	11	0	**42**	M
	15	7	B	32					M
	15	7	C	17					M
	15	8	A	12	17	0	0	**17**	O
* 0-14"	15	8	B	0					O
	15	9	A	53	61	35	7	**61**	O
	15	9	B	61	37				O
	15	9	C	29					
	16	1	A	23	24	14	6	**35**	O
	16	1	B	24					O
	16	1	C	35					O
	21	1	A	9	9	5	0	**16**	O

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm) 0 to 12"	12 to 18"	18 to 24"	24 to 36"	Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
	21	1	B	16					O
	21	1	C	5					O
	21	2	A	45	42	32	13	**45**	O
	21	2	B	10					O
	21	3	A	34	25	9	0	**34**	O
	21	3	B	22					O
	21	4	A	20	32	12	2	**53**	O
	21	4	B	33					O
	21	4	C	53					O
	21	4	D	45					O
	21	4	E	52					O
	21	4	F	43					O
	21	7	A	14	18	12	2	**46**	O
	21	7	B	41					O
	21	7	C	46					O
	21	8	A	17	12	9	1	**71**	O
	21	8	B	6					O
	21	8	C	71					O
	21	9	A	32	22	14	2	**55**	O
	21	9	B	55					O
	21	10	A	28	19	4	3	**102**	O
	21	10	B	102					O
	21	10	C	91					O
	21	11	A	123	61	9	1	**123**	O
	21	11	B	76					O
	21	11	C	47					O
	22	1	A	5	32	0		**32**	O
	22	1	B	0					O
	22	1	C	0					O
	22	3	A	42	22	3		**42**	O
	22	3	B	14					O
	22	3	C	5					O
	22	4	A	0	4	3	2	**5**	M
	22	4	B	5					M
	22	5	A	25	22	20	14	**57**	OM
	22	5	B	57					OM
	22	5	C	4					OM
* 0-14"	22	6A	B	0				**0**	O
	22	6	A	50	29	1	2	**50**	O
	22	6	B	37					O
	22	6	C	7					O

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm) 0 to 12"	12 to 18"	18 to 24"	24 to 36"	Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
	22	7	A	33	16	3	0	**105**	O
	22	7	B	98					O
	22	7	C	105					O
	22	8	A	48	24	1	0	**48**	O
* 0-18"	22	8	B	38					O
	22	9	A	70	37	8	1	**70**	OM
	22	9	B	37					OM
	22	10	A	26	27	26	13	**67**	OM
	22	10	B	67					OM
	22	10	C	39					OM
	22	11	A	23	18	16		**64**	OM
	22	11	B	64					OM
	22	12	A	31	45	25	6	**45**	OM
	22	12	B	18					OM
	22	12	C	11					OM
	22	13	A	12	15	6	2	**44**	O
	22	13	B	5					O
	22	13	C	44					O
	22	14	A	14	0	4	0	**14**	O
	22	14	B	0					O
	22	14	C	0					O
	22	15	A	0	0	0		**0**	OM
	22	15	B	0					OM
	22	15	C	0					OM
	22	16	A	58	49	24	5	**58**	O
	22	16	B	20					O
	22	16	C	43					O
	22	17	A	16	14	10	2	**16**	OM
	22	17	B	2					OM
	22	17	C	2					OM
	22	19	A	12	15	13	5	**15**	OM
	22	19	B	3					OM
	22	19	C	2					OM
	22	21	A	47	46	11	3	**47**	O
	22	21	B	38					O
	22	21	C	21					O
	22	22	A	4	8	8	3	**12**	OM
	22	22	B	12					OM
	22	23	A	29	1	0	0	**34**	O
	22	23	B	34					O

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm)				Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
				0 to 12"	12 to 18"	18 to 24"	24 to 36"		
	22	24	A	59	26	4		**59**	O
	22	24	B	37					O
	22	25	A	54	35	37		**54**	O
	22	25	B	23					O
	22	25	C	26					O
	22	26	A	10	9	10	9	**10**	OM
	22	26	B	5					OM
	22	26	C	3					OM
	22	27	A	12	12	13		**13**	OM
	22	27	B	7	4				OM
	22	27	C	2					OM
	22	28	A	11	8	3	1	**11**	OM
	22	28	B	2					OM
	22	28	C	3					OM
	22	29	A	7	12	6	3	**12**	O
	22	30	A	9	17	15	10	**17**	O
	22	30	B	6					O
	22	30	C	7					O
	22	31	A	22	20	9	4	**22**	O
	22	31	B	6					O
	22	31	C	12					O
	22	32	A	12	11	5	7	**12**	O
	22	32	B	7					O
	22	33	A	9	5	7	6	**9**	OM
	22	33	B	0	3				OM
	22	34	A	29	13	4	4	**29**	O
	22	34	B	19					O
	22	34	C	20					O
	22	35	A	32	18	12	7	**32**	O
	22	35	B	18					O
	22	36	A	21	13	13		**21**	O
	22	36	B	10					O
	22	36	C	7					O
	22	37	A	11	9	7	3	**18**	OM
	22	37	B	18					OM
	22	37	C	13	8				OM
	22	37	D	4					OM
	22	38	A	39	5	3	2	**39**	O
	22	38	B	0					O
	22	38	C	10					O

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm)				Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
				0 to 12"	12 to 18"	18 to 24"	24 to 36"		
	22	38	D	0					O
	22	39	A	16	14	1	1	**16**	OM
	22	39	B	14					OM
	22	39	C	10					OM
	22	41	A	4	4	0		**34**	M
	22	41	B	3					M
	22	41	C	3					M
	22	41	A'	34	14	13	13		M
	22	41	B'	13					M
	22	41	C'	15					M
	23	1	A	7	6	4		**7**	OM
	23	1	B	5	2				OM
	23	1	C	6					OM
	23	2	A	10	10	12	12	**24**	OM
	23	2	B	12					OM
	23	2	C	24					OM
	23	3	A	4	7	4	5	**13**	O
	23	3	B	3	2				0
	23	3	C	13					0
	23	3	D	4					0
	23	4	A	9	8	13	10	**14**	OM
	23	4	B	13	14				OM
	23	4	C	6	3				OM
	24	1	A	13	15	12	4	**52**	OM
	24	1	B	52	24				OM
	24	1	C	30					OM
	24	2	A	7	7	9	8	**9**	OM
	24	2	B	7	4				OM
	24	2	C	6					OM
	25	1	A	27	16	14	14	**27**	OM
	25	1	B	15					OM
	25	1	C	18					OM
	25	3	A	39	20	18	15	**111**	O
	25	3	B	96					0
	25	3	C	111					0
	25	4	A	26	17	11	4	**77**	O
	25	4	B	19	16				0
	25	4	C	77	57				0
	25	5	A	24	10	0	0	**39**	O
	25	5	B	18	28				O
	25	5	C	39					O
	25	6	A	59	31	27	6	**73**	OM

