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Prepared By/Date	Dept.	Mail/Addr
E. R. McGinnis		T487
Ning Liu, 02/28/2006	EHS	T487

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Approvals	Date
P. D. Rutherford	4/19/06
J. R. Vargo	4/20/06
B. D. Sujata	4/21/06

Distribution

*	Name	Mail Addr.
*	R. Amar	T487
*	J. G. Barnes	T487
*	N. Liu	T487
*	P. D. Rutherford	T487
*	J. R. Vargo	T487
*	Radiation Safety File	T487
*	Facility Release File	T487

Abstract

This document provides the results of the Phase A and Phase B Final Status Survey of Building 4059 (SNAP Ground Prototype Facility) at the Santa Susana Field Laboratory. The data analysis follows the protocols recommended by the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). The survey results demonstrate that the Building 4059 site meets the Department of Energy (DOE) and the State of California, Department of Health Services (DHS) approved release criteria, and the site is therefore suitable for release for unrestricted use.

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Supporting Document
Summary of Change

		No. Page i of 153
Rev.	Summary of Change	Approvals and Date
A	Revise Tables 4 and 5 to present the sum-of-fractions on a per sample basis. This Change is made based on ORISE review comments and recommendations.	P. D. Rutherford 2/13/08 J. R. Vargo 2-12-08 R. Amar 2/15/08

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EXECUTIVE SUMMARY

Building 4059 was constructed in the early 1960s for the Systems for Nuclear Auxiliary Power (SNAP) program. The SNAP operations in the building ceased in 1970, and various non-nuclear operations and decontamination activities have been performed since then.

In 1999, the entire upper building and basement, excluding the Test Cells and Pipe Chase Room (PCR), were surveyed using the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) protocols. The 1999 survey demonstrated that this portion of the building met the Department of Energy (DOE) and the State of California Department of Health Services (DHS) approved release criteria for unrestricted use. After the survey was confirmed independently by the Oak Ridge Institute for Science and Education (ORISE), the DHS, and the Environmental Protection Agency (EPA), the non-radioactive portion of the building was demolished and shipped to a Class 1 hazardous waste disposal site. In 2004, the remaining Test Cells and PCR were completely removed and disposed of as radioactive waste.

The final status survey was performed in accordance with the MARSSIM protocols to demonstrate that the land meets the DOE and DHS approved release criteria for unrestricted use. The survey was divided into two phases. Phase A, which included one Class 1 and one Class 2 survey unit, was performed after the removal of the Test Cell and PCR was completed. After the excavation from the demolition work was backfilled with clean soils, Phase B, which treated the entire Building 4059 site as one Class 3 survey unit, was performed.

The analytical results indicate that the majority of the soil samples collected in both phases contained only naturally-occurring radioisotopes. For the few samples with man-made radionuclides above detection limits, the levels were far below the release limits. Because all individual radionuclide concentrations were below the release limits and the sum-of-fractions of all radionuclides for all individual samples were well below unity, the site met the release criteria.

In conclusion, the surveys in both phases have demonstrated that the Building 4059 site meets the DOE and DHS approved release criteria for unrestricted use.

1.0 INTRODUCTION

Building 4059, the Systems for Nuclear Auxiliary Power (SNAP) Ground Prototype Test Facility (SGPTF), is a former nuclear test facility that has been decontaminated and decommissioned at the Santa Susana Field Laboratory (SSFL), which is located at the Simi Hills of southeastern Ventura County, California, adjacent to the Los Angeles County line and approximately 29 miles northwest of downtown Los Angeles. Figure 1 shows the location of the SSFL relative to the surrounding communities. The Building 4059 (or SGPTF) was located in Area IV, which comprises the western portion of the SSFL in an area known as Burro Flats. Figure 2 shows Building 4059 on a topographic map, and Figure 3 shows an aerial photograph of Building 4059 and surrounding buildings in Area IV.

After Building 4059 was completely dismantled with all components and materials removed, a final status survey for the Building 4059 site has been performed using the protocols of the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) (Reference 1). This report closely follows the format suggested in Appendix A of Reference 1. The objective of this survey is to demonstrate that no residual contamination exceeds the Department of Energy (DOE) and the California Department of Health Services (DHS) approved cleanup standards listed in Reference 2.

The release survey was conducted in two phases. Phase A was the release of the 4059 site, including the excavated portion, as one Class 1 survey unit and one Class 2 survey unit (Figure 4a and 4b). Phase B was performed after the excavation was sampled and backfilled. In Phase B, the entire work site was sampled at ground level as one Class 3 survey unit (Figure 5a and 5b).

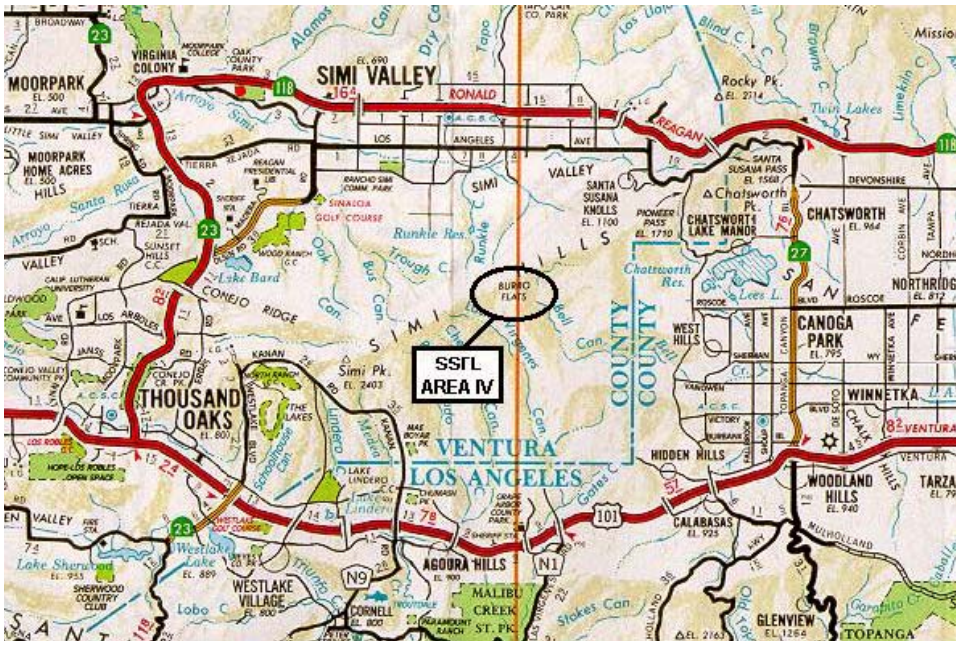


Figure 1. Location of Santa Susana Field Laboratory

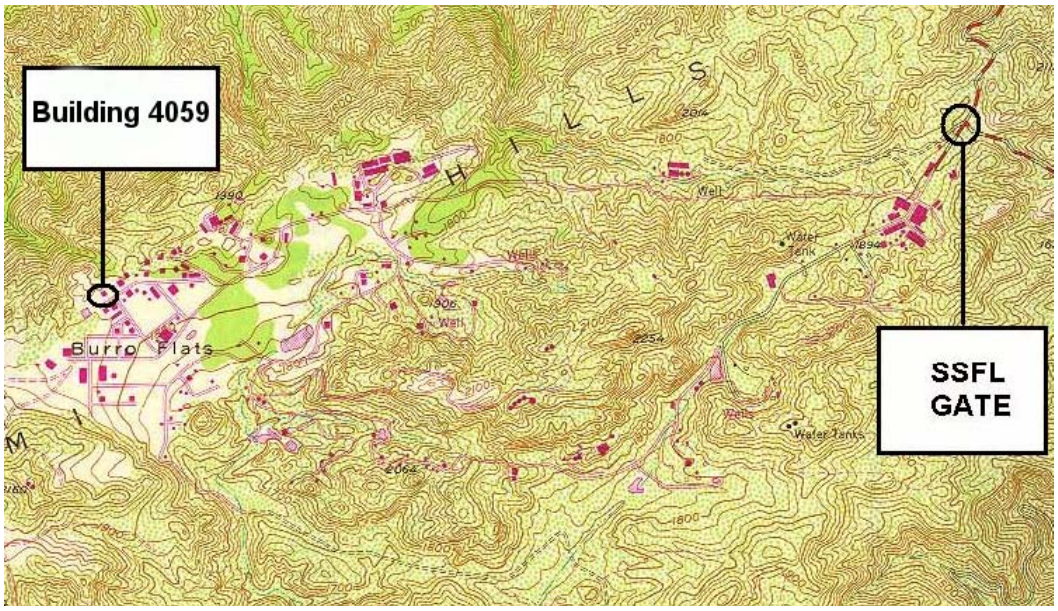


Figure 2. Topographic Map of SSFL and Building 4059

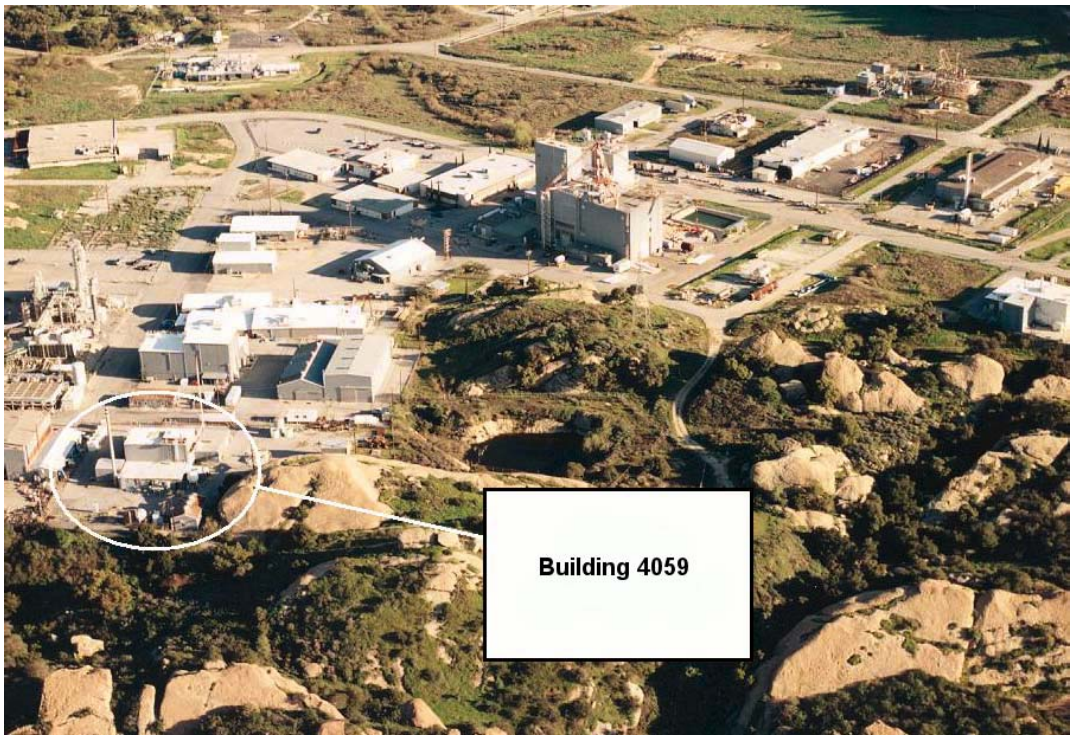


Figure 3. Aerial photograph of Building 4059

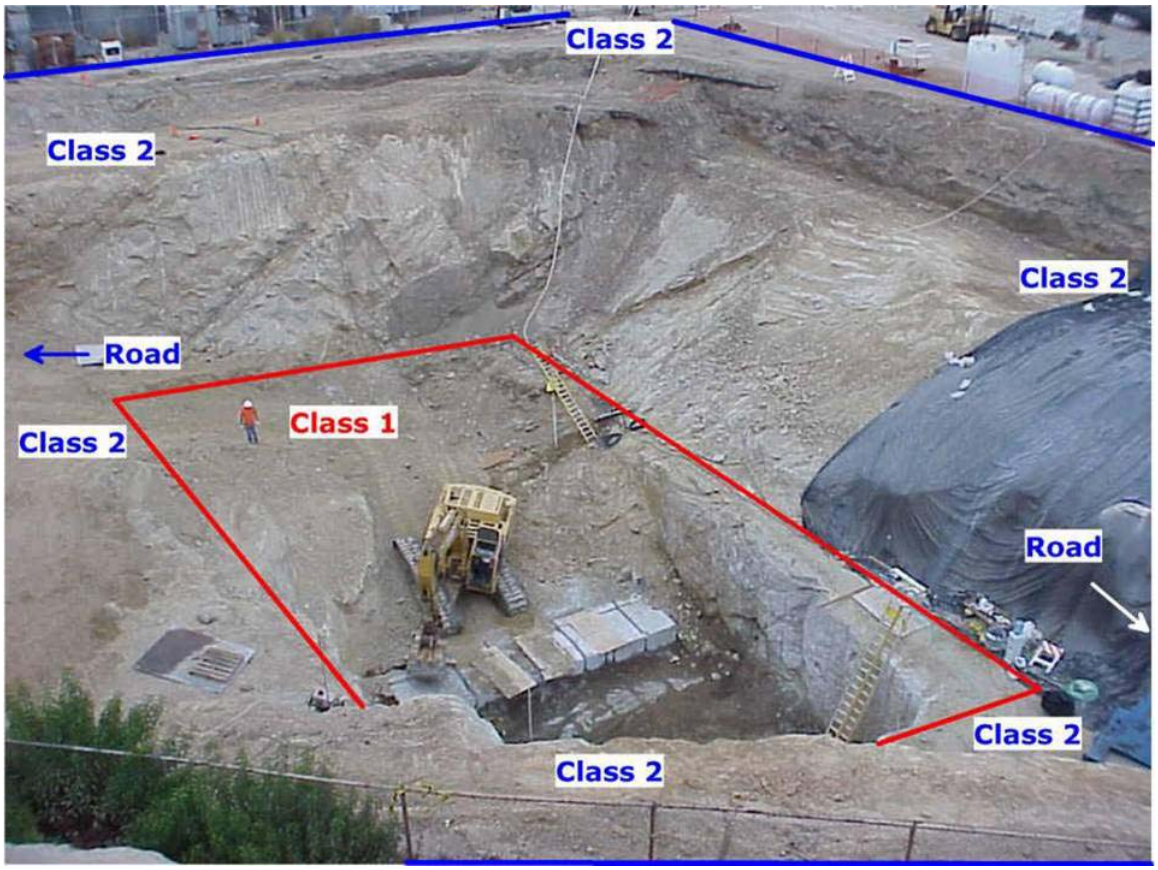


Figure 4a. Phase A Area Photo Showing Removal of Basement Concrete

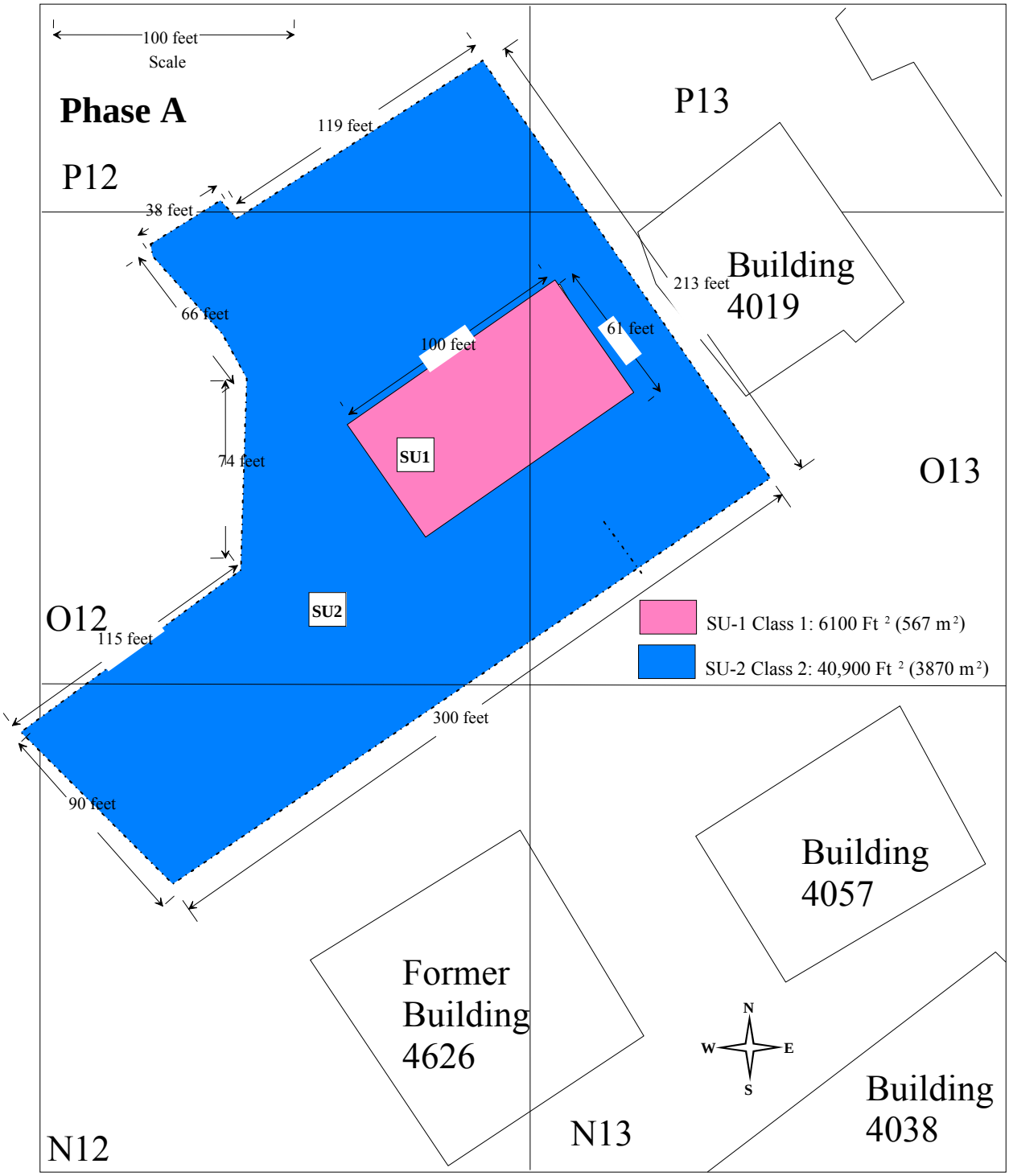


Figure 4b. Phase A Class Areas and Site Dimensions

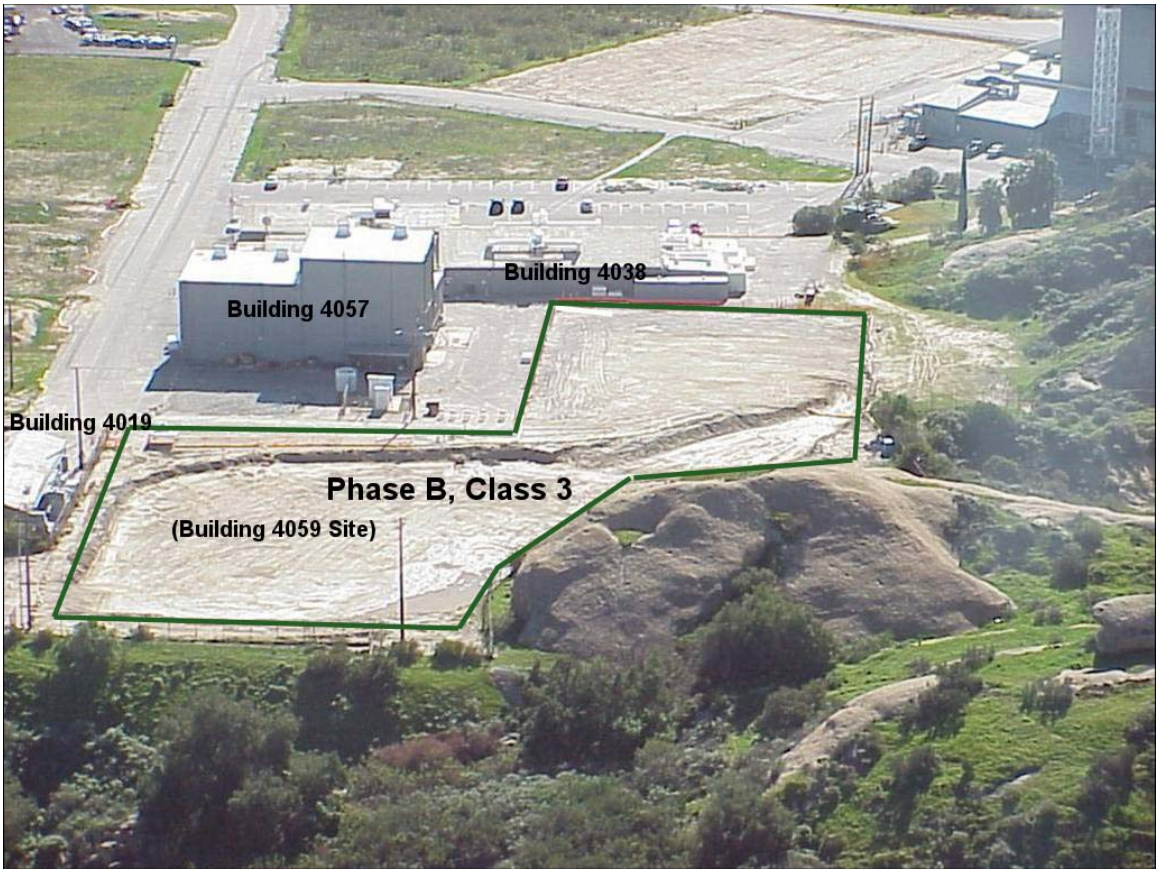


Figure 5a. Phase B Area Photo

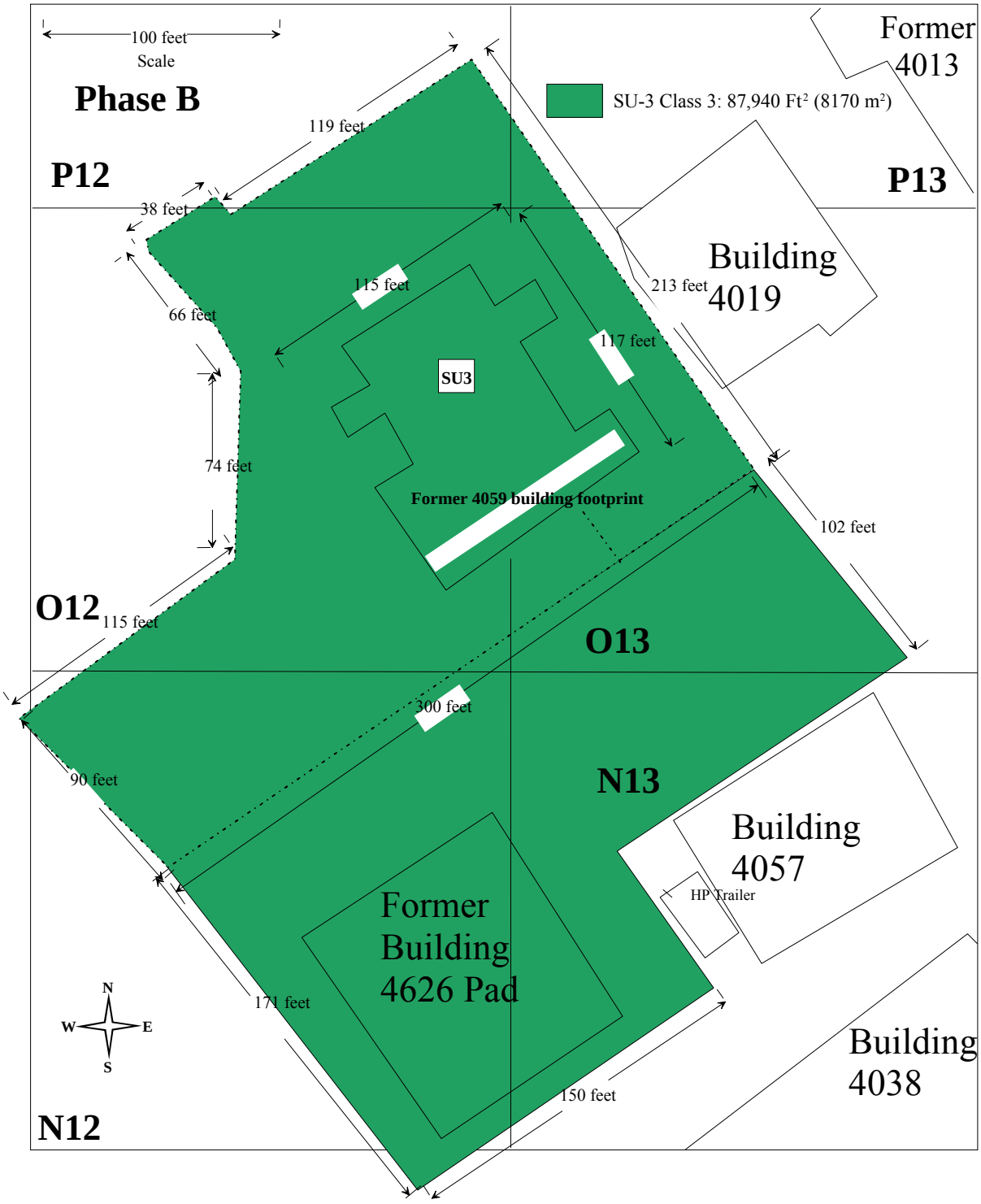


Figure 5b. Phase B Class Area and Site Dimensions

2.0 BACKGROUND AND FACILITY HISTORY

The Systems for Nuclear Auxiliary Power (SNAP) programs were a series of research and development projects on compact nuclear power sources for use as auxiliary power units for terrestrial, underwater, space, satellite, and other specialized applications. The SNAP programs were initiated in the mid-1950s as joint efforts of the Atomic Energy Commission (AEC) with the Army, Navy, and Air Force, and the National Aeronautics and Space Administration (NASA).

Building 4059 was one of the facilities supporting the SNAP program. It was constructed in 1962 and 1963 to provide the necessary environment for the SNAP-8 Development Reactor (S8DR) test, the second nuclear test of the SNAP-8 reactor. The objective of the SNAP-8 program was to develop a nuclear reactor power source for use in space. The reactor had a capacity of 619 kilowatts (kWt); it was operated for a short time period and generated a total power of 182 megawatt days. The SGPTF S8DR tests were shut down in 1964 in order to build additional structures to house a vacuum duct and pumping system. Tests in vacuum were conducted from January to December 1969.

In 1970, the reactor core and associated NaK systems were removed and dispositioned off-site. The reactor test cell was sealed, and associated vacuum systems were mothballed. The SGPTF remained inactive until 1973 when the SNAP program ended. At that time, all control consoles and reactor instrumentation were dismantled and removed.

The facility was placed into a surveillance and maintenance mode until decontamination and decommissioning (D&D) activities commenced in 1988.

From 1988 to 1998, activated and contaminated radioactive materials in Building 4059 were removed in phases. All radioactive materials removed during this time period were disposed as radioactive waste.

In 1999, the entire upper building and basement, excluding the Test Cells and the Pipe Chase Room (PCR) on the bottom of the building, were surveyed by Rocketdyne using the MARSSIM technique (Reference 3). The survey demonstrated that this portion of the building was suitable for release for unrestricted use (Reference 4). The survey results were confirmed by separate surveys by the Oak Ridge Institute for Science and Education (ORISE) (Reference 5) and the State of California Department of Health Service (DHS) in 2000. In October 2000, the Environmental Protection Agency (EPA) performed a third confirmatory survey (Reference 6). All third party surveys confirmed the Rocketdyne conclusion.

The final demolition of Building 4059 started in 2003. The released, non-radioactive portion of the building was demolished and shipped to a Class 1 hazardous waste disposal site. In 2004, the remaining underground Test Cells and PCR were excavated and disposed of as radioactive waste to the Nevada Test Site (NTS).

Detailed operation history and decontamination and decommissioning (D&D) of Building 4059 are documented in Building 4059 (SGPTF) Decontamination and Decommissioning Final Report (Reference 7).

The final status survey on the remaining land was performed to demonstrate that no residual contamination exceeds the DOE and DHS approved cleanup standards listed in Reference 2. The final status survey was conducted using the MARSSIM protocols (Reference 1). Reference 8 describes the survey design and procedures. This document describes the results of the survey

3.0 SURVEY DESIGN

The survey was designed in accordance with the Multi-Agency Radiation Surveys and Site Investigation Manual (MARSSIM) (Reference 1). The manual is jointly developed by the DOE, EPA and Nuclear Regulatory Commission (NRC) to provide detailed guidance for planning, implementing, and evaluating environmental and/or facility radiological survey for the demonstration of compliance with dose- or risk-based regulations.

The survey design is described in detail in Reference 8. The design is briefly summarized below.

3.1 Identification of Radionuclides of Concern

The principle contaminants of concern at 4059 were activation products, including H-3, Fe-55, Co-60, Ni-63, Eu-152, and Eu-154. No other significant isotopes were found during the remediation sampling. However, two small, abandoned, sealed reactor coolant sampling lines discovered during the building structure final survey (Reference 4) contained fission products. Because of this finding, soil sample analysis was performed for all potential radionuclides of concern listed above, as well as other gamma emitting isotopes (Cs-137, etc), Sr-90, Am-241, Pu-241 and isotopic Plutonium, Thorium, and Uranium.

The predominant isotope found in activated sand and bedrock during remediation activities was Eu-152, based on Rocketdyne and ORISE samples (Reference 9). Therefore, Eu-152 was used as the primary isotope of concern (surrogate isotope) in the scanning survey design.

3.2 Derived Concentration Guideline Limits ($DCGL_w$)

The objective of this survey was to demonstrate that residual contamination in excess of the derived concentration guideline limits ($DCGL_w$), as shown in Table 1, was not present within the survey units. Since multiple residual radionuclides could be present in soil, the limit for each radionuclide could only be a fraction of its DCGL so that the sum of the fractions for all radionuclides of concern does not exceed 1.

Ratios of the Eu-152 to the other isotopes were established from 1995 ORISE 4059 activated concrete sampling results (Reference 9) and 1998 Teledyne Brown Engineering laboratory data. With this established ratio, one can use Eu-152 as an indicator for compliance demostration (i.e., a surrogate isotope) even when multiple radionuclides are present in the soil. The modified release limit for Eu-152 is reduced to a lower value such that the sum-of-fraction for all nuclides of concern is less than 1. Formula I-14 from MARSSIM, Appendix I (Reference 1) was used to calculate the $DCGL_{modified}$ for using Eu-152 as a surrogate isotope during the survey design. The modifed DCGL for Eu-152 as a surrogate isotope was 2.8 pCi/g. This value was utilized to determine the number of samples and the scan minimum detectable concentration (MDC).

Table 1. Soil Guideline Release Limits

Radionuclide	Soil Guidelines[1] (pCi/g)
Am-241	5.44
Co-60	1.94
Cs-134	3.33
Cs-137	9.20
Eu-152	4.51
Eu-154	4.11
Fe-55	629,000
H-3	31,900
K-40	27.6
Mn-54	6.11
Na-22	2.31
Ni-59	151,000
Ni-63	55,300
Pu-238	37.2
Pu-239	33.9
Pu-240	33.9
Pu-241	230
Pu-242	35.5
Ra-226	5 and 15[a]
Sr-90	36
Th-228	5 and 15[a]
Th-232	5 and 15[a]
U-234	30[b]
U-235	30[b]
U-238	35[b]

NOTES: (a) DOE Order 5400.5 limits are 5 pCi/g averaged over the first 15 cm of soil depth and 15 pCi/g averaged over 15-cm layers below the top 15 cm.
(b) Generally, more conservative NRC limits for Uranium isotopes are proposed.

[1]From Reference 2, item 1, Rocketdyne Report N001SRR140131, "Approved Sitewide Release Criteria for Remediation of Radiological Facilities at SSFL", February, 1999

$$DCGL_{modified} = \frac{1}{\left(\frac{1}{Eu152DCGL} + \frac{\frac{H3C}{Eu152C}}{H3DCGL} + \frac{\frac{Fe55C}{Eu152C}}{Fe55DCGL} + \frac{\frac{Ni63C}{Eu152C}}{Ni63DCGL} + \frac{\frac{C060C}{Eu152C}}{CO60DCGL} + \frac{\frac{Eu154C}{Eu152C}}{Eu152DCGL} \right)}$$

where isotopeC/Eu-152C = the ratio of the isotope concentration to the Eu-152 concentration from laboratory analyses.

In the absence of a representative background Eu-152 data set, MARSSIM recommendates that the multi-isotope sign test be used as the statistical test to determine compliance with DCGLs. This is a conservative alternative to the Wilcoxon Rank Sum test, because it takes no credit from subtraction of background from the data set.

3.3 Classification of Areas

The final status survey was performed in two phases. The purpose of the Phase A survey was to release the excavation following removal of the building test cells and foundations. After the excavation was demonstrated to be suitable for release for unrestricted use and backfilled, the Phase B survey was performed as a final status survey of the entire ground level site, including the backfilled area.

3.3.1 Phase A Impacted Areas

During the 1995 Area IV survey (Reference 10), all of Area IV was subdivided into 200 ft by 200 ft grid blocks. The blocks are designated by letter (A-Z) from south to north and numbers (0-60) from west to east. This mapping system was created by Rocketdyne specifically for Area IV.

The impacted area was considered to be the 4059 fenced-in area within grid blocks **N12, O12, P12, O13, and P13** (see Figure 4b).

3.3.2 Phase B Impacted Areas

The impacted area was considered to be the 4059 fenced-in area within grid blocks **N12, O12, P12, O13, and P13,** as well as the area containing and surrounding former Building 4626 (used as a staging area for block handling and packaging) within grid blocks **N12, N13 and O13** (see Figure 5b).

3.3.3 Non-Impacted Area

Areas surrounding the survey units were surveyed during the Area IV survey (Reference 10), and, based on soil sample results, were considered to be non-impacted and required no additional survey.

3.3.4 Identification of Survey Units

Table 2 demonstrates the MARSSIM Manual, Roadmap-6 survey unit area limits compared to the survey unit areas used.

3.3.5 Phase A Survey Units

The Class 1 area was the lowest portion of the excavation which encompassed the Basement, Test Cells and the Pipe Chase Room. Since this area was only 567 m^2, the entire area was a single Class 1 Survey Unit. It was designated as SU1. The Class 2 area was the rest of the excavation, which was basically the rest of the fenced-in area. Since this Area was only 3780 m^2, the entire area was a single Class 2 Survey Unit. It was designated SU2.

3.3.6 Phase B Survey Unit

After the excavation was backfilled, the entire work site was considered a Class 3 area and was designated as SU3. Its area was only 8170 m^2, which is less than the maximum area for a Class 2 area.

Table 2. Area Classification

Classification	Potential or Actual Contamination Range	Max Survey Unit Area	Actual Area
Class 1	$X \geq DCGL$	2,000 m^2	567 m^2
Class 2	$20\% DCGL \leq X < DCGL$	10,000 m^2	3,870 m^2
Class 3	$X < 20\% DCGL$	No limit	8,170 m^2

3.4 Data Quality Objectives

3.4.1 Number of Samples

In order to establish the design survey, MARSSIM recommends a series of calculations, based on site data. The survey design was based on the Data Quality Objectives (DQO). These *a priori* calculations yielded the number of samples required to confirm that the survey unit meets Derived Concentration Guide Limits (DCGLs).

The acceptable decision error probabilities used were alpha (regulator's risk) 0.05 and beta (user's risk) 0.05. The lower bound of the gray region (LBGR) was first selected at one half of the effective $DCGL_w$ (2.8 pCi/g) or 1.4 pCi/g. The shift (Δ) is the $DCGL_w$ minus the LBGR. That number is divided by the standard deviation (σ) of the prior measurements in the survey unit (0.34 pCi/g). These measurements were from soil and sand samples taken from behind the reactor cell and Pipe Chase Room walls in 1994. MARSSIM recommends that the relative shift be between 1 and 3. With a LBGR of 1.4 pCi/g the relative shift was over 3. Per MARSSIM recommendations, the LBGR was adjusted up to 1.8 to give a relative shift of 2.91.

To assist with these calculations and the DQO, the computer program called Compass 1.0 (Reference 11) was written by the Oak Ridge Institute for Science and Education (ORISE). The Compass output may be reviewed in Appendix A. This program was utilized for this sampling plan during the DQO process. The number of sample points calculated by "Compass" for all 3 survey units (SU) was 14 each.

When the number of samples required by the MARSSIM protocols is applied to a survey unit, sometimes more sample locations are needed to cover the grid spacing map. In survey units 1 and 2, Compass calculated 14 required sample locations for each unit. However, when the grid was applied to the map, it generated 15 sample locations for SU-1 and 17 for SU-2. Samples were taken at the extra locations as best management practice. Sample locations for all three survey units are shown in Appendix B.

3.4.2 Instrument Scan Detection Capability

MARSSIM requires instrument scanning in Class 1 and 2 survey units to verify that DCGLs are not exceeded in the site between sample locations. The actual scan minimum detectable concentration (MDC) should be less than the required scan MDC. If the scan MDC is greater than the required MDC, the number of sample locations should be increased. RESRAD 6.2 was used to calculate area factors for Eu-152 required by Compass to calculate the required scan MDC.

The area of contamination in RESRAD 6.2 defaults to 10,000 m^2. Other than changing the area (*i.e.*, 1, 3, 10, 30, 100, 300, 1,000, or 3,000 m^2), the RESRAD default values were not changed. An area factor is a "factor used to adjust $DCGL_W$ to estimate $DCGL_{EMC}$ and the *minimum detectable concentration* for scanning surveys in *Class 1* survey units—$DCGL_{EMC} = DCGL_W \bullet A_m$. A_m is the magnitude by which the *residual radioactivity* in a small *area of elevated activity* can exceed the $DCGL_W$ while maintaining compliance with the *release criterion*." (Reference 1).

The area factors were computed by taking the ratio of the dose or risk per unit concentration generated by RESRAD for the default 10,000 m^2 to that generated for the other areas listed. The survey unit SU-1 had an area of 567 m^2 and 14 samples (567/14 = 40.5 m^2), and the area factor can be interpolated between 30 and 100 m^2, that is,

$$\frac{(40.5-30)(1.19-1.47)}{(100-30)}+1.47=1.43$$

For an area factor of 1.43, the required scan MDC = 1.43 * 2.8 pCi/g = 4.0 pCi/g. Compass used this formula to calculate the required scan MDC. The area factors calculated are shown in Table 3.

Table 3. Derived Outdoor Area Factors for 1 pCi/g of Eu-152

Area m^2	Outdoor Area Factor
1	9.27
3	4.20
10	2.03
30	1.47
100	1.19
140	1.16
300	1.10
430	1.08
1000	1.05
3000	1.03
3800	1.02
10,000	1.00

Instruments used for gamma scan included a Ludlum Model 44-2, which is a 1" (2.5 cm) diameter by 1" (2.5 cm) thick sodium iodide (NaI) scintillation detector and a TSA Systems' GPRS-104 radiation scanning system, which includes a 3" wide by 30" long by 1.5" thick plastic scintillation detector and a GPS receiver for location data logging (see Section 3.6). The following section shows how the MDCs for the both scanning instruments are calculated using the NUREG-1507 formulas.

Background = B = 3480 cpm (from process knowledge)
Assumed hot spot dimensions = 1.5 ft x 1.5 ft
Assumed hot spot depth = 0.5 ft
Scan Speed = 2.5 ft/sec
Observational interval = 1.5 ft / 2.5 fps = 0.6 sec
Detectability index = 1.38
Surveyor efficiency = 0.5
Background counts in 1 observational interval = b_i = 3400 cpm * 0.6 sec * 1 min/60 sec = 34.8 counts
MDCR = 1.38 * √34.8 counts* 60 sec/1min = 488 cpm
$MDCR_{surveyor}$ = 488 cpm / √0.5 = 691 cpm
Instrument Efficiency = 376.9 cpm per μR/hr (NUREG 1507, page 6-21)
MDC (μR/hr) = 691 cpm / 377 cpm per μR/hr = 1.8 μR/hr
MicroShield μR/hr for 1 pCi/g Eu-152 in soil = 0.59 μR/hr per pCi/g
MDC (pCi/g) = 1.8 μR/hr / 0.59 μR/hr per pCi/g = 3.1 pCi/g

Since the actual scan MDC (3.1 pCi/g) was less than the required MDC (4.0 pCi/g), the number of samples remained at 14 for SU-1. These calculations did not apply to SU-2 and SU-3 since it is not required by MARSSIM for Class 2 and Class 3 areas.

The same NUREG 1507 calculations were performed for the TSA radiation scanning system (3" x 30" x 1.5" plastic scintillation detector).

Background = B = 35,087 cpm
Assumed hot spot dimensions = 1.5 ft x 1.5 ft
Assumed hot spot depth = 0.5 ft
Scan Speed = 1.0 ft/sec
Observational interval = 1.5 ft / 1.0 fps = 1.5 sec
Detectability index = 1.38
Surveyor efficiency = 0.5
Background counts in 1 observational interval = b_i = 35,087 cpm * 1.5 sec * 1 min/60 sec = 877 counts
MDCR = 1.38 * √877 counts* 60 sec/1min = 2,452 cpm
$MDCR_{surveyor}$ = 2,452 cpm / √0.5 = 3,468cpm
Instrument Efficiency = 4,896 cpm per μR/hr (NUREG 1507, page 6-21)
MDC (μR/hr) = 3,468 cpm / 4,896 cpm per μR/hr = 0.7 μR/hr
MicroShield μR/hr for 1 pCi/g Eu-152 in soil = 0.59 μR/hr per pCi/g
MDC (pCi/g) = 0.7 μR/hr / 0.59 μR/hr per pCi/g = 1.2 pCi/g

The actual scan MDC was 1.2 pCi/g, which was less than the required scan MDC (4.0 pCi/g). When this instrument was utilized, the number of samples remained at 14.

3.5 Gamma Survey Instrument Description and Requirements

Two types of gamma survey instruments, Ludlum Model 44-2 and TSA Systems' GPRS-104, were used in the survey. The Ludlum Model 44-2 is a general purpose survey meter for high energy gamma radiation. It includes a 1" (2.5 cm) diameter by 1" (2.5 cm) thick sodium iodide (NaI)Tl scintillator and is suitable for detecting activation products such Co-60, Eu-152 and Eu-154.

The TSA Systems' GPRS-104 radiation scanning system is an equally capable survey instrument for detecting gamma emitters. It consists of a 3" x 30" x 1.5" plastic scintillation detector, a GPS receiver, and a laptop computer for data logging. The system is designed to work as a logging system to record position information from the GPS system along with the radiation activity on a one second basis. The information is written to the hard drive in the computer under a file name supplied by the user. Because of its GPS and data logging capabilities, the GPRS-104 was used as the primary gamma scan instrument for the Building 4059 final status survey.

3.5.1 Instrument Performance Check

Measurement integrity of the instruments was monitored throughout all parts of gamma surveys by periodic checks of the instrument's response to normal background radiation, and to a field check source (Reference 12).

3.5.2 Environmental Calibration Site

The instrument background, calibration and efficiency checks were conducted per Reference 12 at a non-radioactive facility. The background readings were taken from the open field across from Building 4038. This area, as determined by the Radiation Safety Technicians, had a background radiation level similar to that of the Building 4059 site. This area was also used for the daily source check area throughout the Building 4059 survey.

4.0 SURVEY RESULTS

4.1 Surface Exposure Rate Results

4.1.1 Phase A

After the excavation was completed, a surface scan was performed using the TSA Systems' GPRS-104 radiation scanning system. GPRS-104 is a GPS equipped gamma scan system. It records the gamma exposure rate every second along with date, time, longitude and latitude associated with the counting result. Figure C1 (Appendix C) illustrates the radiation exposure map in the Class 1 and 2 survey units. Areas where no measurements were recorded were steep inaccessible slopes.

The relatively high readings in the excavated pit were primarily due to two factors: 1) different counting geometry and 2) exposed bedrock. The detector was calibrated in a semi-infinite geometry (i.e., a flat surface) and used in an inside cylindrical geometry (i.e., an excavated pit in the ground), in which gamma radiation shined not only from the floor, but also from the surrounding walls. Therefore, the readings were expected to be higher in an excavated pit. Because the excavation exposed bedrock, and bedrock in general has higher naturally occurring radioactivity than surface soils, survey readings on top of bedrock would be higher than those on surface soils.

In addition to the exposure geometry and the bedrock, it is possible that the high readings in the gamma scan were due to residual gamma-emitting contaminants. The color coded images provided the guidance for further investigation. After reviewing the GPRS-104 gamma scan data, a total of 12 soil samples were collected at the high gamma dose rate spots for gamma spectrometry analysis. No man-made radionuclides were found in these samples. These soil samples ruled out the possibility that the elevated gamma exposure rate was due to residual contamination.

4.1.2 Phase B

After the excavation was backfilled and graded, the entire Building 4059 site was classified as one Class 3 survey unit. According to the MARSSIM protocol, surface scan is not required for Class 3 survey unit. However, as a best management practice, a random walk-about surface scan was performed using the GPRS-104 system. No abnormal readings were observed. Figure C2 (Appendix C) shows these random walk surface scan results in the Phase B Class 3 survey unit.

4.2 Radionuclide Concentrations in Soil

Soil samples were collected in accordance with the MARSSIM protocol to demonstrate that the site satisfy the release for unrestricted use criteria. Because the potential radiological contaminant residuals in soil, if any, are expected to be far below the $DCGL_W$ values, the one-sample statistical test (Sign test) described in Section 5.5.2.3 in MARSSIM is the appropriate statistical test for the demonstration. In the one-sample

Sign test, background concentrations of the radionuclide are included with the residual radioactivity (*i.e.*, the entire amount is attributed to facility operations). Thus, the total concentration of the radionuclide is compared to the release criterion. This is a conservative option and does not require reference area for background subtraction.

The one-sample Sign test evaluates whether the median of the data is above or below the $DCGL_W$. If the data distribution is symmetric, the median is equal to the mean. In cases where the data are severely skewed, the mean may be above the $DCGL_W$, while the median is below the $DCGL_W$. In such cases, the survey unit does *not* meet the release criterion regardless of the result of the statistical tests. On the other hand, if the largest measurement is below the $DCGL_W$, the Sign test will always show that the survey unit meets the release criterion. The following table, excerpted from Table 8.2 in MARSSIM, summarizes the appropriate statistical test for different situations.

Summary of Statistical Tests

Survey Result	**Conclusion**
All measurements less than DCGLW	Survey unit meets release criterion
Average greater than DCGLW	Survey unit does not meet release criterion
Any measurement greater than DCGLW and the average less than DCGLW	Conduct Sign test and elevated measurement comparison

4.2.1 Phase A

There were two survey units, SU-1 and SU-2, in Phase A of the release survey. Soil samples were collected in each unit and analyzed for all radionuclides of concern. Man-made radionuclide concentrations were either below the detection limits or well below the release limits. Naturally occurring isotopes of uranium and thorium that are also nuclear fuel materials were also below the release limits. Detailed results are provided in Appendix D.

All measurements were below their corresponding $DCGL_W$ values, as shown in Table 4a and Table 4b. Because there were multiple radionuclides of concern involved in the survey, the multi-isotope sum-of-fractions was also calculated and compared to 1 (unity rule). For all individual sampling locations, the sum-of-fractions of all radionuclides was well below unity, indicating that the both survey units met the release criteria for unrestricted use.

Shortly after the Phase A survey, ORISE and DHS performed verification surveys of the excavation. ORISE confirmed that the excavation was suitable for unrestricted use (Reference 13). DHS also confirmed that approved DCGLs were met.

Table 4a. Phase A, SU-1 Soil Sampling Results

	Am-241	Co-60	Cs-137	Eu-152	Eu-154	Fe-55	H-3	Ni-63	Pu-238	Pu-239	Pu-240	Pu-241	Sr-90	Sum-of-Fractions
$DCGL_w$, pCi/g	5.44	1.94	9.2	4.51	4.11	629000	31900	55300	37.2	33.9	33.9	230	36	
	Fraction of $DCGL_w$ **													
Sample ID	Am-241	Co-60	Cs-137	Eu-152	Eu-154	Fe-55	H-3	Ni-63	Pu-238	Pu-239	Pu-240	Pu-241	Sr-90	
059-04-0095	0.000	0.010	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029
059-04-0096	0.006	0.000	0.000	0.000	0.051	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.060
059-04-0097	0.002	0.000	0.006	0.029	0.051	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090
059-04-0098	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
059-04-0099	0.000	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.034
059-04-0100	0.000	0.037	0.003	0.000	0.041	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.084
059-04-0101	0.002	0.006	0.000	0.000	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.030
059-04-0102	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.012
059-04-0103	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.006
059-04-0104	0.005	0.000	0.000	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.028
059-04-0105	0.001	0.008	0.000	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.043
059-04-0106	0.002	0.000	0.006	0.029	0.051	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090
059-04-0107	0.002	0.000	0.000	0.042	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.045
059-04-0108	0.002	0.006	0.003	0.129	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.141
059-04-0109	0.001	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.021
059-04-0112*	0.000	0.001	0.000	0.067	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.068

* Field Duplicate.
** For a negative result, zero is used to calculate the fraction.
Note: Naturally-occurring uranium and thorium are not required to be included in the statistical tests.

Table 4b. Phase A, SU-2 Soil Sampling Results

	Am-241	Co-60	Cs-137	Eu-152	Eu-154	Fe-55	H-3	Ni-63	Pu-238	Pu-239	Pu-240	Pu-241	Sr-90	Sum-of-Fractions
$DCGL_w$, pCi/g	5.44	1.94	9.2	4.51	4.11	629000	31900	55300	37.2	33.9	33.9	230	36	
	Fraction of $DCGL_w$ **													
Sample ID	Am-241	Co-60	Cs-137	Eu-152	Eu-154	Fe-55	H-3	Ni-63	Pu-238	Pu-239	Pu-240	Pu-241	Sr-90	
059-04-0113	0.000	0.007	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.019
059-04-0114	0.004	0.006	0.000	0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.041
059-04-0115	0.008	0.014	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.028
059-04-0116	0.003	0.013	0.001	0.018	0.017	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.056
059-04-0117	0.006	0.014	0.000	0.027	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.005	0.000	0.053
059-04-0118	0.007	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010
059-04-0119	0.000	0.008	0.000	0.000	0.078	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.089
059-04-0120	0.015	0.021	0.000	0.000	0.041	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.078
059-04-0121	0.000	0.017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.018
059-04-0122	0.000	0.007	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009
059-04-0123	0.000	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015
059-04-0124	0.004	0.010	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.030
059-04-0125*	0.000	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.014
059-04-0126	0.016	0.023	0.006	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.001	0.000	0.001	0.050
059-04-0127	0.003	0.007	0.000	0.091	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.103
059-04-0128	0.001	0.001	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.026
059-04-0129	0.002	0.021	0.002	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.031
059-04-0130	0.008	0.000	0.000	0.004	0.022	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.002	0.037

* Field Duplicate.
** For a negative result, zero is used to calculate the fraction.
Note: Naturally-occurring uranium and thorium are not required to be included in the statistical tests.

In addition to the MARSSIM samples, soil samples were also taken from the excavated soil. A total of 12 samples were collected for gamma spectrometry analysis, and no man-made gamma emitters were detected in these samples. The ORISE also took two composite samples from the excavated soil and analyzed for all radionuclides of concern. No man-made radionuclides were detected in these composite samples (Reference 13). The excavated soils were used as part of the backfill soil.

4.2.2 Phase B

After the excavation was surveyed and backfilled, the entire Building 4059 site was classified as one Class 3 survey unit. A total of 14 soil samples were collected in accordance with the MARSSIM protocol to demonstrate the site meets the release criteria and is suitable for unrestricted use.

Man-made radionuclide concentrations were either below the detection limits or well below the release limits. Naturally occurring isotopes of uranium and thorium that are also nuclear fuel materials were also below the release limits. Detailed results are presented in Appendix D.

All measurements were below their corresponding $DCGL_W$ values, as shown in Table 5. Because there are multiple radionuclides of interest involved in the survey, the multi-isotope sum-of-fractions comparison to unity was applied. For all individual sampling locations, the sum-of-fractions of all radionuclides was well below unity, indicating that the survey unit met the release criteria for unrestricted use.

Table 5. Phase B Soil Sampling Results

	Am-241	Co-60	Cs-137	Eu-152	Eu-154	Fe-55	H-3	Ni-63	Pu-238	Pu-239	Pu-240	Pu-241	Sr-90	Sum-of-Fractions
$DCGL_w$, pCi/g	5.44	1.94	9.2	4.51	4.11	629000	31900	55300	37.2	33.9	33.9	230	36	
	Fraction of $DCGL_w$ *													
Sample ID	Am-241	Co-60	Cs-137	Eu-152	Eu-154	Fe-55	H-3	Ni-63	Pu-238	Pu-239	Pu-240	Pu-241	Sr-90	
59-05-0004	0.003	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.006
59-05-0005	0.002	0.031	0.000	0.018	0.004	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.007	0.063
59-05-0006	0.006	0.000	0.016	0.050	0.044	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.117
59-05-0007	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004
59-05-0008	0.003	0.019	0.007	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.009	0.041
59-05-0009	0.008	0.000	0.001	0.087	0.016	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.015	0.128
59-05-0011	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006
59-05-0012	0.002	0.000	0.001	0.051	0.013	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.069
59-05-0013	0.007	0.000	0.013	0.008	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.035	0.065
59-05-0014	0.003	0.000	0.000	0.074	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.003	0.083
59-05-0015	0.022	0.020	0.003	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.005	0.049
59-05-0016	0.000	0.049	0.000	0.050	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.003	0.104
59-05-0017	0.002	0.000	0.002	0.000	0.023	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.005	0.033
59-05-0018	0.000	0.000	0.005	0.077	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.089

* For a negative result, zero is used to calculate the fraction.

Note: Naturally-occurring uranium and thorium are not required to be included in the statistical tests.

5.0 CONCLUSION

Surface radiation exposure measurements and MARSSIM soil sampling have demonstrated that the Building 4059 site meets the DOE and DHS approved release criteria for unrestricted use. During the Phase A survey, surface gamma radiation scan indicated excavation locations with elevated dose rates because of the survey geometry in the excavated pit and proximity to bedrock. Soil samples were taken at the locations with high dose rates for radioisotopic analysis, and no man-made gamma emitters were found in these samples. The surface scan in Phase B indicated only background gamma radiation levels at the site.