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm)				Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
				0 to 12"	12 to 18"	18 to 24"	24 to 36"		
	25	6	B	73	31				OM
	25	6	C	53					OM
	25	7	A	21	13	14		**33**	O
	25	7	B	27					O
	25	7	C	33					O
	25	8	A	4	3	3	1	**4**	M
	25	8	B	3	0	2	0		M
	25	9	A	12	6	2	0	**17**	OM
	25	9	B	6					OM
	25	9	C	17					OM
	25	10	A	6	5	0	2	**21**	O
	25	10	B	21	18				O
	25	10	C	20					O
	25	11	A	155	74	57	27	**155**	O
	25	11	B	102					O
	25	12	A	2	2	1	0	**2**	M
	25	12	B	2	1	2			M
	25	13	A	4	3	2	1	**5**	OM
	25	13	B	5					OM
	25	13	C	2	4				OM
	25	14	A	30	15	9	6	**30**	O
	25	14	B	26					O
	25	14	C	6	11				O
	25	15	A	23	12	12	14	**119**	OM
	25	15	B	52	50				OM
	25	15	C	119					OM
	25	16	A	45	48	28	12	**90**	O
	25	16	B	53	27				O
	25	16	C	90	36				O
	25	17	A	3	2	2	1	**12**	M
	25	17	B	12	10				M
	25	17	C	4					M
	26	2	A	16	10			**96**	O
	26	2	B	60					O
	26	2	C	96					O
	26	3	A	133	41	19	7	**133**	O
	26	3	B	129					O
	26	3	C	31					O
	26	4	A	267	82	62	35	**267**	O
	26	4	B	33					O
	26	4	C	152					O

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm) 0 to 12"	12 to 18"	18 to 24"	24 to 36"	Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
	26	5	A	129	62	82		**129**	O
	26	5	B	61					O
	26	5	C	96					O
	26	6	A	64	41	28		**100**	O
	26	6	B	100					O
	26	6	C	51					O
	26	7	A	84	20	5	4	**84**	OM
* 0-18"	26	7	B	46					OM
	26	8	A	128	46	17		**128**	OM
	26	8	B	108					OM
	26	8	C	40					OM
	26	9	A	51	57	40	0	**112**	OM
	26	9	B	112					OM
	26	9	C	58					OM
	26	10	A	19	12	13	25	**44**	O
	26	10	B	44					O
	26	10	C	15					O
	26	11	A	0	0	0	0	**1**	OM
	26	11	B	1					OM
	26	11	C	0					OM
	26	12	A	40	24	25	25	**40**	O
	26	12	B	16					O
	26	12	C	35					O
	26	13	A	8	8	5	12	**48**	OM
	26	13	B	23					OM
	26	13	C	48					OM
	26	14	A	59	33			**147**	O
	26	14	B	147					O
	26	14	C	125					O
	26	15	A	135	64	56	4	**135**	O
* 0-18"	26	15	B	53					O
	26	16	A	12	8	5	2	**88**	O
	26	16	B	88					O
	26	16	C	30					O
	26	17	A	15	9	6	2	**21**	O
	26	17	B	7	10				O
	26	17	C	21					O
	26	18	A	61	31	29	10	**108**	OM
	26	18	B	72					OM
	26	18	C	108					OM

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm)				Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
				0 to 12"	12 to 18"	18 to 24"	24 to 36"		
	26	19	A	30	7	5	4	**186**	OM
	26	19	B	33					OM
	26	19	C	186	39				OM
	26	20	A	76	30	5	2	**90**	O
	26	20	B	90					O
	26	20	C	90					O
	26	21	A	56	33	18	11	**56**	O
	26	21	B	56					O
	26	21	C	50					O
	26	22	A	84	73	51		**162**	O
	26	22	A1	80					O
	26	22	B	162					O
	26	22	C	135					O
	26	23	A	152	40	38	36	**152**	O
	26	23	B	140					O
	26	23	C	125					O
	26	24	A	45	60	42	10	**181**	O
* 0-18"	26	24	B	69					O
	26	24	A'	181	55	32	13		O
	26	24	B'	74					O
	26	24	C'	64					O
	26	25	A	20	12	16	11	**37**	O
	26	25	B	37					O
	26	25	C	22	14				O
	26	26	A	37	30	20	9	**57**	O
	26	26	B	57	56				O
	26	26	C	27					O
	26	27	A	147	47	34	17	**147**	O
	26	27	B	36	14				O
	26	27	C	60					O
	26	28	A	23	8	8		**24**	O
* 0-18"	26	28	B	24					O
	26	29	A	160	48	50	20	**160**	O
	26	29	B	46					O
	26	29	C	60					O
	26	30	A	6	9	9	6	**9**	OM
	26	30	B	4					OM
	26	30	C	3					OM
	26	31	A	84				**124**	OM
	26	31	B	35					OM
	26	31	C	40	36				OM
	26	31	D	124	33				OM

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm) 0 to 12"	12 to 18"	18 to 24"	24 to 36"	Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
	26	33	A	58	42	6	34	**58**	O
* 0-18"	26	33	B	35					O
	26	34	A	44	20	20	18	**75**	OM
	26	34	B	75					OM
	26	34	C	39					OM
	26	35	A	5	2	2	1	**40**	O
	26	35	B	5					O
	26	35	C	40					O
	26	36	A	82	29	31	19	**82**	OM
	26	36	B	14					OM
	26	36	C	80					OM
	26	37	A	59	26	6	2	**70**	O
	26	37	B	70					O
	26	37	C	34					O
	26	38	A	90	51	34		**102**	O
	26	38	A1	60					O
	26	38	A2	102					O
	26	38	A3	63					O
	26	38	A4	58					O
	26	38	B1	100					O
	26	38	B2	80					O
	26	38	B3	69					O
	26	38	B4	72					O
	26	39	A	8	4	3	1	**15**	OM
	26	39	B	9	5				OM
	26	39	C	15					OM
	27	1	A	78	39	13	2	**78**	OM
	27	1	B	65					OM
	27	1	C	51					OM
	27	2	A	49	54	24	8	**54**	M
	27	2	B	12					M
	27	2	C	26					M
	27	3	A	12	10	11	3	**47**	OM
	27	3	B	47					OM
	27	3	C	40					OM
	27	4	A	29	29	29	17	**29**	OM
	27	5	B	53				**105**	OM
	27	5	C	105					OM
	27	6	A	40	23	13	4	**40**	OM
	27	6	B	19					OM
	27	6	C	14					OM
	27	7	A	116	37	13	2	**116**	OM

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm)				Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
				0 to 12"	12 to 18"	18 to 24"	24 to 36"		
	27	7	B	15					OM
	27	7	C	32					OM
	27	7	A'	68	14	4			OM
* 0-18"	27	7	B'	32					OM
	27	8	A	7	5	6	3	**8**	O
	27	8	B	2					O
	27	8	C	8					O
	27	10	A	32	0	2	0	**38**	O
	27	10	B	38					O
	27	10	C	24					O
	27	13	B	93				**93**	O
	27	13	C	63					O
	27	14	A	91	48	5	2	**140**	O
	27	14	B	90					O
	27	14	C	140					O
	27	15	A	92	52	2	3	**92**	O
	27	15	B	60					O
	27	15	C	71					O
	27	16	A	81	50	26	14	**112**	O
	27	16	B	112					O
	27	16	C	88					O
	27	17	A	20	2	5	8	**44**	OM
	27	17	B	44					OM
	27	17	C	38					OM
	27	18	A	4	1	0	0	**4**	OM
	27	18	B	0					OM
	27	18	C	2					OM
	27	19	A	24	9	1	0	**60**	O
	27	19	B	15					O
	27	19	C	60					O
	27	20	A	44	50	31	14	**50**	OM
	27	20	B	50					OM
	27	20	C	2					OM
	27	21	A	90	12	31		**190**	O
	27	21	B	70					O
	27	21	C	190					O
	27	22	A	67	33	33	5	**186**	O
	27	22	C	150					O
	27	22	C'	186					O
	27	23	A	88	32	30	53	**126**	O
	27	23	B	126					O
	27	23	C	120					O

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm) 0 to 12"	12 to 18"	18 to 24"	24 to 36"	Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
	27	26	A	48	38	13	18	**94**	O
	27	26	B	94					O
	27	26	C	90					O
	27	27	A	30	44	26	7	**92**	OM
	27	27	B	32					OM
	27	27	C	92					OM
	27	28	A	32	24	20	21	**142**	O
	27	28	B	142					O
	27	28	C	26					O
	27	29	A	42	29	35		**176**	O
	27	29	B	176					O
	27	29	C	88					O
	27	30	A	14	10	0	2	**106**	OM
	27	30	B	100					OM
	27	30	C	106					OM
	27	31	A	86	43	38	26	**86**	O
	27	31	B	64					O
	27	31	C	52					O
	27	32	A	142	93	42	30	**142**	O
	27	32	B	34					O
	27	32	C	46					O
	27	33	A	22	30	13	6	**48**	O
	27	33	B	22					O
	27	33	C	48					O
	27	34	A	7	14	1	0	**14**	OM
	27	34	B	3					OM
	27	34	C	5					OM
	27	35	A	60	50			**188**	O
	27	35	B	158					O
	27	35	C	68					O
	27	35	D	91	29	5	0		O
	27	35	E1	124					O
	27	35	E2	132					O
	27	35	E3	72					O
	27	35	E4	100					O
	27	35	E5	188					O
	27	35	E6	119					O
	27	35	E7	126					O
	27	35	E8	128					O
	27	35	E9	150					O
	27	35	E10	66					O
	27	35	E11	120					O
	27	35	E12	108					O
	27	35	E13	112					O
	27	35	E14	62					O

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm)				Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
				0 to 12"	12 to 18"	18 to 24"	24 to 36"		
	27	35	E15	66					O
	27	35	E16	44					O
	27	35	E17	45	21				O
	27	37	A	62	48	31	7	**162**	OM
	27	37	B	98					OM
	27	37	C	162					OM
	27	40	A	20	6	0	0	**44**	OM
	27	40	B	20					OM
	27	40	C	44					OM
	27	41	A	58	61	51	21	**61**	O
	27	41	B	27					O
	27	41	C	6					O
	27	42	A	2	2	0	0	**16**	O
	27	42	B	0					O
	27	42	C	16					O
	27	46	A	10	4	5	13	**13**	O
	27	46	B	6					O
	27	46	C	10					O
	27	47	A	68	30	37	37	**68**	OM
	27	47	B	54					OM
	27	50	A	16	13	8	8	**29**	M
	27	50	B1	11	10				M
	27	50	B2	15					M
	27	50	C1	16					M
	27	50	C2	17					M
* 0-18"	27	50	C3	15					M
	27	50	D1	22					M
	27	50	D2	15					M
	27	50	D3	16					M
* 0-18"	27	50	E1	20					M
* 0-18"	27	50	E2	27					M
	27	50	E3	29					M
	28	1	A	79	38	1	0	**79**	OM
	28	1	B	41	19				OM
	29	1	A	2	0	0		**2**	M
* 0-18"	29	1	B	1					M
	29	2	A	0	0	0	0	**0**	M
	29	2	B	0					M
	29	3	A	9	6	5		**9**	M
	29	3	B	6					M
	29	4	A	6	15	4	2	**15**	O
	29	4	B	13					O
	29	4	C	3					

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm)				Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
				0 to 12"	12 to 18"	18 to 24"	24 to 36"		
	29	5	A	15	11	9	6	**15**	O
	29	7	A	58	21	10	18	**63**	O
	29	7	B	63					O
	29	7	C	29					O
	29	7	D	33					O
	29	8	A	61	56	47	45	**61**	OM
	29	8	B	9					OM
	30	1	A	13	10	12	15	**15**	O
	30	1	B	14					O
	30	2	A	58	23	18	11	**58**	O
	30	2	B	57					O
	31	1	A	4	0	1	2	**4**	M
* 0-18"	31	1	B	2					M
	31	2	A	172	37	23		**172**	O
	31	2	A1	129					O
	31	2	A2	82					O
	31	3	A	133	37	40	37	**160**	O
	31	3	B	160					O
	31	3	C	141					O
	31	4	A	64	54	43	34	**76**	O
* 0-18"	31	4	B	76					O
	31	6	A	36	34	22	18	**36**	O
* 0-18"	31	6	B	27					O
	31	7	A	36	39	28	23	**54**	O
	31	7	B	54					O
	31	7	C	53					O
	31	8	A	304	79	40	30	**304**	O
	31	8	B	114					O
	31	8	C	215					O
	31	10	A	104	42	39		**118**	O
	31	10	B	66					O
	31	10	C	96					O
	31	10	D	118					O
	31	11	A	84	36	26	14	**114**	O
	31	11	B	106					O
	31	11	C	114					O
	31	12	A	55	36	22	18	**150**	O
	31	12	B	150					O
	31	12	C	62					O