The majority of the MARSSIM soil samples collected in both phases contained only naturally-occurring radioisotopes. For the few samples that indicated man-made radioisotopes above detection limits, the levels were far below the release limits (DCGLs). Because all individual radionuclide concentrations were below the DCGLs and the sum-of-fractions of all radionuclides at all individual sampling locations were well below unity, the site is suitable for release for unrestricted use.

6.0 REFERENCES

1. NUREG 1575, EPA 402-R-97-016, "Multi Agency Radiation Survey and Site Investigation Manual (MARSSIM)", Rev.1, August 2000.

2. N001SRR140131, "Approved Site wide Release Criteria for Remediation of Radiological Facilities at the Santa Susana Field Laboratory", February 18, 1999.

3. RS-00001, "Building 4059, Phase 1 Final Status Survey Procedure", Rev New, April 29, 1999.

4. RS-00002, "Building 4059 Final Status Survey Report", Rev New, August 20, 1999.

5. ORISE 2000-1523, "Verification Survey of Building 4059 (Phase 1), Santa Susana Field Laboratory, The Boeing Company, Ventura County, California", December, 2000.

6. U. S. Environmental Protection Agency, "Final Oversight Verification and Confirmation Survey Report for Building 4059," December 20, 2002.

7. EID-08640, "Building 4059 (SGPTF) Decontamination and Decommissioning Final Report", Rev. New, April 29, 2005.

8. RS-00023, "Building 4059 Final Status Survey Procedure", Rev New, September 17, 2004.

9. ORISE, 95/G-18, "Radiological Survey of the Building 059 Reactor Vault, Santa Susana Laboratory, Rockwell International, Ventura County, California", June 1995.

10. Rocketdyne Report A4CM-ZR-0011, "Area IV Radiological Characterization Survey", August 15, 1996.

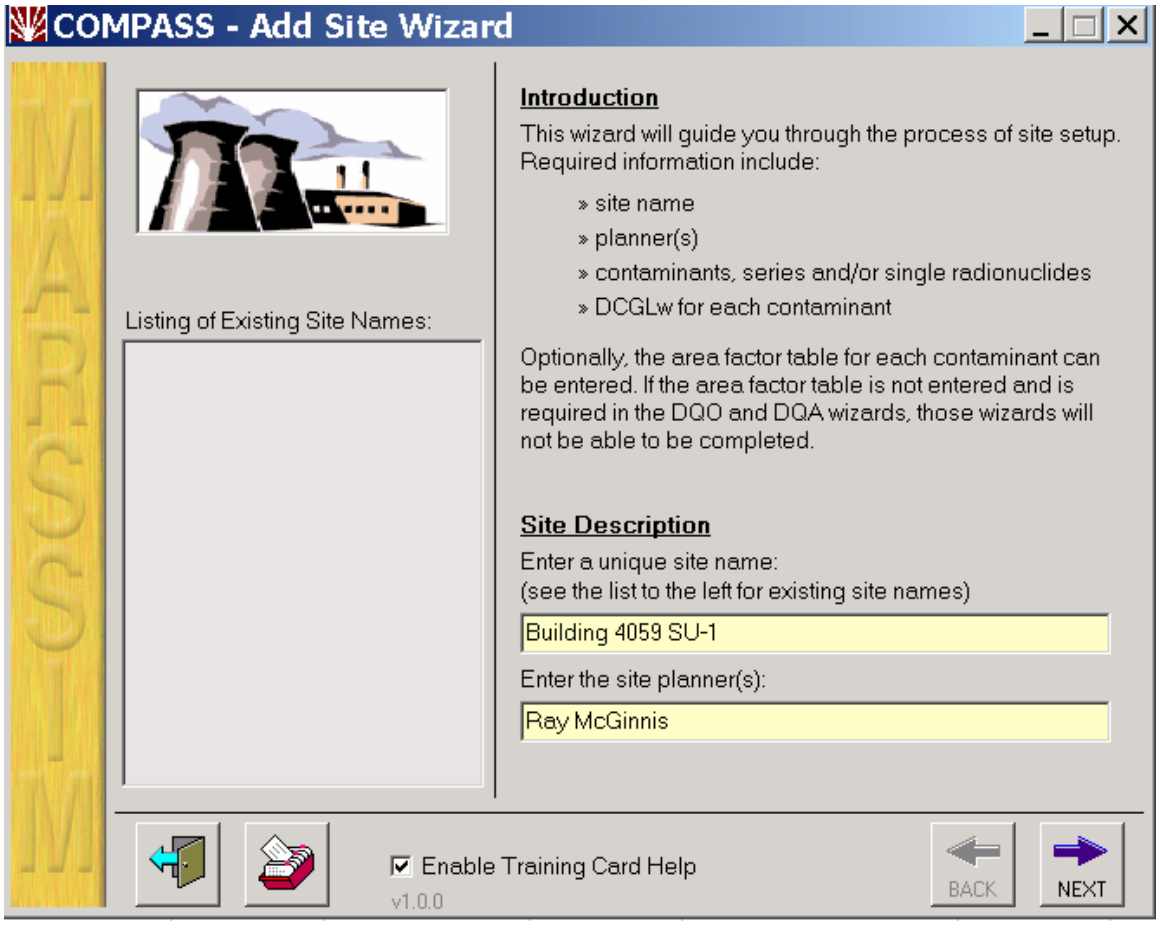
11. Compass, Oak Ridge Institute for Science and Education (ORISE), Version 1.0.0, © 2000, 2001.

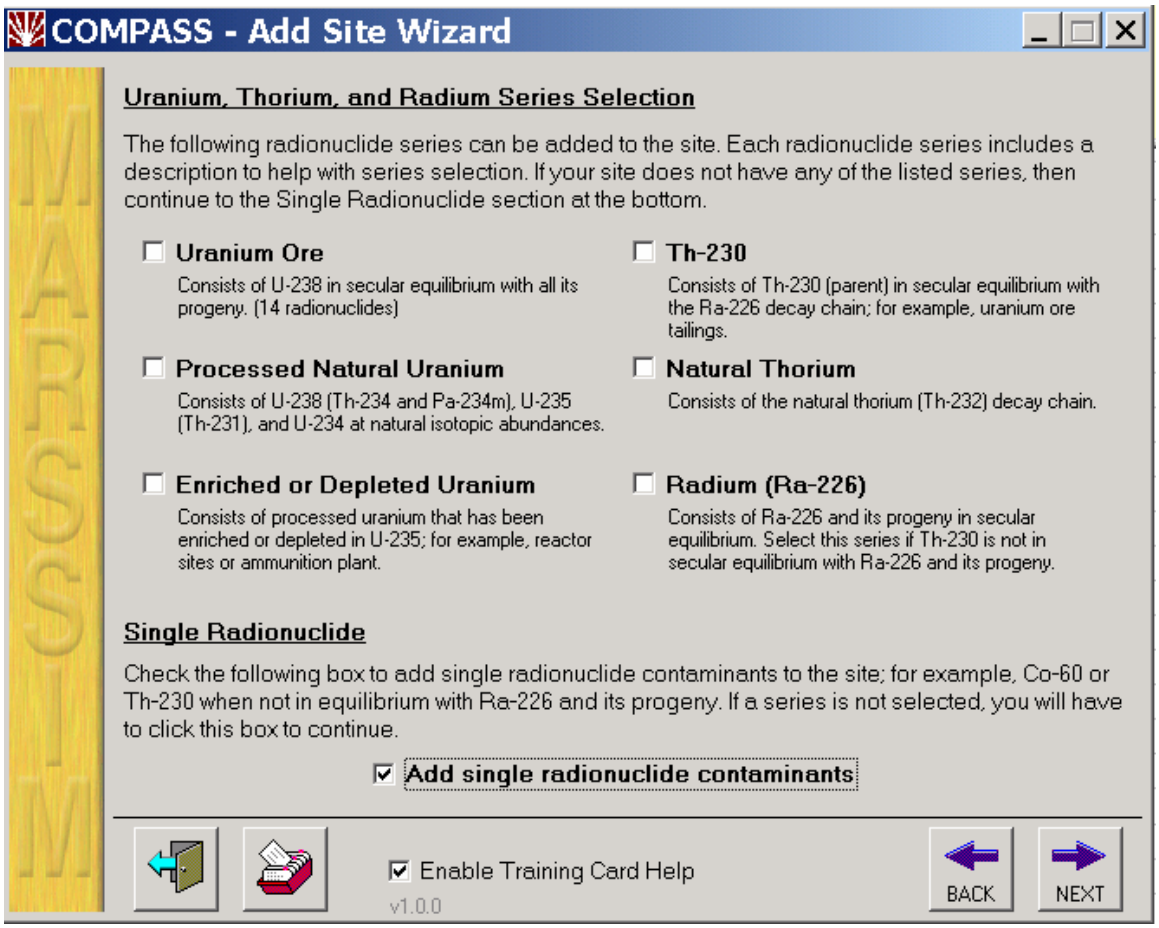
12. RS-00012, "Methods and Procedures for Radiological Monitoring", Rev A, January 2, 2002.

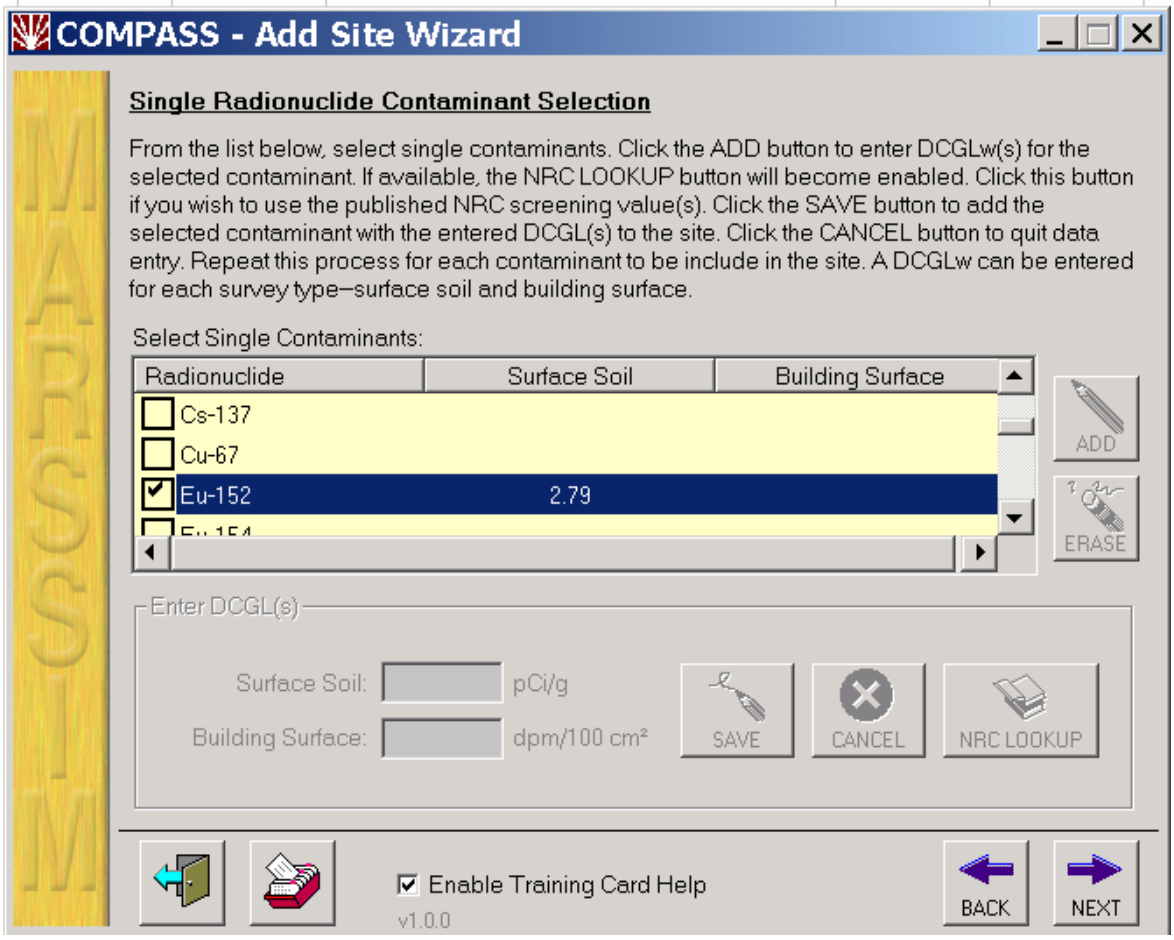
13. ORISE 2000-1523, "Verification Survey of the Building 4059 Excavation, Santa Susana Field Laboratory, The Boeing Company, Ventura County, California", March, 2005.

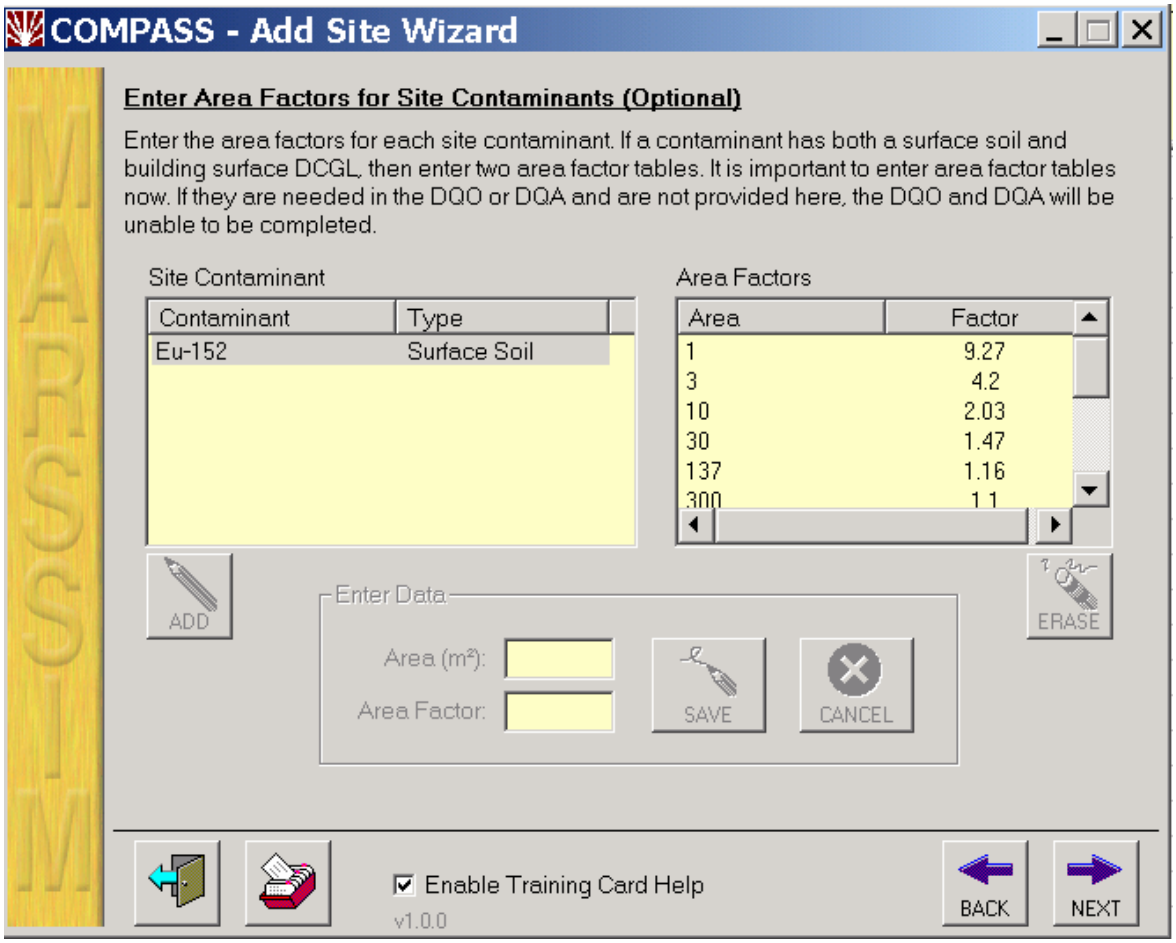
APPENDIX A. COMPASS COMPUTER PROGRAM SCREEN SHOTS

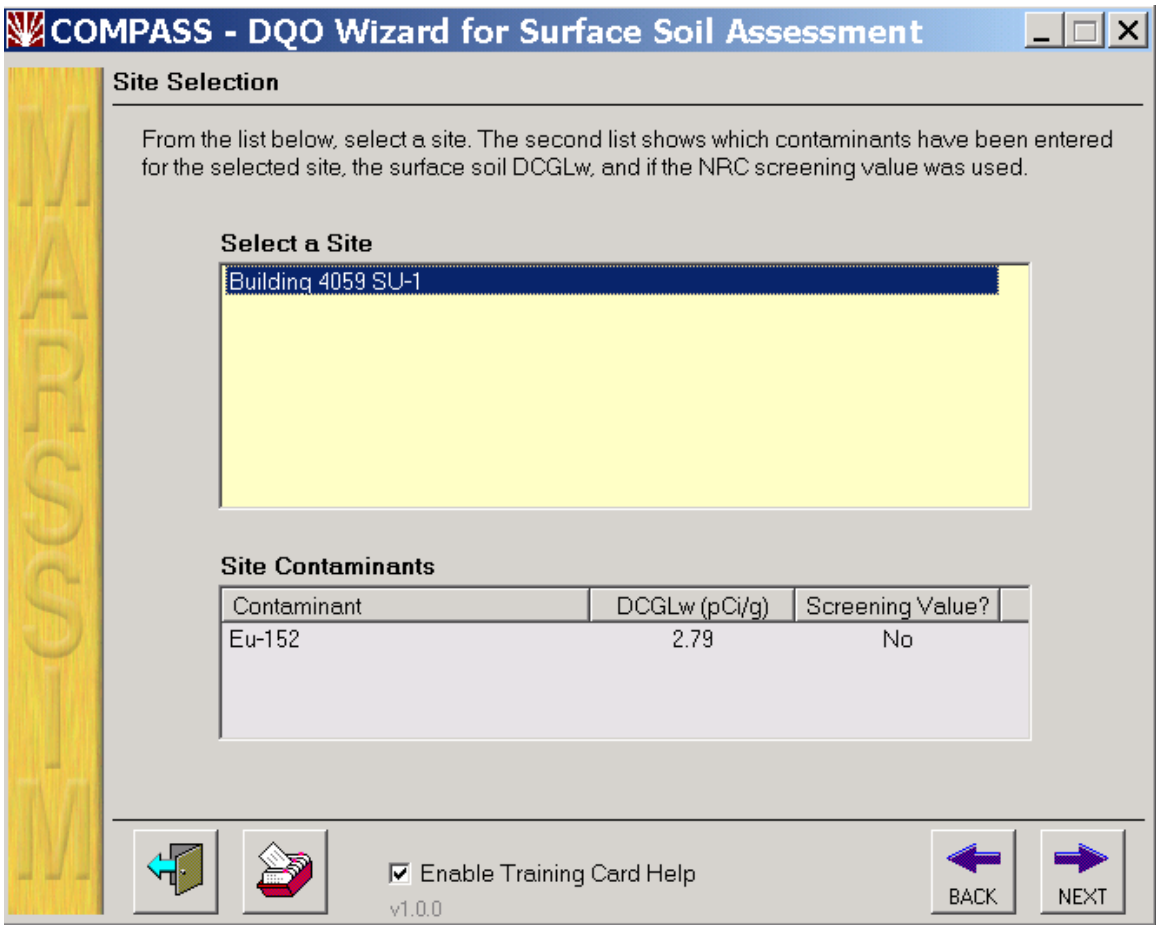
Phase A, Survey Unit 1 Compass Run

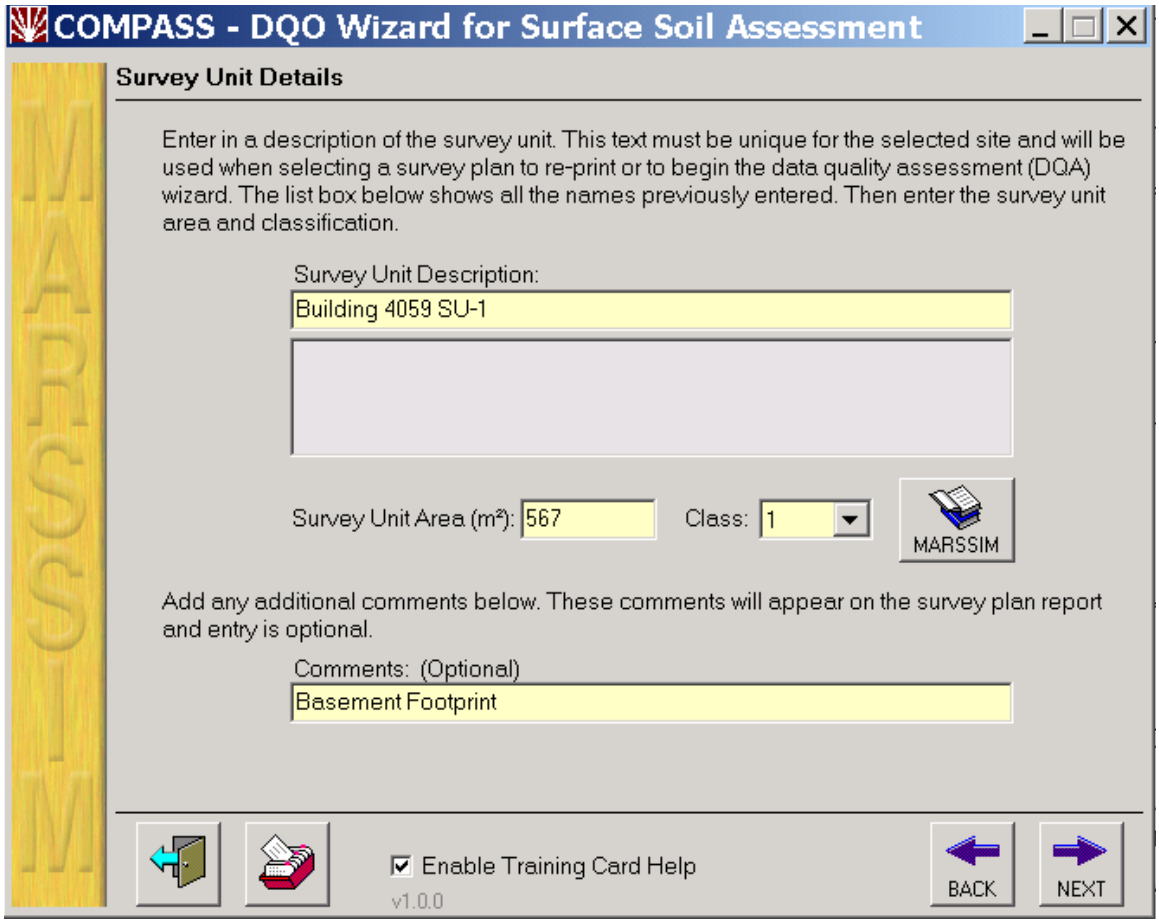

COMPASS - Add Site Wizard
MARSSIM
Listing of Existing Site Names:
Introduction
This wizard will guide you through the process of site setup. Required information include:
» site name
» planner(s)
» contaminants, series and/or single radionuclides
» DCGLw for each contaminant
Optionally, the area factor table for each contaminant can be entered. If the area factor table is not entered and is required in the DQO and DQA wizards, those wizards will not be able to be completed.
Site Description
Enter a unique site name:
(see the list to the left for existing site names)
Building 4059 SU-1
Enter the site planner(s):
Ray McGinnis
Enable Training Card Help
v1.0.0
BACK
NEXT

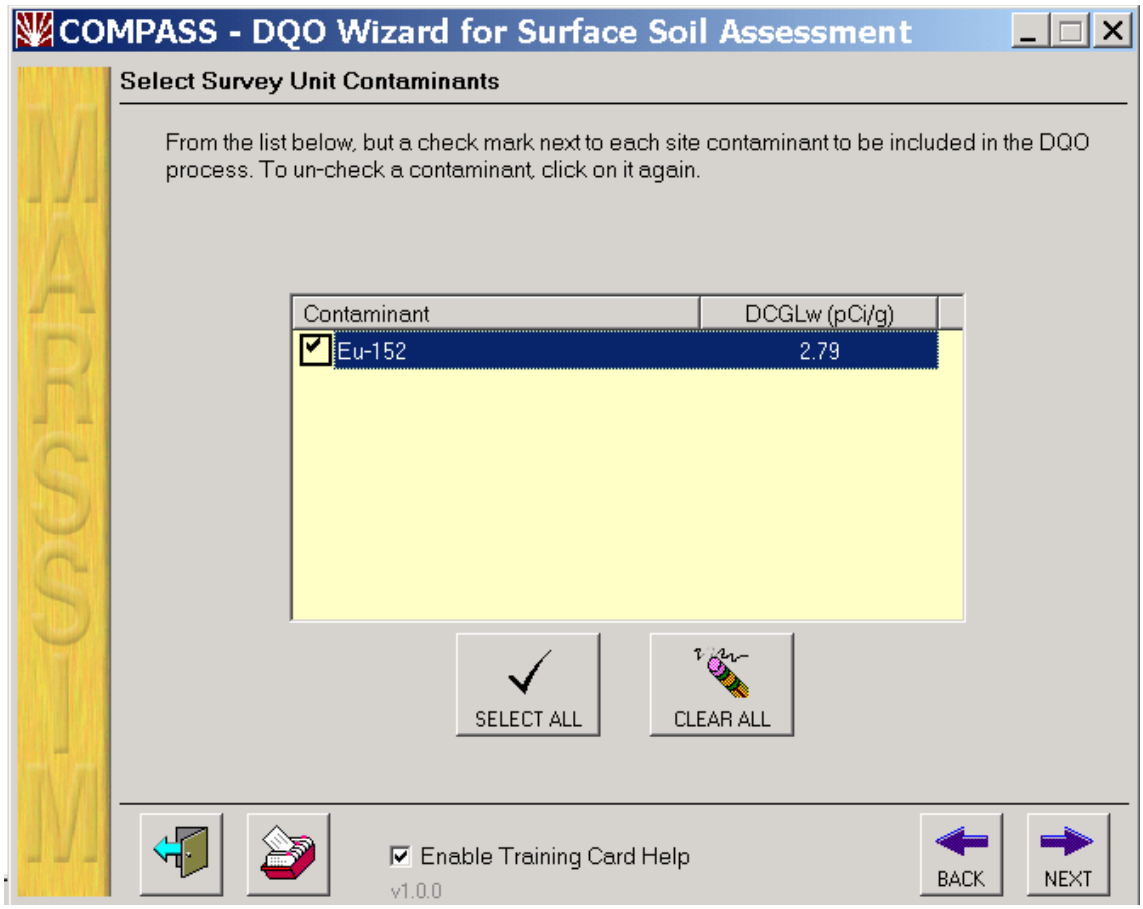

COMPASS - Add Site Wizard
Uranium, Thorium, and Radium Series Selection
The following radionuclide series can be added to the site. Each radionuclide series includes a description to help with series selection. If your site does not have any of the listed series, then continue to the Single Radionuclide section at the bottom.
Uranium Ore
Consists of U-238 in secular equilibrium with all its progeny. (14 radionuclides)
Th-230
Consists of Th-230 (parent) in secular equilibrium with the Ra-226 decay chain; for example, uranium ore tailings.
Processed Natural Uranium
Consists of U-238 (Th-234 and Pa-234m), U-235 (Th-231), and U-234 at natural isotopic abundances.
Natural Thorium
Consists of the natural thorium (Th-232) decay chain.
Enriched or Depleted Uranium
Consists of processed uranium that has been enriched or depleted in U-235; for example, reactor sites or ammunition plant.
Radium (Ra-226)
Consists of Ra-226 and its progeny in secular equilibrium. Select this series if Th-230 is not in secular equilibrium with Ra-226 and its progeny.
Single Radionuclide
Check the following box to add single radionuclide contaminants to the site; for example, Co-60 or Th-230 when not in equilibrium with Ra-226 and its progeny. If a series is not selected, you will have to click this box to continue.
Add single radionuclide contaminants
Enable Training Card Help
v1.0.0
BACK
NEXT

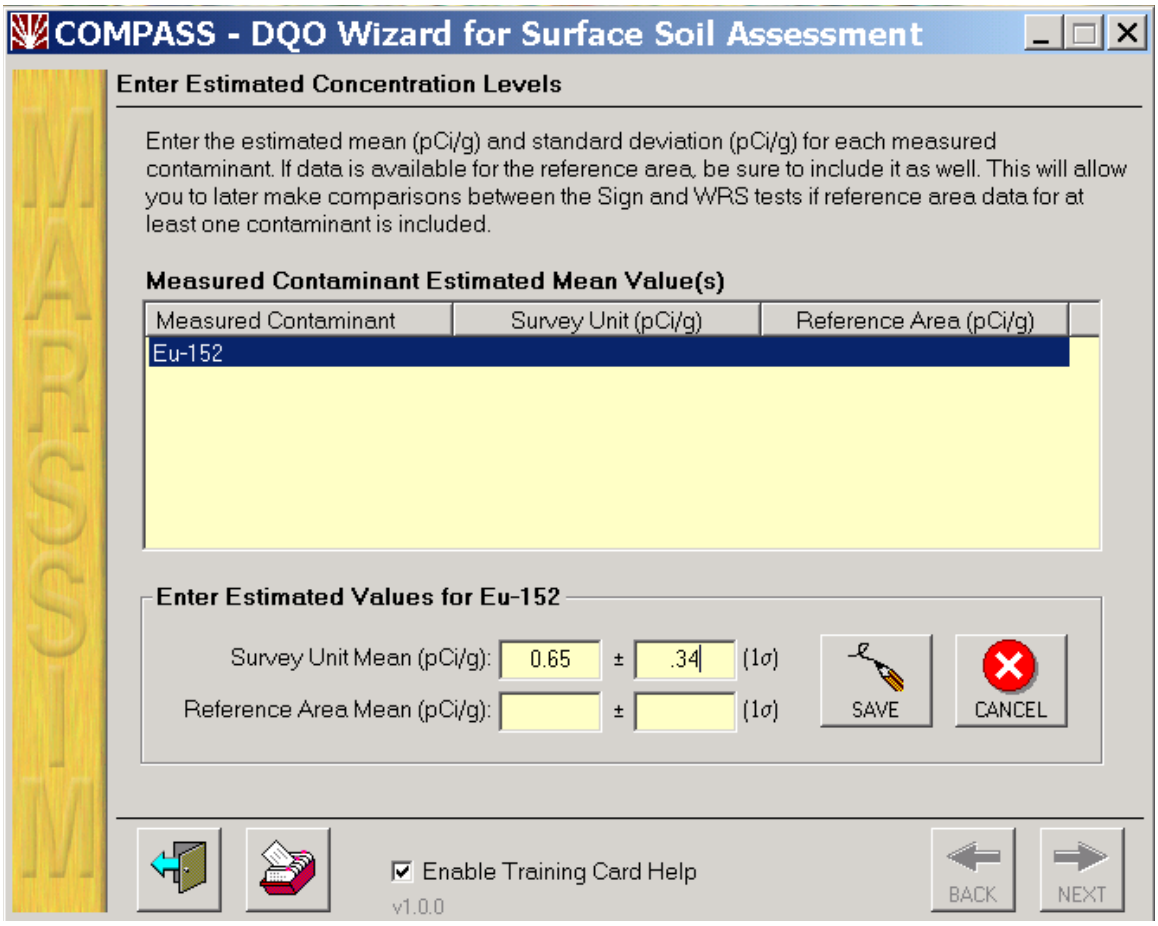

COMPASS - Add Site Wizard
MARSSIM
Single Radionuclide Contaminant Selection
From the list below, select single contaminants. Click the ADD button to enter DCGLw(s) for the selected contaminant. If available, the NRC LOOKUP button will become enabled. Click this button if you wish to use the published NRC screening value(s). Click the SAVE button to add the selected contaminant with the entered DCGL(s) to the site. Click the CANCEL button to quit data entry. Repeat this process for each contaminant to be include in the site. A DCGLw can be entered for each survey type–surface soil and building surface.
Select Single Contaminants:
Radionuclide
Surface Soil
Building Surface
Cs-137
Cu-67
Eu-152
2.79
ADD
ERASE
Enter DCGL(s)
Surface Soil:
pCi/g
Building Surface:
dpm/100 cm²
SAVE
CANCEL
NRC LOOKUP
Enable Training Card Help
v1.0.0
BACK
NEXT

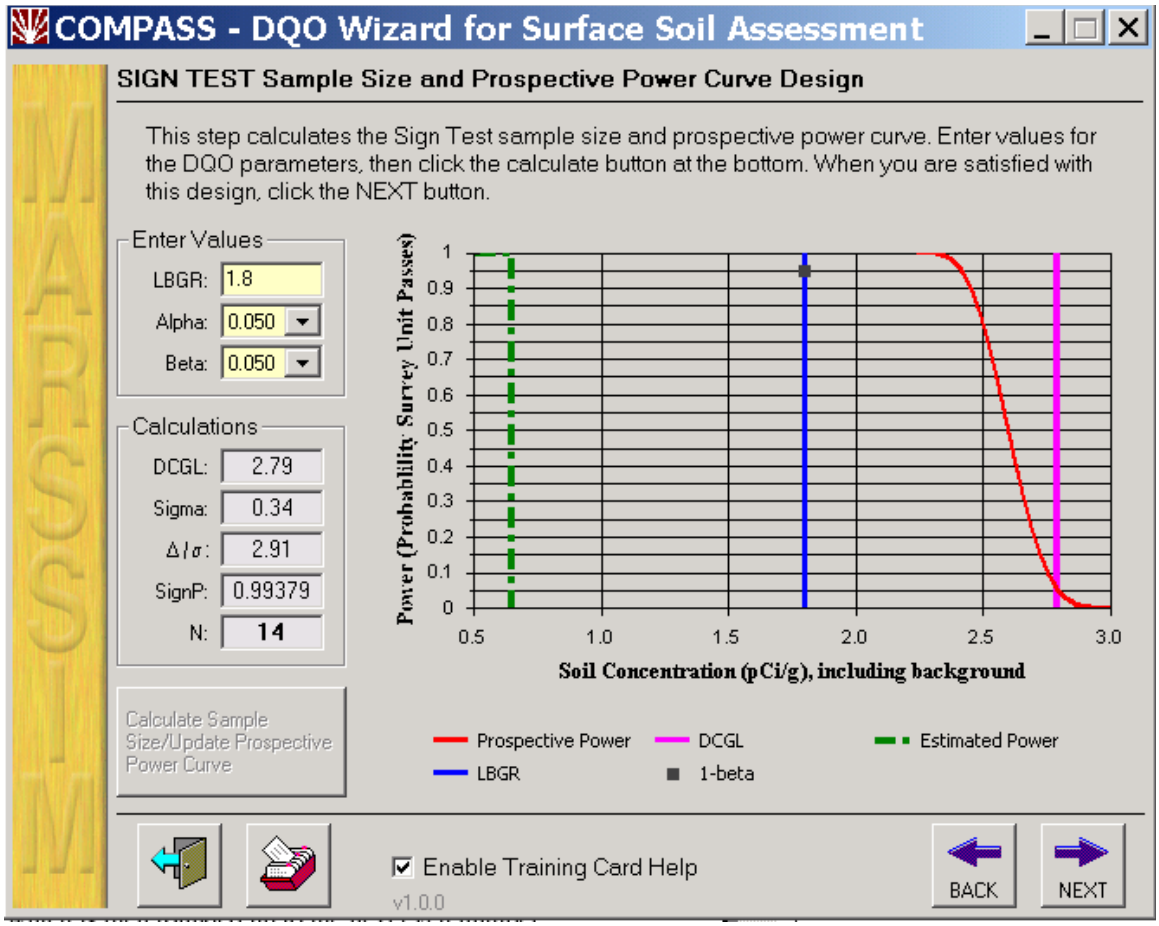

COMPASS - Add Site Wizard
Enter Area Factors for Site Contaminants (Optional)
Enter the area factors for each site contaminant. If a contaminant has both a surface soil and building surface DCGL, then enter two area factor tables. It is important to enter area factor tables now. If they are needed in the DQO or DQA and are not provided here, the DQO and DQA will be unable to be completed.
Site Contaminant
Contaminant
Type
Eu-152
Surface Soil
Area Factors
Area
Factor
1
9.27
3
4.2
10
2.03
30
1.47
137
1.16
300
1.1
ADD
ERASE
Enter Data
Area (m²):
Area Factor:
SAVE
CANCEL
Enable Training Card Help
v1.0.0
BACK
NEXT

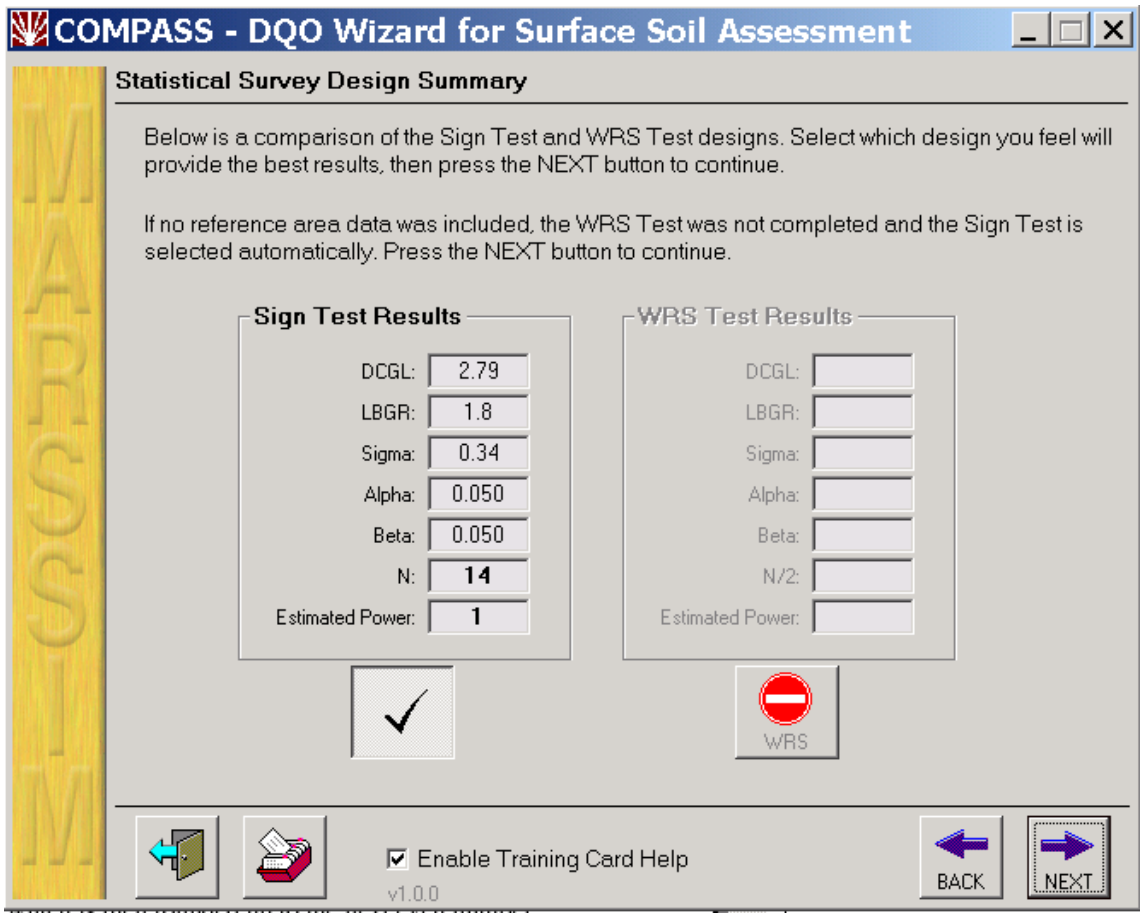

COMPASS - DQO Wizard for Surface Soil Assessment
MARSSIM
Site Selection
From the list below, select a site. The second list shows which contaminants have been entered for the selected site, the surface soil DCGLw, and if the NRC screening value was used.
Select a Site
Building 4059 SU-1
Site Contaminants
Contaminant
DCGLw (pCi/g)
Screening Value?
Eu-152
2.79
No
Enable Training Card Help
v1.0.0
BACK
NEXT

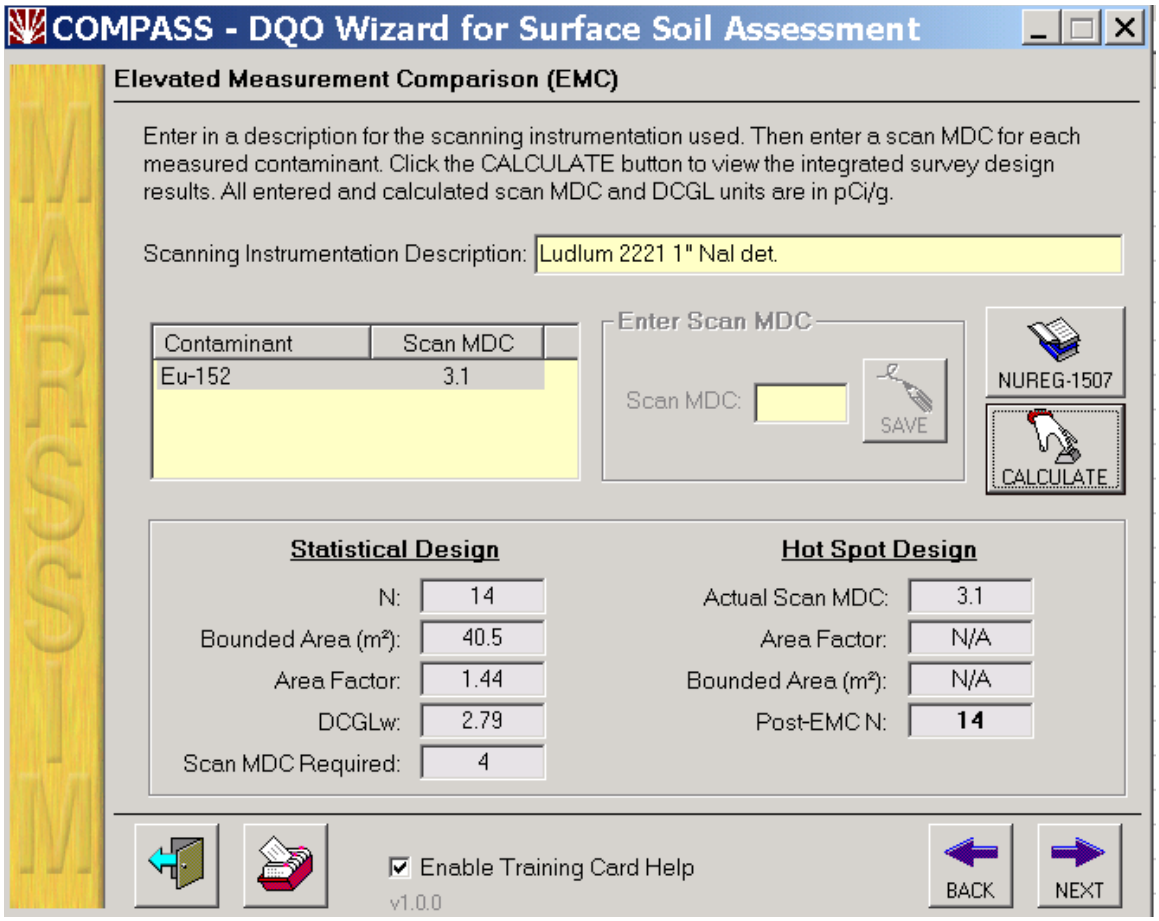

COMPASS - DQO Wizard for Surface Soil Assessment
MARSSIM
Survey Unit Details
Enter in a description of the survey unit. This text must be unique for the selected site and will be used when selecting a survey plan to re-print or to begin the data quality assessment (DQA) wizard. The list box below shows all the names previously entered. Then enter the survey unit area and classification.
Survey Unit Description:
Building 4059 SU-1
Survey Unit Area (m²): 567
Class: 1
MARSSIM
Add any additional comments below. These comments will appear on the survey plan report and entry is optional.
Comments: (Optional)
Basement Footprint
Enable Training Card Help
v1.0.0
BACK
NEXT


COMPASS - DQO Wizard for Surface Soil Assessment
MARSSIM
Select Survey Unit Contaminants
From the list below, but a check mark next to each site contaminant to be included in the DQO process. To un-check a contaminant, click on it again.
Contaminant
DCGLw (pCi/g)
Eu-152
2.79
SELECT ALL
CLEAR ALL
Enable Training Card Help
v1.0.0
BACK
NEXT

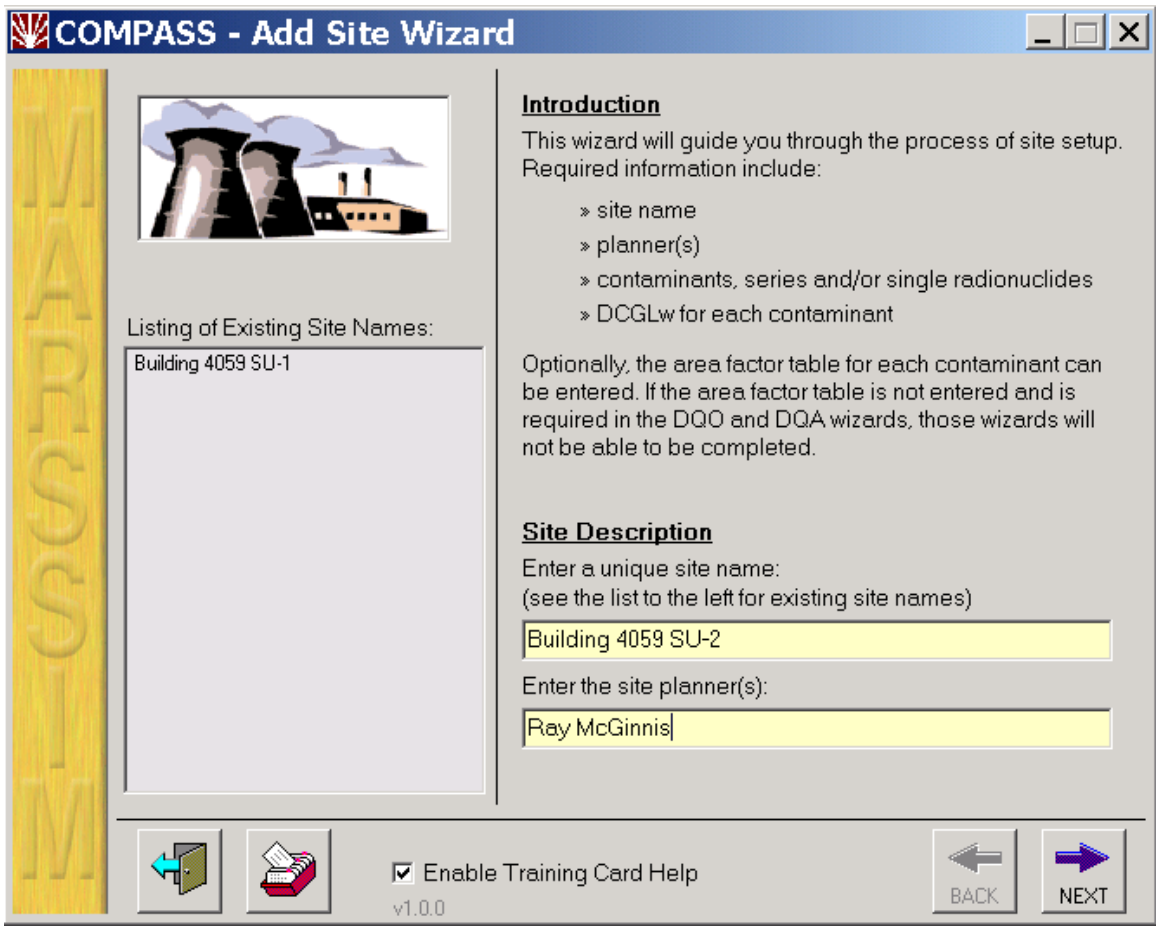

COMPASS - DQO Wizard for Surface Soil Assessment
Enter Estimated Concentration Levels
Enter the estimated mean (pCi/g) and standard deviation (pCi/g) for each measured contaminant. If data is available for the reference area, be sure to include it as well. This will allow you to later make comparisons between the Sign and WRS tests if reference area data for at least one contaminant is included.
Measured Contaminant Estimated Mean Value(s)
Measured Contaminant
Survey Unit (pCi/g)
Reference Area (pCi/g)
Eu-152
Enter Estimated Values for Eu-152
Survey Unit Mean (pCi/g): 0.65 ± .34 (1σ)
Reference Area Mean (pCi/g): ± (1σ)
SAVE
CANCEL
Enable Training Card Help
v1.0.0
BACK
NEXT

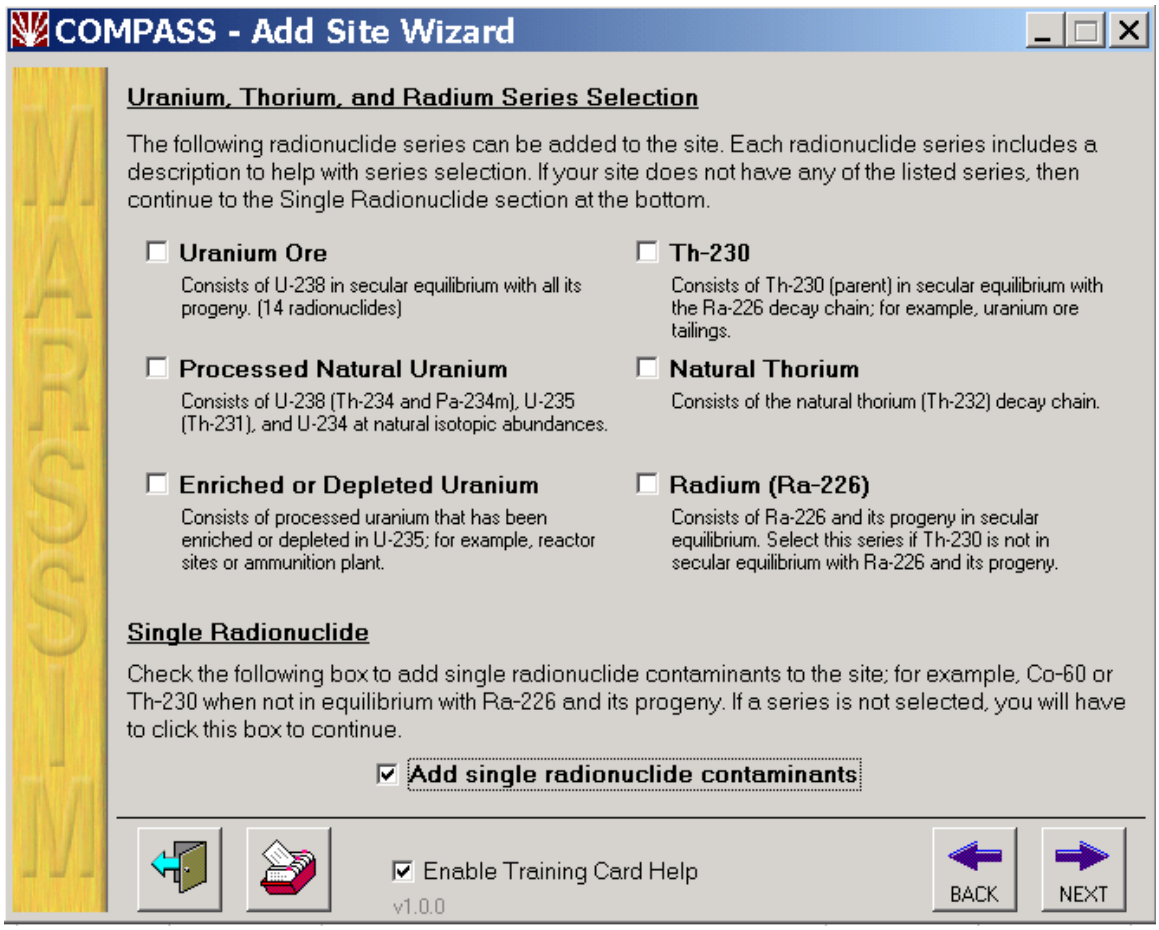

COMPASS - DQO Wizard for Surface Soil Assessment
SIGN TEST Sample Size and Prospective Power Curve Design
This step calculates the Sign Test sample size and prospective power curve. Enter values for the DQO parameters, then click the calculate button at the bottom. When you are satisfied with this design, click the NEXT button.
Enter Values
LBGR: 1.8
Alpha: 0.050
Beta: 0.050
Calculations
DCGL: 2.79
Sigma: 0.34
Δ/σ: 2.91
SignP: 0.99379
N: 14
Calculate Sample Size/Update Prospective Power Curve
Power (Probability Survey Unit Passes)
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
0.5 1.0 1.5 2.0 2.5 3.0
Soil Concentration (pCi/g), including background
Prospective Power
DCGL
Estimated Power
LBGR
1-beta
Enable Training Card Help
v1.0.0
BACK
NEXT