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm)				Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
				0 to 12"	12 to 18"	18 to 24"	24 to 36"		
	31	13	A	178	46	40	38	**257**	O
	31	13	B	92					O
	31	13	C	257					O
	31	14	A	282	30	39	39	**282**	O
	31	14	B	34					O
	31	14	C	31					O
	31	15	A	205	36	32	40	**1100**	O
	31	15	A1	141					O
	31	15	A2	123					O
	31	15	A3	112					O
	31	15	A4	177					O
	31	15	A5	50					O
	31	15	A6	84					O
	31	15	A7	78					O
	31	15	A8	87					O
	31	15	A9	89					O
	31	15	A10	147					O
	31	15	A11	82					O
	31	15	A12	132					O
	31	15	A13	5					O
	31	15	A14	164					O
	31	15	A15	100					O
	31	15	A16	120					O
	31	15	A17	132					O
	31	15	A18	190					O
	31	15	A19	78					O
	31	15	A20	104					O
	31	15	A21	88					O
	31	15	A22	325					O
	31	15	A23	1100					O
	31	15	A24	212					O
	31	15	A25	91					O
	31	15	A26	98					O
	31	15	A27	134					O
	31	15	A28	43					O
	31	15	A29	192					O
	31	16	A	43	25	25	12	**43**	O
	31	16	B	37					O
	31	16	C	29					O
	31	17	A	67	41	44	18	**67**	OM
	31	17	B	46					OM
	32	1	A	29	17	11	6	**441**	OM
	32	1	B	441					OM
	32	2	A	61	29	27	16	**61**	OM
	32	2	B	43					OM
	32	2	C	41					OM
	32	3	A	46	34	37	26	**52**	OM
	32	3	B	52					OM

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm)				Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
				0 to 12"	12 to 18"	18 to 24"	24 to 36"		
	32	3	C	52					OM
	32	4	A	180	29	65	54	**180**	OM
	32	4	B	43					OM
	32	5	A	59	62	44	20	**129**	OM
	32	5	B	39					OM
	32	5	C	129					OM
	32	6	A	44	37	22		**97**	O
	32	6	B	97	47				O
	32	7	A	35	34	32	21	**139**	O
	32	7	B	139					O
	32	8	A	135	36	34		**135**	O
	32	8	B	27					O
	32	8	C	48					O
	32	9	A	79	62	37		**79**	OM
	32	9	B	58	36				OM
	32	9	C	1					OM
	32	10	A	300	64	18	8	**300**	O
	32	10	B	72					O
	32	10	C	51					O
	32	12	A	14	8	0	0	**14**	O
	32	13	A	30	20	0	0	**30**	O
	32	13	B	29					O
	32	14	A	69	16	10	6	**69**	OM
	32	14	B	23					OM
	32	14	C	48					OM
	32	15	A	50	40	33	16	**259**	O
	32	15	B	53					O
	32	15	C	259					O
	32	16	A	90	45	50	28	**120**	O
	32	16	B	60					O
	32	16	C	103					O
	32	16	A'	120	30	30	22		O
	32	16	B'	37					O
	32	16	C'	0					O
	34	1	A	105	44	49	34	**156**	OM
	34	1	B	96					OM
	34	1	C	156					OM
	34	2	A	16	12	11	8	**25**	M
	34	2	B	18	25				M
	35	1	A	86	41	51	29	**92**	O

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm)				Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
				0 to 12"	12 to 18"	18 to 24"	24 to 36"		
* 0-18"	35	1	B	92					O
	35	2X	A	93	44	26	7	**93**	M
* 0-18"	35	2X	B1	93					M
	35	2X	B2	69					M
* 0-18"	35	2X	B3	69					M
* 0-18"	35	2X	C1	62					M
	35	2X	C2	67					M
	35	2X	D1	61					M
	35	2X	D2	63					M
	35	2X	D3	78					M
	35	2X	E1	57					M
*12 to 18"	35	2X	E2		49				M
	35	2X	E3	54					M
	35	2	A	124	115			**255**	O
	35	2	B	121	45				O
	35	2	C	255					O
	35	3	A	57	30			**162**	OM
	35	3	B	46					OM
	35	3	C	162					OM
	35	4	A	69	35	33		**225**	OM
	35	4	B	225					OM
	35	4	C	66					OM
	35	5	A	144	44	46	38	**144**	OM
* 0-18"	35	5	B	58					OM
	35	6	A	10	7			**20**	O
	35	6	B	19					O
	35	6	C	20					O
	35	6	D	8					O
	35	7	A	177	49	64	36	**273**	O
	35	7	B	273					O
	35	7	C	210					O
	35	9	A	48	50	31	11	**50**	OM
* 0-18"	35	9	B	50					OM
	35	12	A	123	48	29		**123**	M
	35	12	A1	36					M
	35	12	A2	18					M
	35	12	A3	20					M
	35	12	A4	13					M
	35	12	A5	13					M
	35	12	A6	28					M
	35	14	A	80	40			**80**	O
	35	14	B	56					O
	35	14	C	62					O
	35	15	A	84	56	41	38	**111**	OM

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm)				Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
				0 to 12"	12 to 18"	18 to 24"	24 to 36"		
	35	15	B	111					OM
	35	15	C	52					OM
	35	16	A	16	0	2		**16**	M
	35	16	B	0					M
	35	16	C	0					M
	35	17	A	26	10	6	4	**26**	OM
	35	17	B	9					OM
	35	17	C	6					OM
	35	18	A	15	14	21	25	**25**	O
* 0-18"	35	18	B	16					O
	35	19	A	116	35	33		**116**	O
	35	19	B	2					O
	35	19	C	60					O
	35	20	A	90	55	30		**90**	OM
	35	20	B	54					OM
	35	20	C	0					OM
	35	22	A	108	52	33		**108**	O
	35	22	B	92					O
	35	22	C	74					O
	35	23	A	64	30			**100**	O
	35	23	B	100					O
	35	23	C	40					O
	35	24	A	14	16			**54**	O
	35	24	B	54					
	35	24	C	44					
	36	1	A	39	29	30	20	**74**	OM
	36	1	B	74					OM
	36	1	C	19					OM
	36	2	A	64	34	37	24	**64**	OM
	36	2	B	26					OM
	36	3	A1	67				**146**	OM
	36	3	A2	52					OM
	36	3	A3	146					OM
	36	3	A4	67					OM
	36	3	A5	69					OM
	36	3	A6	60	58				OM
	36	3	A7	120					OM
	36	3	A8	81					OM
	36	3	A9	118					OM
	36	3	A10	118					OM
	36	3	A	96	51				OM
	36	3	B	26					OM
	36	3	C	33					OM
	36	3	D	41					OM

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm)				Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
				0 to 12"	12 to 18"	18 to 24"	24 to 36"		
	36	4	A	58	28	24	20	**83**	OM
	36	4	B	83					OM
	36	4	C	10					OM
	36	5	A	122	54	40	30	**122**	O
	36	5	B	60					O
	36	5	C	60					O
	36	6	A	81	57	30	33	**96**	M
	36	6	B	58					M
	36	6	C	96					M
	36	8	A	177	54	39	21	**225**	O
	36	8	A1	127					O
	36	8	A2	225					O
	36	8	A3	147					O
	36	8	A4	84					O
	36	8	B1	96					O
	36	8	B2	78					O
	36	8	B3	79					O
	36	8	B4	130					O
	36	9	A	112	47	33	17	**112**	O
	36	9	B	54					O
	36	9	C	69					O
	36	10	A	30	27	18	6	**54**	O
* 0-18"	36	10	B	54					O
	36	11	A	195	28	4	4	**195**	O
	36	11	B	90	43				O
	36	11	C	74					O
	36	12	A	18	11	12	14	**90**	O
	36	12	B	90	44				O
	36	12	C	66					O
	36	13	A	29	22	13	0	**38**	M
	36	13	B	6					M
	36	13	C	38					M
	36	14	A	104	73	65		**104**	O
	36	14	B	43					O
	36	14	C	23					O
	36	17	A	165	45	29	17	**165**	O
	36	17	B	138					O
	36	17	C	78					O
	36	18	A	175	38	22		**175**	O
	36	18	B	25					O
	36	18	C	24					O
	36	19	A	42	108	52	39	**123**	O