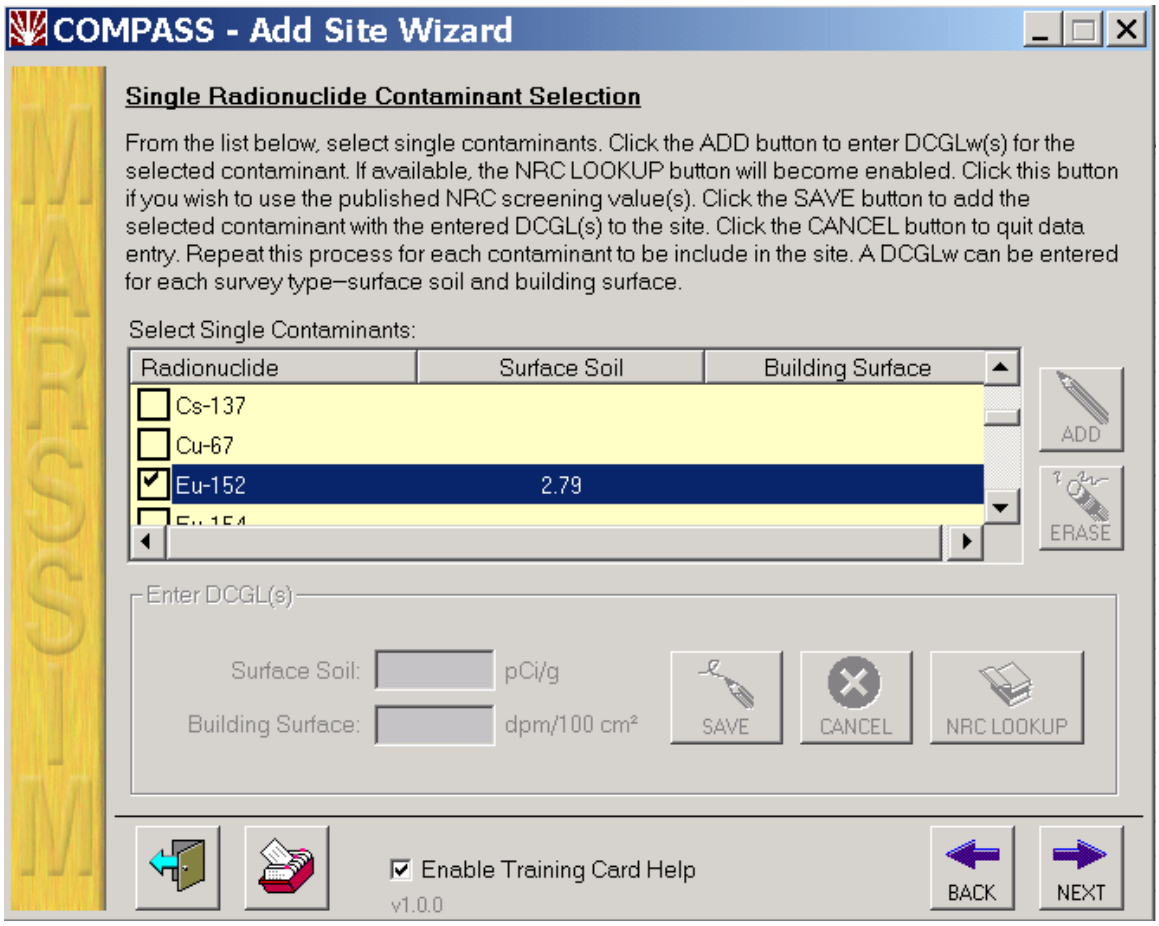

COMPASS - DQO Wizard for Surface Soil Assessment
MARSSIM
Statistical Survey Design Summary
Below is a comparison of the Sign Test and WRS Test designs. Select which design you feel will provide the best results, then press the NEXT button to continue.
If no reference area data was included, the WRS Test was not completed and the Sign Test is selected automatically. Press the NEXT button to continue.
Sign Test Results
DCGL: 2.79
LBGR: 1.8
Sigma: 0.34
Alpha: 0.050
Beta: 0.050
N: 14
Estimated Power: 1
WRS Test Results
DCGL:
LBGR:
Sigma:
Alpha:
Beta:
N/2:
Estimated Power:
WRS
Enable Training Card Help
v1.0.0
BACK
NEXT

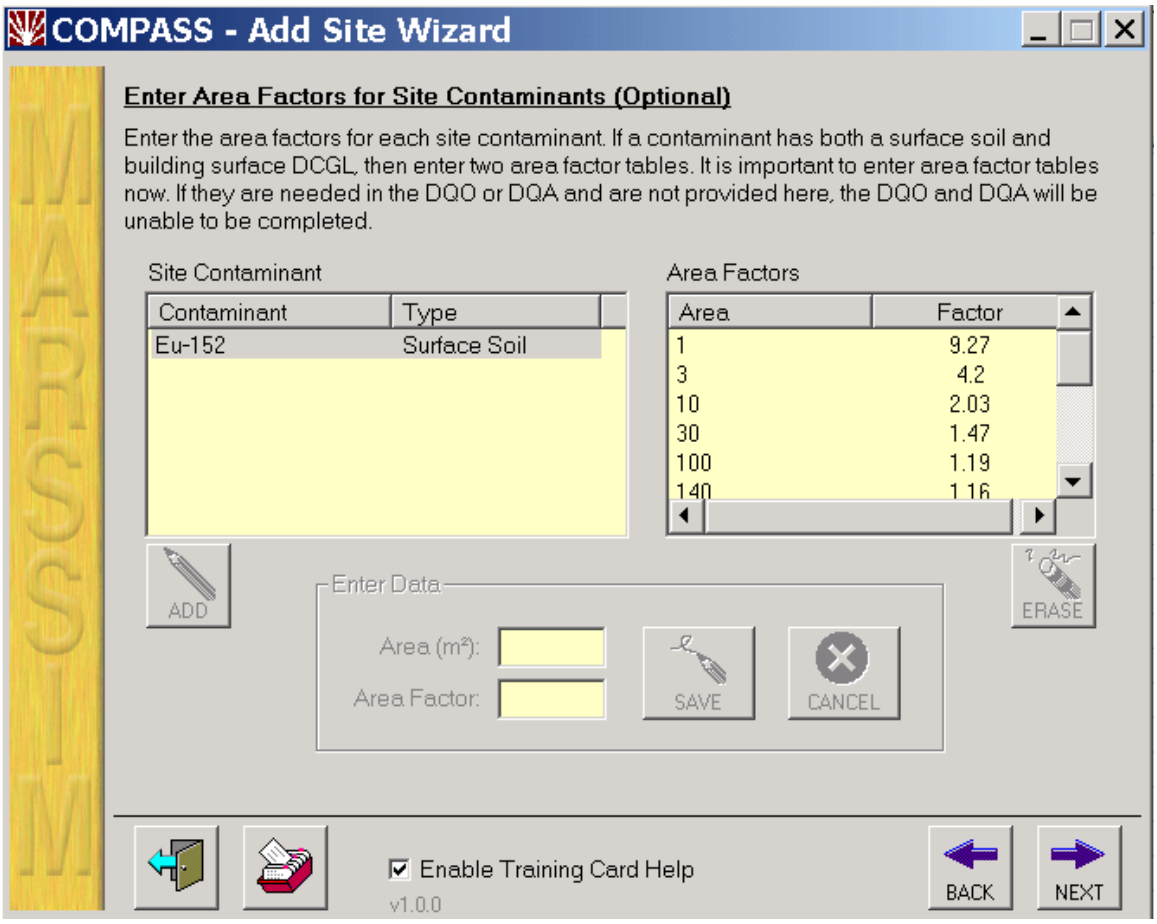

COMPASS - DQO Wizard for Surface Soil Assessment
MARSSIM
Elevated Measurement Comparison (EMC)
Enter in a description for the scanning instrumentation used. Then enter a scan MDC for each measured contaminant. Click the CALCULATE button to view the integrated survey design results. All entered and calculated scan MDC and DCGL units are in pCi/g.
Scanning Instrumentation Description: Ludlum 2221 1" NaI det.
Contaminant
Scan MDC
Eu-152
3.1
Enter Scan MDC
Scan MDC:
SAVE
NUREG-1507
CALCULATE
Statistical Design
N: 14
Bounded Area (m²): 40.5
Area Factor: 1.44
DCGLw: 2.79
Scan MDC Required: 4
Hot Spot Design
Actual Scan MDC: 3.1
Area Factor: N/A
Bounded Area (m²): N/A
Post-EMC N: 14
Enable Training Card Help
v1.0.0
BACK
NEXT

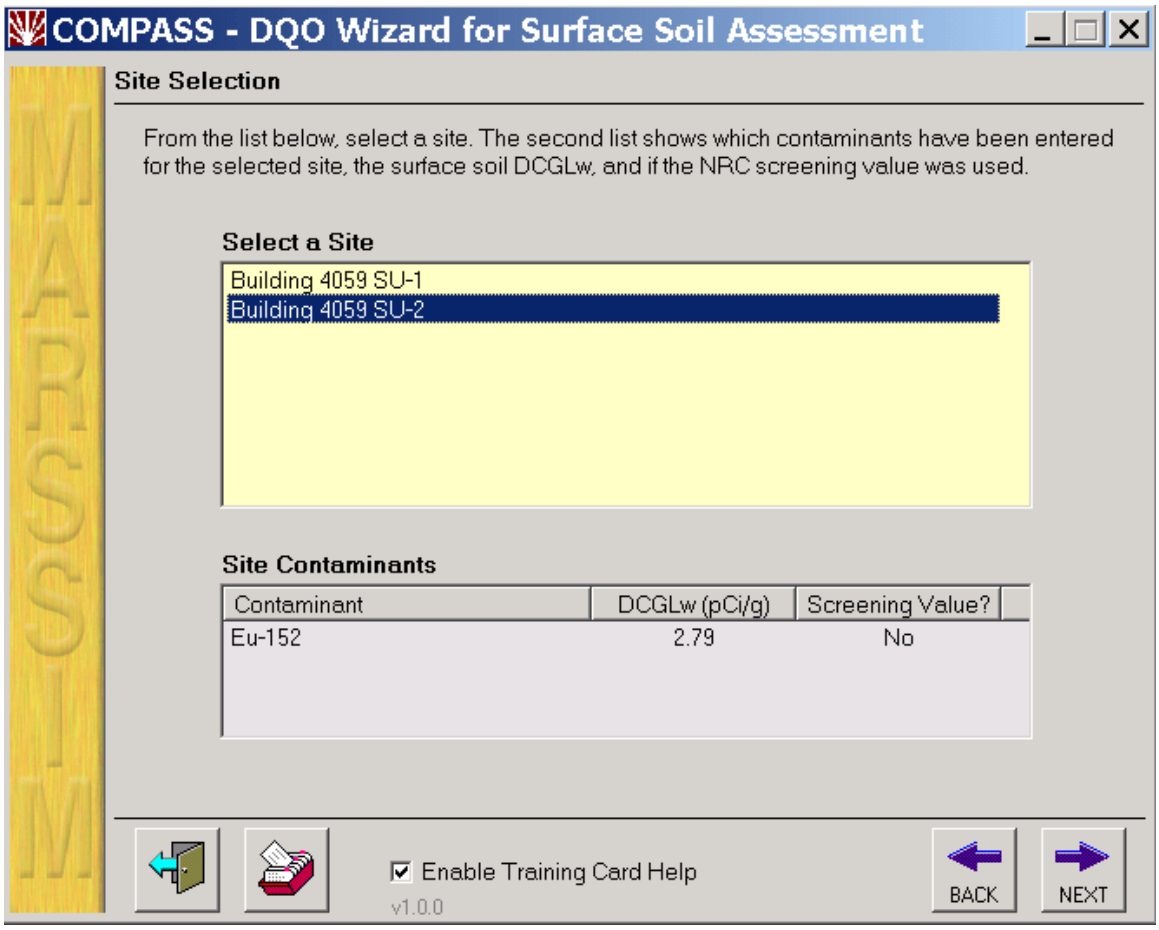
Phase A, Survey Unit 2 Compass Run

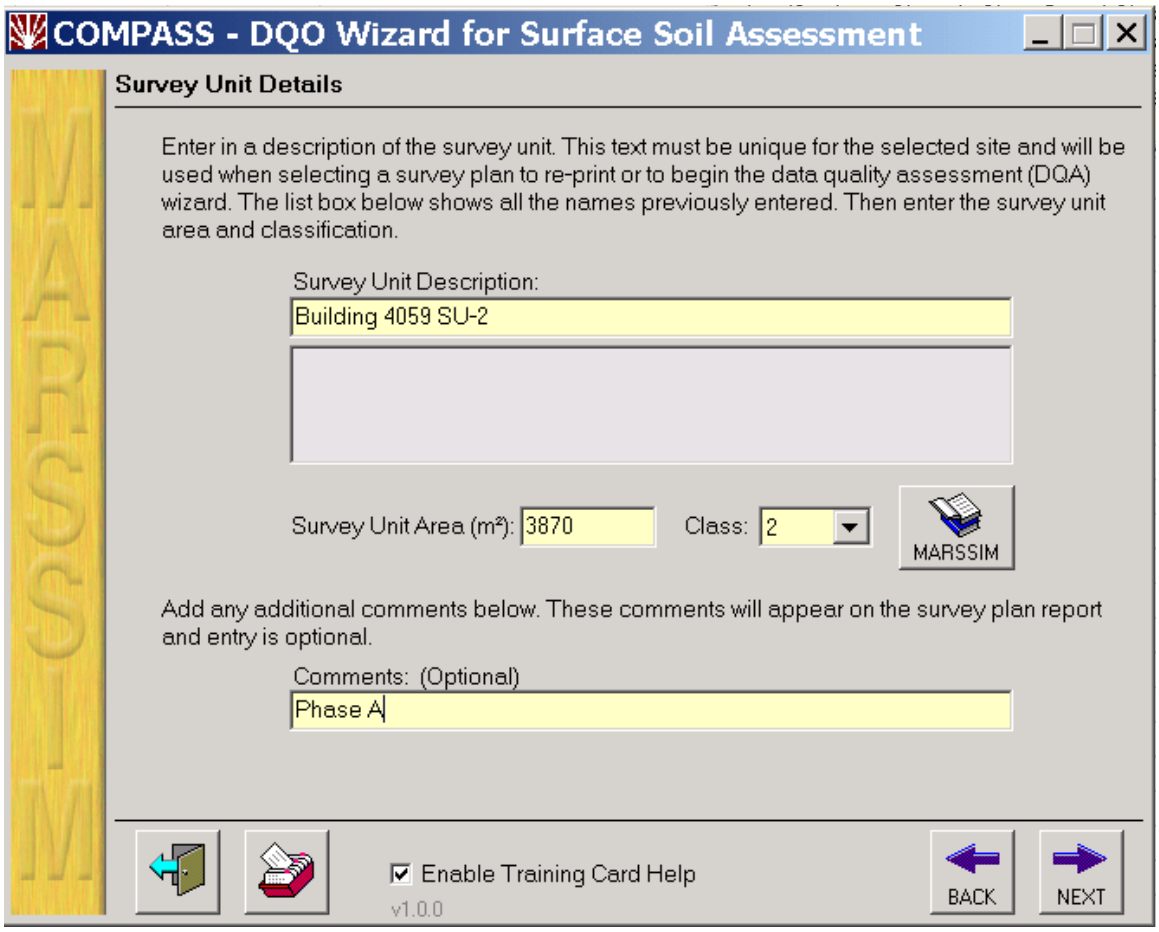

COMPASS - Add Site Wizard
MARSSIM
Listing of Existing Site Names:
Building 4059 SU-1
Introduction
This wizard will guide you through the process of site setup. Required information include:
» site name
» planner(s)
» contaminants, series and/or single radionuclides
» DCGLw for each contaminant
Optionally, the area factor table for each contaminant can be entered. If the area factor table is not entered and is required in the DQO and DQA wizards, those wizards will not be able to be completed.
Site Description
Enter a unique site name:
(see the list to the left for existing site names)
Building 4059 SU-2
Enter the site planner(s):
Ray McGinnis
Enable Training Card Help
v1.0.0
BACK
NEXT

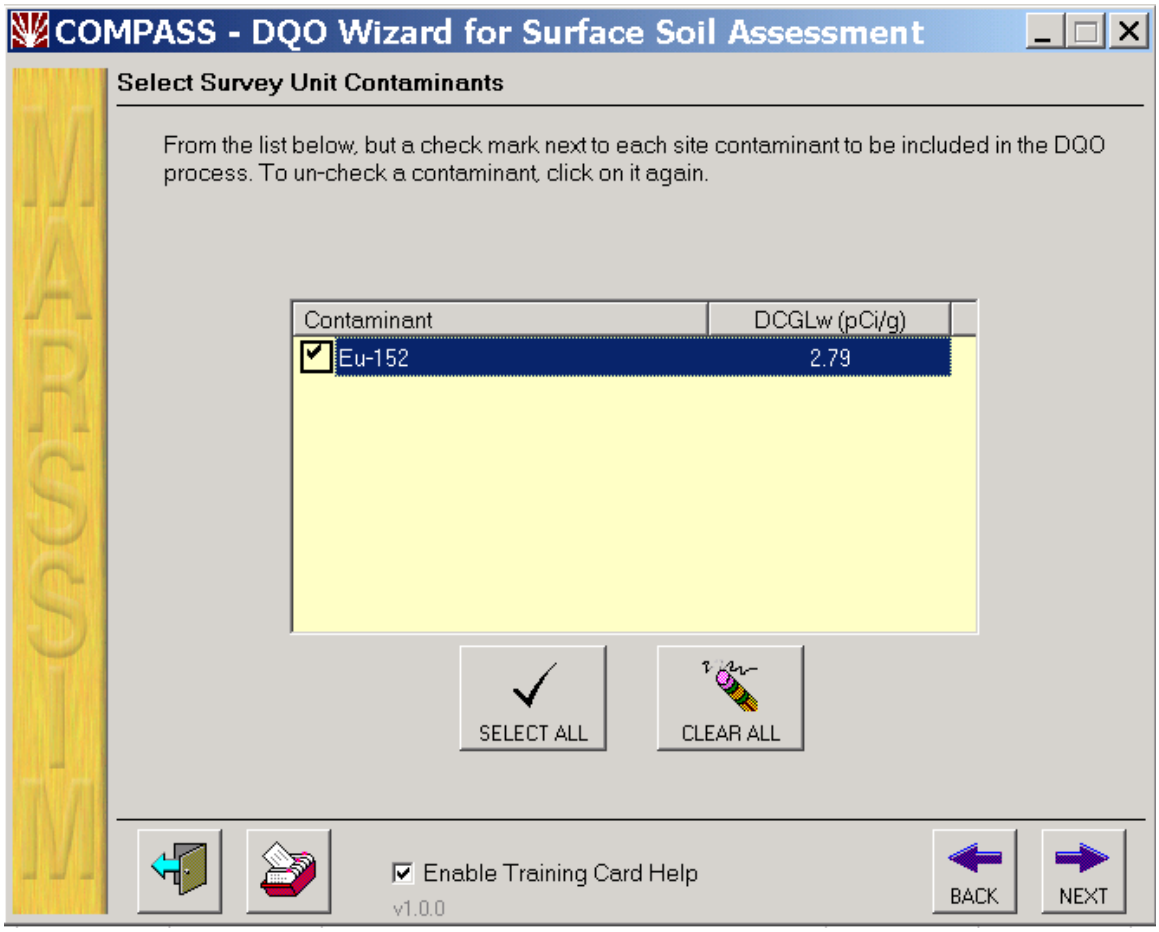

COMPASS - Add Site Wizard
MARSSIM
Uranium, Thorium, and Radium Series Selection
The following radionuclide series can be added to the site. Each radionuclide series includes a description to help with series selection. If your site does not have any of the listed series, then continue to the Single Radionuclide section at the bottom.
Uranium Ore
Consists of U-238 in secular equilibrium with all its progeny. (14 radionuclides)
Th-230
Consists of Th-230 (parent) in secular equilibrium with the Ra-226 decay chain; for example, uranium ore tailings.
Processed Natural Uranium
Consists of U-238 (Th-234 and Pa-234m), U-235 (Th-231), and U-234 at natural isotopic abundances.
Natural Thorium
Consists of the natural thorium (Th-232) decay chain.
Enriched or Depleted Uranium
Consists of processed uranium that has been enriched or depleted in U-235; for example, reactor sites or ammunition plant.
Radium (Ra-226)
Consists of Ra-226 and its progeny in secular equilibrium. Select this series if Th-230 is not in secular equilibrium with Ra-226 and its progeny.
Single Radionuclide
Check the following box to add single radionuclide contaminants to the site; for example, Co-60 or Th-230 when not in equilibrium with Ra-226 and its progeny. If a series is not selected, you will have to click this box to continue.
Add single radionuclide contaminants
Enable Training Card Help
v1.0.0
BACK
NEXT

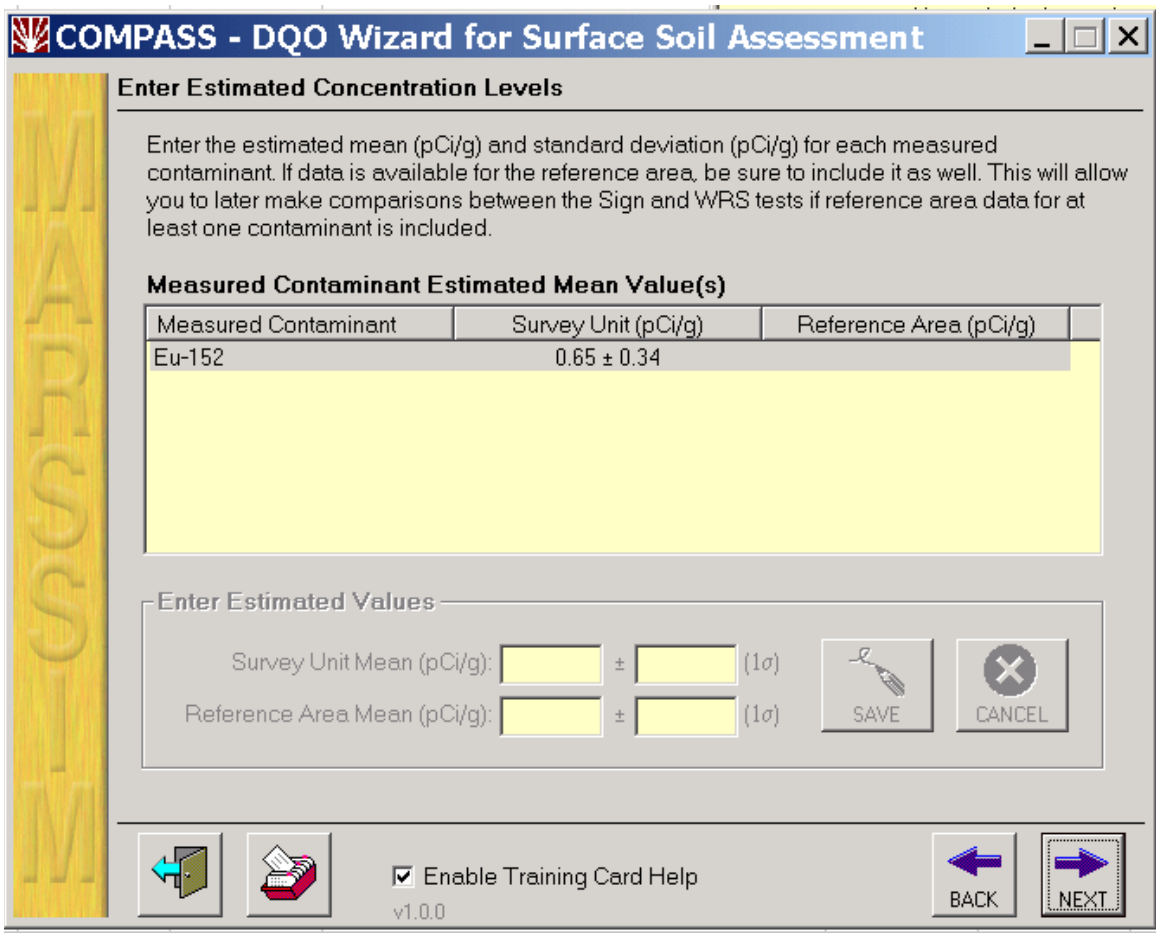

COMPASS - Add Site Wizard
MARSSIM
Single Radionuclide Contaminant Selection
From the list below, select single contaminants. Click the ADD button to enter DCGLw(s) for the selected contaminant. If available, the NRC LOOKUP button will become enabled. Click this button if you wish to use the published NRC screening value(s). Click the SAVE button to add the selected contaminant with the entered DCGL(s) to the site. Click the CANCEL button to quit data entry. Repeat this process for each contaminant to be include in the site. A DCGLw can be entered for each survey type–surface soil and building surface.
Select Single Contaminants:
Radionuclide
Surface Soil
Building Surface
Cs-137
Cu-67
Eu-152
2.79
ADD
ERASE
Enter DCGL(s)
Surface Soil:
pCi/g
Building Surface:
dpm/100 cm²
SAVE
CANCEL
NRC LOOKUP
Enable Training Card Help
v1.0.0
BACK
NEXT

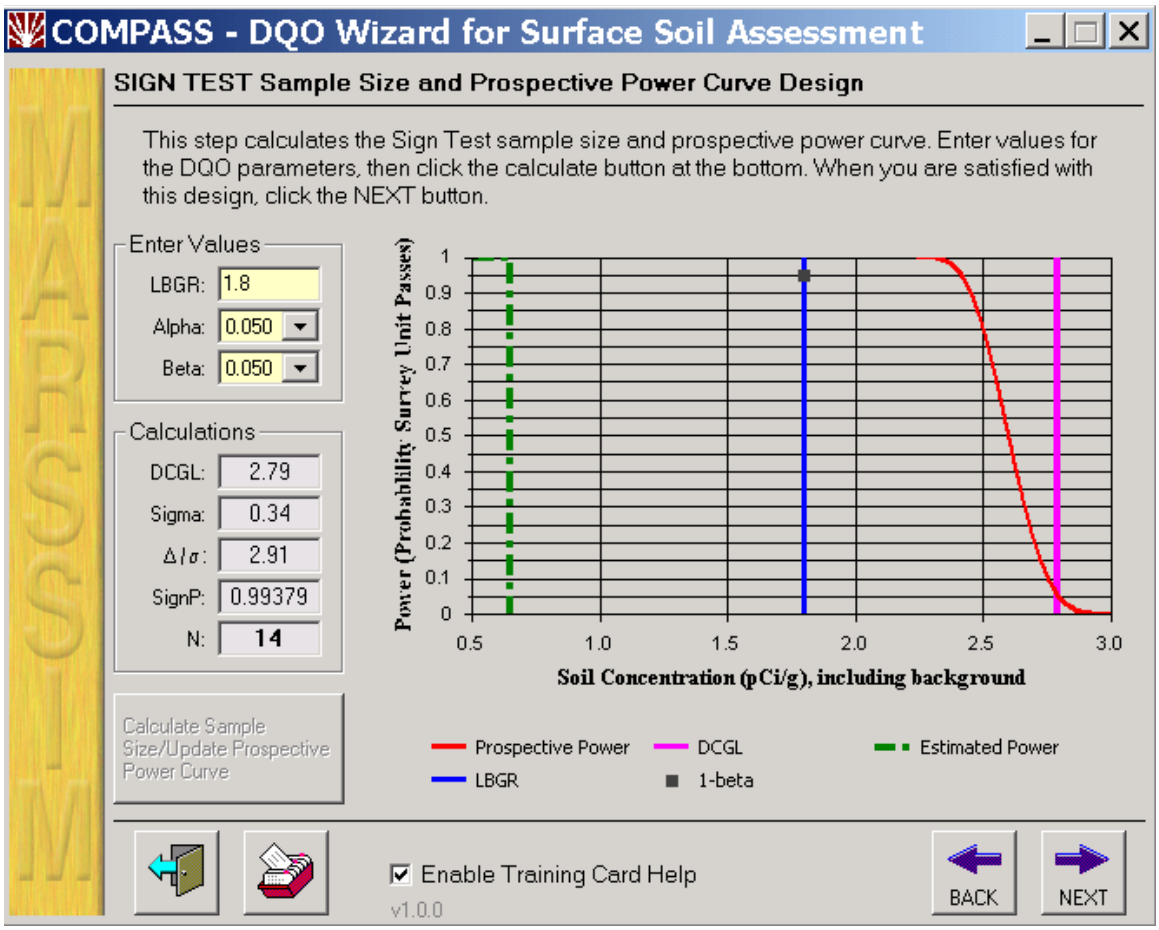

COMPASS - Add Site Wizard
MARSSIM
Enter Area Factors for Site Contaminants (Optional)
Enter the area factors for each site contaminant. If a contaminant has both a surface soil and building surface DCGL, then enter two area factor tables. It is important to enter area factor tables now. If they are needed in the DQO or DQA and are not provided here, the DQO and DQA will be unable to be completed.
Site Contaminant
Contaminant
Type
Eu-152
Surface Soil
Area Factors
Area
Factor
1
9.27
3
4.2
10
2.03
30
1.47
100
1.19
140
1.16
ADD
ERASE
Enter Data
Area (m²):
Area Factor:
SAVE
CANCEL
Enable Training Card Help
v1.0.0
BACK
NEXT

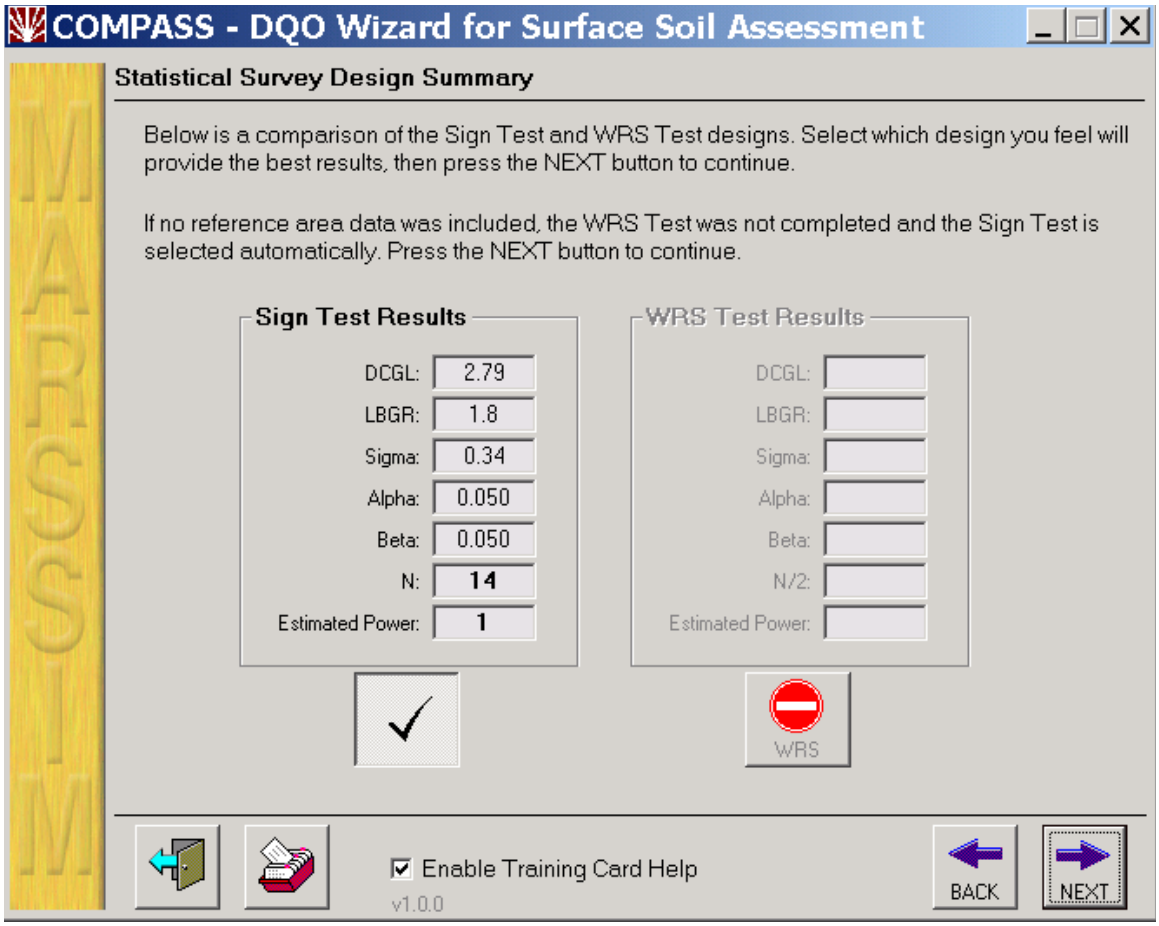

COMPASS - DQO Wizard for Surface Soil Assessment
MARSSIM
Site Selection
From the list below, select a site. The second list shows which contaminants have been entered for the selected site, the surface soil DCGLw, and if the NRC screening value was used.
Select a Site
Building 4059 SU-1
Building 4059 SU-2
Site Contaminants
Contaminant
DCGLw (pCi/g)
Screening Value?
Eu-152
2.79
No
Enable Training Card Help
v1.0.0
BACK
NEXT


COMPASS - DQO Wizard for Surface Soil Assessment
Survey Unit Details
Enter in a description of the survey unit. This text must be unique for the selected site and will be used when selecting a survey plan to re-print or to begin the data quality assessment (DQA) wizard. The list box below shows all the names previously entered. Then enter the survey unit area and classification.
Survey Unit Description:
Building 4059 SU-2
Survey Unit Area (m²): 3870
Class: 2
MARSSIM
Add any additional comments below. These comments will appear on the survey plan report and entry is optional.
Comments: (Optional)
Phase A
Enable Training Card Help
v1.0.0
BACK
NEXT

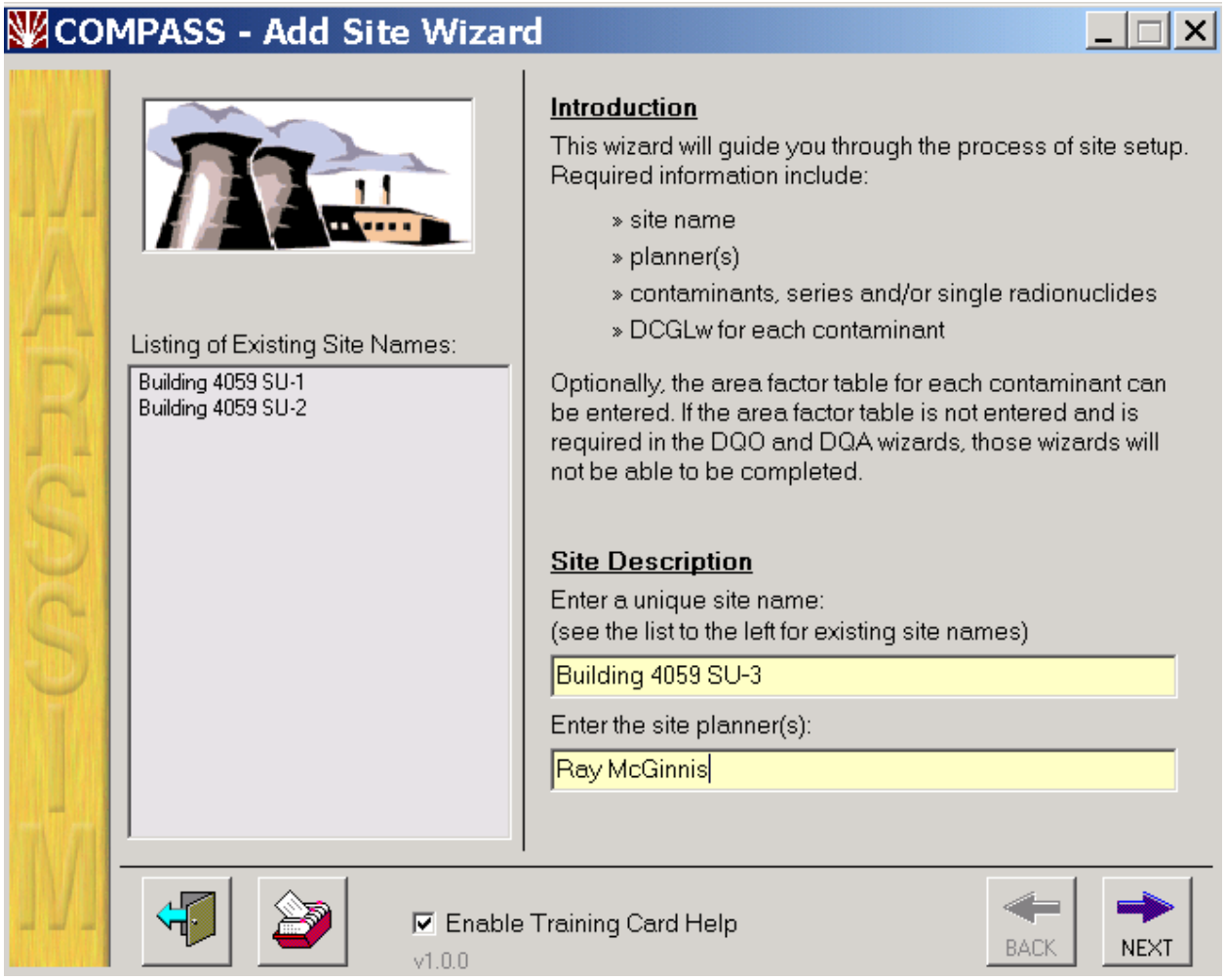

COMPASS - DQO Wizard for Surface Soil Assessment
Select Survey Unit Contaminants
From the list below, but a check mark next to each site contaminant to be included in the DQO process. To un-check a contaminant, click on it again.
Contaminant
DCGLw (pCi/g)
Eu-152
2.79
SELECT ALL
CLEAR ALL
Enable Training Card Help
v1.0.0
BACK
NEXT

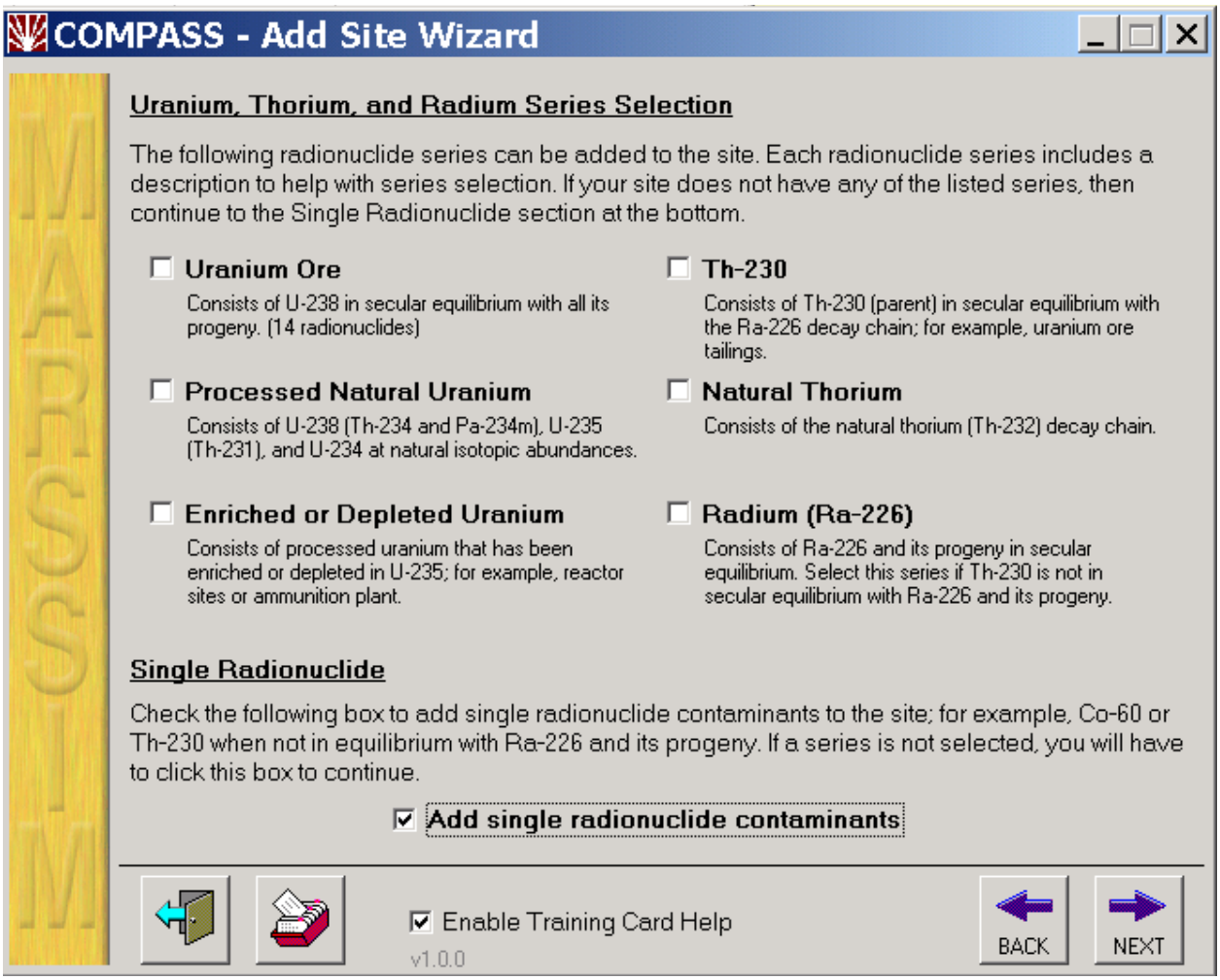

COMPASS - DQO Wizard for Surface Soil Assessment
Enter Estimated Concentration Levels
Enter the estimated mean (pCi/g) and standard deviation (pCi/g) for each measured contaminant. If data is available for the reference area, be sure to include it as well. This will allow you to later make comparisons between the Sign and WRS tests if reference area data for at least one contaminant is included.
Measured Contaminant Estimated Mean Value(s)
Measured Contaminant
Survey Unit (pCi/g)
Reference Area (pCi/g)
Eu-152
0.65 ± 0.34
Enter Estimated Values
Survey Unit Mean (pCi/g):
±
(1σ)
Reference Area Mean (pCi/g):
±
(1σ)
SAVE
CANCEL
Enable Training Card Help
v1.0.0
BACK
NEXT

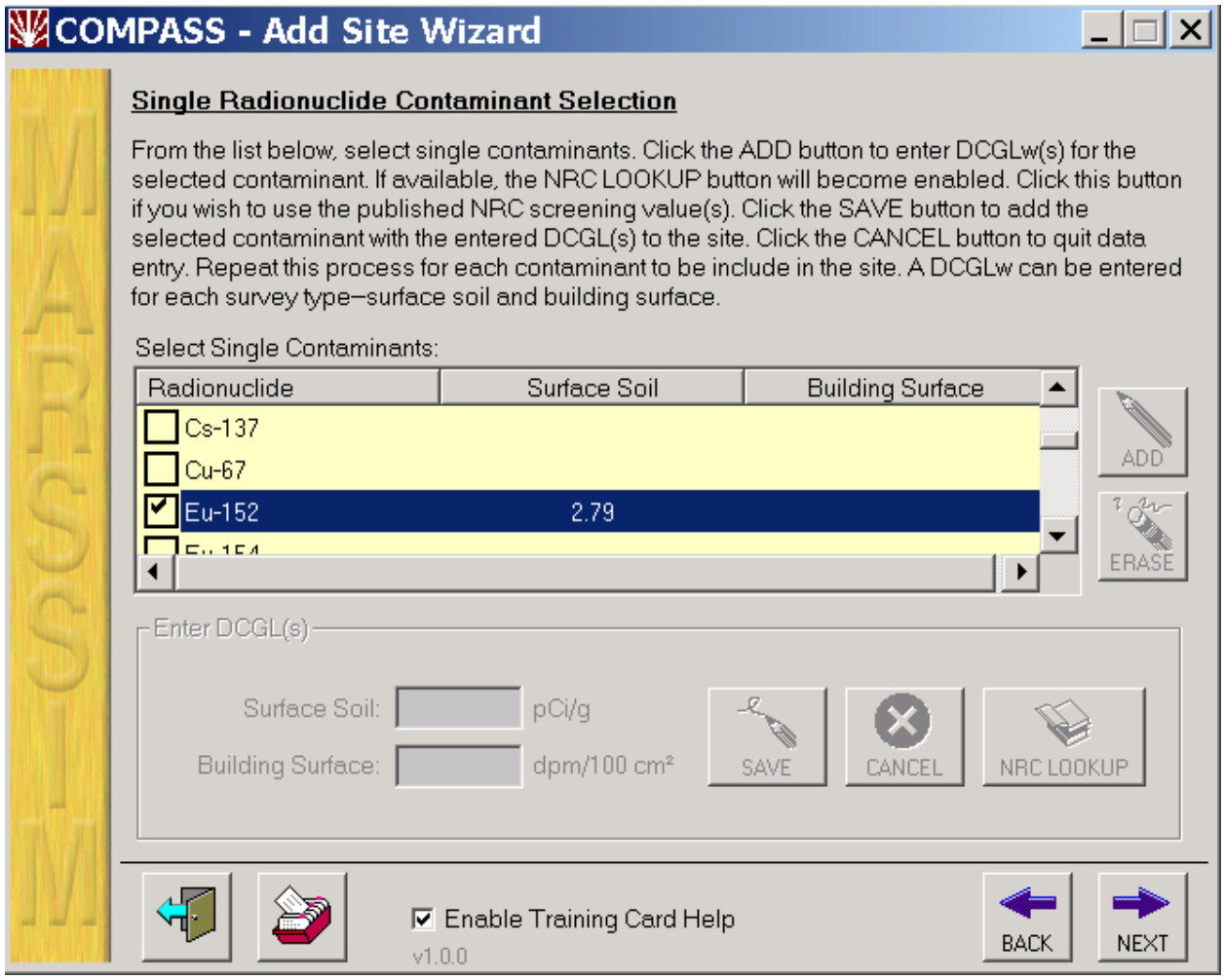

COMPASS - DQO Wizard for Surface Soil Assessment
SIGN TEST Sample Size and Prospective Power Curve Design
This step calculates the Sign Test sample size and prospective power curve. Enter values for the DQO parameters, then click the calculate button at the bottom. When you are satisfied with this design, click the NEXT button.
Enter Values
LBGR: 1.8
Alpha: 0.050
Beta: 0.050
Calculations
DCGL: 2.79
Sigma: 0.34
Δ/σ: 2.91
SignP: 0.99379
N: 14
Calculate Sample Size/Update Prospective Power Curve
Power (Probability Survey Unit Passes)
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
0.5 1.0 1.5 2.0 2.5 3.0
Soil Concentration (pCi/g), including background
Prospective Power
DCGL
Estimated Power
LBGR
1-beta
Enable Training Card Help
v1.0.0
BACK
NEXT

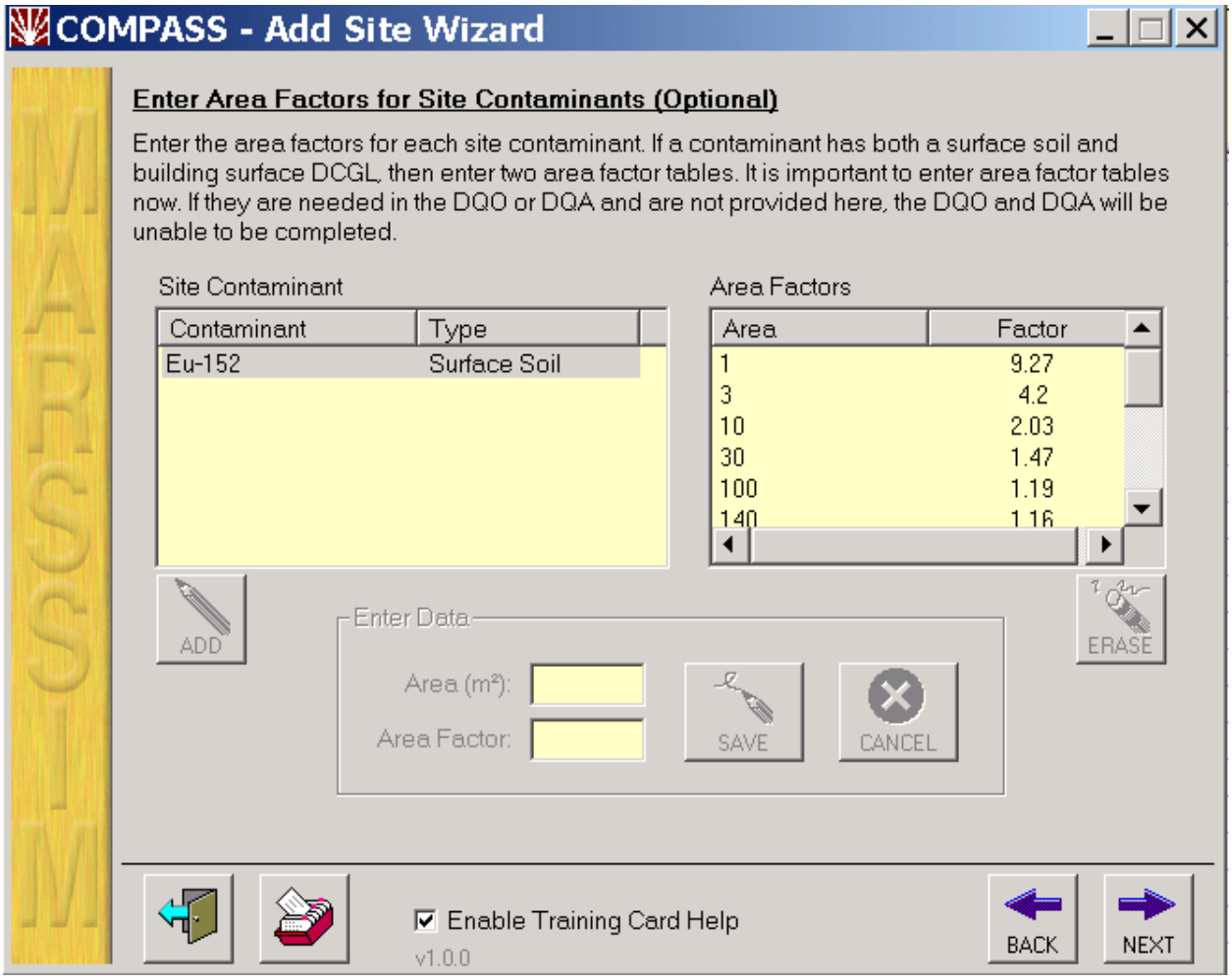

COMPASS - DQO Wizard for Surface Soil Assessment
MARSSIM
Statistical Survey Design Summary
Below is a comparison of the Sign Test and WRS Test designs. Select which design you feel will provide the best results, then press the NEXT button to continue.
If no reference area data was included, the WRS Test was not completed and the Sign Test is selected automatically. Press the NEXT button to continue.
Sign Test Results
DCGL: 2.79
LBGR: 1.8
Sigma: 0.34
Alpha: 0.050
Beta: 0.050
N: 14
Estimated Power: 1
WRS Test Results
DCGL:
LBGR:
Sigma:
Alpha:
Beta:
N/2:
Estimated Power:
WRS
Enable Training Card Help
v1.0.0
BACK
NEXT

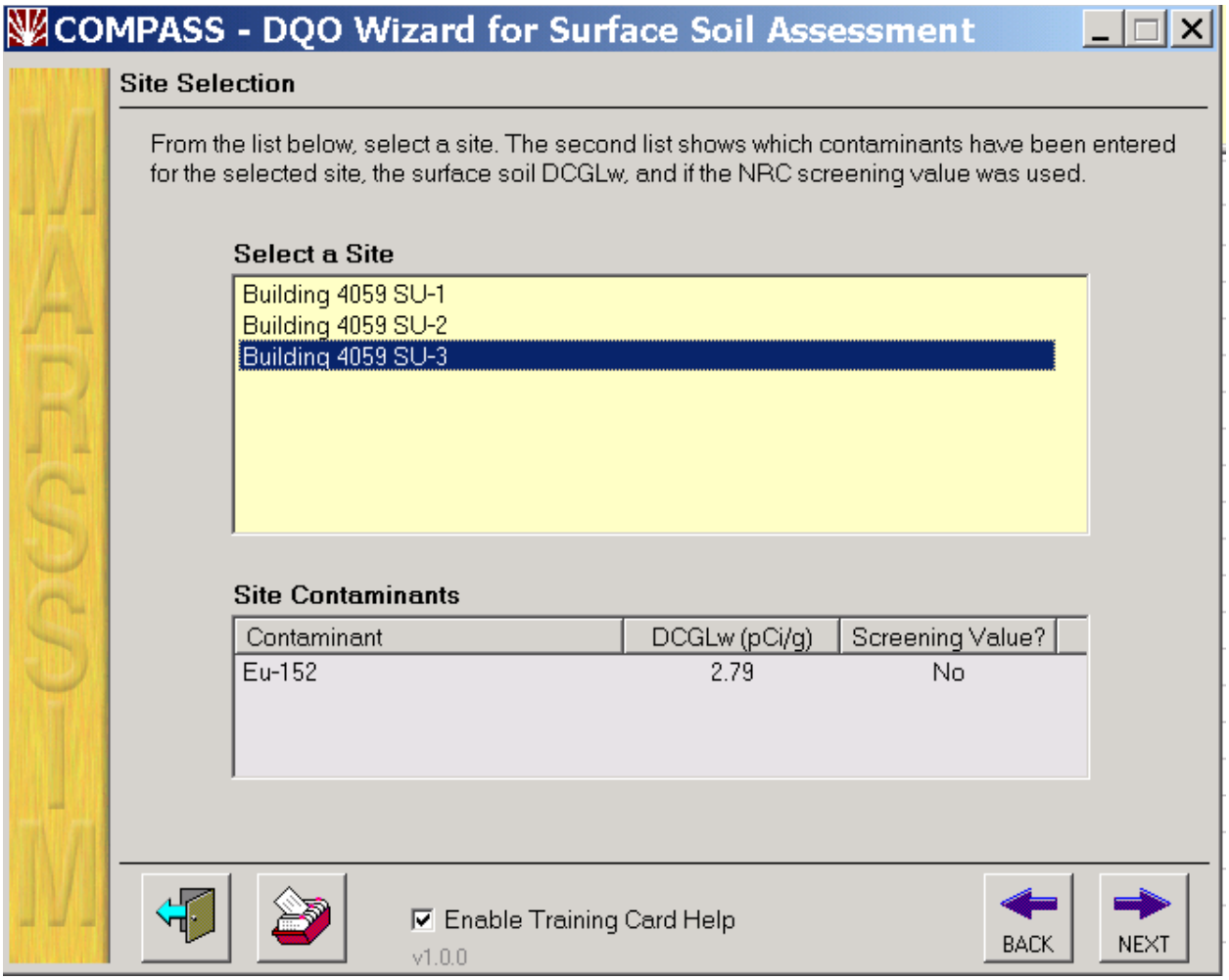
Phase B, Survey Unit 3 Compass Runs

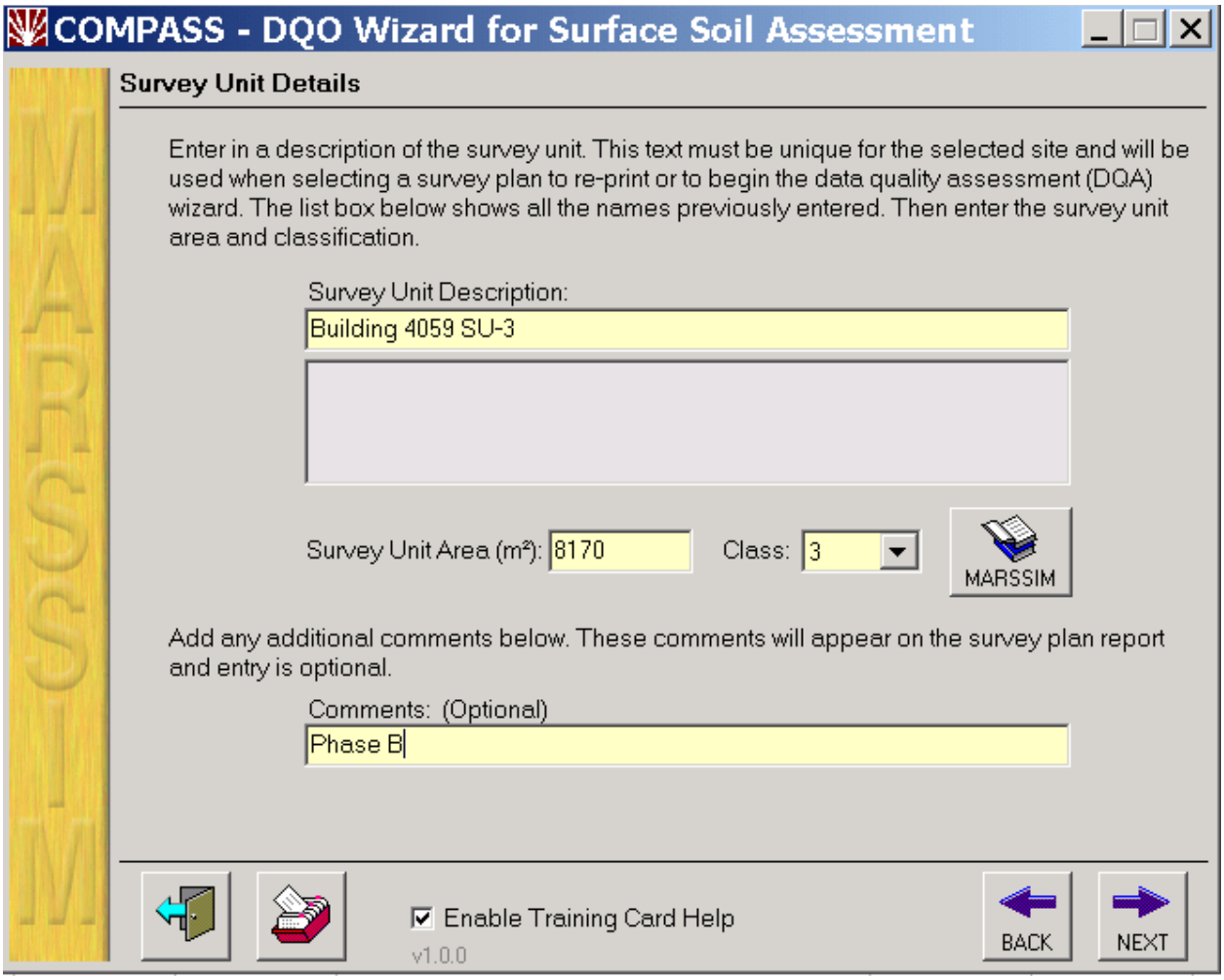

COMPASS - Add Site Wizard
MARSSIM
Listing of Existing Site Names:
Building 4059 SU-1
Building 4059 SU-2
Introduction
This wizard will guide you through the process of site setup.
Required information include:
» site name
» planner(s)
» contaminants, series and/or single radionuclides
» DCGLw for each contaminant
Optionally, the area factor table for each contaminant can be entered. If the area factor table is not entered and is required in the DQO and DQA wizards, those wizards will not be able to be completed.
Site Description
Enter a unique site name:
(see the list to the left for existing site names)
Building 4059 SU-3
Enter the site planner(s):
Ray McGinnis
Enable Training Card Help
v1.0.0
BACK
NEXT

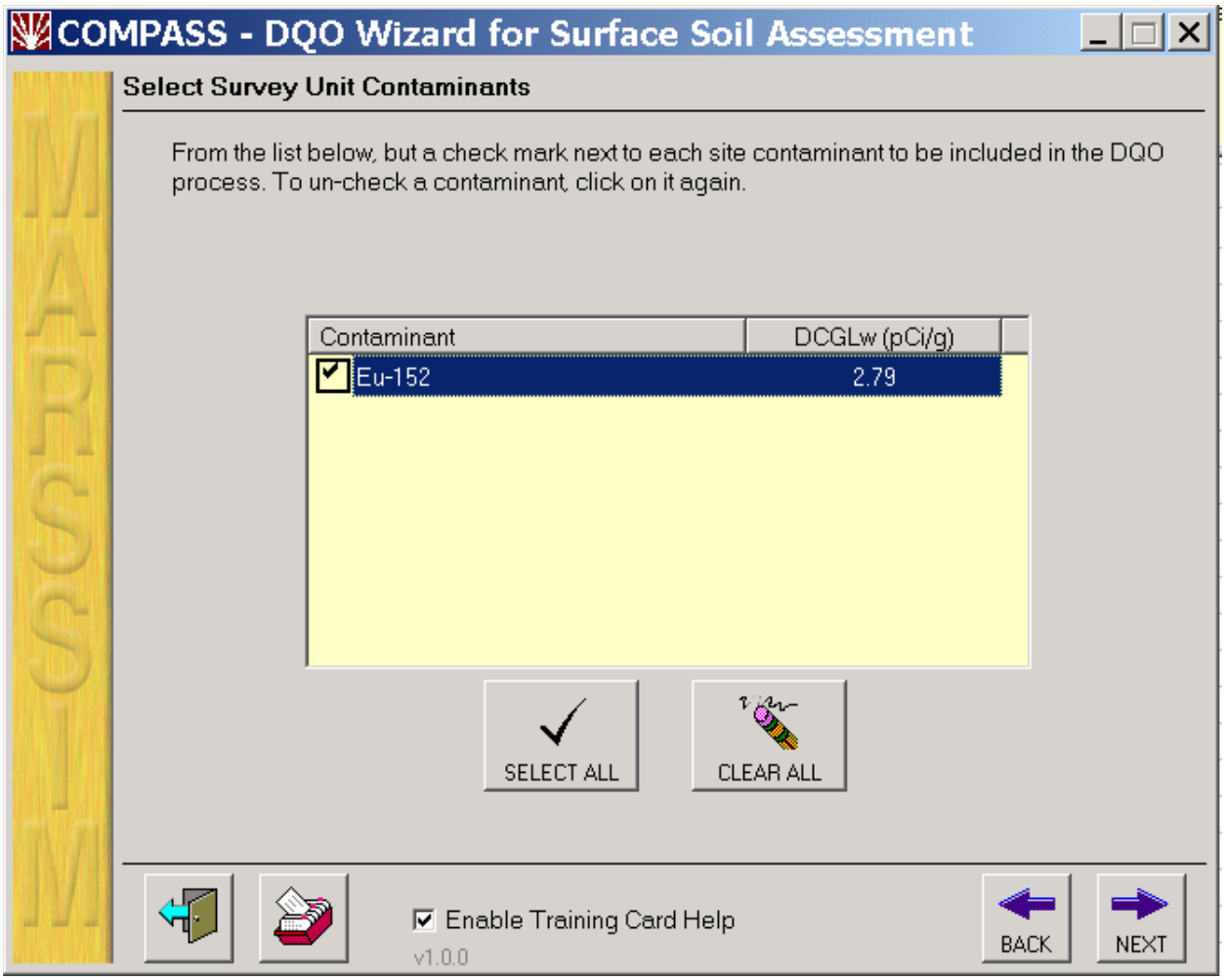

COMPASS - Add Site Wizard
Uranium, Thorium, and Radium Series Selection
The following radionuclide series can be added to the site. Each radionuclide series includes a description to help with series selection. If your site does not have any of the listed series, then continue to the Single Radionuclide section at the bottom.
Uranium Ore
Consists of U-238 in secular equilibrium with all its progeny. (14 radionuclides)
Th-230
Consists of Th-230 (parent) in secular equilibrium with the Ra-226 decay chain; for example, uranium ore tailings.
Processed Natural Uranium
Consists of U-238 (Th-234 and Pa-234m), U-235 (Th-231), and U-234 at natural isotopic abundances.
Natural Thorium
Consists of the natural thorium (Th-232) decay chain.
Enriched or Depleted Uranium
Consists of processed uranium that has been enriched or depleted in U-235; for example, reactor sites or ammunition plant.
Radium (Ra-226)
Consists of Ra-226 and its progeny in secular equilibrium. Select this series if Th-230 is not in secular equilibrium with Ra-226 and its progeny.
Single Radionuclide
Check the following box to add single radionuclide contaminants to the site; for example, Co-60 or Th-230 when not in equilibrium with Ra-226 and its progeny. If a series is not selected, you will have to click this box to continue.
Add single radionuclide contaminants
Enable Training Card Help
v1.0.0
BACK
NEXT

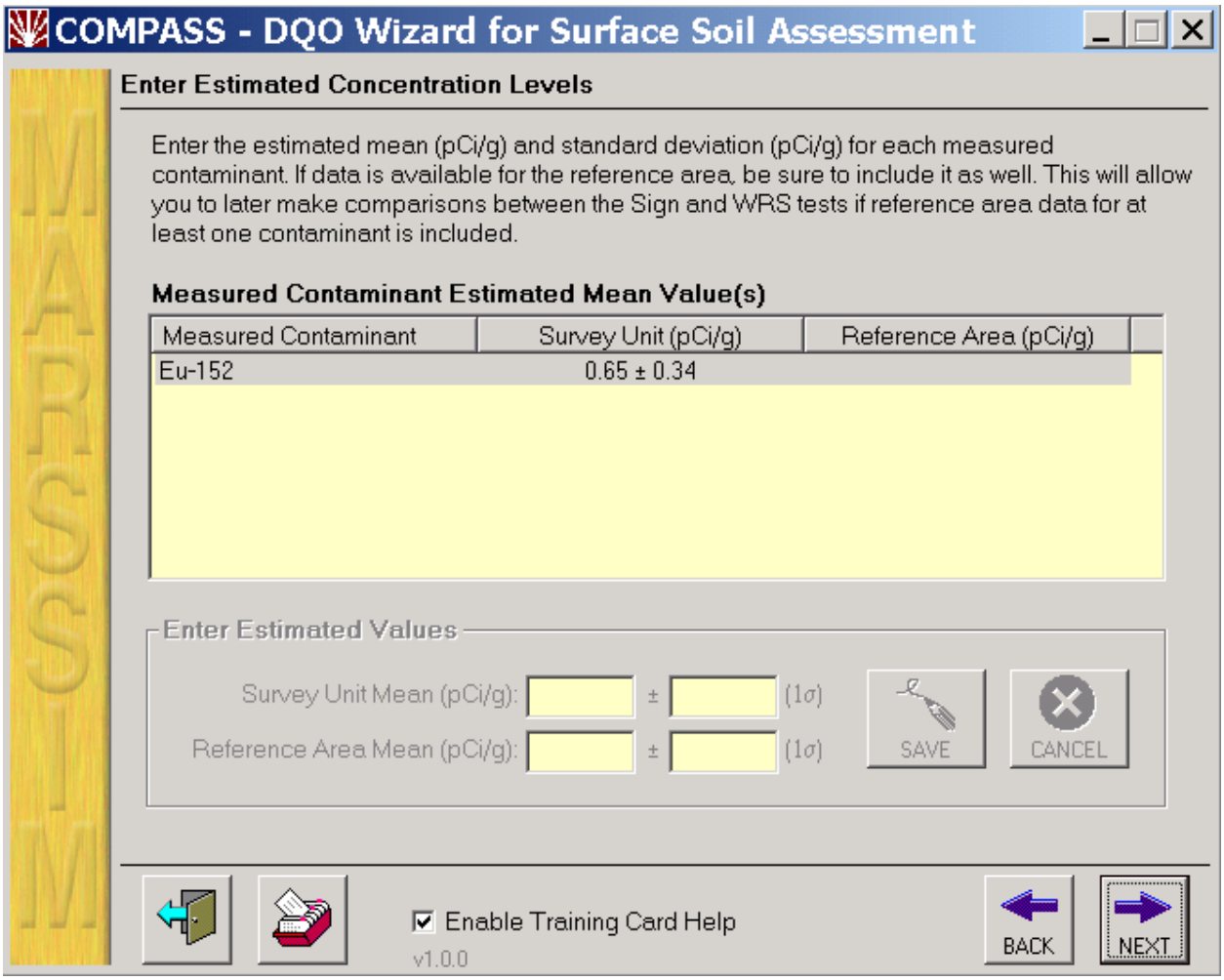

COMPASS - Add Site Wizard
MARSSIM
Single Radionuclide Contaminant Selection
From the list below, select single contaminants. Click the ADD button to enter DCGLw(s) for the selected contaminant. If available, the NRC LOOKUP button will become enabled. Click this button if you wish to use the published NRC screening value(s). Click the SAVE button to add the selected contaminant with the entered DCGL(s) to the site. Click the CANCEL button to quit data entry. Repeat this process for each contaminant to be include in the site. A DCGLw can be entered for each survey type—surface soil and building surface.
Select Single Contaminants:
Radionuclide
Surface Soil
Building Surface
Cs-137
Cu-67
Eu-152
2.79
ADD
ERASE
Enter DCGL(s)
Surface Soil:
pCi/g
Building Surface:
dpm/100 cm²
SAVE
CANCEL
NRC LOOKUP
Enable Training Card Help
v1.0.0
BACK
NEXT

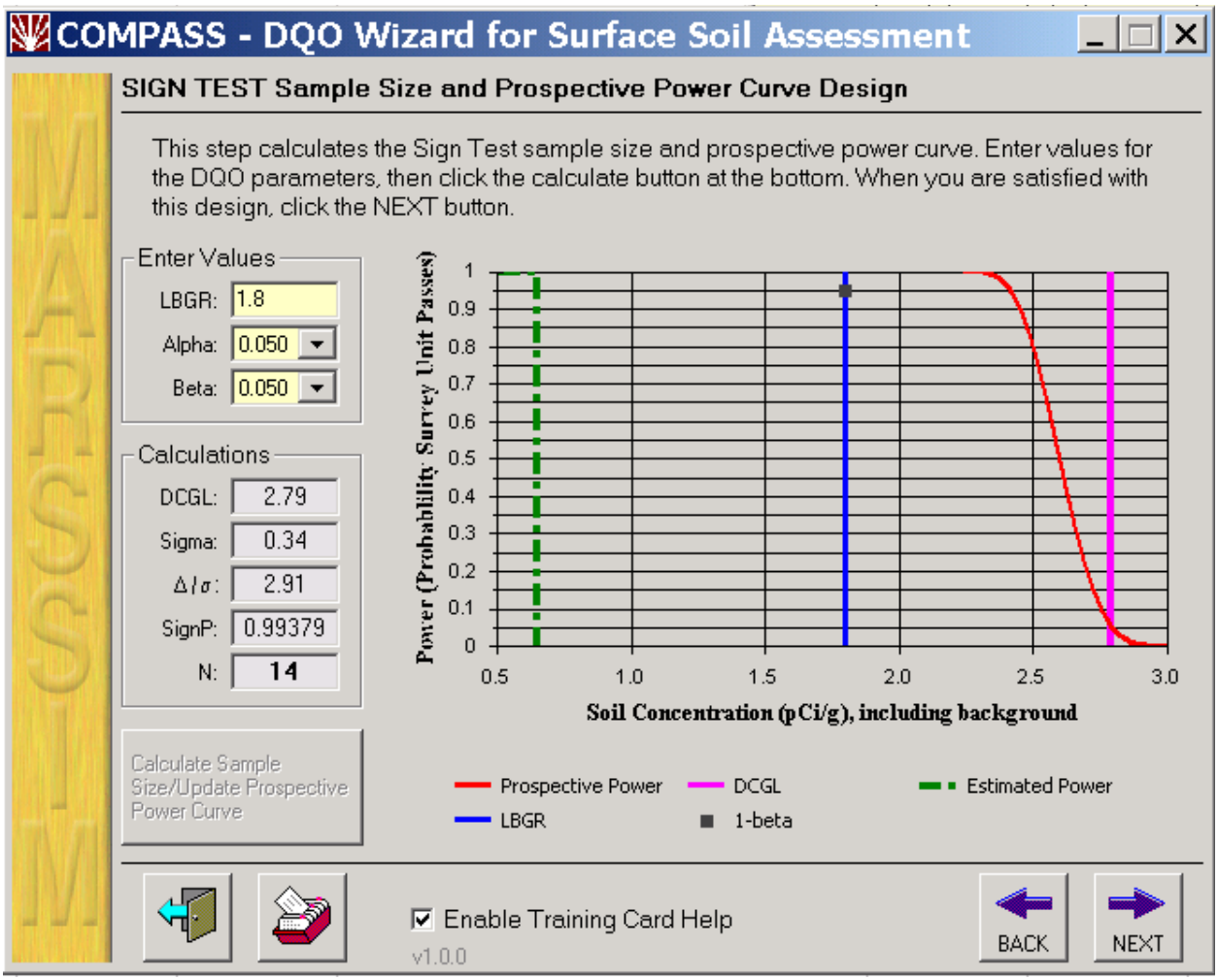

COMPASS - Add Site Wizard
MARSSIM
Enter Area Factors for Site Contaminants (Optional)
Enter the area factors for each site contaminant. If a contaminant has both a surface soil and building surface DCGL, then enter two area factor tables. It is important to enter area factor tables now. If they are needed in the DQO or DQA and are not provided here, the DQO and DQA will be unable to be completed.
Site Contaminant
Contaminant
Type
Eu-152
Surface Soil
Area Factors
Area
Factor
1
9.27
3
4.2
10
2.03
30
1.47
100
1.19
140
1.16
ADD
ERASE
Enter Data
Area (m²):
Area Factor:
SAVE
CANCEL
Enable Training Card Help
v1.0.0
BACK
NEXT

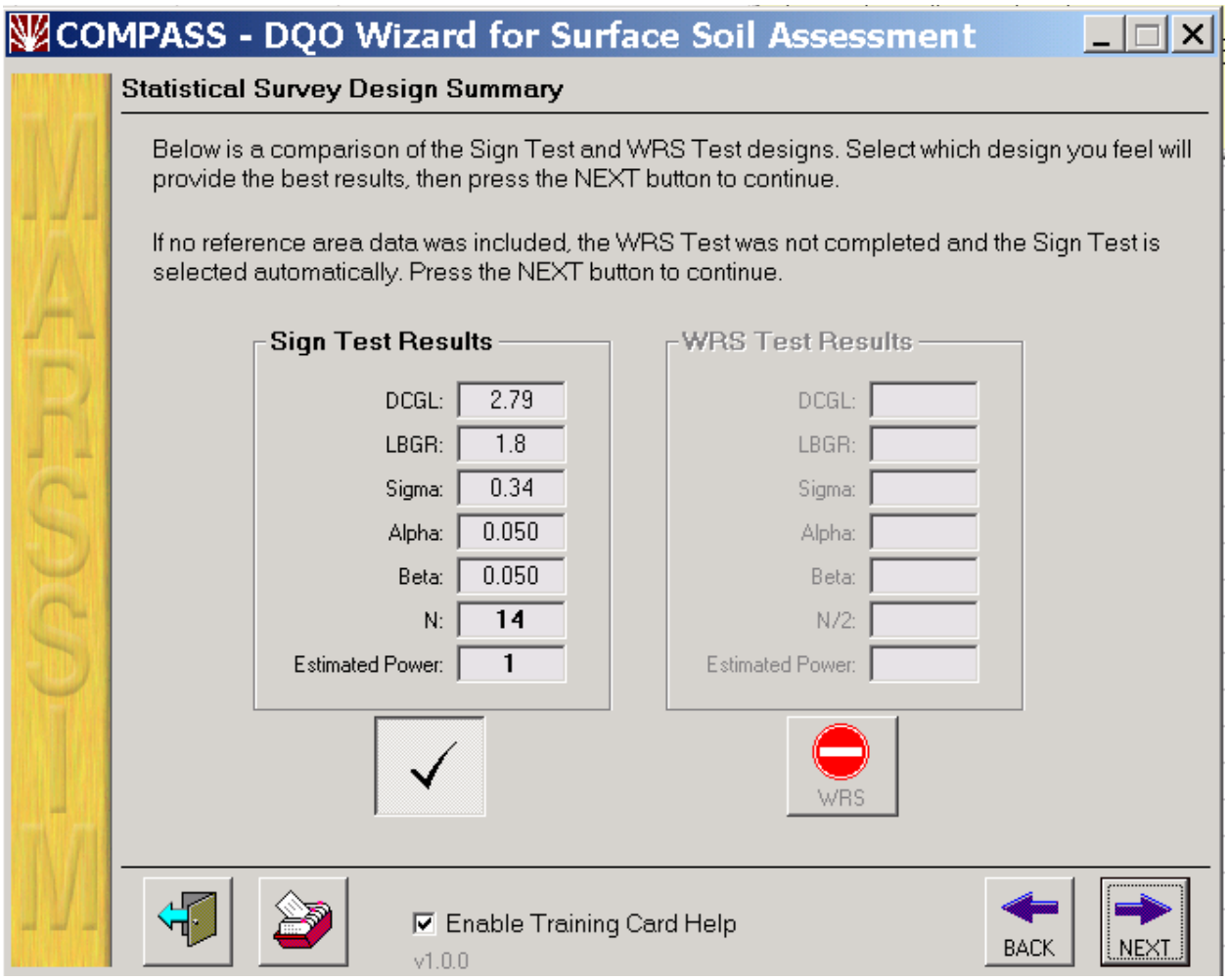

COMPASS - DQO Wizard for Surface Soil Assessment
MARSSIM
Site Selection
From the list below, select a site. The second list shows which contaminants have been entered for the selected site, the surface soil DCGLw, and if the NRC screening value was used.
Select a Site
Building 4059 SU-1
Building 4059 SU-2
Building 4059 SU-3
Site Contaminants
Contaminant
DCGLw (pCi/g)
Screening Value?
Eu-152
2.79
No
Enable Training Card Help
v1.0.0
BACK
NEXT


COMPASS - DQO Wizard for Surface Soil Assessment
MARSSIM
Survey Unit Details
Enter in a description of the survey unit. This text must be unique for the selected site and will be used when selecting a survey plan to re-print or to begin the data quality assessment (DQA) wizard. The list box below shows all the names previously entered. Then enter the survey unit area and classification.
Survey Unit Description:
Building 4059 SU-3
Survey Unit Area (m²): 8170
Class: 3
MARSSIM
Add any additional comments below. These comments will appear on the survey plan report and entry is optional.
Comments: (Optional)
Phase B
Enable Training Card Help
v1.0.0
BACK
NEXT


COMPASS - DQO Wizard for Surface Soil Assessment
MARSSIM
Select Survey Unit Contaminants
From the list below, but a check mark next to each site contaminant to be included in the DQO process. To un-check a contaminant, click on it again.
Contaminant
DCGLw (pCi/g)
Eu-152
2.79
SELECT ALL
CLEAR ALL
Enable Training Card Help
v1.0.0
BACK
NEXT


COMPASS - DQO Wizard for Surface Soil Assessment
Enter Estimated Concentration Levels
Enter the estimated mean (pCi/g) and standard deviation (pCi/g) for each measured contaminant. If data is available for the reference area, be sure to include it as well. This will allow you to later make comparisons between the Sign and WRS tests if reference area data for at least one contaminant is included.
Measured Contaminant Estimated Mean Value(s)
Measured Contaminant
Survey Unit (pCi/g)
Reference Area (pCi/g)
Eu-152
0.65 ± 0.34
Enter Estimated Values
Survey Unit Mean (pCi/g):
±
(1σ)
Reference Area Mean (pCi/g):
±
(1σ)
SAVE
CANCEL
Enable Training Card Help
v1.0.0
BACK
NEXT


COMPASS - DQO Wizard for Surface Soil Assessment
SIGN TEST Sample Size and Prospective Power Curve Design
This step calculates the Sign Test sample size and prospective power curve. Enter values for the DQO parameters, then click the calculate button at the bottom. When you are satisfied with this design, click the NEXT button.
Enter Values
LBGR: 1.8
Alpha: 0.050
Beta: 0.050
Calculations
DCGL: 2.79
Sigma: 0.34
Δ/σ: 2.91
SignP: 0.99379
N: 14
Calculate Sample Size/Update Prospective Power Curve
Power (Probability Survey Unit Passes)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.5
1.0
1.5
2.0
2.5
3.0
Soil Concentration (pCi/g), including background
Prospective Power
DCGL
Estimated Power
LBGR
1-beta
Enable Training Card Help
v1.0.0
BACK
NEXT


COMPASS - DQO Wizard for Surface Soil Assessment
Statistical Survey Design Summary
Below is a comparison of the Sign Test and WRS Test designs. Select which design you feel will provide the best results, then press the NEXT button to continue.
If no reference area data was included, the WRS Test was not completed and the Sign Test is selected automatically. Press the NEXT button to continue.
Sign Test Results
DCGL: 2.79
LBGR: 1.8
Sigma: 0.34
Alpha: 0.050
Beta: 0.050
N: 14
Estimated Power: 1
WRS Test Results
DCGL:
LBGR:
Sigma:
Alpha:
Beta:
N/2:
Estimated Power:
WRS
Enable Training Card Help
v1.0.0
BACK
NEXT

APPENDIX B. SAMPLE LOCATIONS

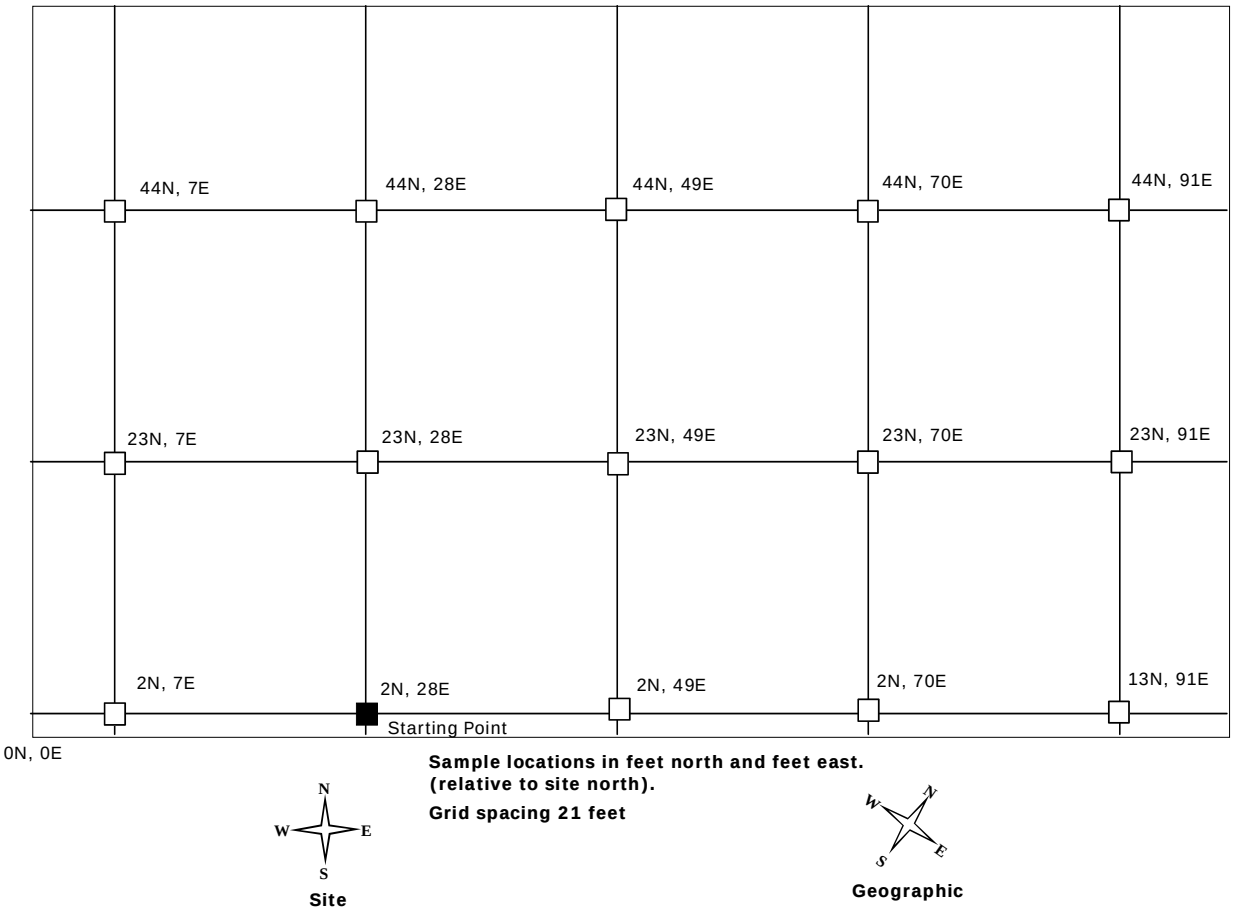


Figure B1. Survey Unit 1 (SU-1) Soil Sample Locations (Phase A)

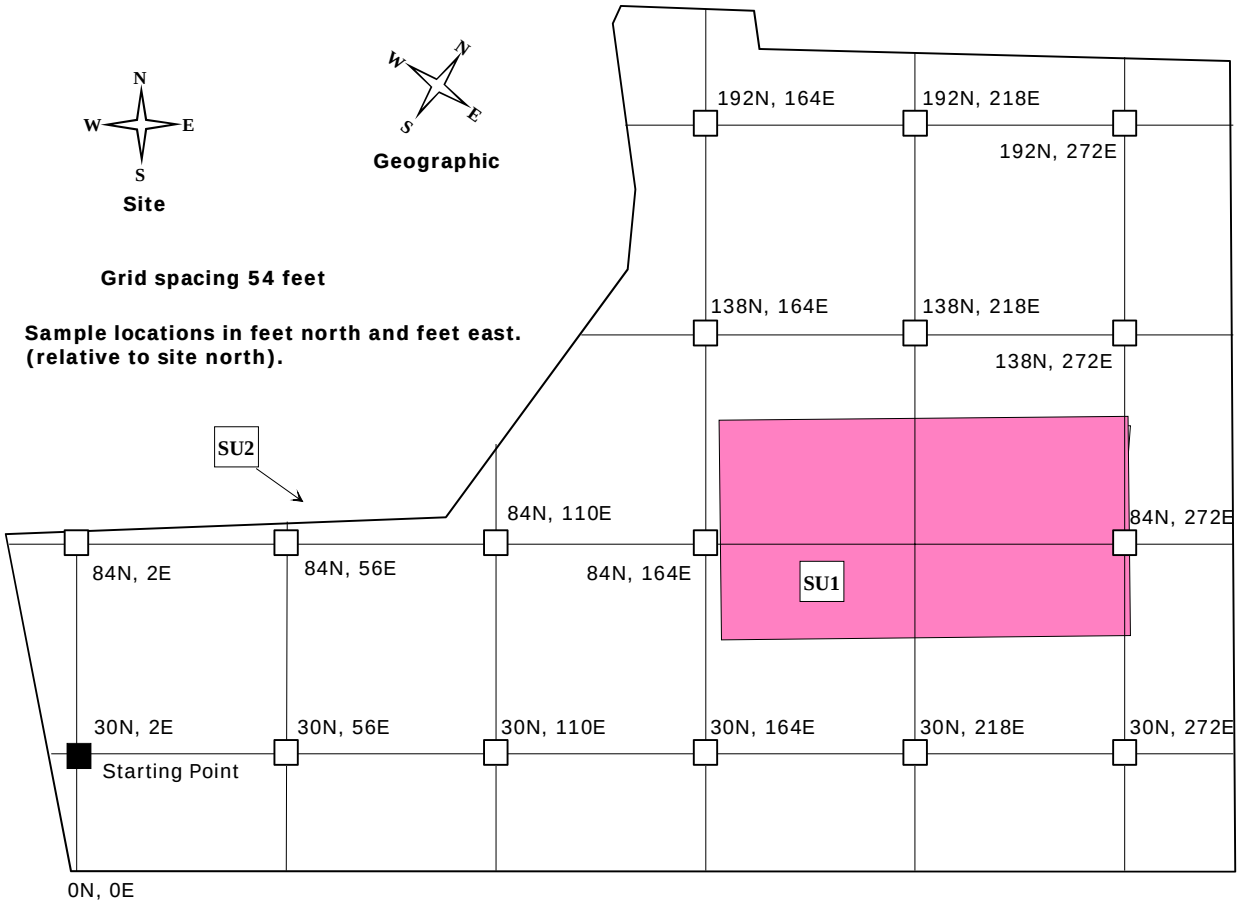


Figure B2. Survey Unit 2 (SU-2) Soil Sample Locations (Phase A)

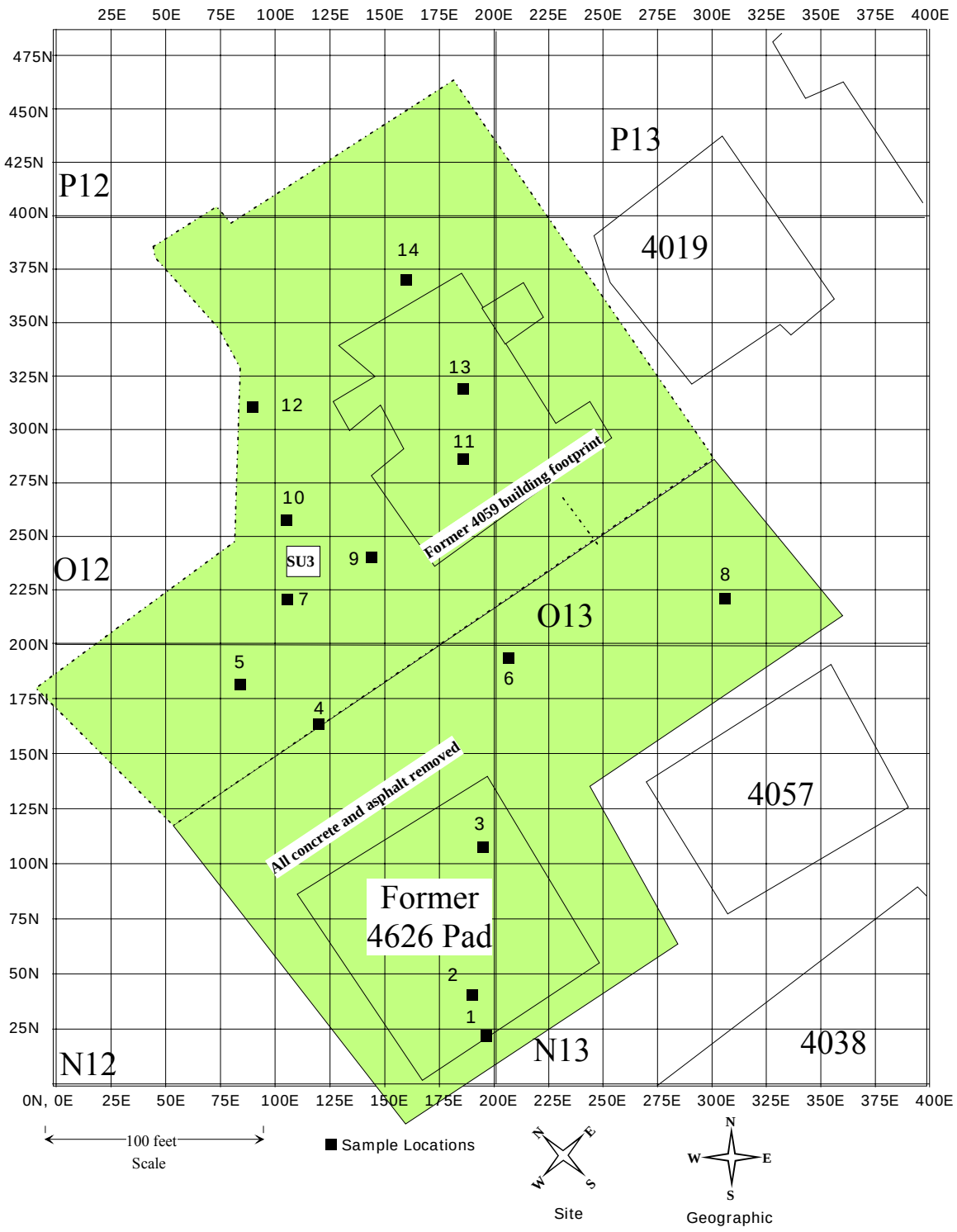


Figure B3. Survey Unit 3 (SU-3) Soil Sample Locations (Phase B)

APPENDIX C. GPS-104 GAMMA SCAN RESULTS

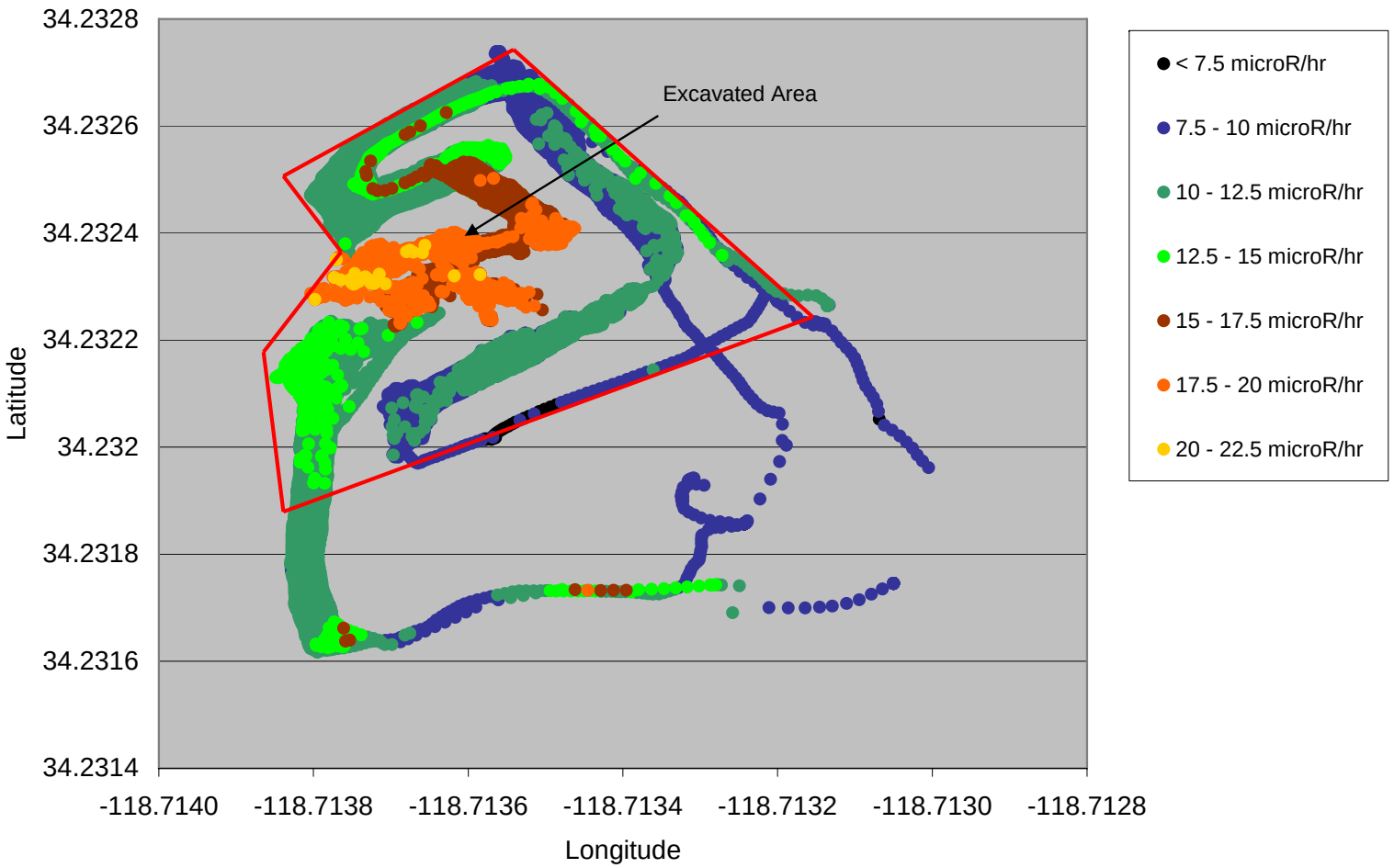


Figure C1. Gamma Scan Results, Phase A

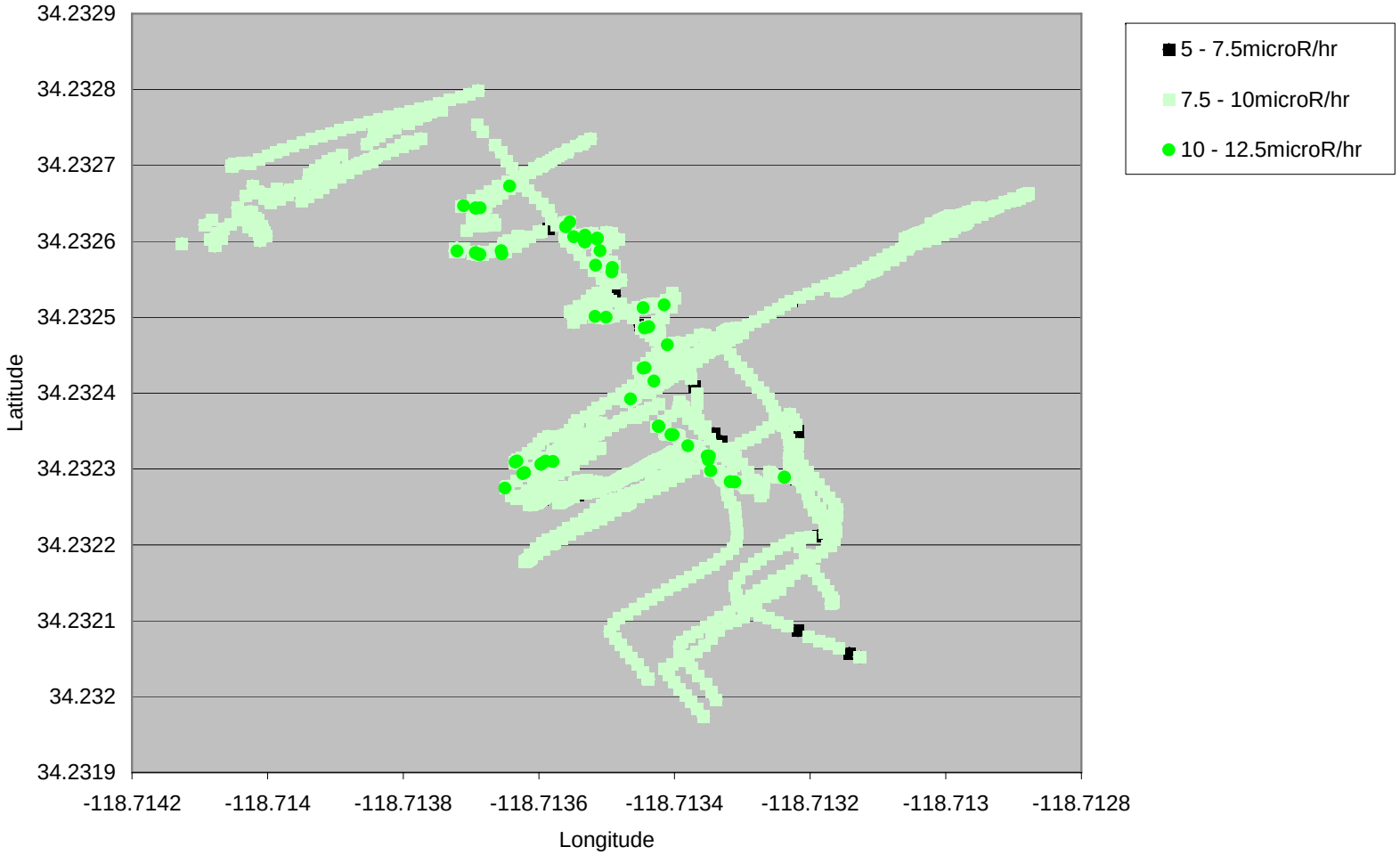


Figure C2. Gamma Scan Results, Phase B

APPENDIX D. SOIL SAMPLE RESULTS

PHASE A (SU-1 AND SU-2)

Table D1. Am-241 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	0.00E+00	0.00E+00	7.00E-02	NDA
059-04-0096	SU-1	2N, 28E	3.30E-02	6.60E-02	1.10E-01	NDA
059-04-0097	SU-1	2N, 48E	1.00E-02	1.80E-02	3.10E-02	NDA
059-04-0098	SU-1	2N, 70E	0.00E+00	0.00E+00	3.00E-02	NDA
059-04-0099	SU-1	2N, 91E	0.00E+00	0.00E+00	1.00E-01	NDA
059-04-0100	SU-1	23N, 7E	0.00E+00	0.00E+00	3.00E-02	NDA
059-04-0101	SU-1	23N, 28E	1.20E-02	5.00E-02	9.20E-02	NDA
059-04-0102	SU-1	23N, 49E	5.90E-02	6.20E-02	9.00E-02	NDA
059-04-0103	SU-1	23N, 70E	1.40E-02	2.80E-02	4.80E-02	NDA
059-04-0104	SU-1	23N 91E	2.80E-02	3.20E-02	4.30E-02	NDA
059-04-0105	SU-1	44N, 7E	6.00E-03	3.80E-02	7.70E-02	NDA
059-04-0106	SU-1	44N, 28E	2.50E-02	2.30E-02	3.00E-02	NDA
059-04-0107	SU-1	44N, 49E	1.00E-02	1.50E-02	2.50E-02	NDA
059-04-0108	SU-1	44N, 70E	1.00E-02	2.00E-02	3.40E-02	NDA
059-04-0109	SU-1	44N, 91E	8.00E-03	2.90E-02	5.20E-02	NDA
059-04-0112*	SU-1	44N, 91E	0.00E+00	0.00E+00	4.00E-02	NDA
059-04-0113	SU-2	30N, 272E	2.00E-03	1.10E-02	2.60E-02	NDA
059-04-0114	SU-2	84N, 272E	2.20E-02	2.40E-02	3.00E-02	NDA
059-04-0115	SU-2	138N, 272E	4.60E-02	5.60E-02	7.40E-02	NDA
059-04-0116	SU-2	192N, 272E	1.40E-02	6.80E-02	1.50E-01	NDA
059-04-0117	SU-2	192N, 218E	3.20E-02	3.10E-02	1.70E-02	
059-04-0118	SU-2	138N, 218E	4.00E-02	2.80E-02	2.70E-02	
059-04-0119	SU-2	30N, 218E	2.00E-03	1.10E-02	2.50E-02	NDA
059-04-0120	SU-2	30N, 164E	7.90E-02	8.40E-02	1.10E-01	NDA
059-04-0121	SU-2	138N, 164E	0.00E+00	0.00E+00	4.00E-02	NDA
059-04-0122	SU-2	192N, 164E	0.00E+00	0.00E+00	4.00E-02	NDA
059-04-0123	SU-2	30N, 110E	0.00E+00	0.00E+00	5.00E-02	NDA
059-04-0124	SU-2	84N, 110E	2.20E-02	1.90E-02	1.00E-02	
059-04-0125*	SU-2	84N, 110E	0.00E+00	0.00E+00	1.00E-01	NDA
059-04-0126	SU-2	30N, 56E	8.50E-02	9.00E-02	1.20E-01	NDA
059-04-0127	SU-2	84N, 56E	1.50E-02	3.00E-02	5.10E-02	NDA
059-04-0128	SU-2	30N, 2E	4.00E-03	1.20E-02	1.10E-02	NDA
059-04-0129	SU-2	84N, 2E	1.30E-02	3.70E-02	3.50E-02	NDA
059-04-0130	SU-2	30N, 164E	4.30E-02	5.70E-02	3.90E-02	

* Field Duplicate

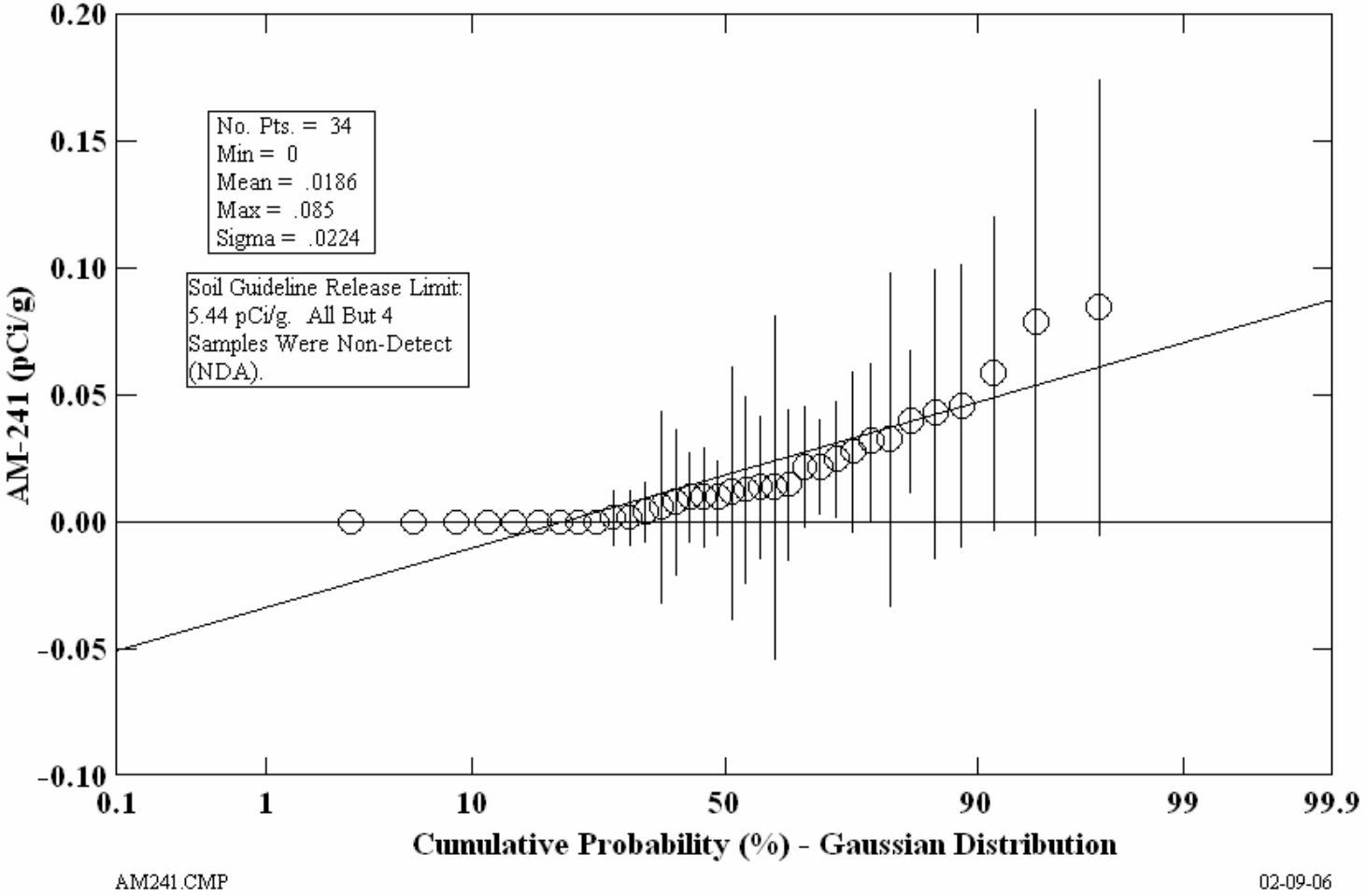


Figure D1. Am-241 Soil Results, SU-1 AND SU-2

Table D2. Co-60 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	2.00E-02	5.10E-02	1.10E-01	NDA
059-04-0096	SU-1	2N, 28E	-2.00E-03	5.60E-02	1.10E-01	NDA
059-04-0097	SU-1	2N, 48E	-4.70E-02	6.00E-02	9.60E-02	NDA
059-04-0098	SU-1	2N, 70E	4.00E-03	5.80E-02	1.10E-01	NDA
059-04-0099	SU-1	2N, 91E	-1.10E-02	4.70E-02	9.10E-02	NDA
059-04-0100	SU-1	23N, 7E	7.20E-02	5.50E-02	1.30E-01	NDA
059-04-0101	SU-1	23N, 28E	1.10E-02	5.60E-02	1.20E-01	NDA
059-04-0102	SU-1	23N, 49E	-1.30E-02	6.40E-02	1.20E-01	NDA
059-04-0103	SU-1	23N, 70E	-7.00E-03	4.90E-02	9.50E-02	NDA
059-04-0104	SU-1	23N 91E	-1.50E-02	6.60E-02	1.20E-01	NDA
059-04-0105	SU-1	44N, 7E	1.50E-02	6.20E-02	2.12E+00	NDA
059-04-0106	SU-1	44N, 28E	-2.40E-02	6.70E-02	1.20E-01	NDA
059-04-0107	SU-1	44N, 49E	-5.00E-04	4.40E-02	9.00E-02	NDA
059-04-0108	SU-1	44N, 70E	1.20E-02	3.90E-02	8.70E-02	NDA
059-04-0109	SU-1	44N, 91E	3.40E-02	5.80E-02	1.20E-01	NDA
059-04-0112*	SU-1	44N, 91E	2.00E-03	5.60E-02	1.10E-01	NDA
059-04-0113	SU-2	30N, 272E	1.30E-02	3.20E-02	7.80E-02	NDA
059-04-0114	SU-2	84N, 272E	1.20E-02	5.10E-02	1.00E-01	NDA
059-04-0115	SU-2	138N, 272E	2.80E-02	4.60E-02	9.90E-02	NDA
059-04-0116	SU-2	192N, 272E	2.50E-02	5.00E-02	1.10E-01	NDA
059-04-0117	SU-2	192N, 218E	2.70E-02	5.00E-02	1.10E-01	NDA
059-04-0118	SU-2	138N, 218E	-4.00E-03	5.80E-02	1.10E-01	NDA
059-04-0119	SU-2	30N, 218E	1.50E-02	5.30E-02	1.10E-01	NDA
059-04-0120	SU-2	30N, 164E	4.10E-02	5.60E-02	1.20E-01	NDA
059-04-0121	SU-2	138N, 164E	3.30E-02	4.40E-02	9.60E-02	NDA
059-04-0122	SU-2	192N, 164E	1.30E-02	5.60E-02	1.20E-01	NDA
059-04-0123	SU-2	30N, 110E	2.30E-02	5.90E-02	1.20E-01	NDA
059-04-0124	SU-2	84N, 110E	1.90E-02	5.40E-02	1.10E-01	NDA
059-04-0125*	SU-2	84N, 110E	2.30E-02	5.40E-02	1.10E-01	NDA
059-04-0126	SU-2	30N, 56E	4.40E-02	6.80E-02	1.50E-01	NDA
059-04-0127	SU-2	84N, 56E	1.40E-02	5.30E-02	1.00E-01	NDA
059-04-0128	SU-2	30N, 2E	2.00E-03	5.10E-02	1.00E-01	NDA
059-04-0129	SU-2	84N, 2E	4.00E-02	5.70E-02	1.20E-01	NDA
059-04-0130	SU-2	30N, 164E	-7.80E-02	7.00E-02	1.00E-01	NDA