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm) 0 to 12"	12 to 18"	18 to 24"	24 to 36"	Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
	36	19	B	108	73				O
	36	19	C	123					O
	36	20	A	142	122	64	43	**142**	O
	36	20	B	40	45				O
	36	20	C	117					O
	36	21	A	82	96	55	33	**96**	M
	36	21	B	60					M
	36	21	C	29					M
	36	22	A	155	50	33	25	**155**	OM
* 0-18	36	22	B	105					OM
	36	23	A	267	77	42	41	**267**	OM
	36	23	B	100	56				OM
	36	23	C	129					OM
	36	24	A	185	78	49	20	**257**	O
	36	24	B	257					O
	36	24	C	141	55				O
	36	25	A	55	29	20	16	**55**	OM
	36	26	A	128	55	45	28	**128**	OM
	36	26	B	84	60				OM
	36	26	C	31					OM
	36	27	A	32	21	18	19	**42**	OM
	36	27	B	23					OM
	36	27	C	42					OM
	36	28	A	212	83	51	24	**340**	OM
	36	28	B	340	90				OM
	36	28	C	130					OM
	36	29	A	5	5	2		**5**	OM
	36	29	B	4	3				OM
	36	30	A	20	20	12		**27**	OM
	36	30	B	3	2				OM
	36	30	C	27					OM
	36	30	D	5	3				OM
	36	31	A	115	55	35	5	**115**	O
	36	31	B	100					O
	36	31	C	88	44				O
	36	32	A	28	35	20	19	**130**	OM
	36	32	B	10	16				OM
	36	32	C	130					OM
	36	33	A	67	42	34		**102**	OM
	36	33	B	102	69				OM
	36	33	C	72	47				OM

TABLE B-1
FINAL MANSON DATA SET

Notes (a)	Section	Tract	Location	Arsenic Concentration by Sample Depth Interval (ppm)				Maximum Arsenic Concentration per Tract (ppm)	Land Use Classification (b)
				0 to 12"	12 to 18"	18 to 24"	24 to 36"		
	36	34	A	135	77	55	29	**135**	O
* 0-18"	36	34	B	129					O
	36	36	A	96	49	43	28	**225**	O
	36	36	B	225	83				O
	36	36	C	160	72				O
	36	37	A	130	50	29	18	**180**	O
	36	37	B	52	68				O
	36	37	C	180					O
	36	38	A	95	42	36	30	**95**	O
* 0-18"	36	38	B	43					O
	36	39	A	45	27	19	6	**77**	O
	36	39	B	77					O
	36	39	C	75	31				O
	36	40	A	252	56	38	35	**410**	O
	36	40	B	61					O
	36	40	C	410					O
	36	41	A	33	20	18	13	**54**	O
	36	41	B	54	25				O
	36	41	C	35					O
	36	43	A	60	41	34	30	**60**	M
	36	43	B	30					M
	36	43	C	37					M

(a) Items in Notes column represent data format in electronic version of the data set provided by the Washington State Department of Ecology. This format was modified in the table.

(b) Land Use Classification column represents resuts of 1947 aerial photographic analysis:

O = Orchard

OM = Mix orchard and non-orchard

M = Non-orchard

APPENDIX C

Averaged Data at the Tract Level

TABLE C-1
AVERAGE ARSENIC CONCENTRATION BY TRACT

Section	Tract	Track ID	Arsenic Concentration by Sample Depth Interval (ppm)				Major Soil Classification	Minor Soil Classification	1947 Land Use Classification (b)	1998 Land Use Classification (b)
			0 to 12"	12 to 18"	18 to 24"	24 to 36"				
16	1	16-1	27	24	14	6	Chelan		O	O
15	3	15-3	10	45	0	3	Chelan		O	OM
22	41	22-41	12	9	7	13	Chelan		M	OM
21	3	21-3	28	25	9	0	Chelan		O	M
15	8	15-8	12	17	0	0	Chelan	Antilon	O	O
15	9	15-9	48	49	35	7	Chelan	Antilon	O	M
21	2	21-2	28	42	32	13	Chelan		O	M
15	7	15-7	30	26	11	0	Chelan	Antilon	M	OM
15	5	15-5	28	25	11	2	Chelan	Antilon	O	O
15	6	15-6	19	9	8	3	Antilon		OM	M
22	37	22-37	12	9	7	3	Chelan	Antilon	OM	OM
22	38	22-38	12	5	3	2	Antilon	Chelan	O	OM
22	34	22-34	23	13	4	4	Antilon	Chelan	O	OM
22	35	22-35	25	18	12	7	Antilon		O	O
23	1	23-1	6	4	4	-999	Antilon	Chelan	OM	OM
22	39	22-39	13	14	1	1	Chelan	Antilon	OM	OM
22	17	22-17	7	14	10	2	Chelan	Antilon	OM	M
22	15	22-15	0	0	0	-999	Chelan		OM	OM
22	14	22-14	5	0	4	0	Chelan		O	OM
22	13	22-13	20	15	6	2	Chelan		O	M
22	12	22-12	20	45	25	6	Chelan	Antilon	OM	OM
22	11	22-11	44	18	16	-999	Chelan	Antilon	OM	OM
22	10	22-10	44	27	26	13	Chelan	Antilon	OM	OM
22	19	22-19	6	15	13	5	Chelan		OM	M
22	22	22-22	8	8	8	3	Chelan		OM	OM
21	10	21-10	74	19	4	3	Chelan		O	M
22	5	22-5	29	22	20	14	Chelan		OM	M
22	6	22-6	31	29	1	2	Chelan		O	OM
21	9	21-9	44	22	14	2	Chelan		O	O
22	1	22-1	2	32	0	-999	Chelan		O	O
21	8	21-8	31	12	9	1	Chelan		O	OM
21	4	21-4	41	32	12	2	Chelan		O	OM
22	21	22-21	35	46	11	3	Chelan		O	OM
22	23	22-23	32	1	0	0	Chelan		O	O
22	26	22-26	6	9	10	9	Chelan		OM	O
22	27	22-27	7	8	13	-999	Chelan		OM	O
22	25	22-25	34	35	37	-999	Chelan		O	OM
22	28	22-28	5	8	3	1	Chelan		OM	O
22	29	22-29	7	12	6	3	Chelan		O	O
22	30	22-30	7	17	15	10	Chelan		O	O
22	31	22-31	13	20	9	4	Chelan		O	O
22	32	22-32	10	11	5	7	Chelan		O	O
22	33	22-33	5	4	7	6	Chelan		OM	O
27	46	27-46	9	4	5	13	Chelan		O	O
27	15	27-15	74	52	2	3	Chelan		O	OM
27	16	27-16	94	50	26	14	Chelan	Antilon	O	OM
22	9	22-9	54	37	8	1	Chelan		OM	OM
22	8	22-8	48	24	1	0	Chelan	Antilon	O	O
27	13	27-13	78	-999	-999	-999	Chelan		O	OM
22	7	22-7	79	16	3	0	Chelan		O	OM
27	14	27-14	107	48	5	2	Chelan		O	OM
22	24	22-24	48	26	4	-999	Chelan	Antilon	O	O
27	6	27-6	24	23	13	4	Chelan	Antilon	OM	M
27	7	27-7	58	26	9	2	Chelan		OM	M
27	8	27-8	6	5	6	3	Chelan		O	O