* Field Duplicate

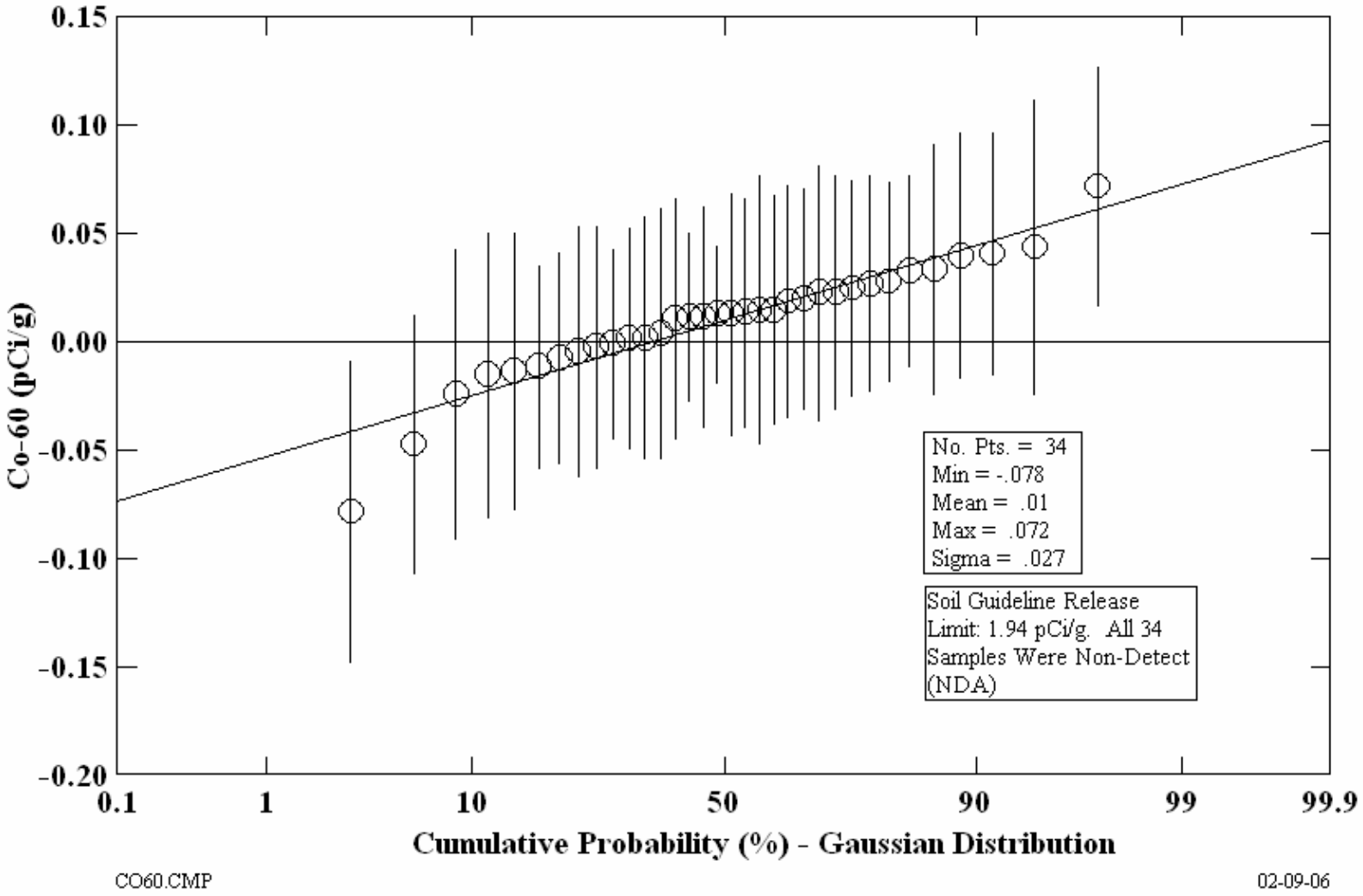


Figure D2. Co-60 Soil Results, SU-1 AND SU-2

Table D3. Cs-137 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	-3.00E-02	4.50E-02	7.60E-02	NDA
059-04-0096	SU-1	2N, 28E	-1.60E-02	5.20E-02	9.50E-02	NDA
059-04-0097	SU-1	2N, 48E	5.20E-02	5.20E-02	1.10E-01	NDA
059-04-0098	SU-1	2N, 70E	-2.60E-02	4.80E-02	8.10E-02	NDA
059-04-0099	SU-1	2N, 91E	-4.00E-03	5.50E-02	1.00E-01	NDA
059-04-0100	SU-1	23N, 7E	2.80E-02	4.40E-02	9.10E-02	NDA
059-04-0101	SU-1	23N, 28E	-9.00E-03	4.60E-02	8.50E-02	NDA
059-04-0102	SU-1	23N, 49E	-4.00E-02	5.00E-02	8.20E-02	NDA
059-04-0103	SU-1	23N, 70E	-2.00E-04	5.20E-02	9.80E-02	NDA
059-04-0104	SU-1	23N 91E	-4.10E-02	6.10E-02	1.00E-01	NDA
059-04-0105	SU-1	44N, 7E	-2.50E-02	4.80E-02	8.10E-02	NDA
059-04-0106	SU-1	44N, 28E	-1.00E-02	5.50E-02	1.00E-01	NDA
059-04-0107	SU-1	44N, 49E	-1.10E-02	5.10E-02	9.40E-02	NDA
059-04-0108	SU-1	44N, 70E	2.40E-02	4.50E-02	9.10E-02	NDA
059-04-0109	SU-1	44N, 91E	-2.60E-02	5.00E-02	8.40E-02	NDA
059-04-0112*	SU-1	44N, 91E	-2.00E-03	4.30E-02	8.00E-02	NDA
059-04-0113	SU-2	30N, 272E	-2.00E-02	5.30E-02	9.40E-02	NDA
059-04-0114	SU-2	84N, 272E	-1.00E-03	5.10E-02	9.10E-02	NDA
059-04-0115	SU-2	138N, 272E	-2.30E-02	4.70E-02	8.00E-02	NDA
059-04-0116	SU-2	192N, 272E	1.10E-02	5.10E-02	9.80E-02	NDA
059-04-0117	SU-2	192N, 218E	-2.00E-03	5.20E-02	9.70E-02	NDA
059-04-0118	SU-2	138N, 218E	1.70E-02	5.60E-02	1.10E-01	NDA
059-04-0119	SU-2	30N, 218E	-3.20E-02	6.00E-02	1.00E-01	NDA
059-04-0120	SU-2	30N, 164E	-4.00E-04	5.60E-02	1.00E-01	NDA
059-04-0121	SU-2	138N, 164E	-4.00E-02	4.30E-02	7.20E-02	NDA
059-04-0122	SU-2	192N, 164E	1.20E-02	5.40E-02	1.00E-01	NDA
059-04-0123	SU-2	30N, 110E	-1.10E-02	5.20E-02	9.00E-02	NDA
059-04-0124	SU-2	84N, 110E	-3.70E-02	4.60E-02	7.70E-02	NDA
059-04-0125*	SU-2	84N, 110E	7.00E-04	4.20E-02	8.20E-02	NDA
059-04-0126	SU-2	30N, 56E	5.50E-02	7.00E-02	1.40E-01	NDA
059-04-0127	SU-2	84N, 56E	-3.30E-02	4.70E-02	7.70E-02	NDA
059-04-0128	SU-2	30N, 2E	1.66E-01	7.30E-02	9.50E-02	
059-04-0129	SU-2	84N, 2E	2.00E-02	4.80E-02	9.40E-02	NDA
059-04-0130	SU-2	30N, 164E	1.00E-04	6.00E-02	1.10E-01	NDA

* Field Duplicate

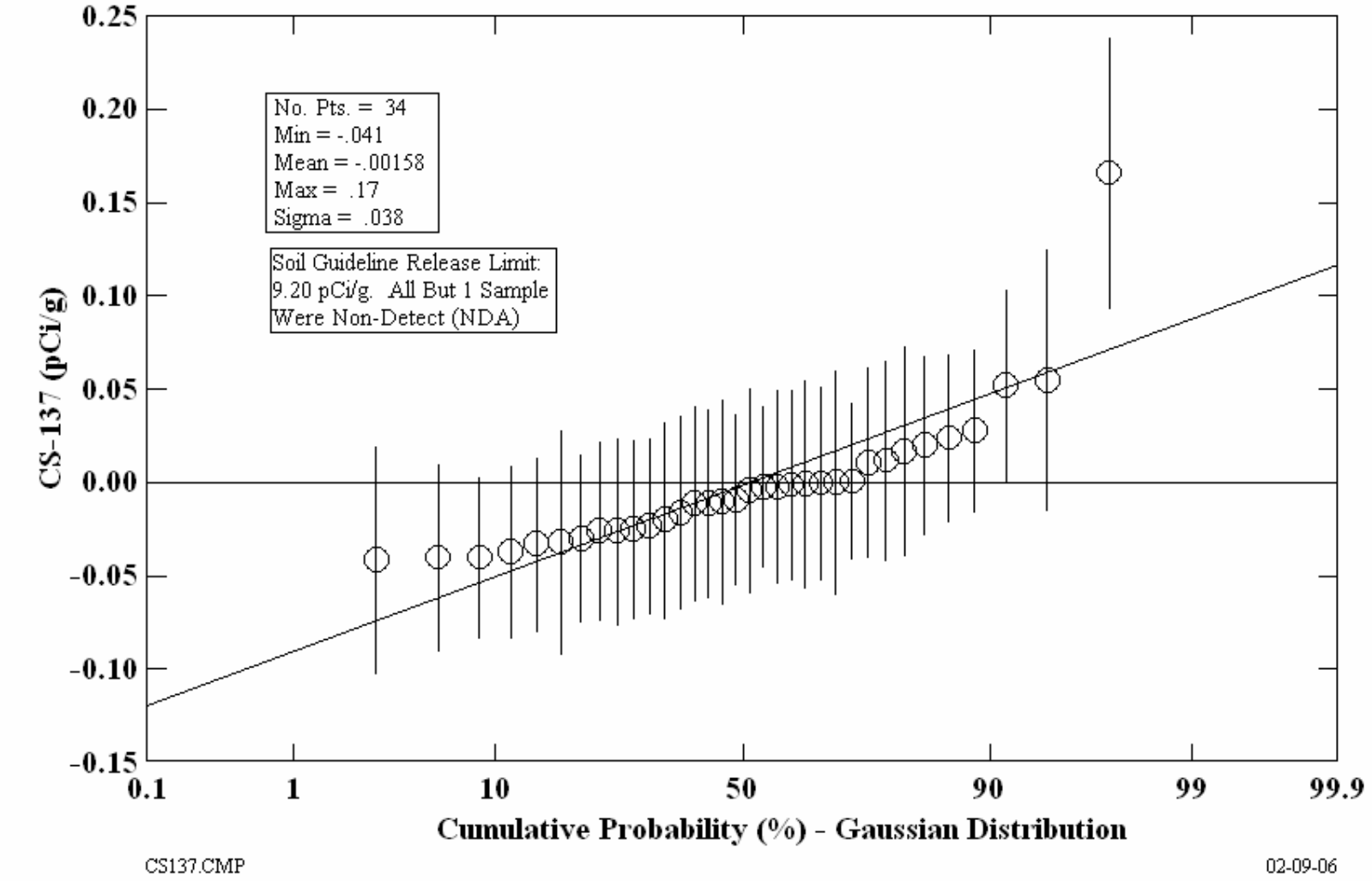


Figure D3. Cs-137 Soil Results, SU-1 AND SU-2

Table D4. Eu-152 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	8.00E-02	4.40E-01	8.50E-01	NDA
059-04-0096	SU-1	2N, 28E	-1.50E-01	3.50E-01	6.30E-01	NDA
059-04-0097	SU-1	2N, 48E	1.30E-01	5.20E-01	1.00E+00	NDA
059-04-0098	SU-1	2N, 70E	-3.50E-01	5.30E-01	8.90E-01	NDA
059-04-0099	SU-1	2N, 91E	2.00E-03	4.20E-01	8.10E-01	NDA
059-04-0100	SU-1	23N, 7E	-1.70E-01	4.40E-01	7.80E-01	NDA
059-04-0101	SU-1	23N, 28E	-2.30E-01	4.80E-01	8.60E-01	NDA
059-04-0102	SU-1	23N, 49E	-1.20E-01	5.50E-01	9.70E-01	NDA
059-04-0103	SU-1	23N, 70E	-1.90E-01	4.20E-01	7.40E-01	NDA
059-04-0104	SU-1	23N 91E	9.00E-02	5.60E-01	1.10E+00	NDA
059-04-0105	SU-1	44N, 7E	1.40E-01	5.90E-01	9.60E-01	NDA
059-04-0106	SU-1	44N, 28E	-2.60E-01	5.50E-01	9.50E-01	NDA
059-04-0107	SU-1	44N, 49E	1.90E-01	3.90E-01	8.00E-01	NDA
059-04-0108	SU-1	44N, 70E	5.80E-01	4.20E-01	9.60E-01	NDA
059-04-0109	SU-1	44N, 91E	-5.00E-02	4.70E-01	8.60E-01	NDA
059-04-0112*	SU-1	44N, 91E	3.00E-01	4.80E-01	9.60E-01	NDA
059-04-0113	SU-2	30N, 272E	-5.00E-02	4.20E-01	7.90E-01	NDA
059-04-0114	SU-2	84N, 272E	1.30E-01	4.90E-01	9.20E-01	NDA
059-04-0115	SU-2	138N, 272E	-1.00E-01	5.00E-01	8.70E-01	NDA
059-04-0116	SU-2	192N, 272E	8.00E-02	4.60E-01	8.80E-01	NDA
059-04-0117	SU-2	192N, 218E	1.20E-01	4.30E-01	8.50E-01	NDA
059-04-0118	SU-2	138N, 218E	-3.90E-01	-4.10E-01	6.50E-01	NDA
059-04-0119	SU-2	30N, 218E	-3.10E-01	4.80E-01	8.20E-01	NDA
059-04-0120	SU-2	30N, 164E	-1.60E-01	4.60E-01	8.10E-02	NDA
059-04-0121	SU-2	138N, 164E	-9.00E-02	3.70E-01	6.60E-01	NDA
059-04-0122	SU-2	192N, 164E	-2.30E-01	4.60E-01	8.20E-01	NDA
059-04-0123	SU-2	30N, 110E	-1.70E-01	4.80E-01	8.40E-01	NDA
059-04-0124	SU-2	84N, 110E	-2.90E-01	5.00E-01	8.50E-01	NDA
059-04-0125*	SU-2	84N, 110E	-1.00E-01	3.50E-01	6.40E-01	NDA
059-04-0126	SU-2	30N, 56E	-7.00E-02	5.30E-01	1.00E+00	NDA
059-04-0127	SU-2	84N, 56E	4.10E-01	4.20E-01	8.50E-01	NDA
059-04-0128	SU-2	30N, 2E	-2.50E-01	4.70E-01	8.10E-01	NDA
059-04-0129	SU-2	84N, 2E	2.00E-02	3.60E-01	7.00E-01	NDA
059-04-0130	SU-2	30N, 164E	2.00E-02	4.30E-01	8.60E-01	NDA

* Field Duplicate

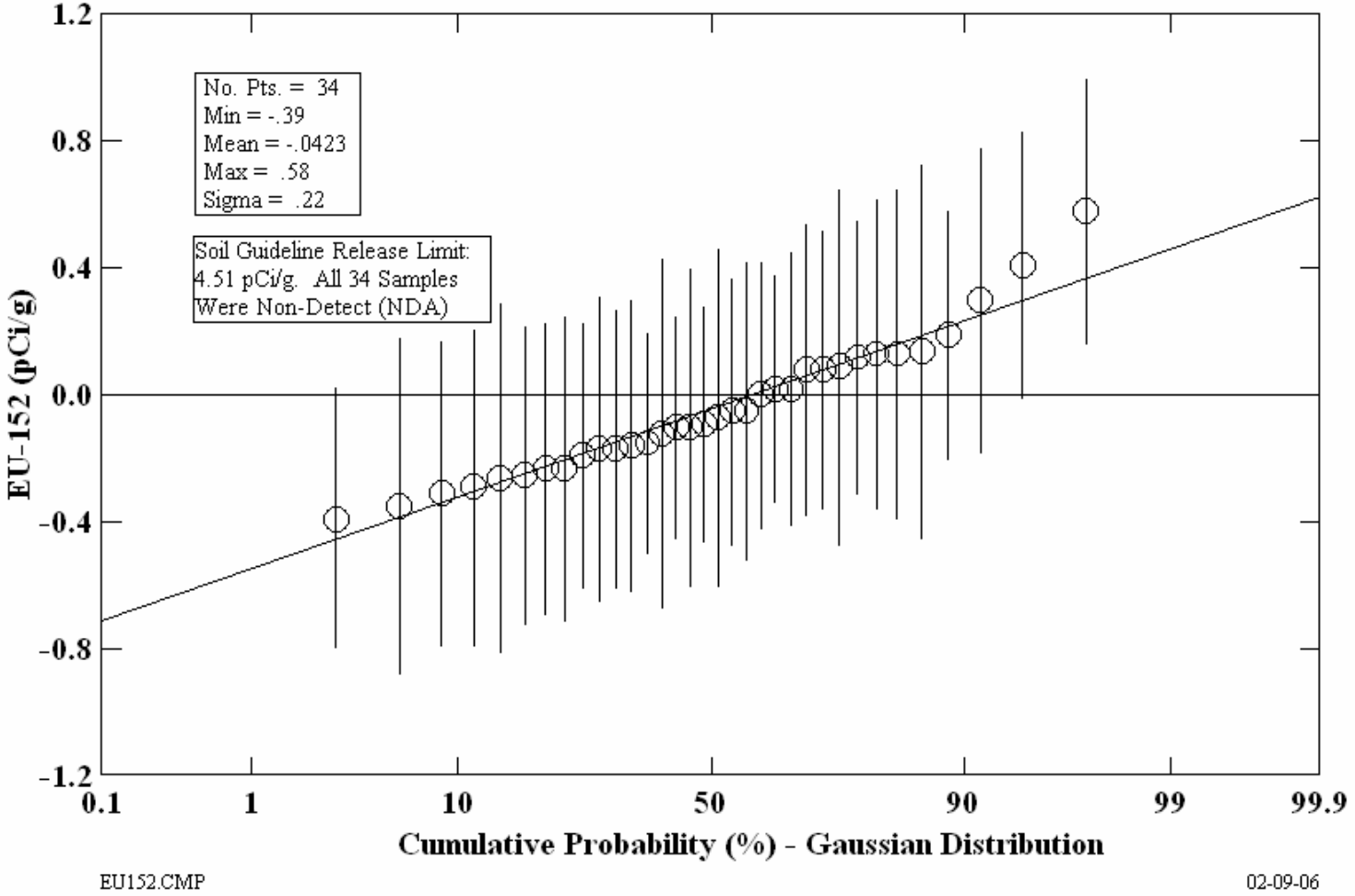


Figure D4. Eu-152 Soil Results, SU-1 AND SU-2

Table D5. Eu-154 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	-2.20E-01	3.80E-01	6.40E-01	NDA
059-04-0096	SU-1	2N, 28E	2.10E-01	3.10E-01	6.60E-01	NDA
059-04-0097	SU-1	2N, 48E	2.10E-01	3.50E-01	7.70E-01	NDA
059-04-0098	SU-1	2N, 70E	-1.80E-01	4.20E-01	7.20E-01	NDA
059-04-0099	SU-1	2N, 91E	1.30E-01	4.40E-01	8.70E-01	NDA
059-04-0100	SU-1	23N, 7E	1.70E-01	4.10E-01	8.10E-01	NDA
059-04-0101	SU-1	23N, 28E	8.00E-02	3.70E-01	7.60E-01	NDA
059-04-0102	SU-1	23N, 49E	-3.00E-02	4.00E-01	7.20E-01	NDA
059-04-0103	SU-1	23N, 70E	-2.10E-01	3.70E-01	6.40E-01	NDA
059-04-0104	SU-1	23N 91E	-4.00E-01	4.70E-01	7.60E-01	NDA
059-04-0105	SU-1	44N, 7E	-3.20E-01	4.40E-01	7.10E-01	NDA
059-04-0106	SU-1	44N, 28E	2.40E-01	4.20E-01	8.70E-01	NDA
059-04-0107	SU-1	44N, 49E	-1.20E-01	2.90E-01	5.20E-01	NDA
059-04-0108	SU-1	44N, 70E	-1.70E-01	3.70E-01	6.50E-01	NDA
059-04-0109	SU-1	44N, 91E	-1.40E-01	3.80E-01	6.60E-01	NDA
059-04-0112*	SU-1	44N, 91E	-1.30E-01	4.30E-01	7.50E-01	NDA
059-04-0113	SU-2	30N, 272E	4.00E-02	4.30E-01	8.30E-01	NDA
059-04-0114	SU-2	84N, 272E	-1.90E-01	4.50E-01	7.70E-01	NDA
059-04-0115	SU-2	138N, 272E	1.00E-02	4.10E-01	7.50E-01	NDA
059-04-0116	SU-2	192N, 272E	7.00E-02	4.00E-01	7.60E-01	NDA
059-04-0117	SU-2	192N, 218E	-4.50E-01	4.90E-01	7.70E-01	NDA
059-04-0118	SU-2	138N, 218E	-3.30E-01	3.50E-01	5.60E-01	NDA
059-04-0119	SU-2	30N, 218E	3.20E-01	4.90E-01	1.00E+00	NDA
059-04-0120	SU-2	30N, 164E	1.70E-01	4.00E-01	7.80E-01	NDA
059-04-0121	SU-2	138N, 164E	-1.90E-01	3.30E-01	5.70E-01	NDA
059-04-0122	SU-2	192N, 164E	-4.90E-01	4.30E-01	6.40E-01	NDA
059-04-0123	SU-2	30N, 110E	-4.00E-02	3.70E-01	6.70E-01	NDA
059-04-0124	SU-2	84N, 110E	4.00E-02	3.80E-01	7.30E-01	NDA
059-04-0125*	SU-2	84N, 110E	-8.00E-02	3.90E-01	7.00E-01	NDA
059-04-0126	SU-2	30N, 56E	-1.60E-01	5.10E-01	9.20E-01	NDA
059-04-0127	SU-2	84N, 56E	-3.20E-01	4.00E-01	6.40E-01	NDA
059-04-0128	SU-2	30N, 2E	-1.50E-01	3.60E-01	6.30E-01	NDA
059-04-0129	SU-2	84N, 2E	-3.20E-01	3.70E-01	5.90E-01	NDA
059-04-0130	SU-2	30N, 164E	9.00E-02	4.60E-01	9.20E-01	NDA

* Field Duplicate

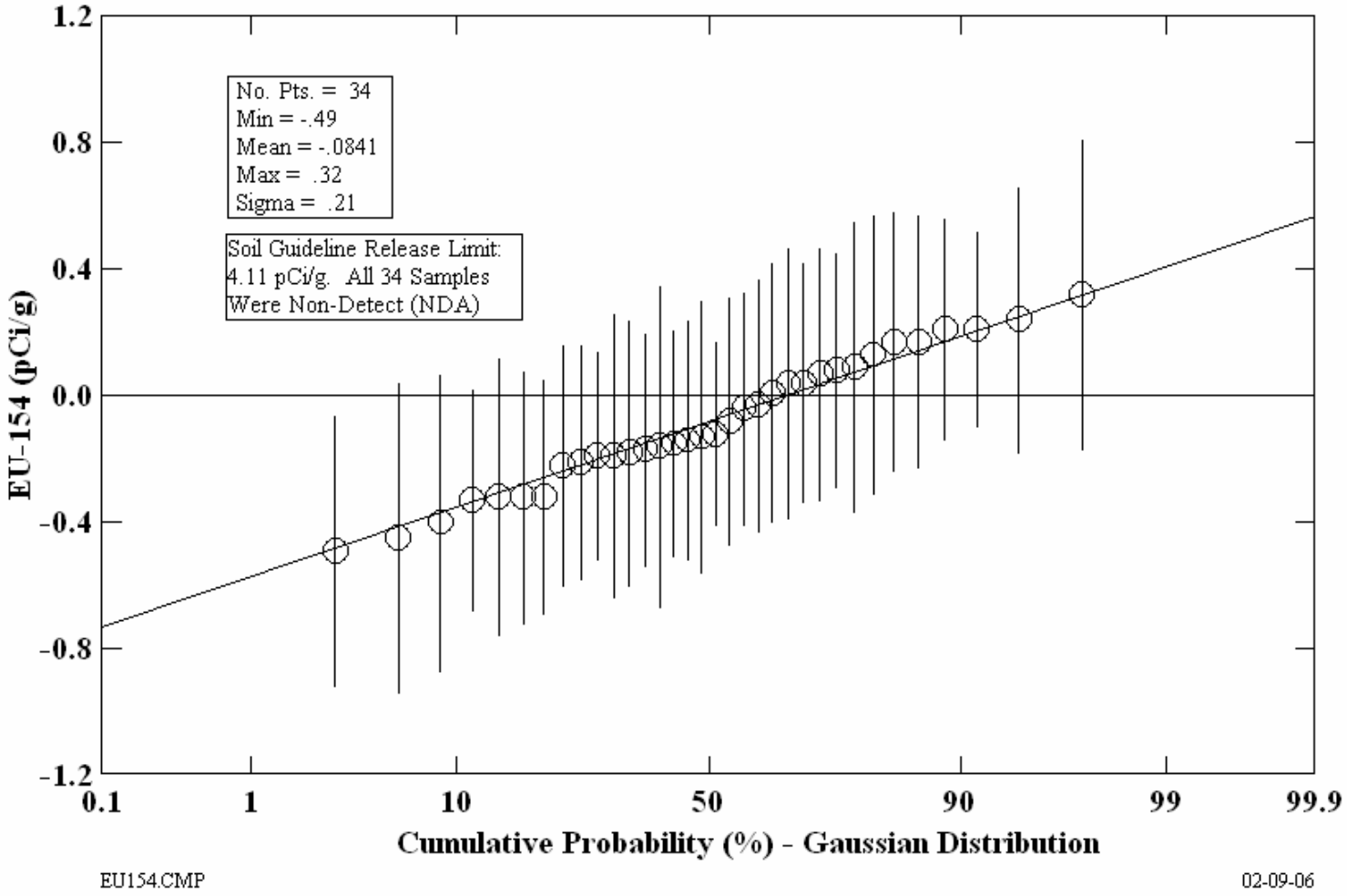


Figure D5. Eu-154 Soil Results, SU-1 AND SU-2

Table D6. Fe-55 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	4.00E+00	2.60E+00	1.70E+01	NDA
059-04-0096	SU-1	2N, 28E	6.90E+00	5.10E+00	2.50E+01	NDA
059-04-0097	SU-1	2N, 48E	5.80E+00	4.40E+00	2.20E+01	NDA
059-04-0098	SU-1	2N, 70E	7.70E+00	7.20E+00	2.00E+01	NDA
059-04-0099	SU-1	2N, 91E	5.00E+00	3.30E+00	2.10E+01	NDA
059-04-0100	SU-1	23N, 7E	1.50E+01	1.90E+01	2.30E+01	NDA
059-04-0101	SU-1	23N, 28E	9.80E+00	9.50E+00	2.20E+01	NDA
059-04-0102	SU-1	23N, 49E	1.00E+01	1.10E+01	2.00E+01	NDA
059-04-0103	SU-1	23N, 70E	5.00E+00	3.30E+00	2.00E+01	NDA
059-04-0104	SU-1	23N 91E	8.10E+00	7.10E+00	2.10E+01	NDA
059-04-0105	SU-1	44N, 7E	8.70E+00	8.20E+00	2.10E+01	NDA
059-04-0106	SU-1	44N, 28E	9.90E+00	9.40E+00	2.10E+01	NDA
059-04-0107	SU-1	44N, 49E	4.00E+00	2.60E+00	1.90E+01	NDA
059-04-0108	SU-1	44N, 70E	8.50E+00	7.70E+00	2.00E+01	NDA
059-04-0109	SU-1	44N, 91E	7.70E+00	6.70E+00	2.00E+01	NDA
059-04-0112*	SU-1	44N, 91E	4.90E+00	3.50E+00	1.70E+01	NDA
059-04-0113	SU-2	30N, 272E	7.00E+00	1.70E+01	1.90E+01	NDA
059-04-0114	SU-2	84N, 272E	1.00E+01	1.10E+02	2.00E+01	NDA
059-04-0115	SU-2	138N, 272E	1.00E+01	1.50E+02	2.00E+01	NDA
059-04-0116	SU-2	192N, 272E	6.00E+00	1.10E+01	2.10E+01	NDA
059-04-0117	SU-2	192N, 218E	2.00E+01	1.40E+02	3.00E+01	NDA
059-04-0118	SU-2	138N, 218E	5.70E+00	7.50E+00	2.40E+01	NDA
059-04-0119	SU-2	30N, 218E	1.00E+01	1.30E+01	3.00E+01	NDA
059-04-0120	SU-2	30N, 164E	8.00E+00	1.60E+01	2.30E+01	NDA
059-04-0121	SU-2	138N, 164E	5.70E+00	8.40E+00	2.30E+01	NDA
059-04-0122	SU-2	192N, 164E	1.00E+01	3.60E+01	2.30E+01	NDA
059-04-0123	SU-2	30N, 110E	8.00E+00	1.60E+01	2.40E+01	NDA
059-04-0124	SU-2	84N, 110E	1.00E+01	1.00E+02	2.00E+01	NDA
059-04-0125*	SU-2	84N, 110E	2.00E+01	6.20E+02	3.00E+01	NDA
059-04-0126	SU-2	30N, 56E	1.80E+01	3.80E+01	3.40E+01	NDA
059-04-0127	SU-2	84N, 56E	2.50E+01	8.30E+01	2.80E+01	NDA
059-04-0128	SU-2	30N, 2E	9.00E+00	1.10E+01	2.60E+01	NDA
059-04-0129	SU-2	84N, 2E	3.00E+01	5.70E+01	2.80E+01	
059-04-0130	SU-2	30N, 164E	1.30E+01	3.20E+01	2.60E+01	NDA

* Field Duplicate

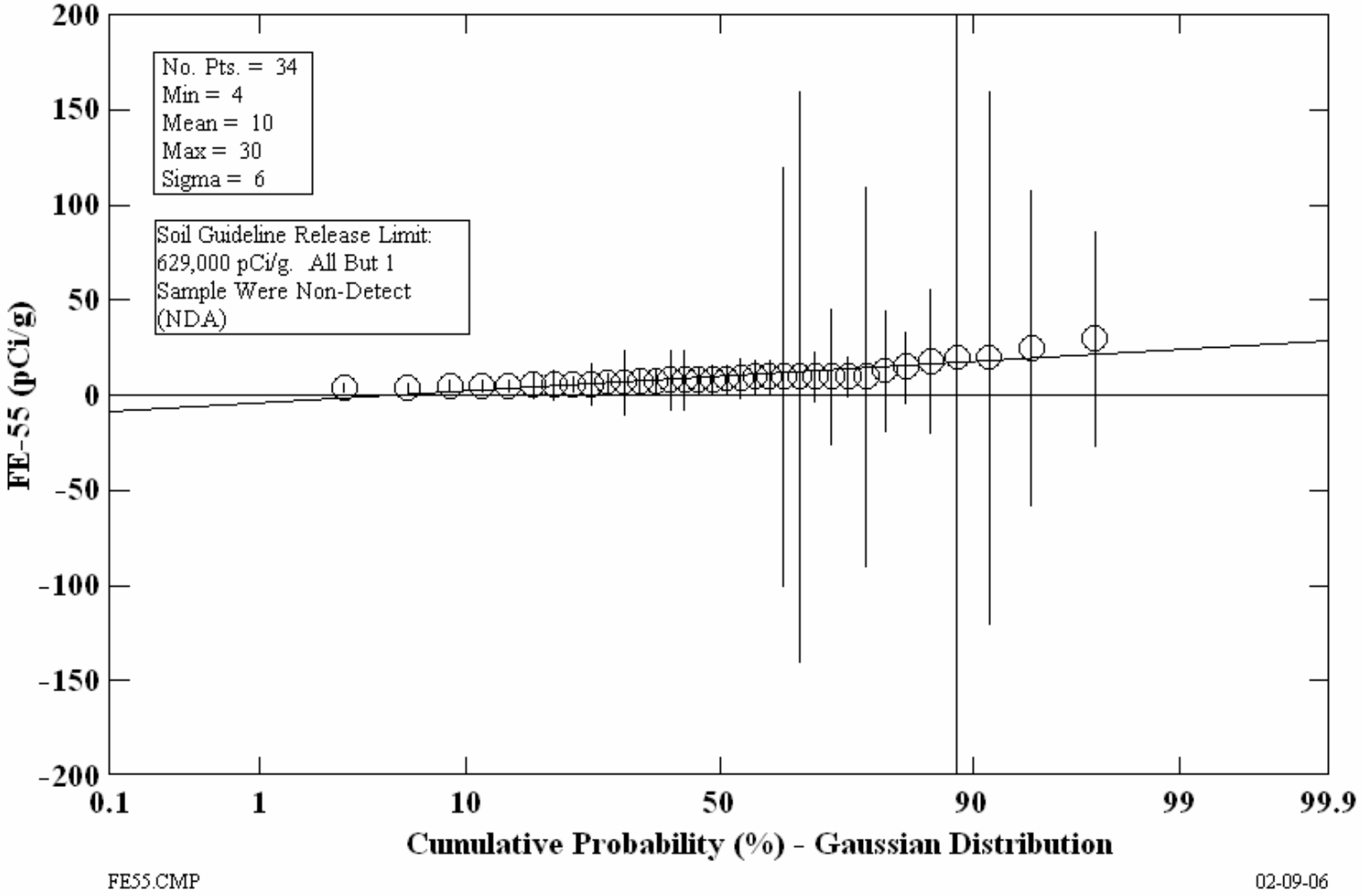


Figure D6. Fe-55 Soil Results, SU-1 AND SU-2

Table D7. H-3 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	5.80E+00	1.00E+00	7.00E-01	
059-04-0096	SU-1	2N, 28E	1.08E+00	5.20E-01	7.00E-01	
059-04-0097	SU-1	2N, 48E	-2.20E-01	3.50E-01	6.80E-01	NDA
059-04-0098	SU-1	2N, 70E	-2.90E-01	3.10E-01	7.00E-01	NDA
059-04-0099	SU-1	2N, 91E	-1.80E-01	3.30E-01	6.20E-01	NDA
059-04-0100	SU-1	23N, 7E	-3.00E-01	2.90E-01	6.00E-01	NDA
059-04-0101	SU-1	23N, 28E	2.00E-02	0.00E+00	7.00E-01	NDA
059-04-0102	SU-1	23N, 49E	9.00E-02	1.70E-01	3.50E-01	NDA
059-04-0103	SU-1	23N, 70E	1.40E-01	2.30E-01	4.00E-01	NDA
059-04-0104	SU-1	23N 91E	-3.00E-02	2.00E-01	2.90E-01	NDA
059-04-0105	SU-1	44N, 7E	8.00E-02	1.80E-01	3.10E-01	NDA
059-04-0106	SU-1	44N, 28E	9.00E-01	2.50E-01	3.30E-01	
059-04-0107	SU-1	44N, 49E	1.00E-02	1.70E-01	3.90E-01	NDA
059-04-0108	SU-1	44N, 70E	2.20E-01	2.20E-01	3.70E-01	NDA
059-04-0109	SU-1	44N, 91E	-1.00E-02	2.90E-01	3.40E-01	NDA
059-04-0112*	SU-1	44N, 91E	2.00E-02	1.70E-01	3.70E-01	NDA
059-04-0113	SU-2	30N, 272E	4.10E-01	2.60E-01	3.90E-01	
059-04-0114	SU-2	84N, 272E	-7.00E-02	1.60E-01	3.80E-01	NDA
059-04-0115	SU-2	138N, 272E	1.00E-02	3.30E-01	2.80E-01	NDA
059-04-0116	SU-2	192N, 272E	1.00E-02	3.30E-01	2.80E-01	NDA
059-04-0117	SU-2	192N, 218E	1.18E+00	3.00E-01	3.70E-01	
059-04-0118	SU-2	138N, 218E	-1.20E-02	9.30E-02	3.20E-01	NDA
059-04-0119	SU-2	30N, 218E	-6.00E-04	9.20E-03	3.80E-01	NDA
059-04-0120	SU-2	30N, 164E	-1.00E-02	1.60E-01	3.90E-01	NDA
059-04-0121	SU-2	138N, 164E	-2.50E-02	8.90E-02	2.90E-01	NDA
059-04-0122	SU-2	192N, 164E	2.30E-01	2.70E-01	3.80E-01	NDA
059-04-0123	SU-2	30N, 110E	4.00E-02	2.50E-01	3.60E-01	NDA
059-04-0124	SU-2	84N, 110E	1.00E-02	9.60E-01	3.30E-01	NDA
059-04-0125*	SU-2	84N, 110E	1.30E-01	2.40E-01	3.80E-01	NDA
059-04-0126	SU-2	30N, 56E	4.00E-02	3.20E-01	4.00E-01	NDA
059-04-0127	SU-2	84N, 56E	4.00E-04	1.70E-02	2.30E-01	NDA
059-04-0128	SU-2	30N, 2E	3.00E-02	2.10E-01	2.70E-01	NDA
059-04-0129	SU-2	84N, 2E	-1.30E-01	1.90E-01	3.60E-01	NDA
059-04-0130	SU-2	30N, 164E	5.00E-02	1.70E-01	2.70E-01	NDA

* Field Duplicate

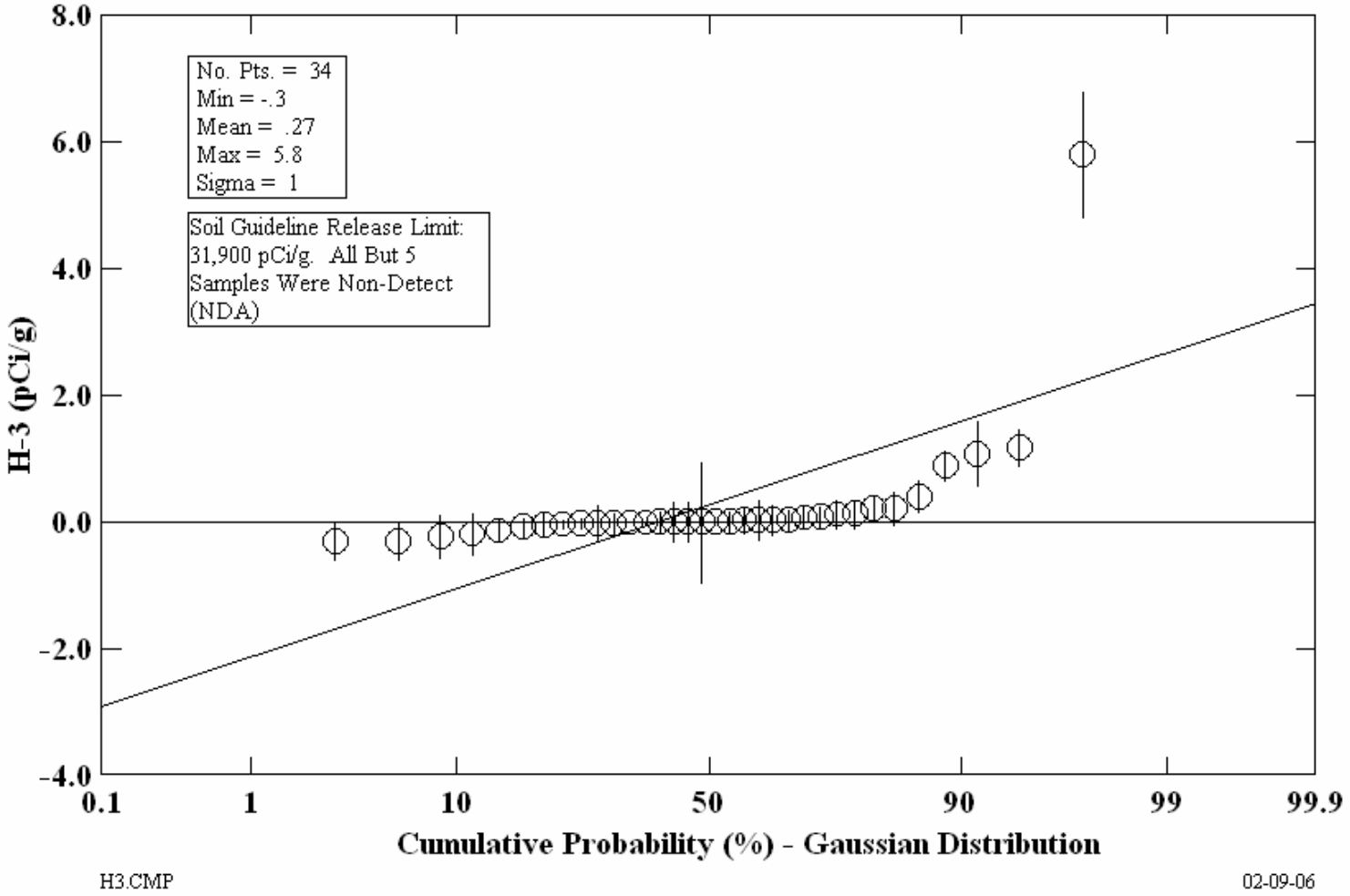


Figure D7. H-3 Soil Results, SU-1 AND SU-2

Table D8. Ni-63 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	9.70E+00	2.70E+00	2.40E+00	
059-04-0096	SU-1	2N, 28E	8.00E+00	2.90E+00	3.00E+00	
059-04-0097	SU-1	2N, 48E	1.07E+01	3.50E+00	3.30E+00	
059-04-0098	SU-1	2N, 70E	6.90E+00	2.40E+00	2.50E+00	
059-04-0099	SU-1	2N, 91E	9.10E+00	3.10E+00	3.10E+00	
059-04-0100	SU-1	23N, 7E	1.03E+01	3.60E+00	3.60E+00	
059-04-0101	SU-1	23N, 28E	6.20E+00	2.30E+00	2.50E+00	
059-04-0102	SU-1	23N, 49E	8.00E+00	2.80E+00	2.90E+00	
059-04-0103	SU-1	23N, 70E	5.00E+00	2.00E+00	2.20E+00	
059-04-0104	SU-1	23N 91E	8.80E+00	3.20E+00	3.40E+00	
059-04-0105	SU-1	44N, 7E	8.80E+00	2.80E+00	2.70E+00	
059-04-0106	SU-1	44N, 28E	6.80E+00	2.50E+00	2.70E+00	
059-04-0107	SU-1	44N, 49E	6.60E+00	2.50E+00	2.70E+00	
059-04-0108	SU-1	44N, 70E	6.80E+00	2.20E+00	2.20E+00	
059-04-0109	SU-1	44N, 91E	6.80E+00	2.70E+00	2.90E+00	
059-04-0112*	SU-1	44N, 91E	5.70E+00	2.30E+00	2.50E+00	
059-04-0113	SU-2	30N, 272E	2.60E+00	4.10E+00	9.20E+00	NDA
059-04-0114	SU-2	84N, 272E	7.10E+00	5.20E+00	8.80E+00	NDA
059-04-0115	SU-2	138N, 272E	5.90E+00	5.00E+00	9.20E+00	NDA
059-04-0116	SU-2	192N, 272E	5.90E+00	5.00E+00	9.20E+00	NDA
059-04-0117	SU-2	192N, 218E	4.85E+01	9.40E+00	8.70E+00	
059-04-0118	SU-2	138N, 218E	9.80E+00	6.00E+00	9.20E+00	
059-04-0119	SU-2	30N, 218E	3.10E+00	8.20E+00	1.10E+01	NDA
059-04-0120	SU-2	30N, 164E	7.30E+00	5.50E+00	8.90E+00	NDA
059-04-0121	SU-2	138N, 164E	2.40E+00	9.90E+00	1.10E+01	NDA
059-04-0122	SU-2	192N, 164E	7.40E+00	4.80E+00	7.70E+00	NDA
059-04-0123	SU-2	30N, 110E	9.70E+00	5.40E+00	8.30E+00	
059-04-0124	SU-2	84N, 110E	3.80E+00	4.20E+00	7.50E+00	NDA
059-04-0125*	SU-2	84N, 110E	3.80E+00	4.10E+00	7.30E+00	NDA
059-04-0126	SU-2	30N, 56E	5.20E+00	4.70E+00	8.00E+00	NDA
059-04-0127	SU-2	84N, 56E	4.80E+00	4.90E+00	8.50E+00	NDA
059-04-0128	SU-2	30N, 2E	5.90E+00	4.40E+00	7.20E+00	NDA
059-04-0129	SU-2	84N, 2E	4.90E+00	4.50E+00	7.90E+00	NDA
059-04-0130	SU-2	30N, 164E	1.50E+00	2.90E+00	6.30E+00	NDA

* Field Duplicate

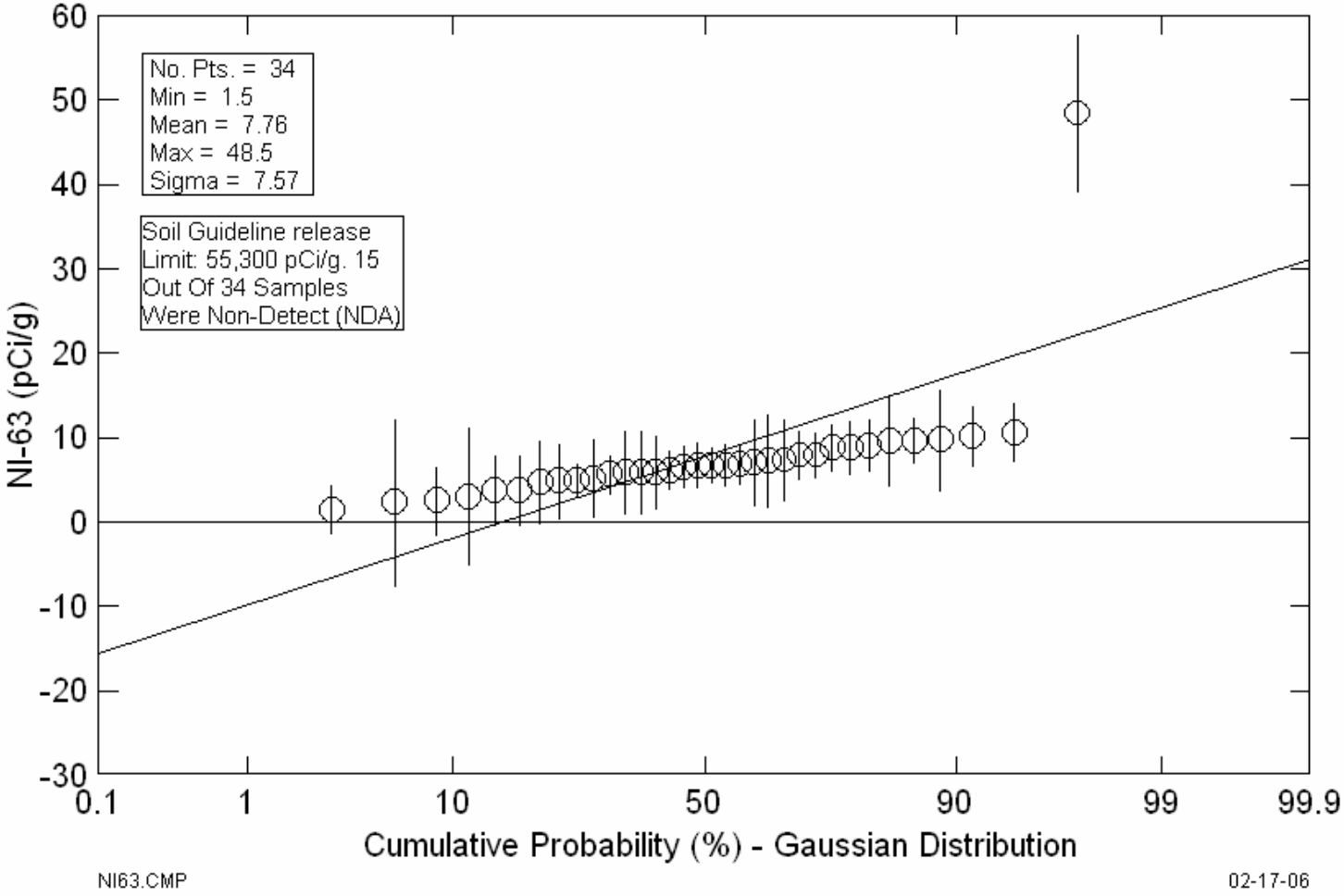


Figure D8. Ni-63 Soil Results, SU-1 AND SU-2

Table D9. Pu-238 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	0.00E+00	0.00E+00	1.00E-01	NDA
059-04-0096	SU-1	2N, 28E	9.00E-03	1.10E-02	1.60E-02	NDA
059-04-0097	SU-1	2N, 48E	1.30E-02	2.10E-02	3.30E-02	NDA
059-04-0098	SU-1	2N, 70E	0.00E+00	0.00E+00	4.00E-02	NDA
059-04-0099	SU-1	2N, 91E	0.00E+00	0.00E+00	1.00E-01	NDA
059-04-0100	SU-1	23N, 7E	0.00E+00	0.00E+00	3.00E-02	NDA
059-04-0101	SU-1	23N, 28E	1.70E-02	4.70E-02	8.60E-02	NDA
059-04-0102	SU-1	23N, 49E	4.00E-03	4.70E-02	9.10E-02	NDA
059-04-0103	SU-1	23N, 70E	7.00E-03	2.10E-02	3.70E-02	NDA
059-04-0104	SU-1	23N 91E	0.00E+00	0.00E+00	3.00E-02	NDA
059-04-0105	SU-1	44N, 7E	4.00E-03	2.80E-02	6.00E-02	NDA
059-04-0106	SU-1	44N, 28E	2.80E-02	2.50E-02	1.30E-02	
059-04-0107	SU-1	44N, 49E	8.00E-03	1.30E-02	2.10E-02	NDA
059-04-0108	SU-1	44N, 70E	4.00E-03	2.10E-02	4.00E-02	NDA
059-04-0109	SU-1	44N, 91E	1.10E-02	2.10E-02	3.60E-02	NDA
059-04-0112*	SU-1	44N, 91E	6.10E-03	1.10E-03	8.20E-03	NDA
059-04-0113	SU-2	30N, 272E	2.60E-03	6.90E-03	1.30E-02	NDA
059-04-0114	SU-2	84N, 272E	3.50E-03	6.10E-03	4.70E-03	NDA
059-04-0115	SU-2	138N, 272E	0.00E+00	0.00E+00	2.00E-02	NDA
059-04-0116	SU-2	192N, 272E	1.50E-02	4.20E-02	4.00E-02	NDA
059-04-0117	SU-2	192N, 218E	0.00E+00	0.00E+00	3.00E-02	NDA
059-04-0118	SU-2	138N, 218E	1.80E-03	5.20E-03	5.00E-03	NDA
059-04-0119	SU-2	30N, 218E	3.90E-03	6.70E-03	5.20E-03	NDA
059-04-0120	SU-2	30N, 164E	2.20E-02	2.90E-02	2.00E-02	
059-04-0121	SU-2	138N, 164E	2.20E-03	6.30E-03	6.00E-03	NDA
059-04-0122	SU-2	192N, 164E	0.00E+00	0.00E+00	5.00E-03	NDA
059-04-0123	SU-2	30N, 110E	0.00E+00	0.00E+00	1.00E-02	NDA
059-04-0124	SU-2	84N, 110E	0.00E+00	0.00E+00	5.00E-03	NDA
059-04-0125*	SU-2	84N, 110E	7.00E-03	2.10E-02	2.00E-02	NDA
059-04-0126	SU-2	30N, 56E	7.20E-02	7.80E-02	1.10E-01	NDA
059-04-0127	SU-2	84N, 56E	0.00E+00	0.00E+00	4.00E-02	NDA
059-04-0128	SU-2	30N, 2E	0.00E+00	0.00E+00	5.00E-03	NDA
059-04-0129	SU-2	84N, 2E	0.00E+00	0.00E+00	2.00E-02	NDA
059-04-0130	SU-2	30N, 164E	2.30E-02	3.10E-02	4.50E-02	NDA

* Field Duplicate

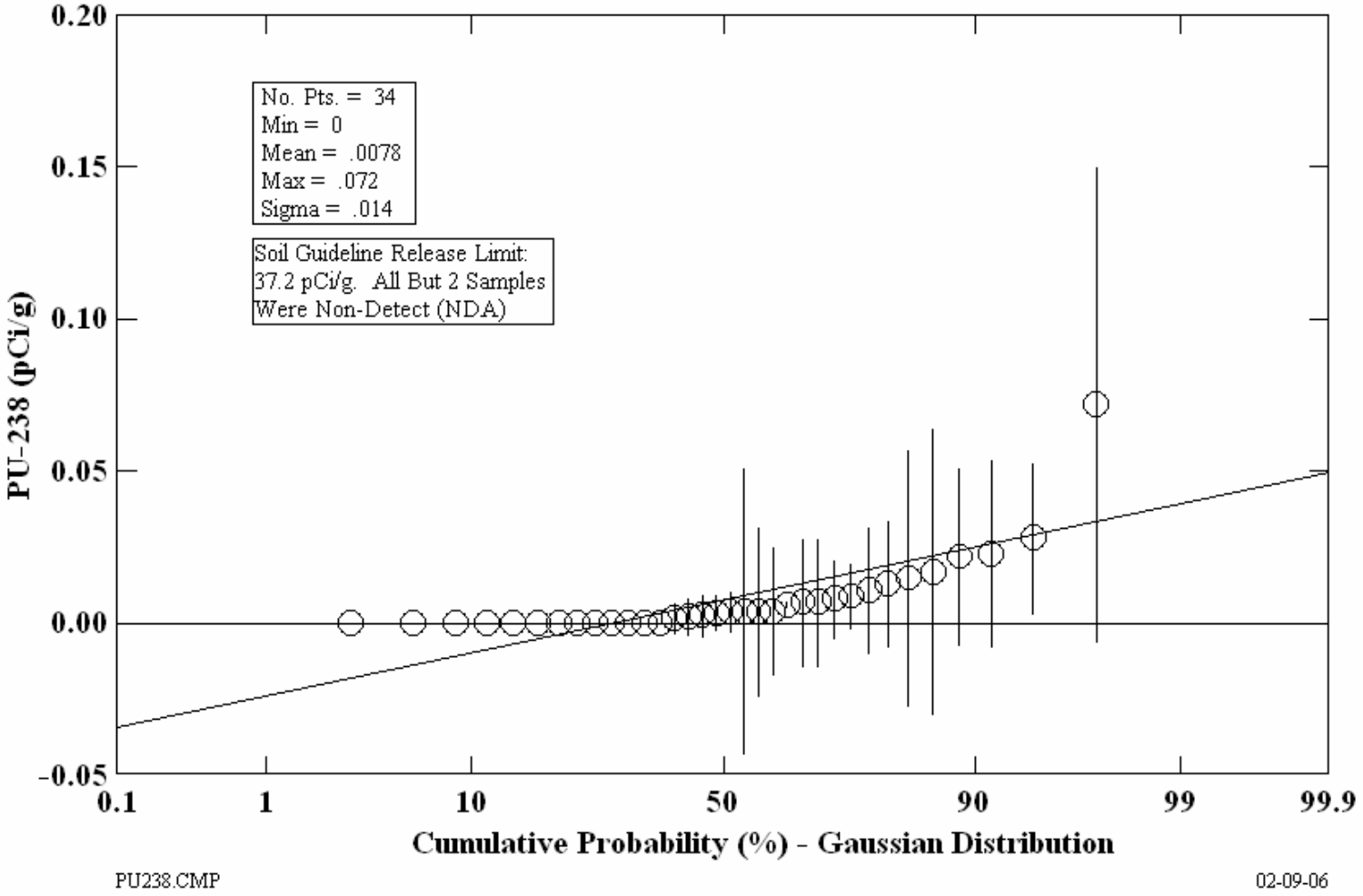


Figure D9. Pu-238 Soil Results, SU-1 AND SU-2

Table D10. Pu-239 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	1.26E-03	1.39E-03	3.40E-03	NDA
059-04-0096	SU-1	2N, 28E	0.00E+00	0.00E+00	6.30E-03	NDA
059-04-0097	SU-1	2N, 48E	0.00E+00	0.00E+00	5.67E-03	NDA
059-04-0098	SU-1	2N, 70E	0.00E+00	0.00E+00	1.89E-02	NDA
059-04-0099	SU-1	2N, 91E	0.00E+00	0.00E+00	1.26E-02	NDA
059-04-0100	SU-1	23N, 7E	2.52E-03	4.35E-03	3.40E-03	NDA
059-04-0101	SU-1	23N, 28E	1.26E-03	1.39E-02	3.40E-02	NDA
059-04-0102	SU-1	23N, 49E	5.04E-03	1.39E-02	1.32E-02	NDA
059-04-0103	SU-1	23N, 70E	0.00E+00	0.00E+00	1.89E-02	NDA
059-04-0104	SU-1	23N 91E	0.00E+00	0.00E+00	1.26E-02	NDA
059-04-0105	SU-1	44N, 7E	0.00E+00	0.00E+00	4.41E-02	NDA
059-04-0106	SU-1	44N, 28E	0.00E+00	0.00E+00	1.89E-02	NDA
059-04-0107	SU-1	44N, 49E	3.15E-04	3.21E-03	7.56E-03	NDA
059-04-0108	SU-1	44N, 70E	0.00E+00	0.00E+00	1.89E-02	NDA
059-04-0109	SU-1	44N, 91E	2.52E-03	6.93E-03	6.93E-03	NDA
059-04-0112*	SU-1	44N, 91E	0.00E+00	0.00E+00	5.04E-03	NDA
059-04-0113	SU-2	30N, 272E	3.15E-04	3.47E-03	8.19E-03	NDA
059-04-0114	SU-2	84N, 272E	1.13E-03	3.15E-03	3.02E-03	NDA
059-04-0115	SU-2	138N, 272E	1.07E-02	1.89E-02	3.15E-02	NDA
059-04-0116	SU-2	192N, 272E	9.45E-03	2.65E-02	2.52E-02	NDA
059-04-0117	SU-2	192N, 218E	5.04E-03	9.45E-03	1.51E-02	NDA
059-04-0118	SU-2	138N, 218E	0.00E+00	0.00E+00	3.15E-03	NDA
059-04-0119	SU-2	30N, 218E	1.51E-03	4.03E-03	8.19E-03	NDA
059-04-0120	SU-2	30N, 164E	0.00E+00	0.00E+00	1.26E-02	NDA
059-04-0121	SU-2	138N, 164E	0.00E+00	0.00E+00	6.30E-03	NDA
059-04-0122	SU-2	192N, 164E	0.00E+00	0.00E+00	3.15E-03	NDA
059-04-0123	SU-2	30N, 110E	6.30E-04	6.30E-03	1.58E-02	NDA
059-04-0124	SU-2	84N, 110E	0.00E+00	0.00E+00	3.15E-03	NDA
059-04-0125*	SU-2	84N, 110E	4.41E-03	1.32E-02	1.26E-02	NDA
059-04-0126	SU-2	30N, 56E	3.02E-02	2.96E-02	1.64E-02	
059-04-0127	SU-2	84N, 56E	0.00E+00	0.00E+00	5.04E-03	NDA
059-04-0128	SU-2	30N, 2E	4.85E-03	5.42E-03	3.28E-03	
059-04-0129	SU-2	84N, 2E	0.00E+00	0.00E+00	1.26E-02	NDA
059-04-0130	SU-2	30N, 164E	0.00E+00	0.00E+00	3.15E-02	NDA

* Field Duplicate

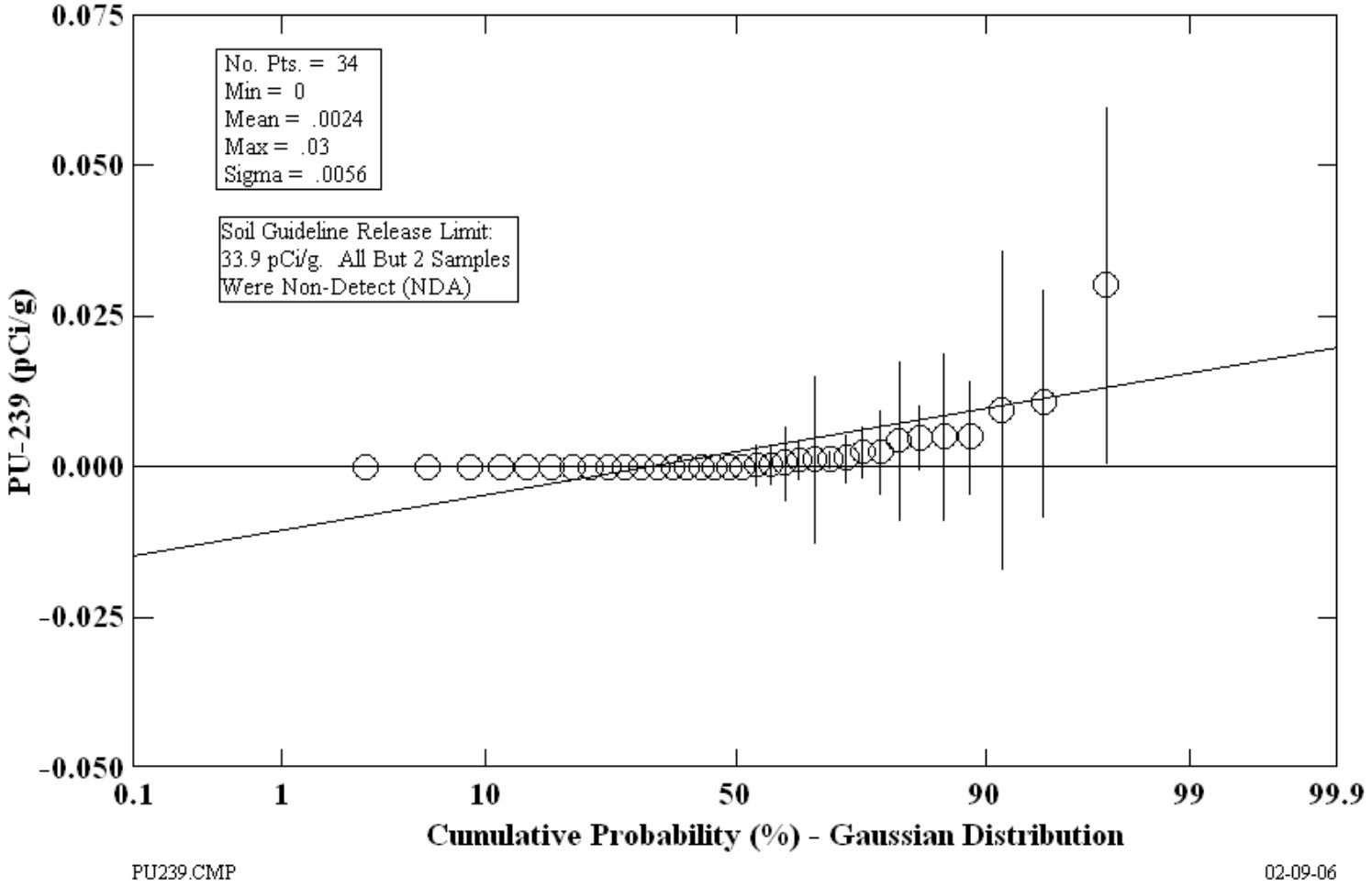


Figure D10. Pu-239 Soil Results, SU-1 AND SU-2

Table D11. Pu-240 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	7.40E-04	8.14E-04	2.00E-03	NDA
059-04-0096	SU-1	2N, 28E	0.00E+00	0.00E+00	3.70E-03	NDA
059-04-0097	SU-1	2N, 48E	0.00E+00	0.00E+00	3.33E-03	NDA
059-04-0098	SU-1	2N, 70E	0.00E+00	0.00E+00	1.11E-02	NDA
059-04-0099	SU-1	2N, 91E	0.00E+00	0.00E+00	7.40E-03	NDA
059-04-0100	SU-1	23N, 7E	1.48E-03	2.55E-03	2.00E-03	NDA
059-04-0101	SU-1	23N, 28E	7.40E-04	8.14E-03	2.00E-02	NDA
059-04-0102	SU-1	23N, 49E	2.96E-03	8.14E-03	7.77E-03	NDA
059-04-0103	SU-1	23N, 70E	0.00E+00	0.00E+00	1.11E-02	NDA
059-04-0104	SU-1	23N 91E	0.00E+00	0.00E+00	7.40E-03	NDA
059-04-0105	SU-1	44N, 7E	0.00E+00	0.00E+00	2.59E-02	NDA
059-04-0106	SU-1	44N, 28E	0.00E+00	0.00E+00	1.11E-02	NDA
059-04-0107	SU-1	44N, 49E	1.85E-04	1.89E-03	4.44E-03	NDA
059-04-0108	SU-1	44N, 70E	0.00E+00	0.00E+00	1.11E-02	NDA
059-04-0109	SU-1	44N, 91E	1.48E-03	4.07E-03	4.07E-03	NDA
059-04-0112*	SU-1	44N, 91E	0.00E+00	0.00E+00	2.96E-03	NDA
059-04-0113	SU-2	30N, 272E	1.85E-04	2.04E-03	4.81E-03	NDA
059-04-0114	SU-2	84N, 272E	6.66E-04	1.85E-03	1.78E-03	NDA
059-04-0115	SU-2	138N, 272E	6.29E-03	1.11E-02	1.85E-02	NDA
059-04-0116	SU-2	192N, 272E	5.55E-03	1.55E-02	1.48E-02	NDA
059-04-0117	SU-2	192N, 218E	2.96E-03	5.55E-03	8.88E-03	NDA
059-04-0118	SU-2	138N, 218E	0.00E+00	0.00E+00	1.85E-03	NDA
059-04-0119	SU-2	30N, 218E	8.88E-04	2.37E-03	4.81E-03	NDA
059-04-0120	SU-2	30N, 164E	0.00E+00	0.00E+00	7.40E-03	NDA
059-04-0121	SU-2	138N, 164E	0.00E+00	0.00E+00	3.70E-03	NDA
059-04-0122	SU-2	192N, 164E	0.00E+00	0.00E+00	1.85E-03	NDA
059-04-0123	SU-2	30N, 110E	3.70E-04	3.70E-03	9.25E-03	NDA
059-04-0124	SU-2	84N, 110E	0.00E+00	0.00E+00	1.85E-03	NDA
059-04-0125*	SU-2	84N, 110E	2.59E-03	7.77E-03	7.40E-03	NDA
059-04-0126	SU-2	30N, 56E	1.78E-02	1.74E-02	9.62E-03	
059-04-0127	SU-2	84N, 56E	0.00E+00	0.00E+00	2.96E-03	NDA
059-04-0128	SU-2	30N, 2E	2.85E-03	3.18E-03	1.92E-03	
059-04-0129	SU-2	84N, 2E	0.00E+00	0.00E+00	7.40E-03	NDA
059-04-0130	SU-2	30N, 164E	0.00E+00	0.00E+00	1.85E-02	NDA

* Field Duplicate

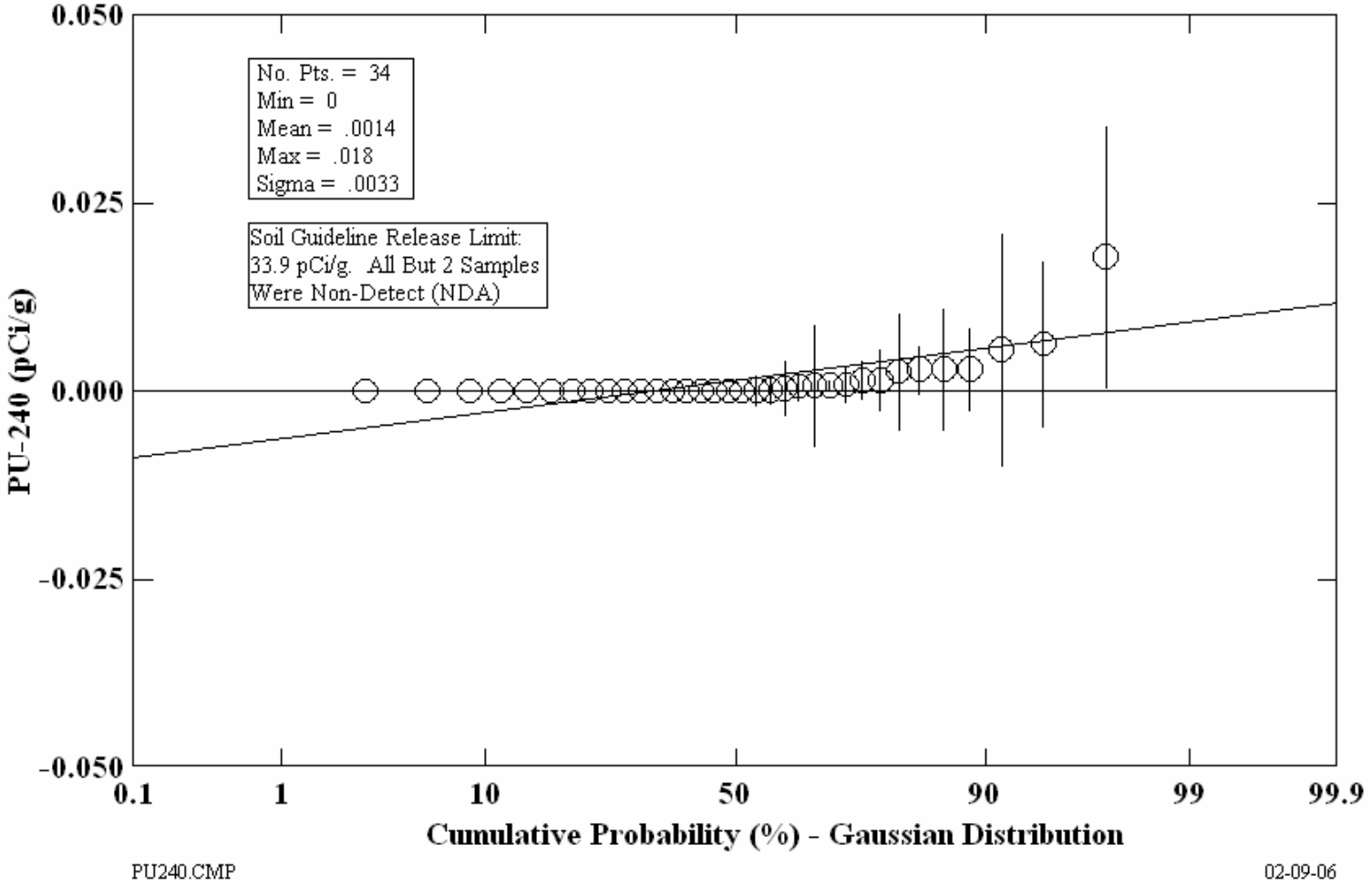


Figure D11. Pu-240 Soil Results, SU-1 AND SU-2

Table D12. Pu-241 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	-1.70E+00	4.40E+00	4.30E+00	NDA
059-04-0096	SU-1	2N, 28E	-9.00E-01	1.80E+00	1.10E+00	NDA
059-04-0097	SU-1	2N, 48E	-1.10E-01	1.80E-01	2.00E+00	NDA
059-04-0098	SU-1	2N, 70E	-1.00E+00	2.60E+01	2.00E+00	NDA
059-04-0099	SU-1	2N, 91E	-7.40E-01	9.40E-01	4.10E+00	NDA
059-04-0100	SU-1	23N, 7E	-1.50E-01	4.30E-01	1.20E+00	NDA
059-04-0101	SU-1	23N, 28E	-3.00E+00	1.40E+01	4.00E+00	NDA
059-04-0102	SU-1	23N, 49E	-3.30E+00	8.90E+00	4.00E+00	NDA
059-04-0103	SU-1	23N, 70E	6.80E-01	5.20E-01	2.00E+00	NDA
059-04-0104	SU-1	23N 91E	-7.00E-01	9.10E+00	1.20E+00	NDA
059-04-0105	SU-1	44N, 7E	-1.10E+00	2.00E+00	3.80E+00	NDA
059-04-0106	SU-1	44N, 28E	-1.00E+00	2.50E+00	2.50E+00	NDA
059-04-0107	SU-1	44N, 49E	-9.20E-03	9.40E-03	9.80E-01	NDA
059-04-0108	SU-1	44N, 70E	-9.00E-01	4.00E+00	2.10E+00	NDA
059-04-0109	SU-1	44N, 91E	-4.70E-01	6.30E-01	2.00E+00	NDA
059-04-0112*	SU-1	44N, 91E	-6.00E-01	1.20E+00	1.60E+00	NDA
059-04-0113	SU-2	30N, 272E	-2.20E-01	7.30E-01	1.30E+00	NDA
059-04-0114	SU-2	84N, 272E	3.00E-01	5.80E-01	1.10E+00	NDA
059-04-0115	SU-2	138N, 272E	-5.00E-01	3.20E+00	4.90E+00	NDA
059-04-0116	SU-2	192N, 272E	7.00E-01	4.40E+00	9.60E+00	NDA
059-04-0117	SU-2	192N, 218E	1.20E+00	1.40E+00	2.40E+00	NDA
059-04-0118	SU-2	138N, 218E	-6.00E-02	8.80E-01	1.20E+00	NDA
059-04-0119	SU-2	30N, 218E	2.30E-01	5.50E-01	1.20E+00	NDA
059-04-0120	SU-2	30N, 164E	-7.00E-01	2.70E+00	4.40E+00	NDA
059-04-0121	SU-2	138N, 164E	-3.00E-01	1.00E+00	1.40E+00	NDA
059-04-0122	SU-2	192N, 164E	5.00E-02	2.70E-01	1.00E+00	NDA
059-04-0123	SU-2	30N, 110E	-1.00E+00	1.50E+00	2.60E+00	NDA
059-04-0124	SU-2	84N, 110E	4.40E-01	6.40E-01	1.20E+00	NDA
059-04-0125*	SU-2	84N, 110E	4.00E-01	1.80E+00	4.50E+00	NDA
059-04-0126	SU-2	30N, 56E	-9.00E-01	3.90E+00	5.90E+00	NDA
059-04-0127	SU-2	84N, 56E	4.10E-01	8.80E-01	1.90E+00	NDA
059-04-0128	SU-2	30N, 2E	3.40E-01	6.40E-01	1.20E+00	NDA
059-04-0129	SU-2	84N, 2E	-4.00E-02	7.70E-01	5.00E+00	NDA
059-04-0130	SU-2	30N, 164E	-1.20E+00	2.70E+00	4.50E+00	NDA

* Field Duplicate

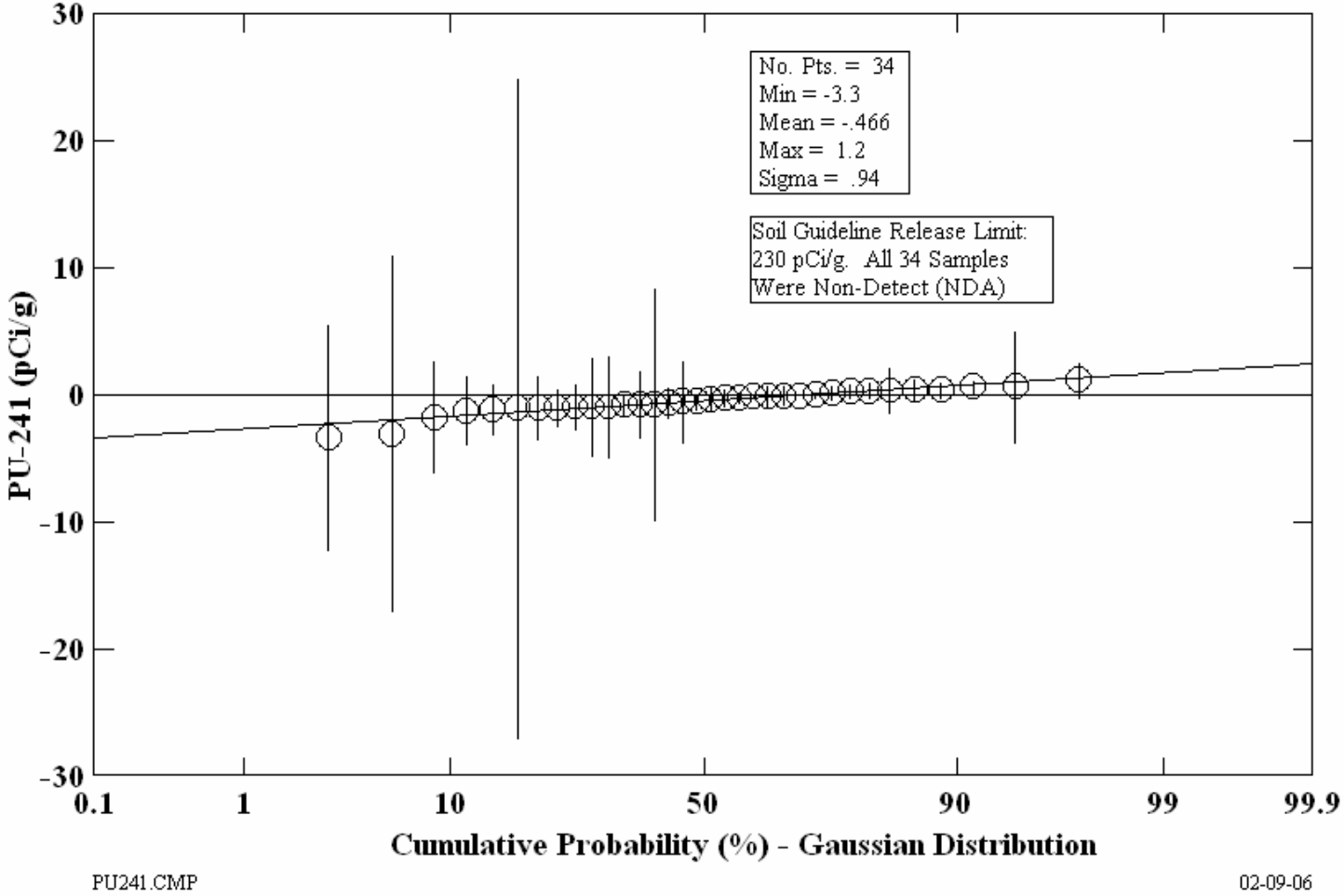


Figure D12. Pu-241 Soil Results, SU-1 AND SU-2

Table D13. Sr-90 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	8.00E-03	4.50E-02	7.60E-02	NDA
059-04-0096	SU-1	2N, 28E	3.40E-02	5.00E-02	8.30E-02	NDA
059-04-0097	SU-1	2N, 48E	8.00E-03	3.70E-02	6.30E-02	NDA
059-04-0098	SU-1	2N, 70E	1.10E-02	3.70E-02	6.20E-02	NDA
059-04-0099	SU-1	2N, 91E	6.00E-03	3.20E-02	5.50E-02	NDA
059-04-0100	SU-1	23N, 7E	1.10E-02	3.60E-02	6.10E-02	NDA
059-04-0101	SU-1	23N, 28E	3.20E-02	3.80E-02	6.10E-02	NDA
059-04-0102	SU-1	23N, 49E	2.30E-02	4.30E-02	7.10E-02	NDA
059-04-0103	SU-1	23N, 70E	1.70E-02	4.00E-02	6.70E-02	NDA
059-04-0104	SU-1	23N 91E	2.60E-02	3.40E-02	5.60E-02	NDA
059-04-0105	SU-1	44N, 7E	2.90E-02	4.40E-02	7.30E-02	NDA
059-04-0106	SU-1	44N, 28E	1.90E-02	5.40E-02	9.00E-02	NDA
059-04-0107	SU-1	44N, 49E	2.60E-02	3.50E-02	5.70E-02	NDA
059-04-0108	SU-1	44N, 70E	2.20E-02	5.00E-02	8.40E-02	NDA
059-04-0109	SU-1	44N, 91E	3.70E-02	4.00E-02	6.40E-02	NDA
059-04-0112*	SU-1	44N, 91E	1.80E-02	3.80E-02	6.30E-02	NDA
059-04-0113	SU-2	30N, 272E	7.60E-02	6.20E-02	9.80E-02	NDA
059-04-0114	SU-2	84N, 272E	-3.00E-02	5.40E-02	9.60E-02	NDA
059-04-0115	SU-2	138N, 272E	3.10E-02	5.40E-02	9.10E-02	NDA
059-04-0116	SU-2	192N, 272E	1.40E-02	5.20E-02	8.90E-02	NDA
059-04-0117	SU-2	192N, 218E	-1.00E-02	5.10E-02	9.00E-02	NDA
059-04-0118	SU-2	138N, 218E	1.20E-02	5.20E-02	8.90E-02	NDA
059-04-0119	SU-2	30N, 218E	6.10E-02	6.20E-02	1.00E-01	NDA
059-04-0120	SU-2	30N, 164E	2.30E-02	5.00E-02	8.40E-02	NDA
059-04-0121	SU-2	138N, 164E	3.20E-02	6.30E-02	1.00E-01	NDA
059-04-0122	SU-2	192N, 164E	-2.60E-02	5.20E-02	9.30E-02	NDA
059-04-0123	SU-2	30N, 110E	1.40E-02	5.90E-02	1.00E-01	NDA
059-04-0124	SU-2	84N, 110E	3.50E-02	3.60E-02	5.80E-02	NDA
059-04-0125*	SU-2	84N, 110E	-2.10E-02	3.20E-02	5.80E-02	NDA
059-04-0126	SU-2	30N, 56E	2.50E-02	5.50E-02	9.20E-02	NDA
059-04-0127	SU-2	84N, 56E	-1.00E-03	5.80E-02	9.50E-02	NDA
059-04-0128	SU-2	30N, 2E	6.00E-02	6.10E-02	9.80E-02	NDA
059-04-0129	SU-2	84N, 2E	2.60E-02	5.20E-02	8.70E-02	NDA
059-04-0130	SU-2	30N, 164E	8.30E-02	7.30E-02	1.20E-01	NDA

* Field Duplicate

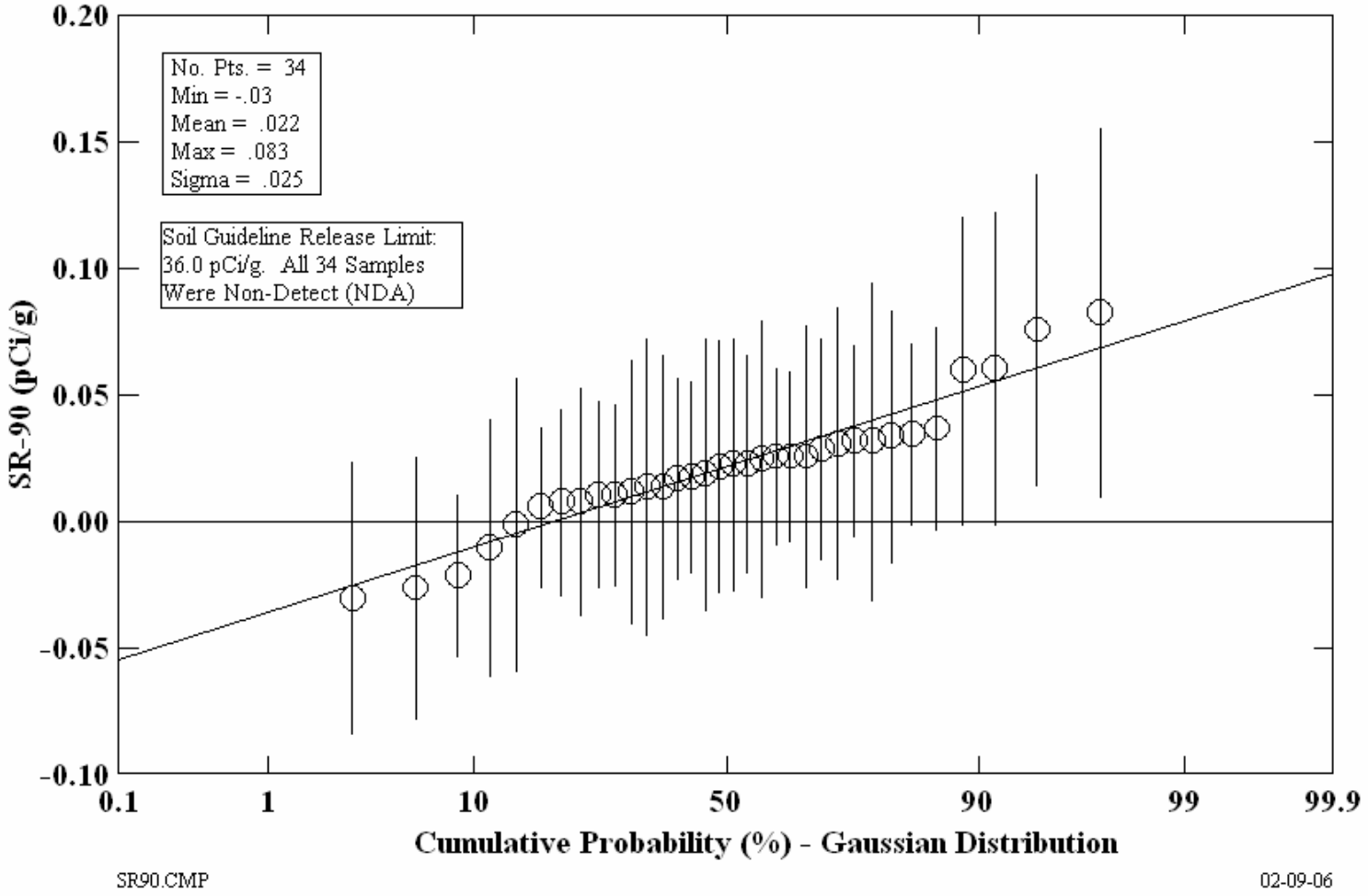


Figure D13. Sr-90 Soil Results, SU-1 AND SU-2

Table D14. Th-228 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	1.27E+00	2.20E-01	8.00E-02	
059-04-0096	SU-1	2N, 28E	1.12E+00	1.20E-01	2.00E-02	
059-04-0097	SU-1	2N, 48E	1.14E+00	1.40E-01	3.00E-02	
059-04-0098	SU-1	2N, 70E	1.05E+00	1.30E-01	3.00E-02	
059-04-0099	SU-1	2N, 91E	9.70E-01	1.80E-01	2.00E-02	
059-04-0100	SU-1	23N, 7E	7.97E-01	9.00E-02	5.00E-03	
059-04-0101	SU-1	23N, 28E	1.59E+00	2.50E-01	2.00E-02	
059-04-0102	SU-1	23N, 49E	8.30E-01	1.60E-01	5.00E-02	
059-04-0103	SU-1	23N, 70E	9.50E-01	1.30E-01	1.00E-02	
059-04-0104	SU-1	23N 91E	9.50E-01	1.10E-01	7.00E-03	
059-04-0105	SU-1	44N, 7E	8.70E-01	1.70E-01	2.00E-02	
059-04-0106	SU-1	44N, 28E	1.21E+00	1.70E-01	1.00E-02	
059-04-0107	SU-1	44N, 49E	7.40E-01	8.70E-02	2.20E-02	
059-04-0108	SU-1	44N, 70E	8.60E-01	1.30E-01	4.00E-02	
059-04-0109	SU-1	44N, 91E	1.06E+00	1.50E-01	4.00E-02	
059-04-0112*	SU-1	44N, 91E	8.10E-01	1.10E-01	4.00E-02	
059-04-0113	SU-2	30N, 272E	9.20E-01	1.10E-01	2.00E-02	
059-04-0114	SU-2	84N, 272E	1.06E+00	1.60E-01	5.00E-02	
059-04-0115	SU-2	138N, 272E	1.14E+00	2.00E-01	7.00E-02	
059-04-0116	SU-2	192N, 272E	1.27E+00	2.90E-01	1.40E-01	
059-04-0117	SU-2	192N, 218E	1.07E+00	1.50E-01	6.00E-02	
059-04-0118	SU-2	138N, 218E	1.14E+00	1.20E-01	3.00E-02	
059-04-0119	SU-2	30N, 218E	1.15E+00	1.20E-01	3.00E-02	
059-04-0120	SU-2	30N, 164E	1.36E+00	2.20E-01	9.00E-02	
059-04-0121	SU-2	138N, 164E	7.04E-01	9.20E-02	3.30E-02	
059-04-0122	SU-2	192N, 164E	1.14E+00	1.20E-01	2.00E-02	
059-04-0123	SU-2	30N, 110E	1.28E+00	1.60E-01	3.00E-02	
059-04-0124	SU-2	84N, 110E	8.55E-01	9.20E-02	1.90E-02	
059-04-0125*	SU-2	84N, 110E	1.07E+00	2.30E-01	1.10E-01	
059-04-0126	SU-2	30N, 56E	1.36E+00	2.40E-01	1.10E-01	
059-04-0127	SU-2	84N, 56E	1.08E+00	1.30E-01	5.00E-02	
059-04-0128	SU-2	30N, 2E	8.80E-01	1.00E-01	2.00E-02	
059-04-0129	SU-2	84N, 2E	9.60E-01	1.80E-01	5.00E-02	
059-04-0130	SU-2	30N, 164E	1.17E+00	2.00E-01	7.00E-02	

* Field Duplicate

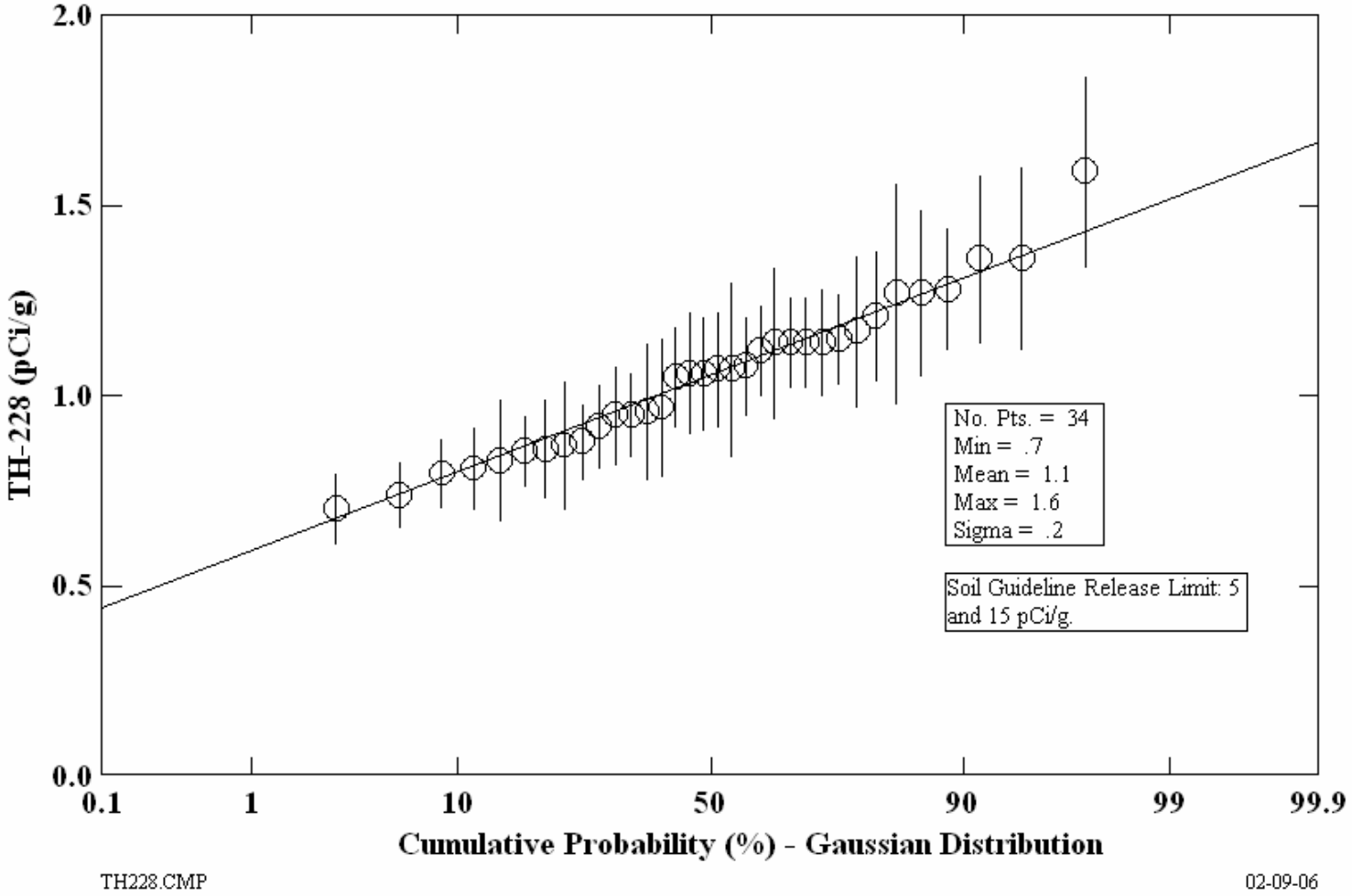


Figure D14. Th-228 Soil Results, SU-1 AND SU-2

Table D15. Th-232 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	1.16E+00	2.00E-01	2.00E-02	
059-04-0096	SU-1	2N, 28E	1.14E+00	1.20E-01	6.00E-03	
059-04-0097	SU-1	2N, 48E	1.19E+00	1.40E-01	2.00E-02	
059-04-0098	SU-1	2N, 70E	8.90E-01	1.20E-01	9.00E-03	
059-04-0099	SU-1	2N, 91E	9.30E-01	1.80E-01	2.00E-02	
059-04-0100	SU-1	23N, 7E	7.34E-01	8.50E-02	5.00E-03	
059-04-0101	SU-1	23N, 28E	1.43E+00	2.30E-01	2.00E-02	
059-04-0102	SU-1	23N, 49E	8.60E-01	1.60E-01	2.00E-02	
059-04-0103	SU-1	23N, 70E	9.80E-01	1.30E-01	1.00E-02	
059-04-0104	SU-1	23N 91E	7.97E-01	9.96E-02	1.60E-02	
059-04-0105	SU-1	44N, 7E	5.10E-01	1.30E-01	5.00E-02	
059-04-0106	SU-1	44N, 28E	1.02E+00	1.50E-01	1.00E-02	
059-04-0107	SU-1	44N, 49E	6.46E-01	8.00E-02	1.60E-02	
059-04-0108	SU-1	44N, 70E	7.40E-01	1.20E-01	3.00E-02	
059-04-0109	SU-1	44N, 91E	9.90E-01	1.40E-01	1.00E-02	
059-04-0112*	SU-1	44N, 91E	8.50E-01	1.10E-01	9.00E-03	
059-04-0113	SU-2	30N, 272E	9.00E-01	1.00E-01	6.00E-03	
059-04-0114	SU-2	84N, 272E	9.90E-01	1.60E-01	4.00E-02	
059-04-0115	SU-2	138N, 272E	1.07E+00	1.90E-01	5.00E-02	
059-04-0116	SU-2	192N, 272E	8.70E-01	2.30E-01	4.00E-02	
059-04-0117	SU-2	192N, 218E	1.08E+00	1.50E-01	1.00E-02	
059-04-0118	SU-2	138N, 218E	9.80E-01	1.10E-01	1.00E-02	
059-04-0119	SU-2	30N, 218E	1.06E+00	1.10E-01	1.00E-02	
059-04-0120	SU-2	30N, 164E	1.15E+00	2.00E-01	7.00E-02	
059-04-0121	SU-2	138N, 164E	6.23E-01	8.40E-02	6.00E-03	
059-04-0122	SU-2	192N, 164E	1.13E+00	1.10E-01	6.00E-03	
059-04-0123	SU-2	30N, 110E	1.27E+00	1.60E-01	1.00E-02	
059-04-0124	SU-2	84N, 110E	7.84E-01	8.70E-02	1.20E-02	
059-04-0125*	SU-2	84N, 110E	1.10E+00	2.30E-01	7.00E-02	
059-04-0126	SU-2	30N, 56E	1.38E+00	2.40E-01	8.00E-02	
059-04-0127	SU-2	84N, 56E	1.00E+00	1.30E-01	9.00E-03	
059-04-0128	SU-2	30N, 2E	9.10E-01	1.00E-01	1.00E-02	
059-04-0129	SU-2	84N, 2E	1.15E+00	2.00E-01	2.00E-02	
059-04-0130	SU-2	30N, 164E	1.07E+00	1.80E-01	2.00E-02	

* Field Duplicate

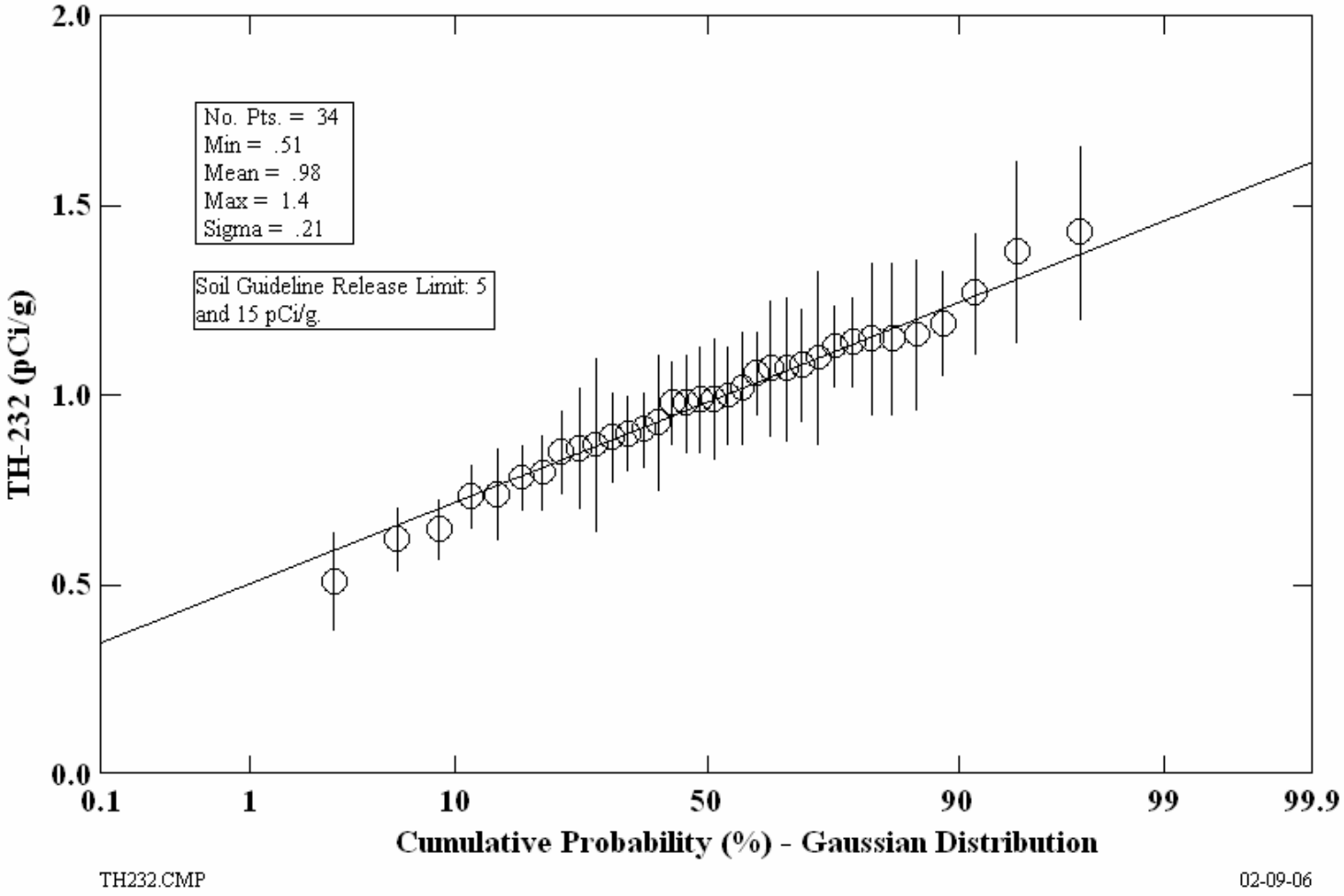


Figure D15. Th-232 Soil Results, SU-1 AND SU-2

Table D16. U-234 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	4.20E-01	1.30E-01	8.00E-02	
059-04-0096	SU-1	2N, 28E	5.17E-01	6.40E-02	1.10E-02	
059-04-0097	SU-1	2N, 48E	4.67E-01	8.00E-02	2.10E-02	
059-04-0098	SU-1	2N, 70E	5.20E-01	8.40E-02	2.00E-02	
059-04-0099	SU-1	2N, 91E	7.10E-01	1.50E-01	5.00E-02	
059-04-0100	SU-1	23N, 7E	4.40E-01	6.30E-02	5.00E-03	
059-04-0101	SU-1	23N, 28E	5.10E-01	1.20E-01	2.00E-02	
059-04-0102	SU-1	23N, 49E	4.70E-01	1.20E-01	2.00E-02	
059-04-0103	SU-1	23N, 70E	5.64E-01	8.80E-02	2.10E-02	
059-04-0104	SU-1	23N 91E	1.07E+00	9.50E-02	1.10E-02	
059-04-0105	SU-1	44N, 7E	5.30E-01	1.30E-01	6.00E-02	
059-04-0106	SU-1	44N, 28E	6.29E-01	9.10E-02	2.00E-02	
059-04-0107	SU-1	44N, 49E	3.07E-01	5.40E-02	1.40E-02	
059-04-0108	SU-1	44N, 70E	3.75E-01	7.20E-02	2.10E-02	
059-04-0109	SU-1	44N, 91E	5.23E-01	9.00E-02	2.30E-02	
059-04-0112*	SU-1	44N, 91E	5.13E-01	8.60E-02	2.20E-02	
059-04-0113	SU-2	30N, 272E	5.68E-01	7.60E-02	1.40E-02	
059-04-0114	SU-2	84N, 272E	6.67E-01	7.80E-02	2.10E-02	
059-04-0115	SU-2	138N, 272E	6.90E-01	1.50E-01	2.00E-02	
059-04-0116	SU-2	192N, 272E	8.20E-01	2.30E-01	1.40E-01	
059-04-0117	SU-2	192N, 218E	4.17E-01	7.60E-02	3.70E-02	
059-04-0118	SU-2	138N, 218E	6.59E-01	9.70E-02	2.00E-02	
059-04-0119	SU-2	30N, 218E	7.10E-01	1.00E-01	2.00E-02	
059-04-0120	SU-2	30N, 164E	6.50E-01	1.40E-01	5.00E-02	
059-04-0121	SU-2	138N, 164E	3.48E-01	6.10E-02	7.00E-03	
059-04-0122	SU-2	192N, 164E	5.79E-01	7.00E-02	2.50E-02	
059-04-0123	SU-2	30N, 110E	4.01E-01	7.60E-02	2.20E-02	
059-04-0124	SU-2	84N, 110E	4.74E-01	6.30E-02	5.00E-03	
059-04-0125*	SU-2	84N, 110E	4.90E-01	1.30E-01	2.00E-02	
059-04-0126	SU-2	30N, 56E	6.90E-01	1.50E-01	2.00E-02	
059-04-0127	SU-2	84N, 56E	2.85E-01	6.50E-02	9.00E-03	
059-04-0128	SU-2	30N, 2E	5.84E-01	6.60E-02	4.00E-03	
059-04-0129	SU-2	84N, 2E	4.80E-01	1.30E-01	2.00E-02	
059-04-0130	SU-2	30N, 164E	5.60E-01	1.40E-01	2.00E-02	