TABLE C-1
AVERAGE ARSENIC CONCENTRATION BY TRACT

Section	Tract	Track ID	Arsenic Concentration by Sample Depth Interval (ppm)				Major Soil Classification	Minor Soil Classification	1947 Land Use Classification (b)	1998 Land Use Classification (b)
			0 to 12"	12 to 18"	18 to 24"	24 to 36"				
27	10	27-10	31	0	2	0	Chelan		O	O
27	1	27-1	65	39	13	2	Chelan		OM	M
27	2	27-2	29	54	24	8	Chelan		M	OM
27	3	27-3	33	10	11	3	Chelan		OM	M
27	5	27-5	79	-999	-999	-999	Chelan	Antilon	OM	M
27	4	27-4	29	29	29	17	Chelan		OM	M
27	47	27-47	61	30	37	37	Chelan	Antilon	OM	O
27	22	27-22	134	33	33	5	Chelan		O	OM
27	17	27-17	34	2	5	8	Chelan	Antilon	OM	M
27	31	27-31	67	43	38	26	Chelan		O	O
27	27	27-27	51	44	26	7	Chelan		OM	OM
26	3	26-3	98	41	19	7	Chelan		O	M
26	2	26-2	57	10	-999	-999	Chelan		O	OM
27	32	27-32	74	93	42	30	Chelan		O	O
27	21	27-21	117	12	31	-999	Chelan		O	OM
27	20	27-20	32	50	31	14	Chelan	Antilon	OM	OM
27	33	27-33	31	30	13	6	Chelan		O	O
27	26	27-26	77	38	13	18	Chelan		O	OM
27	23	27-23	107	32	30	53	Chelan		O	OM
27	19	27-19	33	9	1	0	Chelan		O	O
27	40	27-40	28	6	0	0	Chelan		OM	O
27	41	27-41	30	61	51	21	Chelan		O	O
27	37	27-37	107	48	31	7	Chelan		OM	O
27	35	27-35	102	33	5	0	Chelan		O	OM
26	11	26-11	0	0	0	0	Chelan		OM	M
26	12	26-12	30	24	25	25	Chelan		O	O
23	2	23-2	15	10	12	12	Chelan	Antilon	OM	OM
26	16	26-16	43	8	5	2	Chelan		O	OM
26	18	26-18	80	31	29	10	Chelan		OM	O
26	13	26-13	26	8	5	12	Chelan		OM	OM
26	17	26-17	14	10	6	2	Chelan		O	O
26	19	26-19	83	23	5	4	Chelan		OM	OM
26	21	26-21	54	33	18	11	Chelan		O	OM
26	20	26-20	85	30	5	2	Chelan		O	OM
26	25	26-25	26	13	16	11	Chelan		O	OM
26	26	26-26	40	43	20	9	Chelan	Antilon	O	OM
26	28	26-28	23	8	8	-999	Chelan		O	O
26	27	26-27	81	31	34	17	Antilon	Chelan	O	O
26	24	26-24	91	58	37	12	Chelan	Antilon	O	O
26	37	26-37	54	26	6	2	Chelan		O	OM
26	23	26-23	139	40	38	36	Chelan		O	O
26	22	26-22	115	73	51	-999	Chelan		O	M
26	15	26-15	135	64	56	4	Chelan		O	OM
26	14	26-14	110	33	-999	-999	Chelan		O	O
27	34	27-34	5	14	1	0	Chelan		OM	OM
26	9	26-9	74	57	40	0	Chelan		OM	OM
26	8	26-8	92	46	17	-999	Chelan		OM	OM
27	29	27-29	102	29	35	-999	Chelan		O	M
27	28	27-28	67	24	20	21	Chelan		O	OM
26	6	26-6	72	41	28	-999	Chelan		O	O
26	4	26-4	151	82	62	35	Chelan	Antilon	O	OM
26	7	26-7	84	20	5	4	Chelan		OM	OM
26	5	26-5	95	62	82	-999	Chelan		O	M
35	2	35-2x	68	44	26	7	Chelan		M	OM
35	22	35-22	91	52	33	-999	Chelan	Antilon	O	O