* Field Duplicate

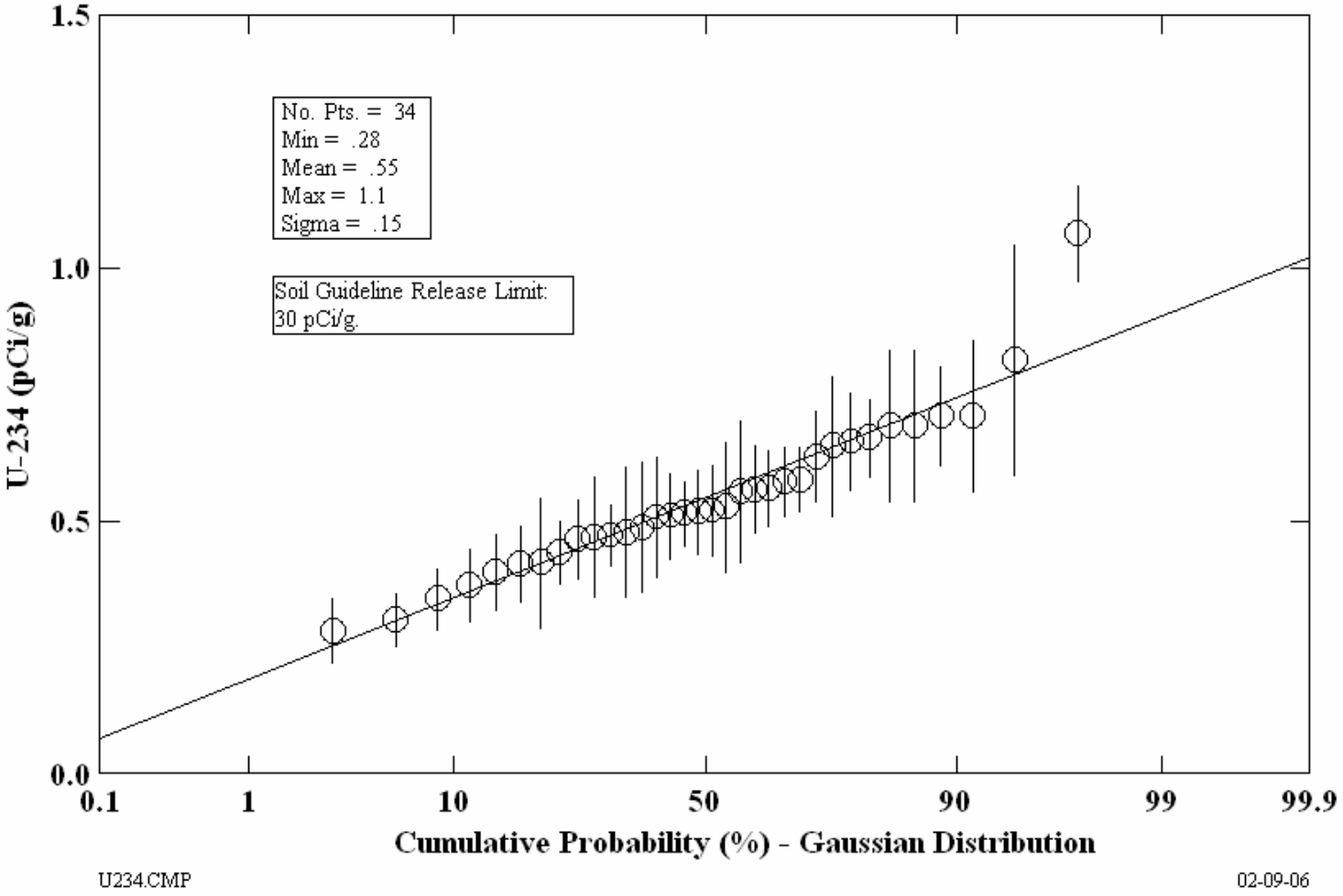


Figure D16. U-234 Soil Results, SU-1 AND SU-2

Table D17. U-235 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	8.00E-02	6.90E-02	8.50E-02	NDA
059-04-0096	SU-1	2N, 28E	3.50E-02	1.80E-02	1.40E-02	
059-04-0097	SU-1	2N, 48E	2.40E-02	2.10E-02	1.10E-02	
059-04-0098	SU-1	2N, 70E	2.00E-02	1.90E-02	1.10E-02	
059-04-0099	SU-1	2N, 91E	9.70E-02	6.50E-02	2.60E-02	
059-04-0100	SU-1	23N, 7E	2.80E-02	1.70E-02	7.00E-03	
059-04-0101	SU-1	23N, 28E	4.10E-02	4.90E-02	7.30E-02	NDA
059-04-0102	SU-1	23N, 49E	5.40E-02	4.60E-02	2.40E-02	
059-04-0103	SU-1	23N, 70E	1.40E-02	2.00E-02	3.20E-02	NDA
059-04-0104	SU-1	23N 91E	7.10E-02	2.50E-02	6.00E-03	
059-04-0105	SU-1	44N, 7E	4.50E-02	4.40E-02	2.40E-02	
059-04-0106	SU-1	44N, 28E	1.90E-02	1.80E-02	1.00E-02	
059-04-0107	SU-1	44N, 49E	7.00E-04	7.20E-03	1.80E-02	NDA
059-04-0108	SU-1	44N, 70E	9.00E-03	1.60E-02	2.60E-02	NDA
059-04-0109	SU-1	44N, 91E	2.30E-02	2.30E-02	2.90E-02	NDA
059-04-0112*	SU-1	44N, 91E	1.70E-02	1.90E-02	1.10E-02	
059-04-0113	SU-2	30N, 272E	4.20E-02	2.20E-02	7.00E-03	
059-04-0114	SU-2	84N, 272E	5.20E-02	2.30E-02	6.00E-03	
059-04-0115	SU-2	138N, 272E	5.80E-02	5.10E-02	2.60E-02	
059-04-0116	SU-2	192N, 272E	6.10E-02	8.20E-02	1.20E-01	NDA
059-04-0117	SU-2	192N, 218E	4.40E-02	2.80E-02	2.50E-02	
059-04-0118	SU-2	138N, 218E	4.30E-02	2.70E-02	2.50E-02	
059-04-0119	SU-2	30N, 218E	6.50E-02	3.30E-02	1.00E-02	
059-04-0120	SU-2	30N, 164E	3.70E-02	4.10E-02	2.50E-02	
059-04-0121	SU-2	138N, 164E	1.20E-02	1.40E-02	8.00E-03	
059-04-0122	SU-2	192N, 164E	3.40E-02	1.80E-02	1.40E-02	
059-04-0123	SU-2	30N, 110E	3.80E-02	2.70E-02	1.10E-02	
059-04-0124	SU-2	84N, 110E	2.30E-02	1.50E-02	6.00E-03	
059-04-0125*	SU-2	84N, 110E	5.90E-02	5.20E-02	2.70E-02	
059-04-0126	SU-2	30N, 56E	1.90E-02	3.30E-02	2.60E-02	NDA
059-04-0127	SU-2	84N, 56E	2.60E-02	2.30E-02	1.20E-02	
059-04-0128	SU-2	30N, 2E	3.00E-02	1.60E-02	5.00E-03	
059-04-0129	SU-2	84N, 2E	3.10E-02	4.10E-02	2.80E-02	
059-04-0130	SU-2	30N, 164E	2.00E-02	3.50E-02	2.80E-02	NDA

* Field Duplicate

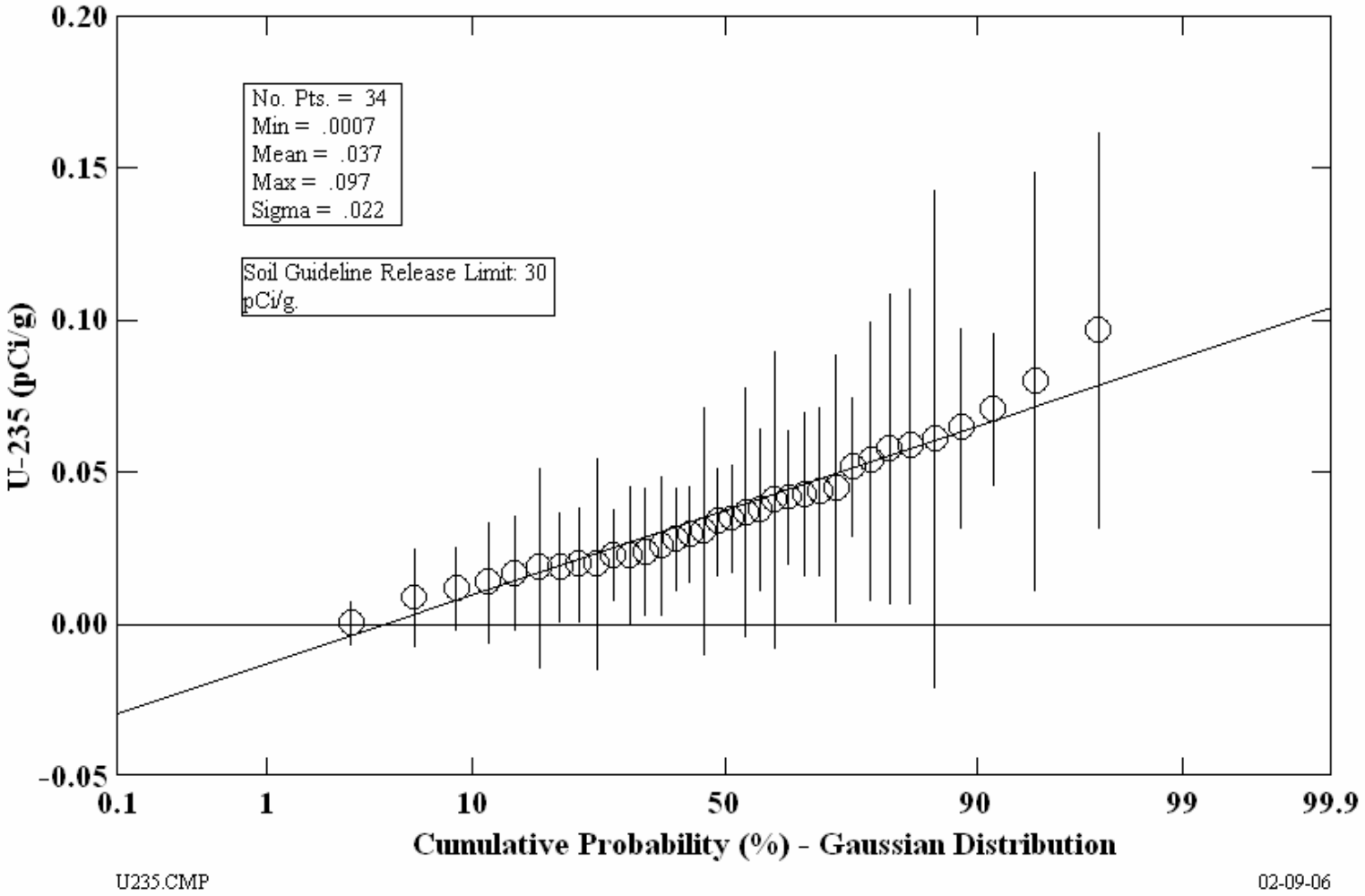


Figure D17. U-235 Soil Results, SU-1 AND SU-2

Table D18. U-238 Soil Results, SU-1 and SU-2

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
059-04-0095	SU-1	2N, 7E	4.80E-01	1.30E-01	7.00E-02	
059-04-0096	SU-1	2N, 28E	4.95E-01	6.20E-02	5.00E-03	
059-04-0097	SU-1	2N, 48E	5.11E-01	8.40E-02	2.10E-02	
059-04-0098	SU-1	2N, 70E	4.09E-01	7.40E-02	2.00E-02	
059-04-0099	SU-1	2N, 91E	6.20E-01	1.40E-01	2.00E-02	
059-04-0100	SU-1	23N, 7E	4.21E-01	6.20E-02	5.00E-03	
059-04-0101	SU-1	23N, 28E	4.50E-01	1.20E-01	2.00E-02	
059-04-0102	SU-1	23N, 49E	4.60E-01	1.20E-01	2.00E-02	
059-04-0103	SU-1	23N, 70E	4.55E-01	7.90E-02	2.10E-02	
059-04-0104	SU-1	23N 91E	9.48E-01	8.80E-02	1.10E-02	
059-04-0105	SU-1	44N, 7E	4.10E-01	1.10E-01	2.00E-02	
059-04-0106	SU-1	44N, 28E	5.46E-01	8.40E-02	2.00E-02	
059-04-0107	SU-1	44N, 49E	3.03E-01	5.40E-02	6.00E-03	
059-04-0108	SU-1	44N, 70E	4.07E-01	7.50E-02	2.10E-02	
059-04-0109	SU-1	44N, 91E	4.60E-01	8.40E-02	1.00E-02	
059-04-0112*	SU-1	44N, 91E	4.50E-01	8.00E-02	2.70E-02	
059-04-0113	SU-2	30N, 272E	5.67E-01	7.60E-02	1.40E-02	
059-04-0114	SU-2	84N, 272E	7.28E-01	8.10E-02	5.00E-03	
059-04-0115	SU-2	138N, 272E	5.00E-01	1.30E-01	2.00E-02	
059-04-0116	SU-2	192N, 272E	1.00E+00	2.50E-01	4.00E-02	
059-04-0117	SU-2	192N, 218E	4.36E-01	7.60E-02	8.00E-03	
059-04-0118	SU-2	138N, 218E	6.02E-01	9.30E-02	2.00E-02	
059-04-0119	SU-2	30N, 218E	6.88E-01	9.98E-02	8.30E-03	
059-04-0120	SU-2	30N, 164E	5.10E-01	1.20E-01	2.00E-02	
059-04-0121	SU-2	138N, 164E	3.16E-01	5.80E-02	7.00E-03	
059-04-0122	SU-2	192N, 164E	6.19E-01	7.20E-02	1.20E-02	
059-04-0123	SU-2	30N, 110E	4.60E-01	8.10E-02	9.00E-03	
059-04-0124	SU-2	84N, 110E	5.14E-01	6.60E-02	5.00E-03	
059-04-0125*	SU-2	84N, 110E	4.10E-01	1.20E-01	2.00E-02	
059-04-0126	SU-2	30N, 56E	6.80E-01	1.50E-01	2.00E-02	
059-04-0127	SU-2	84N, 56E	2.50E-01	6.00E-02	9.00E-03	
059-04-0128	SU-2	30N, 2E	5.99E-01	6.70E-02	4.00E-03	
059-04-0129	SU-2	84N, 2E	4.60E-01	1.30E-01	2.00E-02	
059-04-0130	SU-2	30N, 164E	4.60E-01	1.30E-01	5.00E-02	

* Field Duplicate

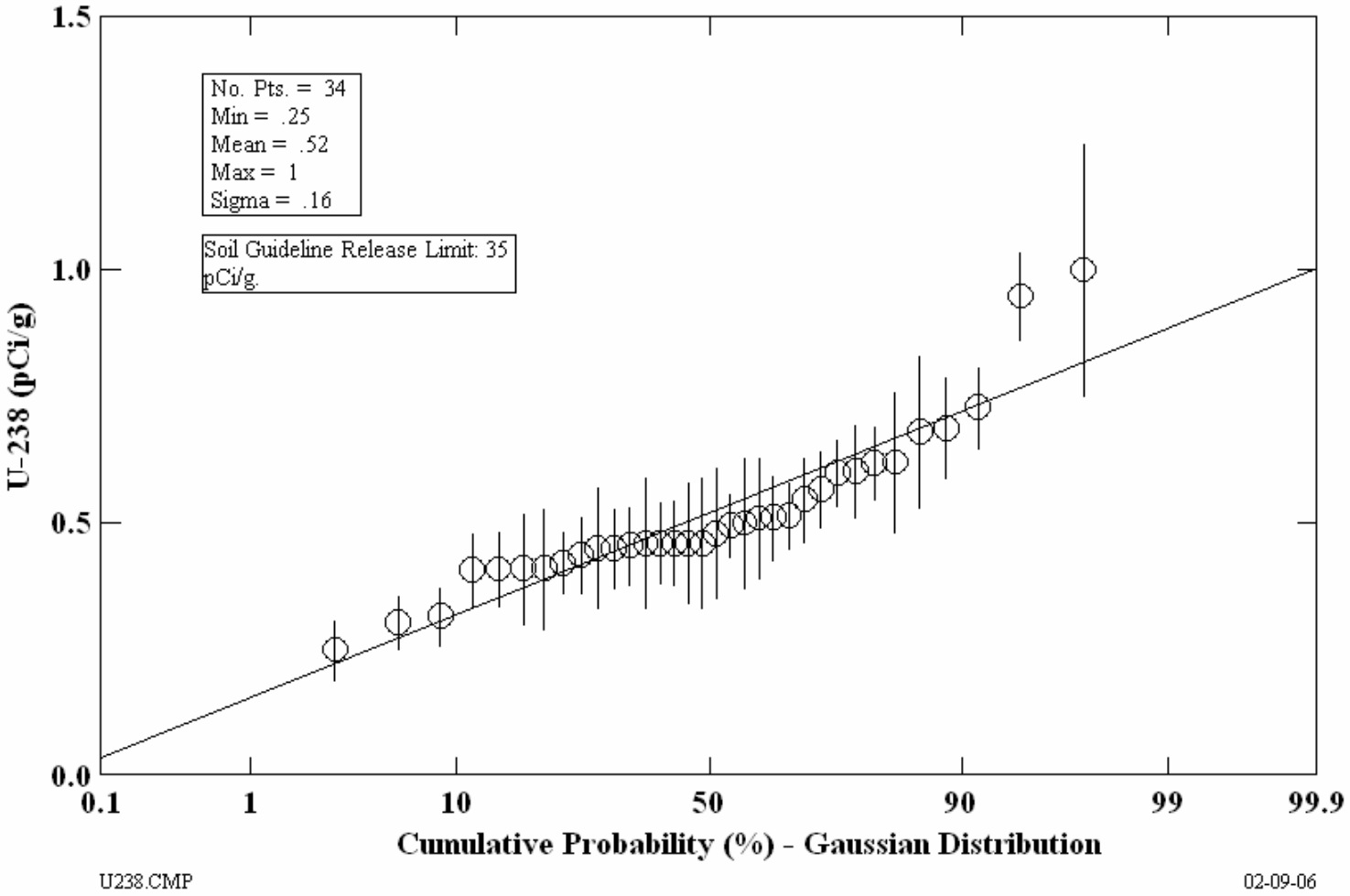


Figure D18. U-238 Soil Results, SU-1 AND SU-2

Table D19. U-234 to U-238 Ratio, SU-1 and SU-2

Sample #	U-234 pCi/g	U-238 pCi/g	U-234/U-238
059-04-0095	4.20E-01	4.80E-01	0.88
059-04-0096	5.17E-01	4.95E-01	1.04
059-04-0097	4.67E-01	5.11E-01	0.91
059-04-0098	5.20E-01	4.09E-01	1.27
059-04-0099	7.10E-01	6.20E-01	1.15
059-04-0100	4.40E-01	4.21E-01	1.05
059-04-0101	5.10E-01	4.50E-01	1.13
059-04-0102	4.70E-01	4.60E-01	1.02
059-04-0103	5.64E-01	4.55E-01	1.24
059-04-0104	1.07E+00	9.48E-01	1.13
059-04-0105	5.30E-01	4.10E-01	1.29
059-04-0106	6.29E-01	5.46E-01	1.15
059-04-0107	3.07E-01	3.03E-01	1.01
059-04-0108	3.75E-01	4.07E-01	0.92
059-04-0109	5.23E-01	4.60E-01	1.14
059-04-0112	5.13E-01	4.50E-01	1.14
059-04-0113	5.68E-01	5.67E-01	1
059-04-0114	6.67E-01	7.28E-01	0.92
059-04-0115	6.90E-01	5.00E-01	1.38
059-04-0116	8.20E-01	1.00E+00	0.82
059-04-0117	4.17E-01	4.36E-01	0.96
059-04-0118	6.59E-01	6.02E-01	1.09
059-04-0119	7.10E-01	6.88E-01	1.03
059-04-0120	6.50E-01	5.10E-01	1.27
059-04-0121	3.48E-01	3.16E-01	1.1
059-04-0122	5.79E-01	6.19E-01	0.94
059-04-0123	4.01E-01	4.60E-01	0.87
059-04-0124	4.74E-01	5.14E-01	0.92
059-04-0125	4.90E-01	4.10E-01	1.2
059-04-0126	6.90E-01	6.80E-01	1.01
059-04-0127	2.85E-01	2.50E-01	1.14
059-04-0128	5.84E-01	5.99E-01	0.97
059-04-0129	4.80E-01	4.60E-01	1.04
059-04-0130	5.60E-01	4.60E-01	1.22

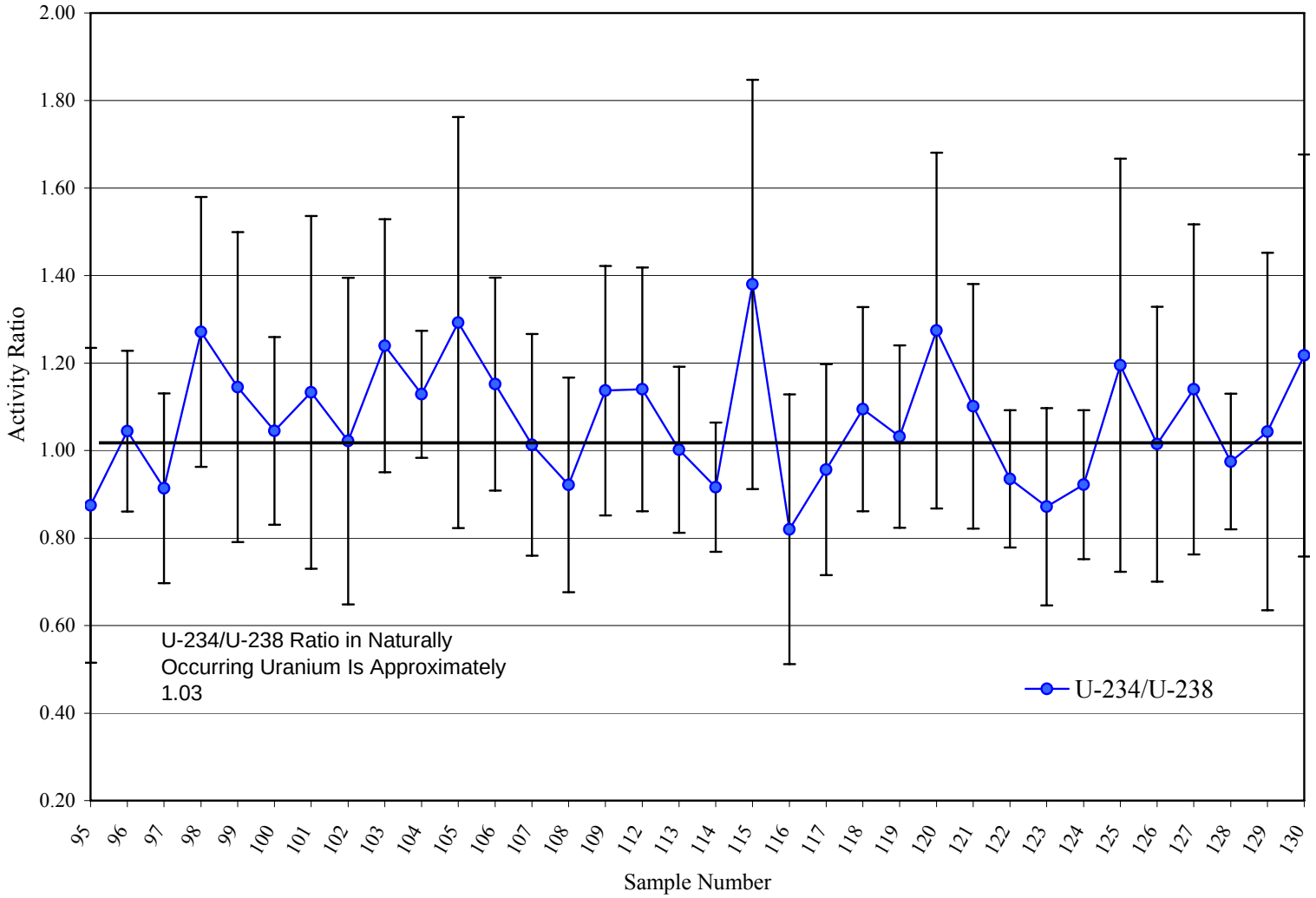


Figure D19. U-234 to U-238 Activity Ratio, SU-1 and SU-2

PHASE B, SU-3

Table D20. Am-241 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	1.49E-02	3.29E-02	7.38E-02	NDA
59-05-0005	SU-3	SU 32N, 187E	1.13E-02	4.30E-02	1.10E-01	NDA
59-05-0006	SU-3	SU 106N, 199E	3.02E-02	4.30E-02	7.31E-02	NDA
59-05-0007	SU-3	SU 164N, 124E	1.91E-02	3.72E-02	7.72E-02	NDA
59-05-0008	SU-3	SU 177N, 80E	1.68E-02	3.71E-02	8.32E-02	NDA
59-05-0009	SU-3	SU 194N, 204E	4.41E-02	4.49E-02	2.99E-02	
59-05-0011	SU-3	SU 223N, 104E	1.40E-03	2.00E-02	6.55E-02	NDA
59-05-0012	SU-3	SU 224N, 307E	1.23E-02	3.15E-02	7.49E-02	NDA
59-05-0013	SU-3	SU 240N, 149E	4.04E-02	4.50E-02	5.98E-02	NDA
59-05-0014	SU-3	SU 258N, 104E	1.59E-02	4.46E-02	1.08E-01	NDA
59-05-0015	SU-3	SU 286N, 182E	1.18E-01	8.08E-02	8.13E-02	
59-05-0016	SU-3	SU 310N, 84E	1.90E-03	2.71E-02	8.87E-02	NDA
59-05-0017	SU-3	SU 321N, 179E	9.30E-03	2.28E-02	5.18E-02	NDA
59-05-0018	SU-3	SU 371N, 159E	-1.21E-02	1.11E-02	9.96E-02	NDA

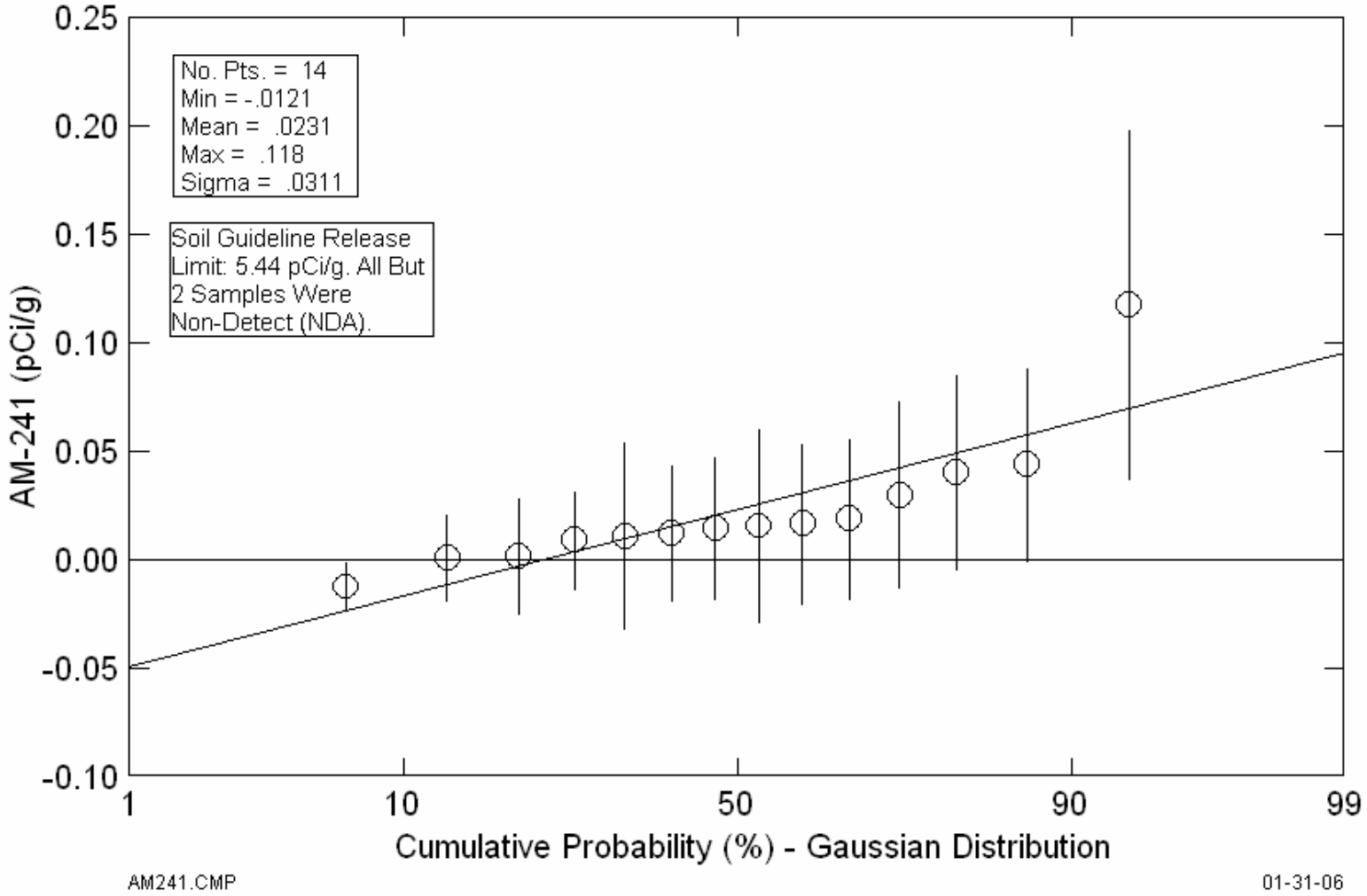


Figure D20. Am-214 Soil Results, SU-3

Table D21. Co-60 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	-5.58E-03	5.93E-02	1.09E-01	NDA
59-05-0005	SU-3	SU 32N, 187E	6.11E-02	7.66E-02	1.46E-01	NDA
59-05-0006	SU-3	SU 106N, 199E	-2.94E-02	7.90E-02	1.32E-01	NDA
59-05-0007	SU-3	SU 164N, 124E	-2.58E-02	7.72E-02	1.37E-01	NDA
59-05-0008	SU-3	SU 177N, 80E	3.72E-02	8.06E-02	1.57E-01	NDA
59-05-0009	SU-3	SU 194N, 204E	-2.26E-02	8.83E-02	1.29E-01	NDA
59-05-0011	SU-3	SU 223N, 104E	-1.99E-02	7.24E-02	1.30E-01	NDA
59-05-0012	SU-3	SU 224N, 307E	-1.27E-02	8.10E-02	1.43E-01	NDA
59-05-0013	SU-3	SU 240N, 149E	-3.47E-02	1.10E-01	2.00E-01	NDA
59-05-0014	SU-3	SU 258N, 104E	-6.24E-02	8.64E-02	1.38E-01	NDA
59-05-0016	SU-3	SU 286N, 182E	3.80E-02	6.59E-02	1.31E-01	NDA
59-05-0015	SU-3	SU 310N, 84E	9.56E-02	9.13E-02	1.58E-01	NDA
59-05-0017	SU-3	SU 321N, 179E	-1.11E-02	1.31E-01	2.43E-01	NDA
59-05-0018	SU-3	SU 371N, 159E	-7.19E-03	8.65E-02	1.50E-01	NDA

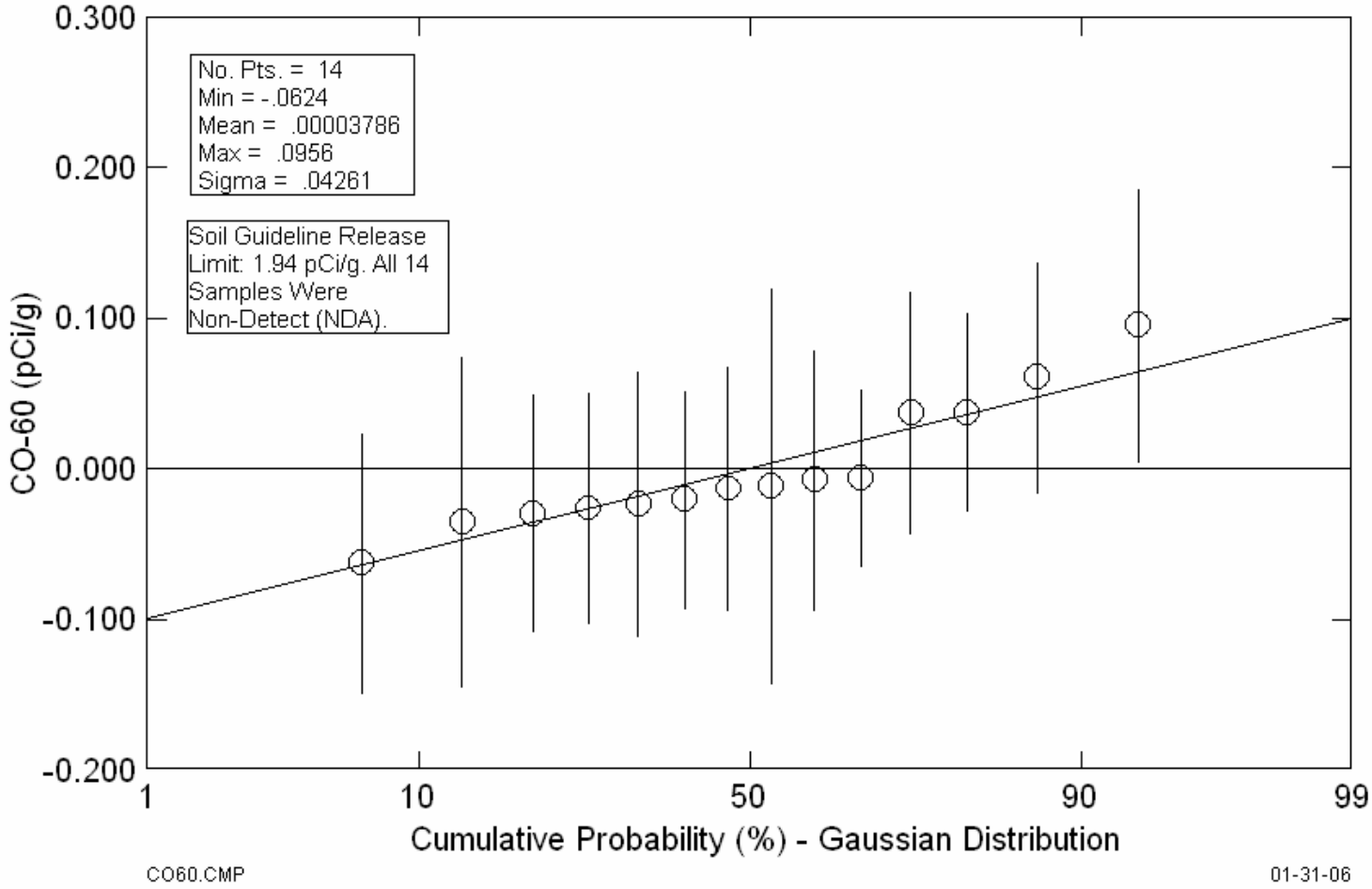


Figure D21. Co-60 Soil Results, SU-3

Table D22. Cs-137 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	-2.15E-02	6.12E-02	1.04E-01	NDA
59-05-0005	SU-3	SU 32N, 187E	-2.39E-02	6.51E-02	1.10E-01	NDA
59-05-0006	SU-3	SU 106N, 199E	1.44E-01	7.83E-02	1.50E-01	NDA
59-05-0007	SU-3	SU 164N, 124E	-4.51E-02	6.89E-02	1.13E-01	NDA
59-05-0008	SU-3	SU 177N, 80E	6.26E-02	7.82E-02	1.21E-01	NDA
59-05-0009	SU-3	SU 194N, 204E	8.68E-03	7.28E-02	1.27E-01	NDA
59-05-0011	SU-3	SU 223N, 104E	-5.61E-02	5.68E-02	8.95E-02	NDA
59-05-0012	SU-3	SU 224N, 307E	6.91E-03	5.99E-02	1.01E-01	NDA
59-05-0013	SU-3	SU 240N, 149E	1.19E-01	1.11E-01	2.36E-01	NDA
59-05-0014	SU-3	SU 258N, 104E	-9.92E-04	7.70E-02	1.35E-01	NDA
59-05-0016	SU-3	SU 286N, 182E	2.63E-02	6.86E-02	1.26E-01	NDA
59-05-0015	SU-3	SU 310N, 84E	3.07E-03	6.77E-02	1.26E-01	NDA
59-05-0017	SU-3	SU 321N, 179E	1.56E-02	1.11E-01	2.13E-01	NDA
59-05-0018	SU-3	SU 371N, 159E	4.62E-02	7.03E-02	1.31E-01	NDA

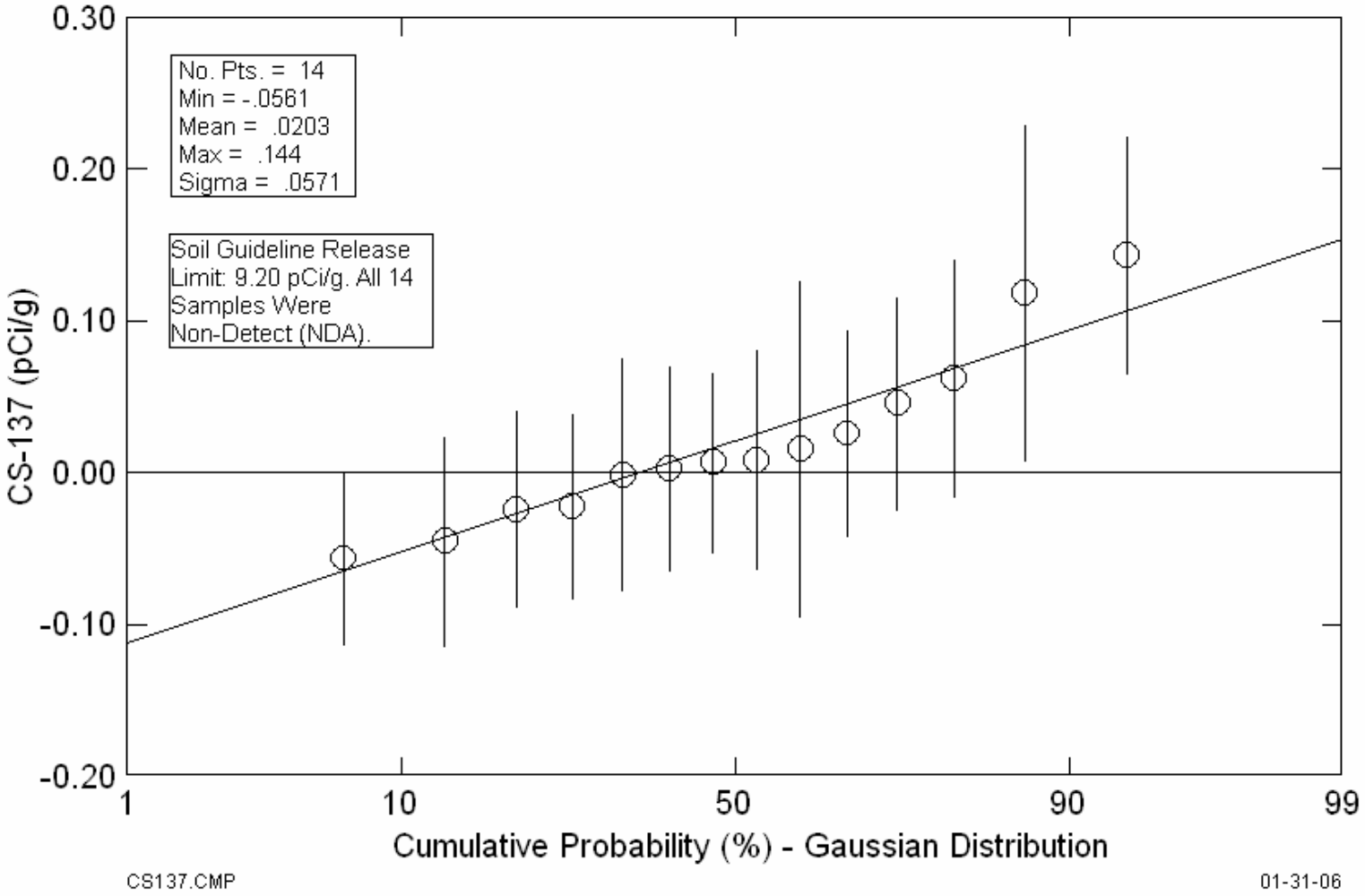


Figure D22. Cs-137 Soil Results, SU-3

Table D23. Eu-152 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	8.51E-03	3.70E-01	6.95E-01	NDA
59-05-0005	SU-3	SU 32N, 187E	7.97E-02	4.63E-01	7.96E-01	NDA
59-05-0006	SU-3	SU 106N, 199E	2.27E-01	3.49E-01	7.27E-01	NDA
59-05-0007	SU-3	SU 164N, 124E	-6.64E-03	3.30E-01	6.42E-01	NDA
59-05-0008	SU-3	SU 177N, 80E	-4.31E-02	3.80E-01	7.19E-01	NDA
59-05-0009	SU-3	SU 194N, 204E	3.94E-01	5.13E-01	8.68E-01	NDA
59-05-0011	SU-3	SU 223N, 104E	2.20E-02	3.75E-01	7.21E-01	NDA
59-05-0012	SU-3	SU 224N, 307E	2.31E-01	3.57E-01	7.58E-01	NDA
59-05-0013	SU-3	SU 240N, 149E	3.42E-02	6.41E-01	1.21E+00	NDA
59-05-0014	SU-3	SU 258N, 104E	3.35E-01	4.37E-01	9.21E-01	NDA
59-05-0015	SU-3	SU 286N, 182E	-1.97E-01	4.16E-01	7.16E-01	NDA
59-05-0016	SU-3	SU 310N, 84E	2.25E-01	3.04E-01	6.72E-01	NDA
59-05-0017	SU-3	SU 321N, 179E	-2.01E-01	6.86E-01	1.27E+00	NDA
59-05-0018	SU-3	SU 371N, 159E	3.46E-01	3.50E-01	7.85E-01	NDA

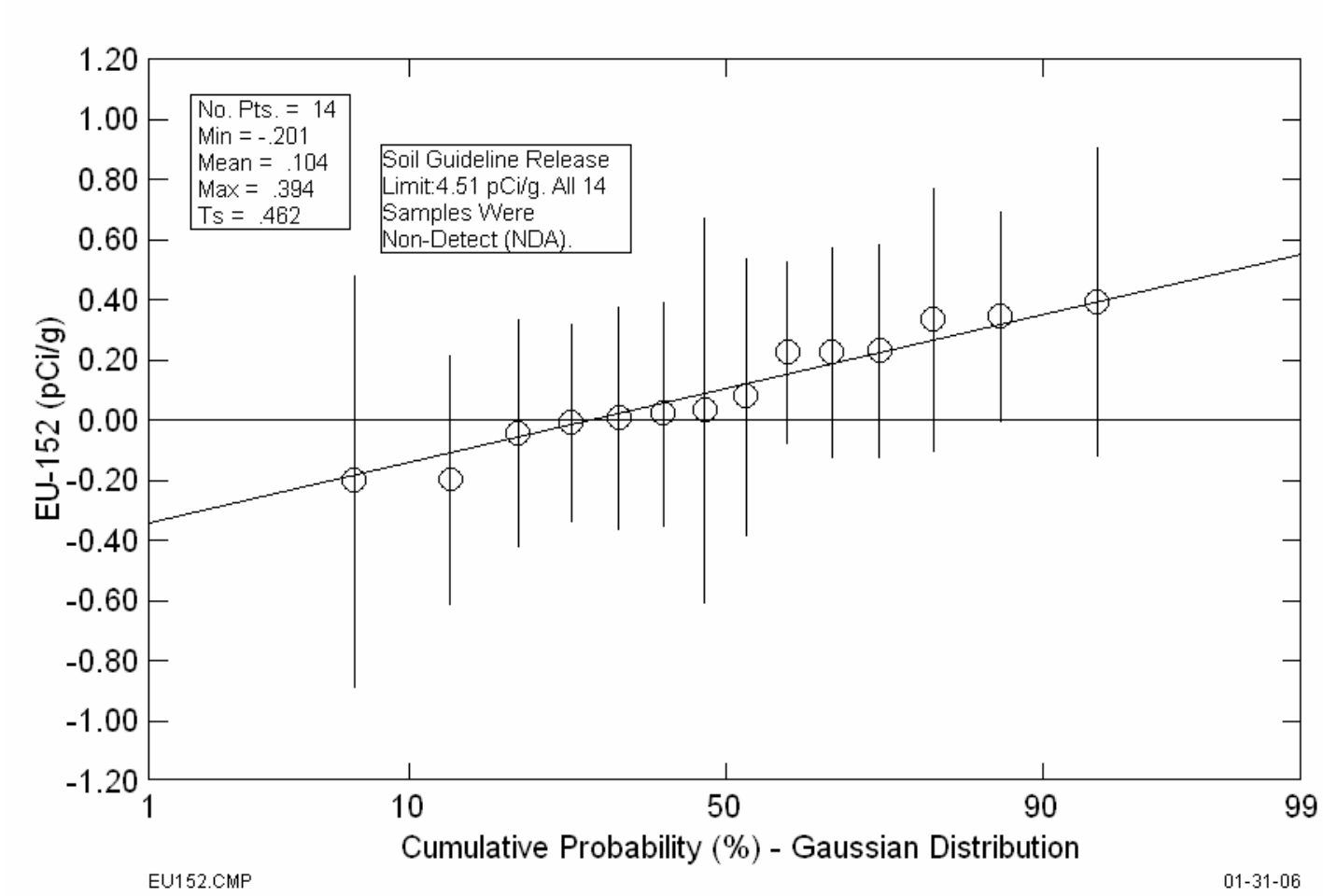


Figure D23. Eu-152 Soil Results, SU-3

Table D24. Eu-154 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	-1.20E-01	1.71E-01	2.90E-01	NDA
59-05-0005	SU-3	SU 32N, 187E	1.63E-02	1.93E-01	3.47E-01	NDA
59-05-0006	SU-3	SU 106N, 199E	1.82E-01	1.99E-01	3.86E-01	NDA
59-05-0007	SU-3	SU 164N, 124E	-1.49E-02	1.98E-01	3.66E-01	NDA
59-05-0008	SU-3	SU 177N, 80E	-2.34E-01	2.20E-01	3.32E-01	NDA
59-05-0009	SU-3	SU 194N, 204E	6.45E-02	2.38E-01	3.79E-01	NDA
59-05-0011	SU-3	SU 223N, 104E	-3.24E-01	2.01E-01	2.93E-01	NDA
59-05-0012	SU-3	SU 224N, 307E	5.42E-02	2.01E-01	3.79E-01	NDA
59-05-0013	SU-3	SU 240N, 149E	-2.52E-01	3.34E-01	5.43E-01	NDA
59-05-0014	SU-3	SU 258N, 104E	-5.55E-02	2.27E-01	3.90E-01	NDA
59-05-0016	SU-3	SU 286N, 182E	-1.64E-01	2.00E-01	3.34E-01	NDA
59-05-0015	SU-3	SU 310N, 84E	-8.79E-02	2.16E-01	3.75E-01	NDA
59-05-0017	SU-3	SU 321N, 179E	9.46E-02	4.90E-01	8.43E-01	NDA
59-05-0018	SU-3	SU 371N, 159E	-6.68E-02	2.54E-01	4.31E-01	NDA

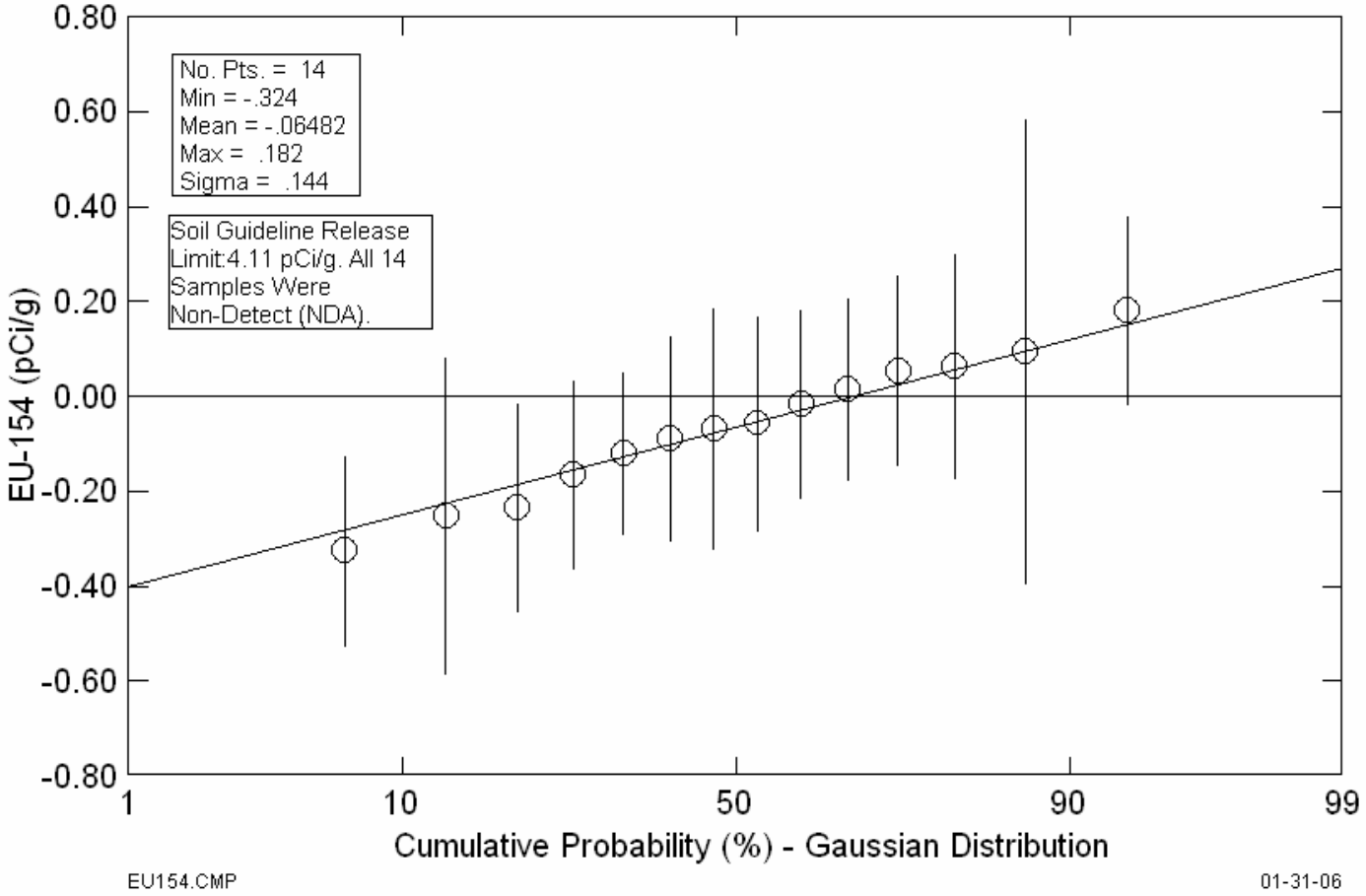


Figure D24. Eu-154 Soil Results, SU-3

Table D25. Fe-55 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	6.20E-01	2.07E+00	1.67E+00	NDA
59-05-0005	SU-3	SU 32N, 187E	-1.90E-01	9.96E-01	1.71E+00	NDA
59-05-0006	SU-3	SU 106N, 199E	-2.61E-01	8.27E-01	1.40E+00	NDA
59-05-0007	SU-3	SU 164N, 124E	-1.53E-02	1.03E+00	1.79E+00	NDA
59-05-0008	SU-3	SU 177N, 80E	2.59E-01	9.65E-01	1.69E+00	NDA
59-05-0009	SU-3	SU 194N, 204E	7.01E-02	9.96E-01	1.74E+00	NDA
59-05-0011	SU-3	SU 223N, 104E	-1.55E-01	8.92E-01	1.53E+00	NDA
59-05-0012	SU-3	SU 224N, 307E	-1.02E+00	9.86E-01	1.53E+00	NDA
59-05-0013	SU-3	SU 240N, 149E	-7.62E-01	9.09E-01	1.45E+00	NDA
59-05-0014	SU-3	SU 258N, 104E	1.18E-01	1.01E+00	1.78E+00	NDA
59-05-0015	SU-3	SU 286N, 182E	8.19E-01	8.72E-01	1.15E+00	NDA
59-05-0016	SU-3	SU 310N, 84E	-1.19E-02	1.01E+00	1.75E+00	NDA
59-05-0017	SU-3	SU 321N, 179E	-8.66E-02	9.34E-01	1.62E+00	NDA
59-05-0018	SU-3	SU 371N, 159E	5.89E-01	8.98E-01	1.61E+00	NDA

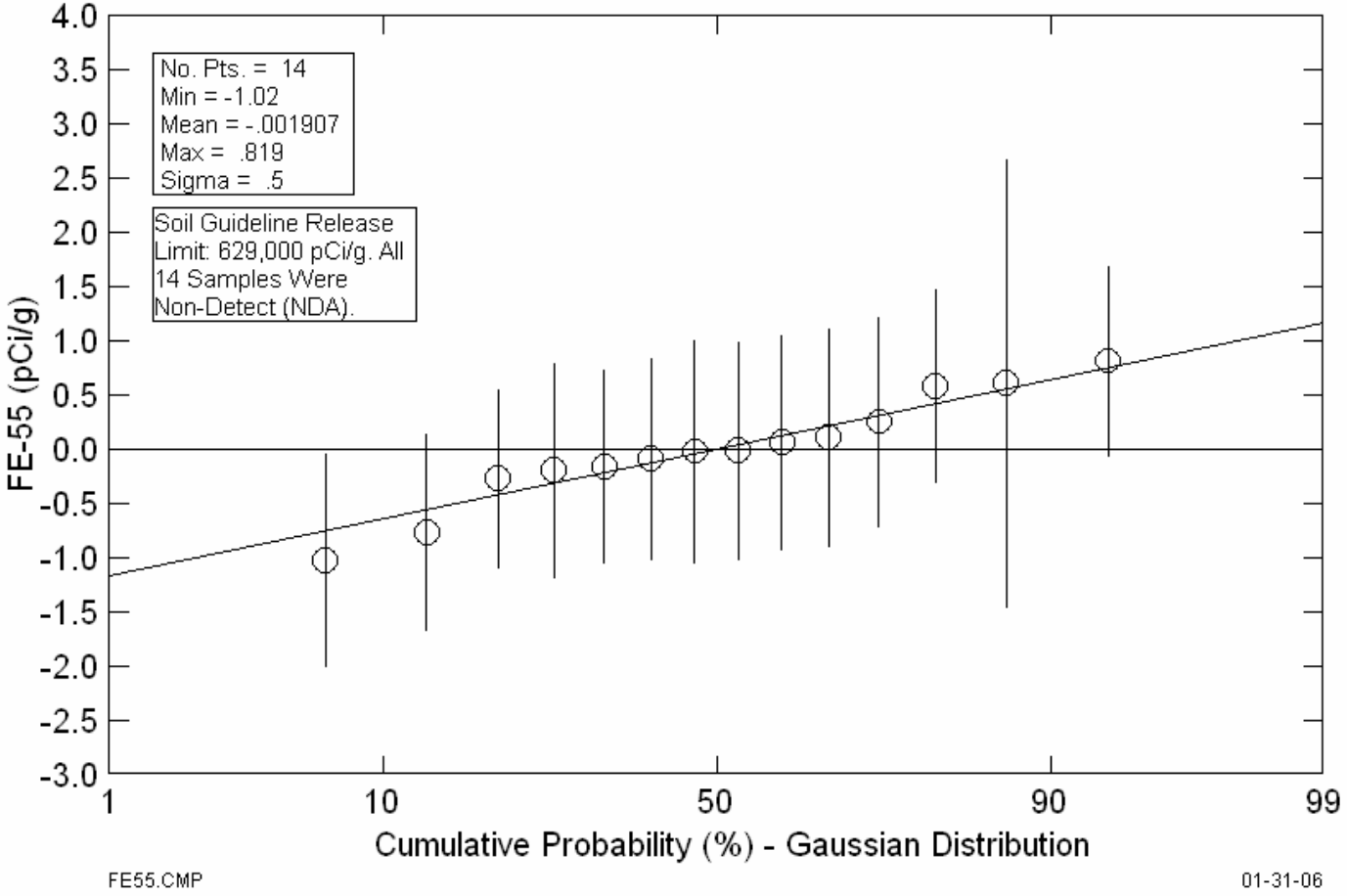


Figure D25. Fe-55 Soil Results, SU-3

Table D26. H-3 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	-2.16E+00	2.52E+00	4.40E+00	NDA
59-05-0005	SU-3	SU 32N, 187E	0.00E+00	0.00E+00	4.00E+00	NDA
59-05-0006	SU-3	SU 106N, 199E	-2.10E+00	2.45E+00	4.28E+00	NDA
59-05-0007	SU-3	SU 164N, 124E	0.00E+00	0.00E+00	4.32E+00	NDA
59-05-0008	SU-3	SU 177N, 80E	2.14E+00	2.60E+00	4.35E+00	NDA
59-05-0009	SU-3	SU 194N, 204E	0.00E+00	0.00E+00	3.87E+00	NDA
59-05-0011	SU-3	SU 223N, 104E	3.89E+00	2.45E+00	3.96E+00	NDA
59-05-0012	SU-3	SU 224N, 307E	0.00E+00	0.00E+00	4.42E+00	NDA
59-05-0013	SU-3	SU 240N, 149E	0.00E+00	0.00E+00	4.30E+00	NDA
59-05-0014	SU-3	SU 258N, 104E	1.99E+00	2.42E+00	4.05E+00	NDA
59-05-0015	SU-3	SU 286N, 182E	1.91E+00	2.32E+00	3.88E+00	NDA
59-05-0016	SU-3	SU 310N, 84E	1.97E+00	2.40E+00	4.02E+00	NDA
59-05-0017	SU-3	SU 321N, 179E	1.86E+00	2.26E+00	3.79E+00	NDA
59-05-0018	SU-3	SU 371N, 159E	0.00E+00	0.00E+00	3.98E+00	NDA