TABLE C-1
AVERAGE ARSENIC CONCENTRATION BY TRACT

Section	Tract	Track ID	Arsenic Concentration by Sample Depth Interval (ppm)				Major Soil Classification	Minor Soil Classification	1947 Land Use Classification (b)	1998 Land Use Classification (b)
			0 to 12"	12 to 18"	18 to 24"	24 to 36"				
34	1	34-1	119	44	49	3	Antilon	Chelan	OM	OM
34	2	34-2	17	19	11	8	Antilon	Chelan	M	OM
35	24	35-24	37	16	-999	-999	Chelan		O	M
35	17	35-17	14	10	6	4	Chelan	Antilon	OM	OM
35	18	35-18	15	14	21	25	Antilon	Chelan	O	O
26	38	26-38	77	51	34	-999	Chelan		O	M
35	6	35-6	14	7	-999	-999	Chelan		O	M
35	7	35-7	220	49	64	36	Chelan		O	M
35	16	35-16	5	0	2	-999	Antilon	Chelan	M	OM
35	15	35-15	82	56	41	38	Antilon	Chelan	OM	OM
35	14	35-14	66	40	-999	-999	Antilon	Chelan	O	OM
35	9	35-9	48	50	31	11	Chelan	Antilon	OM	OM
26	35	26-35	17	2	2	1	Chelan	Antilon	O	OM
26	36	26-36	59	29	31	19	Chelan	Antilon	OM	O
26	34	26-34	53	20	20	18	Chelan	Antilon	OM	O
26	29	26-29	89	48	50	20	Chelan	Antilon	O	OM
26	33	26-33	58	42	6	34	Antilon	Chelan	O	O
36	1	36-1	44	29	30	20	Chelan	Antilon	OM	OM
26	31	26-31	71	35	-999	-999	Chelan	Antilon	OM	O
25	8	25-8	4	2	3	1	Antilon	Chelan	M	M
25	7	25-7	27	13	14	-999	Antilon	Chelan	O	OM
25	6	25-6	62	31	27	6	Antilon		OM	M
25	9	25-9	12	6	2	0	Antilon	Chelan	OM	OM
25	1	25-1	20	16	14	14	Chelan	Antilon	OM	OM
26	30	26-30	4	9	9	6	Chelan		OM	O
25	10	25-10	16	12	0	2	Antilon		O	M
25	11	25-11	129	74	57	27	Antilon	Chelan	O	M
36	4	36-4	50	28	24	20	Antilon	Chelan	OM	OM
25	5	25-5	27	19	0	0	Chelan	Antilon	O	O
25	4	25-4	41	30	11	4	Chelan		O	O
25	3	25-3	82	20	18	15	Chelan	Antilon	O	O
36	2	36-2	45	34	37	24	Chelan	Antilon	OM	OM
36	30	36-30	14	8	12	-999	Entiat	Antilon	OM	M
36	10	36-10	30	27	18	6	Antilon	Chelan	O	OM
36	11	36-11	120	36	4	4	Antilon		O	OM
36	29	36-29	5	4	2	-999	Entiat	Antilon	OM	M
36	3	36-3	78	55	-999	-999	Antilon	Chelan	OM	OM
36	14	36-14	57	73	65	-999	Antilon	Chelan	O	M
36	13	36-13	24	22	13	0	Antilon	Chelan	M	OM
36	12	36-12	58	28	12	14	Chelan	Antilon	O	O
36	27	36-27	32	21	18	19	Chelan	Antilon	OM	M
35	20	35-20	48	55	30	-999	Antilon	Chelan	OM	OM
36	5	36-5	81	54	40	30	Chelan	Antilon	O	OM
36	6	36-6	78	57	30	33	Antilon	Chelan	M	OM
36	9	36-9	78	47	33	17	Chelan	Antilon	O	O
36	8	36-8	127	54	39	21	Antilon	Chelan	O	OM
36	32	36-32	56	26	20	19	Antilon	Chelan	OM	OM
36	39	36-39	66	29	19	6	Antilon	Chelan	O	O
36	38	36-38	95	42	36	30	Chelan	Antilon	O	O
36	40	36-40	241	56	38	35	Antilon	Chelan	O	M
36	41	36-41	41	23	18	13	Antilon	Chelan	O	M
36	36	36-36	160	68	43	28	Antilon	Chelan	O	OM
36	37	36-37	121	59	29	18	Antilon	Chelan	O	OM
36	43	36-43	42	41	34	30	Antilon		M	OM
31	17	31-17	57	41	44	18	Antilon		OM	OM

TABLE C-1
AVERAGE ARSENIC CONCENTRATION BY TRACT

Section	Tract	Track ID	Arsenic Concentration by Sample Depth Interval (ppm)				Major Soil Classification	Minor Soil Classification	1947 Land Use Classification (b)	1998 Land Use Classification (b)
			0 to 12"	12 to 18"	18 to 24"	24 to 36"				
31	8	31-8	211	79	40	30	Antilon		O	O
31	10	31-10	96	42	39	-999	Antilon	Chelan	O	O
31	6	31-6	36	34	22	18	Chelan	Antilon	O	O
31	11	31-11	101	36	26	14	Chelan	Antilon	O	M
31	13	31-13	176	46	40	38	Chelan		O	O
31	12	31-12	89	36	22	18	Chelan	Antilon	O	O
24	2	24-2	7	6	9	8	Chelan		OM	OM
23	4	23-4	9	8	13	10	Chelan		OM	O
31	14	31-14	116	30	39	39	Chelan		O	M
32	16	32-16	68	38	40	25	Chelan	Antilon	O	O
32	4	32-4	112	29	65	54	Chelan	Antilon	OM	M
32	3	32-3	50	34	37	26	Chelan	Antilon	OM	OM
31	16	31-16	36	25	25	12	Chelan	Antilon	O	O
32	2	32-2	48	29	27	16	Chelan	Antilon	OM	O
31	4	31-4	64	54	43	34	Antilon	Chelan	O	OM
31	2	31-2	128	37	23	-999	Antilon	Chelan	O	O
31	3	31-3	145	37	40	37	Antilon	Chelan	O	O
31	7	31-7	48	39	28	23	Antilon	Chelan	O	OM
31	15	31-15	156	36	32	40	Chelan		O	M
30	1	30-1	14	10	12	15	Chelan	Antilon	O	O
35	19	35-19	59	35	33	-999	Chelan	Antilon	O	OM
35	23	35-23	68	30	-999	-999	Chelan		O	M
35	23	35-23	68	30	-999	-999	Antilon	Chelan	O	M
24	1	24-1	32	20	12	4	Chelan		OM	OM
23	3	23-3	6	5	4	5	Chelan		O	OM
25	12	25-12	2	2	2	0	Chelan		M	M
25	13	25-13	4	4	2	1	Chelan		OM	OM
25	14	25-14	21	13	9	6	Chelan	Antilon	O	O
25	15	25-15	65	31	12	14	Chelan	Antilon	OM	O
25	17	25-17	6	6	2	1	Chelan	Antilon	M	O
25	16	25-16	63	37	28	12	Antilon	Chelan	O	O
32	1	32-1	235	17	11	6	Chelan		OM	O
29	2	29-2	0	0	0	0	Chelan		M	OM
32	12	32-12	14	8	0	0	Chelan		O	O
32	13	32-13	30	20	0	0	Chelan		O	O
32	14	32-14	47	16	10	6	Chelan		OM	OM
29	4	29-4	7	15	4	2	Chelan		O	O
29	3	29-3	8	6	5	-999	Chelan		M	OM
29	7	29-7	46	21	10	18	Chelan		O	OM
29	8	29-8	35	56	47	45	Chelan		OM	M
29	1	29-1	2	0	0	-999	Chelan	Entiat	M	M
32	10	32-10	141	64	18	8	Chelan	Antilon	O	O
32	5	32-5	76	62	44	20	Chelan	Antilon	OM	M
32	6	32-6	71	42	22	-999	Antilon	Chelan	O	OM
32	8	32-8	70	36	34	-999	Antilon	Chelan	O	M
32	7	32-7	87	34	32	21	Antilon	Chelan	O	M
5	1	5-1	86	60	45	19	Antilon	Chelan	O	M
5	3	5-3	3	4	3	-999	Chelan		M	M
5	2	5-2	113	48	23	32	Antilon	Chelan	O	M
5	5	5-5	60	41	42	40	Chelan		OM	M
21	7	21-7	34	18	12	2	Chelan		O	O
21	1	21-1	10	9	5	0	Chelan		O	OM
15	4	15-4	27	15	9	4	Chelan		M	OM
22	16	22-16	40	49	24	5	Chelan		O	OM
22	4	22-4	3	4	3	2	Chelan		M	M

TABLE C-1
AVERAGE ARSENIC CONCENTRATION BY TRACT

Section	Tract	Track ID	Arsenic Concentration by Sample Depth Interval (ppm)				Major Soil Classification	Minor Soil Classification	1947 Land Use Classification (b)	1998 Land Use Classification (b)
			0 to 12"	12 to 18"	18 to 24"	24 to 36"				
22	3	22-3	20	22	3	-999	Chelan		O	O
21	11	21-11	82	61	9	1	Chelan		O	M
27	50	27-50	17	12	8	8	Chelan	Antilon	M	OM
26	10	26-10	26	12	13	25	Chelan		O	M
27	18	27-18	2	1	0	0	Chelan		OM	O
27	30	27-30	73	10	0	2	Chelan		OM	OM
36	33	36-33	80	53	34	-999	Chelan	Antilon	OM	OM
36	31	36-31	101	50	35	5	Antilon	Entiat	O	M
36	28	36-28	227	87	51	24	Entiat	Antilon	OM	M
36	26	36-26	81	58	45	28	Chelan	Entiat	OM	M
36	25	36-25	55	29	20	16	Antilon	Entiat	OM	O
36	18	36-18	75	38	22	-999	Chelan	Entiat	O	OM
36	19	36-19	91	91	52	39	Antilon	Chelan	O	M
36	17	36-17	127	45	29	17	Antilon	Chelan	O	M
36	23	36-23	165	67	42	41	Antilon	Entiat	OM	OM
36	24	36-24	194	67	49	20	Antilon	Entiat	O	OM
36	22	36-22	155	50	33	25	Antilon	Chelan	OM	OM
36	21	36-21	57	96	55	33	Antilon	Chelan	M	O
36	20	36-20	100	84	64	43	Antilon	Chelan	O	M
30	2	30-2	58	23	18	11	Antilon	Chelan	O	M
31	1	31-1	4	0	1	2	Antilon		M	M
32	9	32-9	46	49	37	-999	Antilon	Chelan	OM	O
15	2	15-2	48	26	31	20	Chelan		O	M
22	6	22-6A	0	-999	-999	-999	Chelan		O	O
35	1	35-1	86	41	51	29	Chelan	Antilon	O	M
35	5	35-5	144	44	46	38	Chelan		OM	M
29	5	29-5	15	11	9	6	Chelan		O	O
26	39	26-39	11	5	3	1	Antilon	Chelan	OM	OM
16	2	16-2	-999	-999	-999	-999			O	M
16	3	16-3	-999	-999	-999	-999			O	M
22	40	22-40	-999	-999	-999	-999			M	OM
22	0	22-0	-999	-999	-999	-999			M	OM
22	20	22-20	-999	-999	-999	-999			OM	OM
22	2	22-2	-999	-999	-999	-999			O	M
21	0	21-0	-999	-999	-999	-999			OM	OM
21	0	21-0	-999	-999	-999	-999			OM	M
21	0	21-0	-999	-999	-999	-999			OM	OM
27	43	27-43	-999	-999	-999	-999			O	OM
27	0	27-0	-999	-999	-999	-999			OM	OM
22	0	22-0	-999	-999	-999	-999			M	OM
27	0	27-0	-999	-999	-999	-999			M	M
22	0	22-0	-999	-999	-999	-999			M	OM
28	11	28-11	-999	-999	-999	-999			OM	OM
27	0	27-0	-999	-999	-999	-999			M	M
27	0	27-0	-999	-999	-999	-999			M	M
27	0	27-0	-999	-999	-999	-999			M	OM
27	0	27-0	-999	-999	-999	-999			O	OM
27	0	27-0	-999	-999	-999	-999			M	O
35	4	35-4	120	35	33	0	Chelan		OM	OM
35	3	35-3	88	30	0	0	Chelan		OM	O
35	0	35-0	-999	-999	-999	-999			O	M
35	0	35-0	-999	-999	-999	-999			OM	M
35	0	35-0	-999	-999	-999	-999			O	M
35	0	35-0	-999	-999	-999	-999			M	OM
26	0	26-0	-999	-999	-999	-999			M	M

TABLE C-1
AVERAGE ARSENIC CONCENTRATION BY TRACT

Section	Tract	Track ID	Arsenic Concentration by Sample Depth Interval (ppm)				Major Soil Classification	Minor Soil Classification	1947 Land Use Classification (b)	1998 Land Use Classification (b)
			0 to 12"	12 to 18"	18 to 24"	24 to 36"				
35	12	35-12	36	48	29	0	Antilon	Chelan	M	M
36	0	36-0	-999	-999	-999	-999			M	M
35	0	35-0	-999	-999	-999	-999			OM	OM
36	0	36-0	-999	-999	-999	-999			O	M
36	35	36-35	-999	-999	-999	-999			O	M
31	0	31-0	-999	-999	-999	-999			OM	O
31	0	31-0	-999	-999	-999	-999			M	OM
35	0	35-0	-999	-999	-999	-999			O	M
35	0	35-0	-999	-999	-999	-999			OM	M
35	0	35-0	-999	-999	-999	-999			OM	M
35	0	35-0	-999	-999	-999	-999			OM	M
35	0	35-0	-999	-999	-999	-999			M	M
35	0	35-0	-999	-999	-999	-999			O	M
35	0	35-0	-999	-999	-999	-999			OM	M
35	0	35-0	-999	-999	-999	-999			O	M
35	0	35-0	-999	-999	-999	-999			M	M
35	0	35-0	-999	-999	-999	-999			OM	OM
35	0	35-0	-999	-999	-999	-999			OM	M
35	0	35-0	-999	-999	-999	-999			M	M
35	0	35-0	-999	-999	-999	-999			OM	M
27	0	27-0	-999	-999	-999	-999			O	O
27	0	27-0	-999	-999	-999	-999			M	O
35	2	35-2	167	80	0	0	Chelan		O	OM
35	11	35-11	-999	-999	-999	-999			M	M
35	0	35-0	-999	-999	-999	-999			OM	M
30	0	30-0	-999	-999	-999	-999			OM	OM
22	0	22-0	-999	-999	-999	-999			O	O
22	0	22-0	-999	-999	-999	-999			O	O
22	0	22-0	-999	-999	-999	-999			OM	OM
32	15	32-15	120	40	33	16	Chelan		O	OM

O = Orchard
OM = Mix orchard and non-orchard
M = Non-orchard
Source: Chelan County Soil Survey.