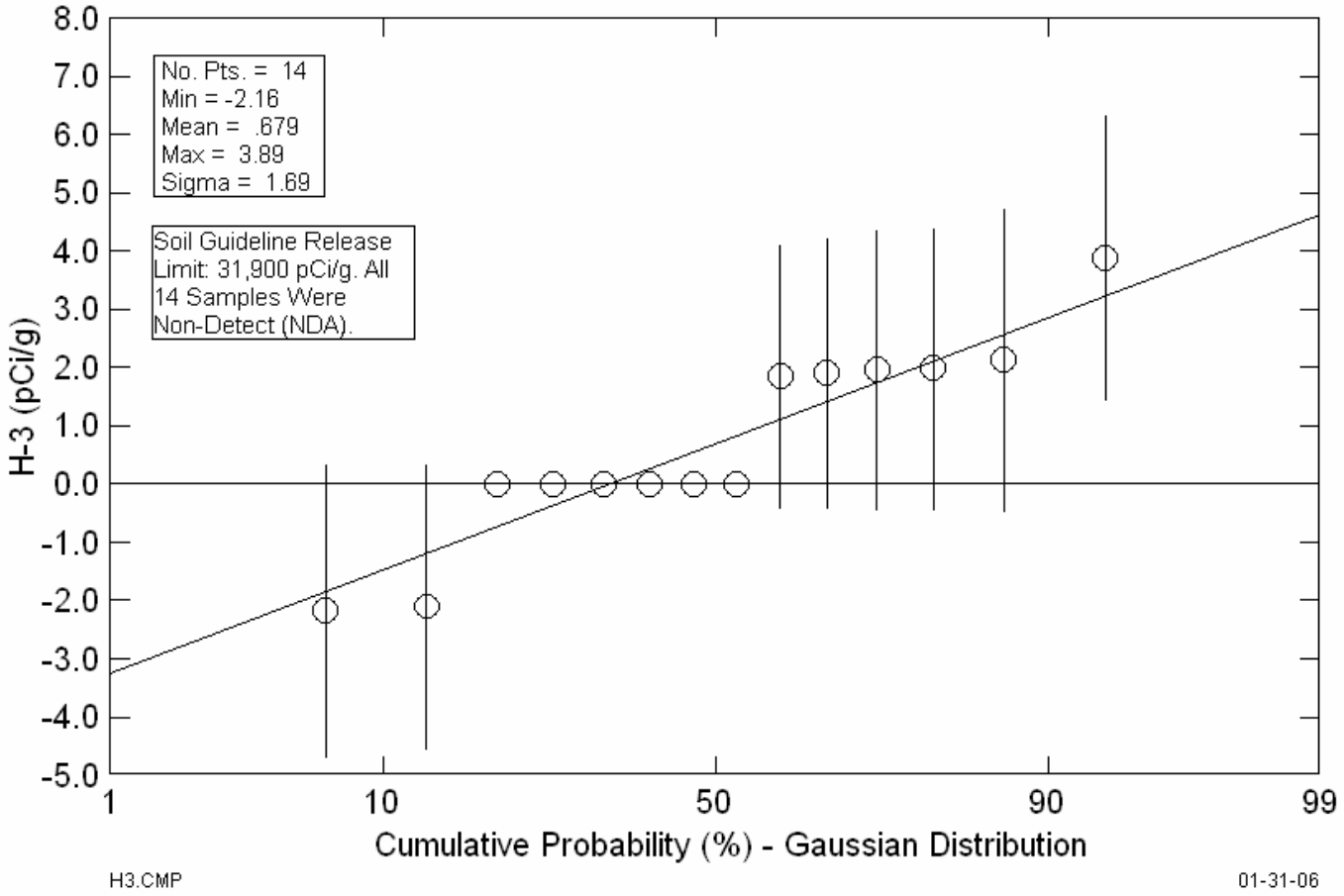


Figure D26. H-3 Soil Results, SU-3

Table D27. Ni-63 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	1.46E+00	2.25E+00	3.78E+00	NDA
59-05-0005	SU-3	SU 32N, 187E	1.93E+00	2.31E+00	3.86E+00	NDA
59-05-0006	SU-3	SU 106N, 199E	2.14E+00	2.35E+00	3.90E+00	NDA
59-05-0007	SU-3	SU 164N, 124E	1.29E+00	2.15E+00	3.61E+00	NDA
59-05-0008	SU-3	SU 177N, 80E	2.71E+00	2.22E+00	3.65E+00	NDA
59-05-0009	SU-3	SU 194N, 204E	2.55E+00	2.12E+00	3.48E+00	NDA
59-05-0011	SU-3	SU 223N, 104E	1.10E-01	1.98E+00	3.39E+00	NDA
59-05-0012	SU-3	SU 224N, 307E	8.96E-01	2.36E+00	4.00E+00	NDA
59-05-0013	SU-3	SU 240N, 149E	9.65E-01	2.07E+00	3.49E+00	NDA
59-05-0014	SU-3	SU 258N, 104E	1.77E+00	2.26E+00	3.77E+00	NDA
59-05-0015	SU-3	SU 286N, 182E	1.39E+00	2.31E+00	3.89E+00	NDA
59-05-0016	SU-3	SU 310N, 84E	1.26E+00	2.29E+00	3.86E+00	NDA
59-05-0017	SU-3	SU 321N, 179E	2.46E+00	2.41E+00	3.98E+00	NDA
59-05-0018	SU-3	SU 371N, 159E	3.22E+00	2.26E+00	3.68E+00	NDA

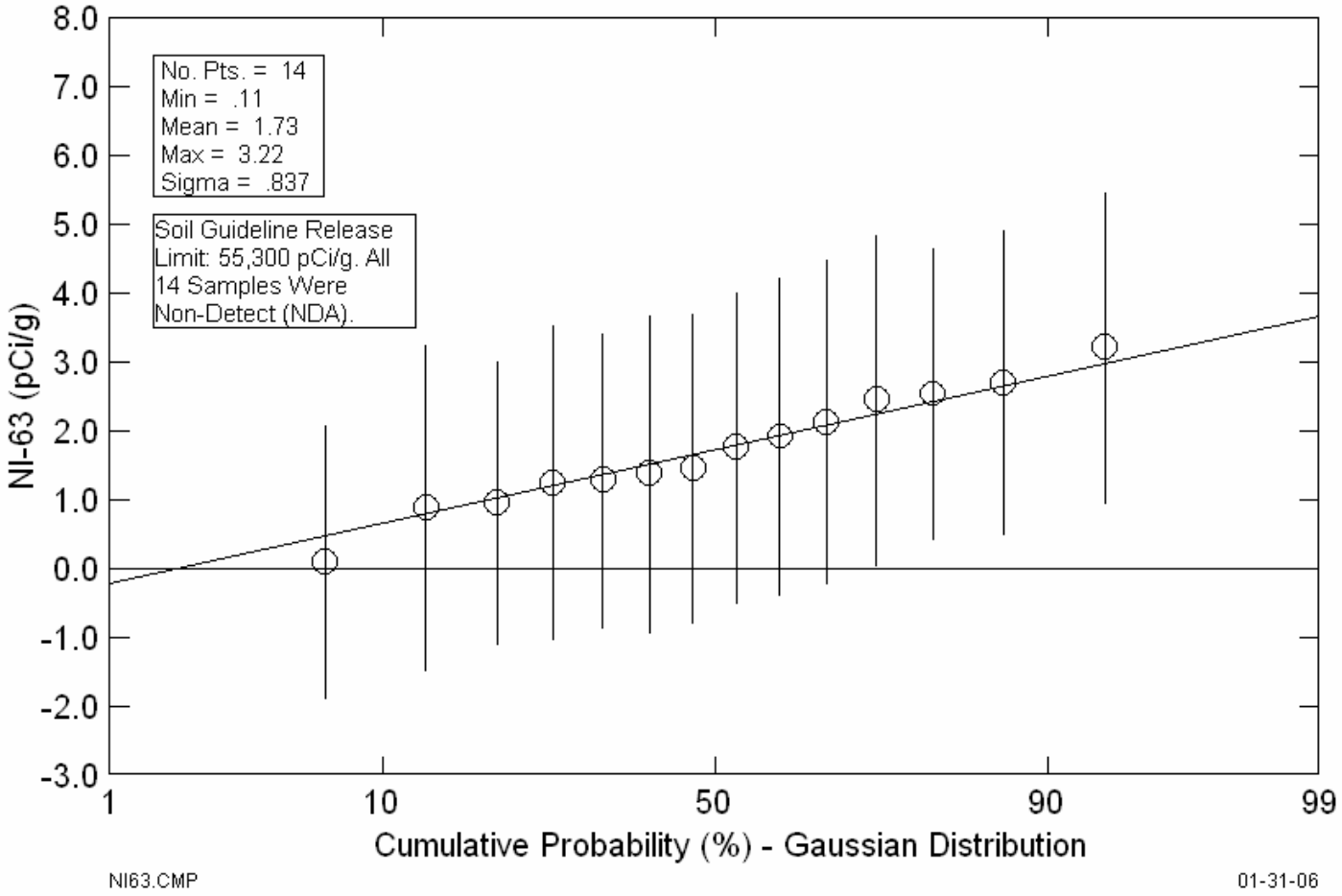


Figure D27. Ni-63 Soil Results, SU-3

Table D28. Pu-238 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	4.55E-02	5.31E-02	4.10E-02	
59-05-0005	SU-3	SU 32N, 187E	4.10E-02	4.79E-02	3.70E-02	
59-05-0006	SU-3	SU 106N, 199E	5.51E-03	7.86E-02	2.57E-01	NDA
59-05-0007	SU-3	SU 164N, 124E	-9.27E-03	3.93E-02	1.48E-01	NDA
59-05-0008	SU-3	SU 177N, 80E	6.26E-02	6.14E-02	7.28E-02	NDA
59-05-0009	SU-3	SU 194N, 204E	2.34E-02	5.75E-02	1.34E-01	NDA
59-05-0011	SU-3	SU 223N, 104E	1.38E-02	5.07E-02	1.33E-01	NDA
59-05-0012	SU-3	SU 224N, 307E	5.50E-02	8.10E-02	1.52E-01	NDA
59-05-0013	SU-3	SU 240N, 149E	3.61E-02	6.52E-02	1.35E-01	NDA
59-05-0014	SU-3	SU 258N, 104E	5.04E-02	6.27E-02	8.23E-02	NDA
59-05-0015	SU-3	SU 286N, 182E	1.93E-02	7.07E-02	1.85E-01	NDA
59-05-0016	SU-3	SU 310N, 84E	3.39E-02	5.19E-02	9.54E-02	NDA
59-05-0017	SU-3	SU 321N, 179E	2.63E-02	4.12E-02	6.65E-02	NDA
59-05-0018	SU-3	SU 371N, 159E	1.65E-02	4.21E-02	1.00E-01	NDA

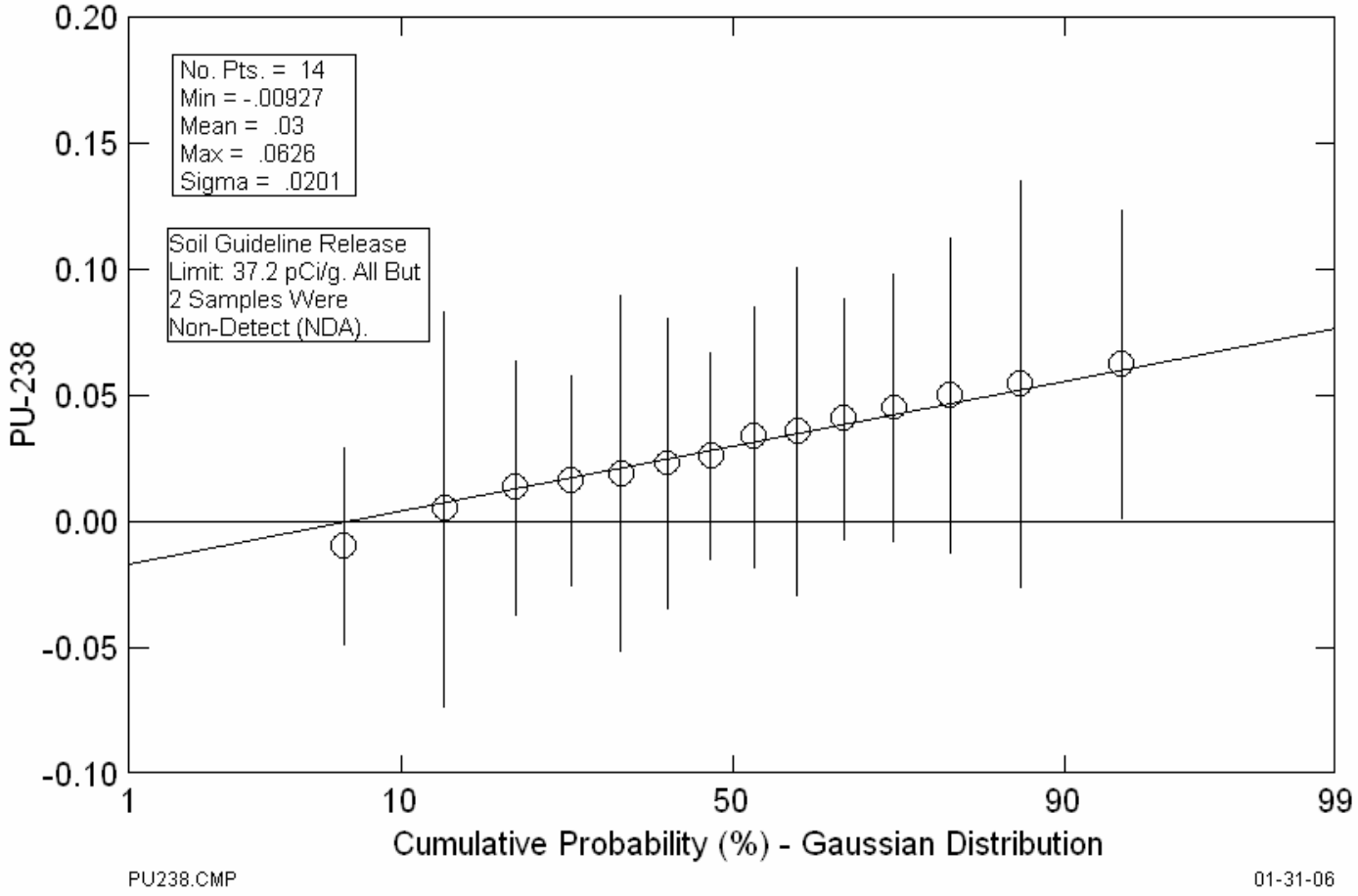


Figure D28. Pu-238 Soil Results, SU-3

Table D29. Pu-239 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	9.54E-03	1.91E-02	2.58E-02	NDA
59-05-0005	SU-3	SU 32N, 187E	-2.93E-03	4.17E-03	4.67E-02	NDA
59-05-0006	SU-3	SU 106N, 199E	1.92E-02	4.71E-02	1.07E-01	NDA
59-05-0007	SU-3	SU 164N, 124E	5.39E-03	2.30E-02	6.64E-02	NDA
59-05-0008	SU-3	SU 177N, 80E	2.39E-02	2.97E-02	3.91E-02	NDA
59-05-0009	SU-3	SU 194N, 204E	-3.40E-03	4.85E-03	5.42E-02	NDA
59-05-0011	SU-3	SU 223N, 104E	7.09E-03	2.21E-02	5.82E-02	NDA
59-05-0012	SU-3	SU 224N, 307E	0.00E+00	0.00E+00	3.34E-02	NDA
59-05-0013	SU-3	SU 240N, 149E	1.90E-02	3.31E-02	6.21E-02	NDA
59-05-0014	SU-3	SU 258N, 104E	2.24E-02	3.20E-02	3.04E-02	NDA
59-05-0015	SU-3	SU 286N, 182E	-7.64E-03	8.95E-03	9.03E-02	NDA
59-05-0016	SU-3	SU 310N, 84E	6.06E-03	1.89E-02	4.98E-02	NDA
59-05-0017	SU-3	SU 321N, 179E	-3.08E-03	4.39E-03	4.91E-02	NDA
59-05-0018	SU-3	SU 371N, 159E	-1.53E-03	3.08E-03	4.18E-02	NDA

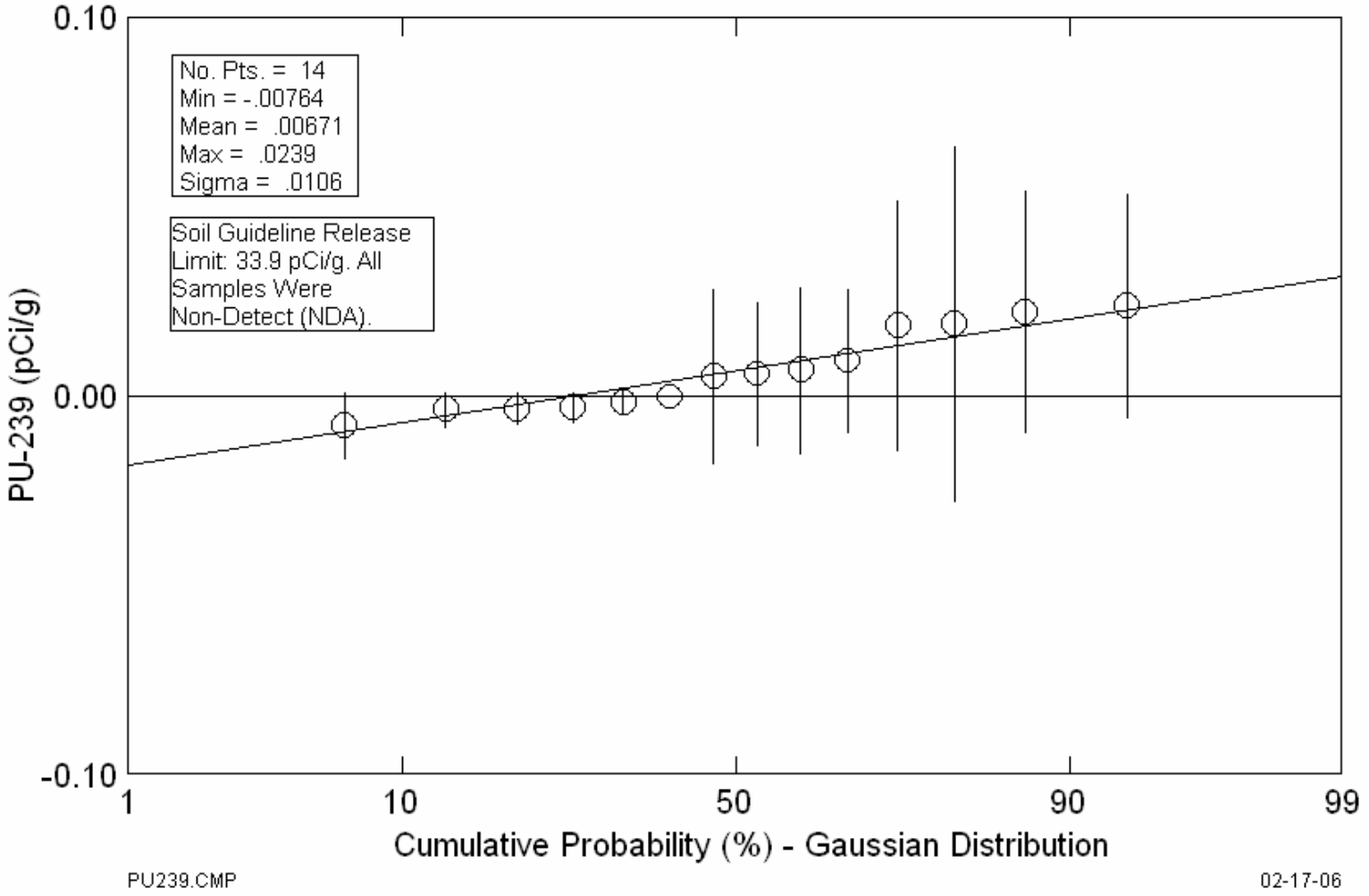


Figure D29. Pu-239 Soil Results, SU-3

Table D30. Pu-240 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	5.60E-03	1.12E-02	1.52E-02	NDA
59-05-0005	SU-3	SU 32N, 187E	-1.72E-03	2.45E-03	2.74E-02	NDA
59-05-0006	SU-3	SU 106N, 199E	1.13E-02	2.77E-02	6.28E-02	NDA
59-05-0007	SU-3	SU 164N, 124E	3.17E-03	1.35E-02	3.90E-02	NDA
59-05-0008	SU-3	SU 177N, 80E	1.41E-02	1.75E-02	2.30E-02	NDA
59-05-0009	SU-3	SU 194N, 204E	-2.00E-03	2.85E-03	3.18E-02	NDA
59-05-0011	SU-3	SU 223N, 104E	4.16E-03	1.30E-02	3.42E-02	NDA
59-05-0012	SU-3	SU 224N, 307E	0.00E+00	0.00E+00	1.96E-02	NDA
59-05-0013	SU-3	SU 240N, 149E	1.12E-02	1.94E-02	3.65E-02	NDA
59-05-0014	SU-3	SU 258N, 104E	1.32E-02	1.88E-02	1.78E-02	NDA
59-05-0015	SU-3	SU 286N, 182E	-4.48E-03	5.26E-03	5.30E-02	NDA
59-05-0016	SU-3	SU 310N, 84E	3.56E-03	1.11E-02	2.92E-02	NDA
59-05-0017	SU-3	SU 321N, 179E	-1.81E-03	2.58E-03	2.88E-02	NDA
59-05-0018	SU-3	SU 371N, 159E	-9.01E-04	1.81E-03	2.45E-02	NDA

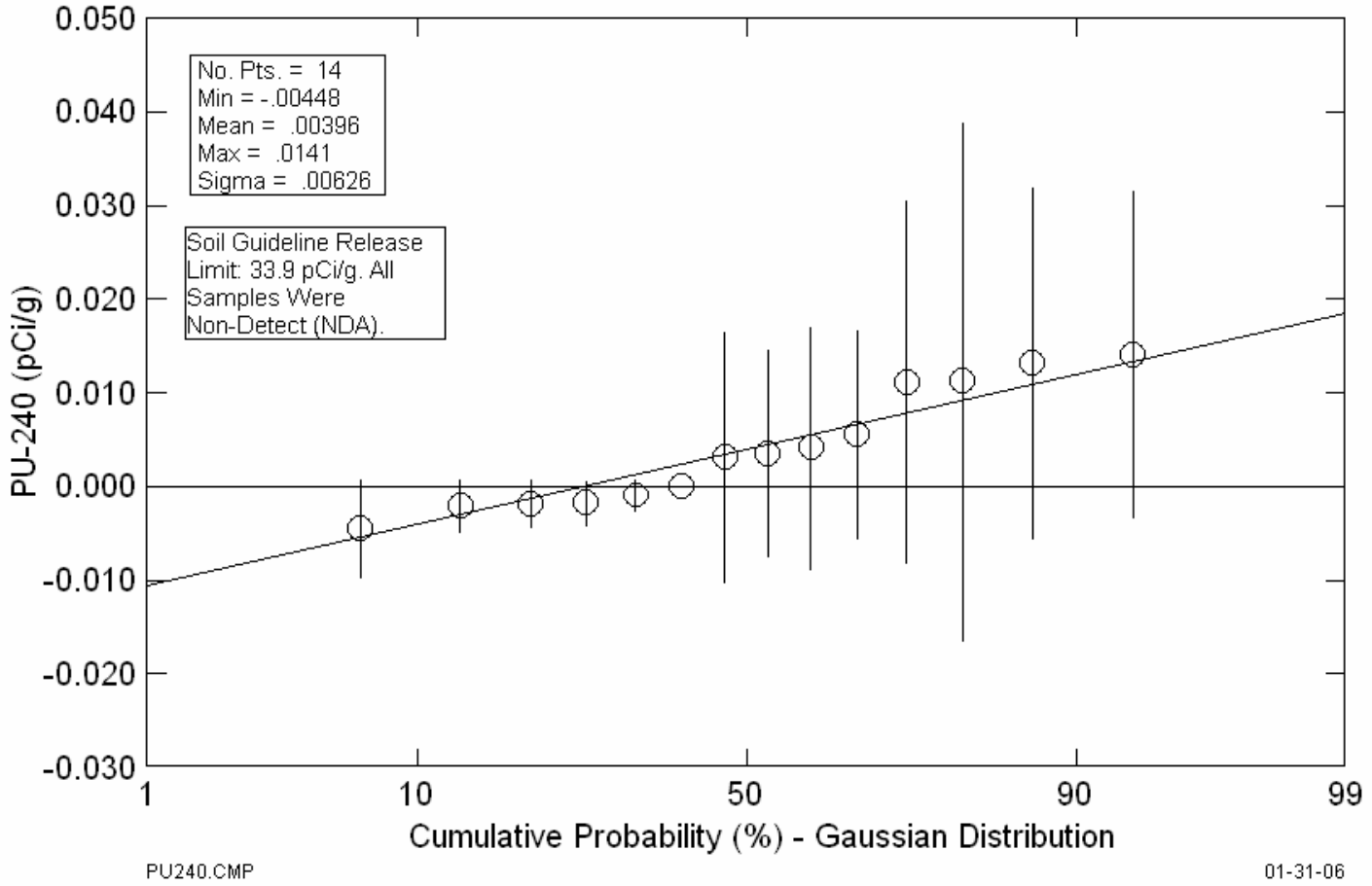


Figure D30. Pu-240 Soil Results, SU-3

Table D31. Pu-241 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	-2.52E-01	4.08E+00	6.98E+00	NDA
59-05-0005	SU-3	SU 32N, 187E	-1.98E+00	3.48E+00	6.01E+00	NDA
59-05-0006	SU-3	SU 106N, 199E	-5.20E+00	9.49E+00	1.64E+01	NDA
59-05-0007	SU-3	SU 164N, 124E	-1.59E+00	4.42E+00	7.60E+00	NDA
59-05-0008	SU-3	SU 177N, 80E	-1.29E-01	3.77E+00	6.44E+00	NDA
59-05-0009	SU-3	SU 194N, 204E	-2.10E+00	3.94E+00	6.80E+00	NDA
59-05-0011	SU-3	SU 223N, 104E	-3.77E+00	4.26E+00	7.40E+00	NDA
59-05-0012	SU-3	SU 224N, 307E	-2.12E+00	5.20E+00	8.95E+00	NDA
59-05-0013	SU-3	SU 240N, 149E	-1.87E+00	4.75E+00	8.19E+00	NDA
59-05-0014	SU-3	SU 258N, 104E	-2.06E+00	4.45E+00	7.68E+00	NDA
59-05-0015	SU-3	SU 286N, 182E	-5.41E+00	5.87E+00	1.02E+01	NDA
59-05-0016	SU-3	SU 310N, 84E	-1.62E+00	3.34E+00	5.77E+00	NDA
59-05-0017	SU-3	SU 321N, 179E	-2.61E+00	3.68E+00	6.37E+00	NDA
59-05-0018	SU-3	SU 371N, 159E	0.00E+00	0.00E+00	6.58E+00	NDA

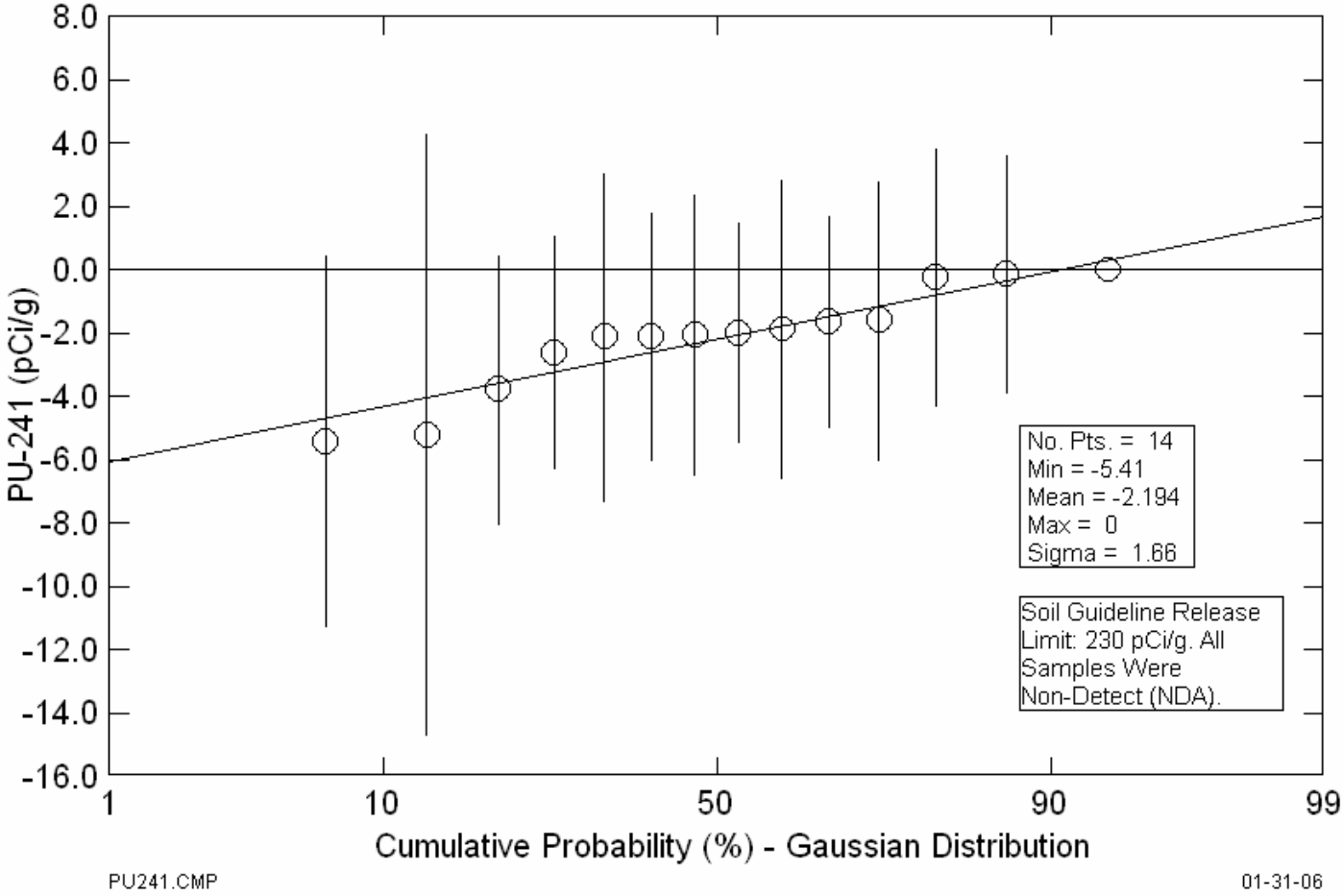


Figure D31. Pu-241 Soil Results, SU-3

Table D32. Sr-90 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	-3.40E-01	3.42E-01	6.13E-01	NDA
59-05-0005	SU-3	SU 32N, 187E	2.58E-01	3.30E-01	5.53E-01	NDA
59-05-0006	SU-3	SU 106N, 199E	-7.41E-02	3.21E-01	5.64E-01	NDA
59-05-0007	SU-3	SU 164N, 124E	-3.80E-01	3.46E-01	6.23E-01	NDA
59-05-0008	SU-3	SU 177N, 80E	3.17E-01	2.94E-01	4.82E-01	NDA
59-05-0009	SU-3	SU 194N, 204E	5.39E-01	3.26E-01	5.09E-01	
59-05-0011	SU-3	SU 223N, 104E	-2.52E-01	3.53E-01	6.30E-01	NDA
59-05-0012	SU-3	SU 224N, 307E	-2.40E-02	3.22E-01	5.65E-01	NDA
59-05-0013	SU-3	SU 240N, 149E	1.25E+00	3.61E-01	4.51E-01	
59-05-0014	SU-3	SU 258N, 104E	1.08E-01	3.58E-01	6.15E-01	NDA
59-05-0015	SU-3	SU 286N, 182E	1.64E-01	3.00E-01	5.09E-01	NDA
59-05-0016	SU-3	SU 310N, 84E	1.02E-01	2.86E-01	4.91E-01	NDA
59-05-0017	SU-3	SU 321N, 179E	1.90E-01	3.04E-01	5.14E-01	NDA
59-05-0018	SU-3	SU 371N, 159E	2.58E-01	3.00E-01	4.99E-01	NDA

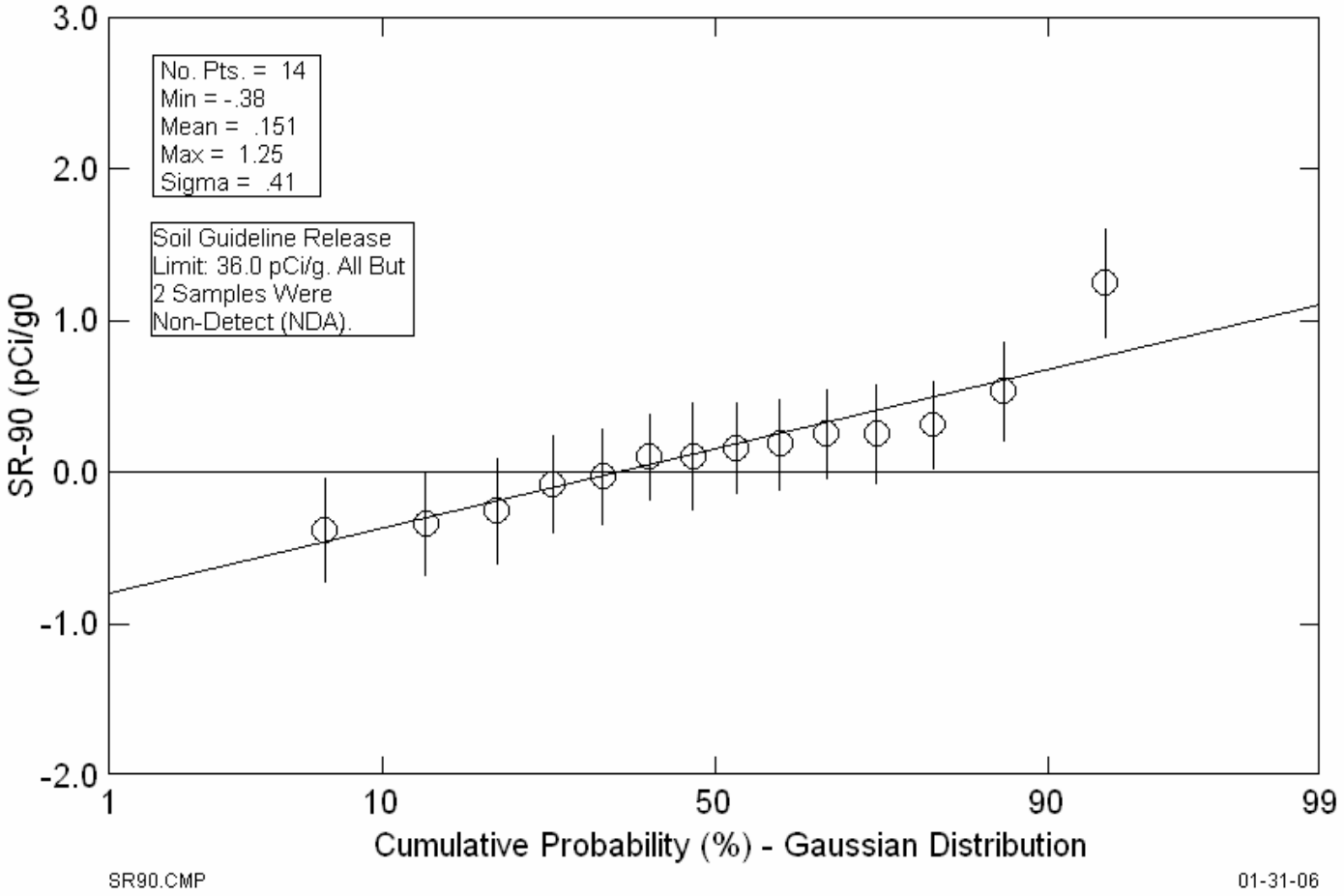


Figure D32. Sr-90 Soil Results, SU-3

Table D33. Th-228 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	1.40E+00	3.62E-01	1.19E-01	
59-05-0005	SU-3	SU 32N, 187E	1.68E+00	4.38E-01	1.42E-01	
59-05-0006	SU-3	SU 106N, 199E	9.23E-01	2.69E-01	1.02E-01	
59-05-0007	SU-3	SU 164N, 124E	1.54E+00	3.90E-01	9.92E-02	
59-05-0008	SU-3	SU 177N, 80E	1.28E+00	3.56E-01	1.18E-01	
59-05-0009	SU-3	SU 194N, 204E	1.87E+00	4.39E-01	9.75E-02	
59-05-0011	SU-3	SU 223N, 104E	8.27E-01	2.50E-01	8.65E-02	
59-05-0012	SU-3	SU 224N, 307E	9.02E-01	2.81E-01	1.21E-01	
59-05-0013	SU-3	SU 240N, 149E	1.57E+00	3.86E-01	9.75E-02	
59-05-0014	SU-3	SU 258N, 104E	1.40E+00	3.69E-01	1.21E-01	
59-05-0015	SU-3	SU 286N, 182E	1.48E+00	4.06E-01	1.17E-01	
59-05-0016	SU-3	SU 310N, 84E	1.38E+00	3.45E-01	1.06E-01	
59-05-0017	SU-3	SU 321N, 179E	1.17E+00	3.17E-01	9.81E-02	
59-05-0018	SU-3	SU 371N, 159E	1.23E+00	3.25E-01	9.19E-02	

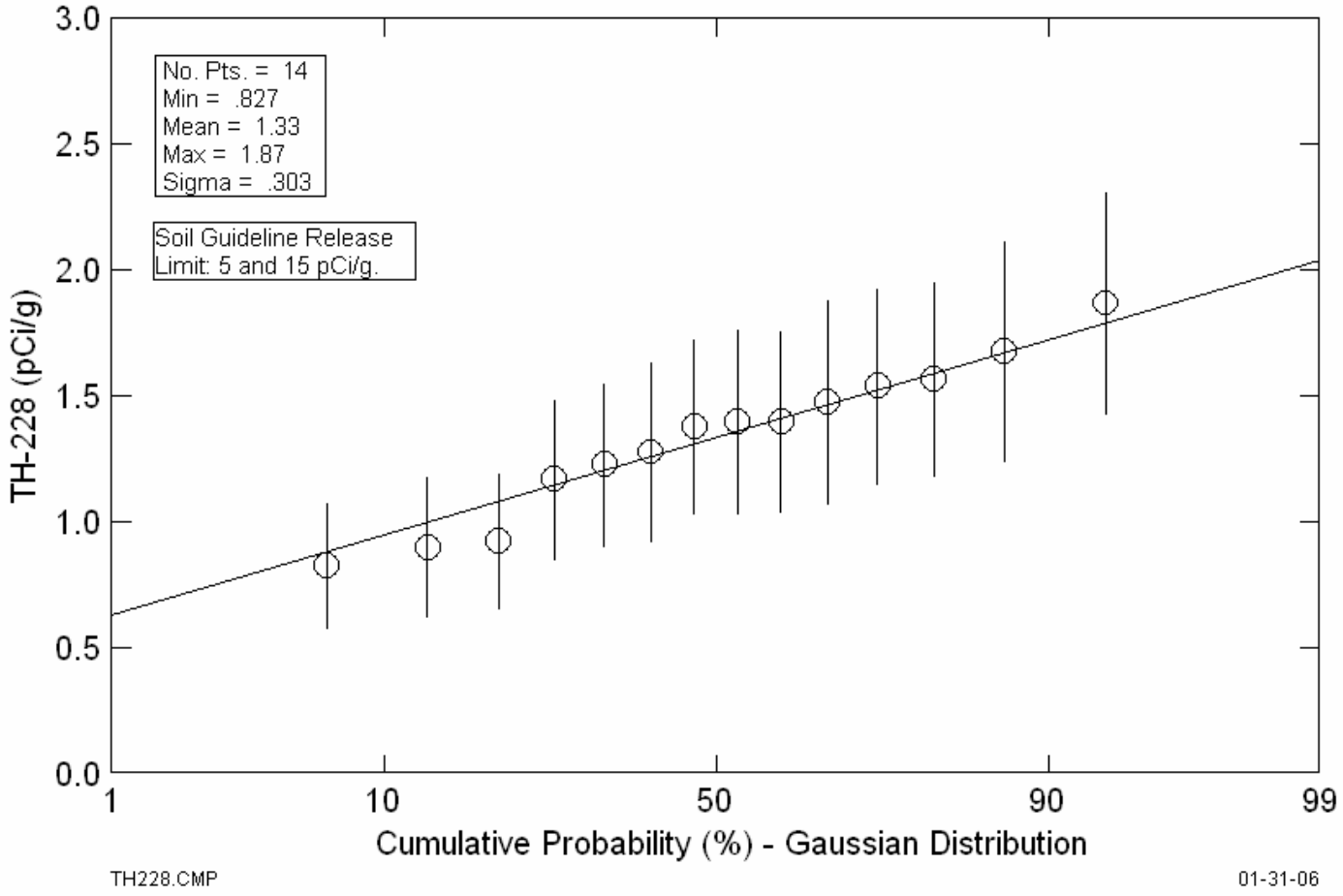


Figure D33. Th-228 Soil Results, SU-3

Table D34. Th-232 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	1.56E+00	3.85E-01	3.46E-02	
59-05-0005	SU-3	SU 32N, 187E	1.80E+00	4.52E-01	1.06E-01	
59-05-0006	SU-3	SU 106N, 199E	9.72E-01	2.73E-01	6.79E-02	
59-05-0007	SU-3	SU 164N, 124E	1.50E+00	3.78E-01	9.92E-02	
59-05-0008	SU-3	SU 177N, 80E	1.38E+00	3.69E-01	1.02E-01	
59-05-0009	SU-3	SU 194N, 204E	1.63E+00	3.93E-01	8.76E-02	
59-05-0011	SU-3	SU 223N, 104E	1.43E+00	3.57E-01	7.45E-02	
59-05-0012	SU-3	SU 224N, 307E	1.18E+00	3.29E-01	6.61E-02	
59-05-0013	SU-3	SU 240N, 149E	1.50E+00	3.69E-01	7.55E-02	
59-05-0014	SU-3	SU 258N, 104E	1.67E+00	4.11E-01	8.01E-02	
59-05-0015	SU-3	SU 286N, 182E	1.44E+00	3.92E-01	1.03E-01	
59-05-0016	SU-3	SU 310N, 84E	1.21E+00	3.09E-01	5.41E-02	
59-05-0017	SU-3	SU 321N, 179E	1.84E+00	4.33E-01	8.24E-02	
59-05-0018	SU-3	SU 371N, 159E	1.34E+00	3.40E-01	5.74E-02	

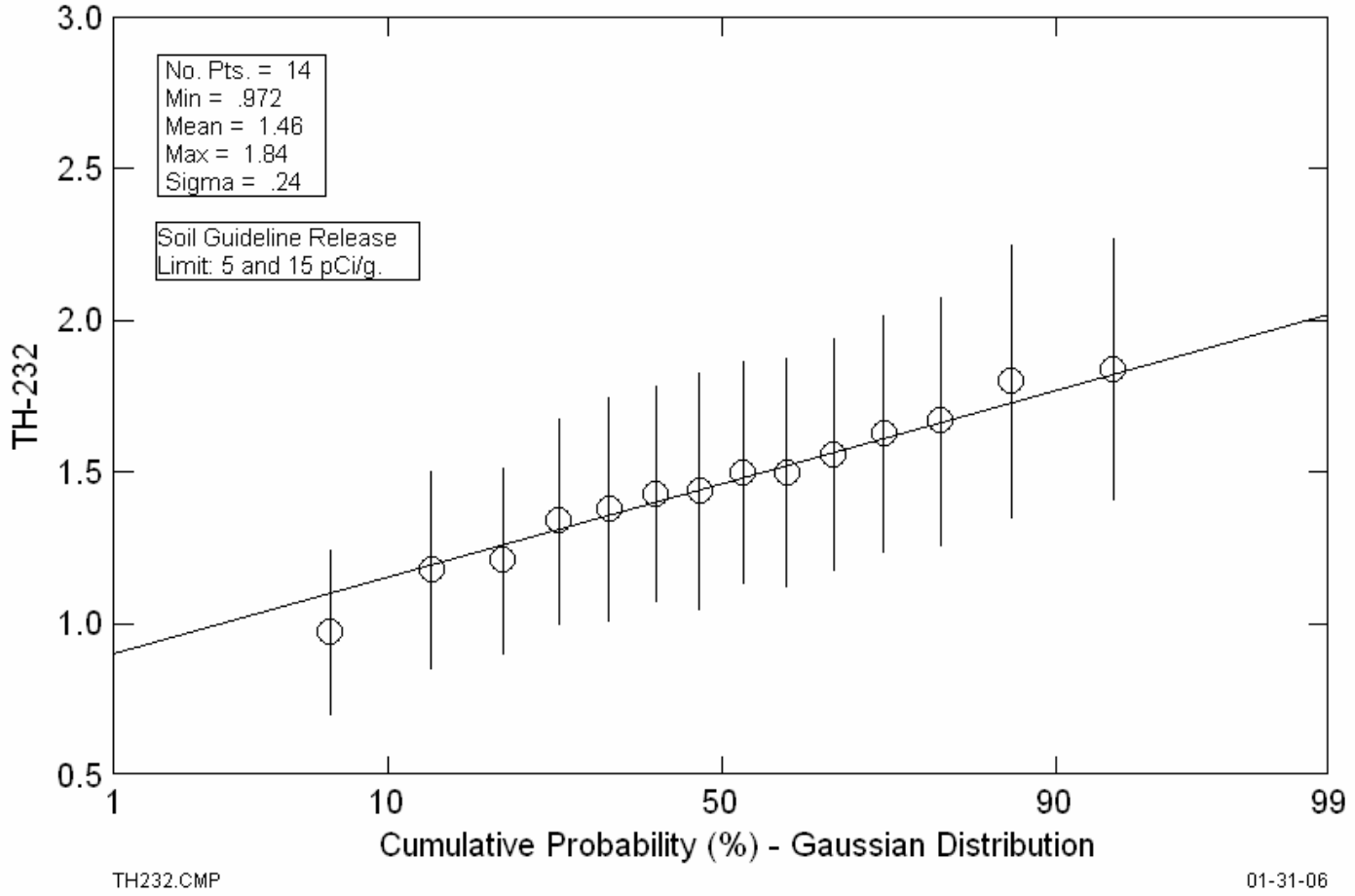


Figure D34. Th-232 Soil Results, SU-3

Table D35. U-234 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	1.34E+00	3.23E-01	7.37E-02	
59-05-0005	SU-3	SU 32N, 187E	1.52E+00	3.59E-01	7.18E-02	
59-05-0006	SU-3	SU 106N, 199E	1.10E+00	2.85E-01	3.10E-02	
59-05-0007	SU-3	SU 164N, 124E	1.36E+00	3.62E-01	9.05E-02	
59-05-0008	SU-3	SU 177N, 80E	1.30E+00	3.32E-01	3.55E-02	
59-05-0009	SU-3	SU 194N, 204E	1.40E+00	3.77E-01	1.27E-01	
59-05-0011	SU-3	SU 223N, 104E	9.84E-01	2.72E-01	5.85E-02	
59-05-0012	SU-3	SU 224N, 307E	9.10E-01	2.70E-01	8.38E-02	
59-05-0013	SU-3	SU 240N, 149E	1.22E+00	3.32E-01	9.38E-02	
59-05-0014	SU-3	SU 258N, 104E	1.18E+00	3.19E-01	9.69E-02	
59-05-0015	SU-3	SU 286N, 182E	9.66E-01	2.79E-01	8.99E-02	
59-05-0016	SU-3	SU 310N, 84E	9.62E-01	2.78E-01	1.06E-01	
59-05-0017	SU-3	SU 321N, 179E	8.71E-01	2.88E-01	1.33E-01	
59-05-0018	SU-3	SU 371N, 159E	1.50E+00	4.09E-01	9.30E-02	

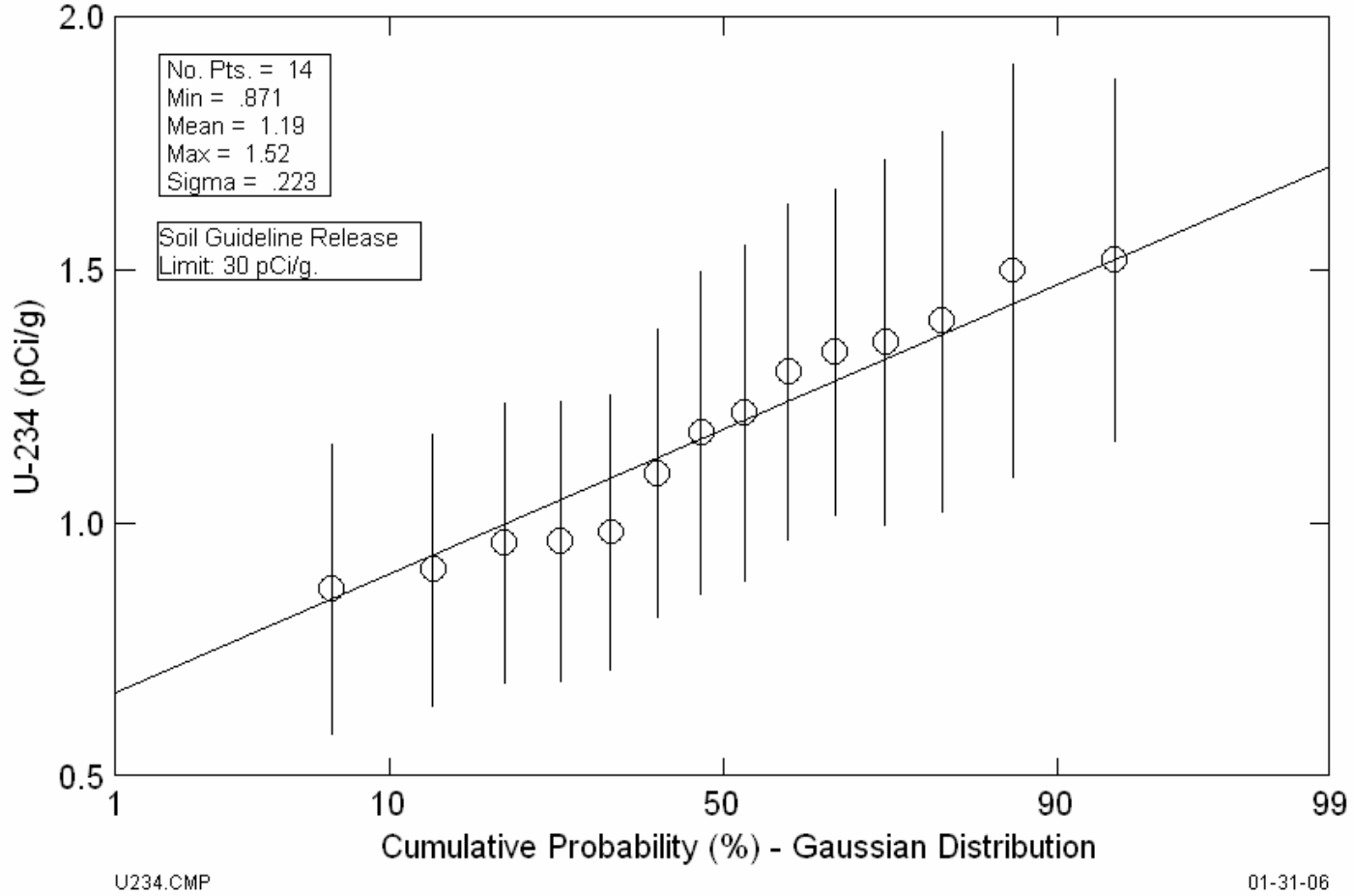


Figure D35. U-234 Soil Results, SU-3

Table D36. U-235 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	5.32E-02	5.64E-02	6.43E-02	NDA
59-05-0005	SU-3	SU 32N, 187E	1.89E-01	1.10E-01	6.80E-02	
59-05-0006	SU-3	SU 106N, 199E	9.65E-02	7.65E-02	6.54E-02	
59-05-0007	SU-3	SU 164N, 124E	1.67E-01	1.14E-01	5.02E-02	
59-05-0008	SU-3	SU 177N, 80E	5.91E-02	6.58E-02	8.76E-02	NDA
59-05-0009	SU-3	SU 194N, 204E	3.40E-01	1.73E-01	1.04E-01	
59-05-0011	SU-3	SU 223N, 104E	9.10E-02	7.80E-02	7.22E-02	
59-05-0012	SU-3	SU 224N, 307E	1.86E-01	1.18E-01	7.93E-02	
59-05-0013	SU-3	SU 240N, 149E	3.15E-01	1.59E-01	8.18E-02	
59-05-0014	SU-3	SU 258N, 104E	1.31E-01	9.92E-02	9.26E-02	
59-05-0015	SU-3	SU 286N, 182E	1.36E-01	9.83E-02	4.59E-02	
59-05-0016	SU-3	SU 310N, 84E	3.32E-02	5.99E-02	1.24E-01	NDA
59-05-0017	SU-3	SU 321N, 179E	1.02E-01	9.64E-02	9.78E-02	
59-05-0018	SU-3	SU 371N, 159E	1.23E-01	1.06E-01	9.79E-02	

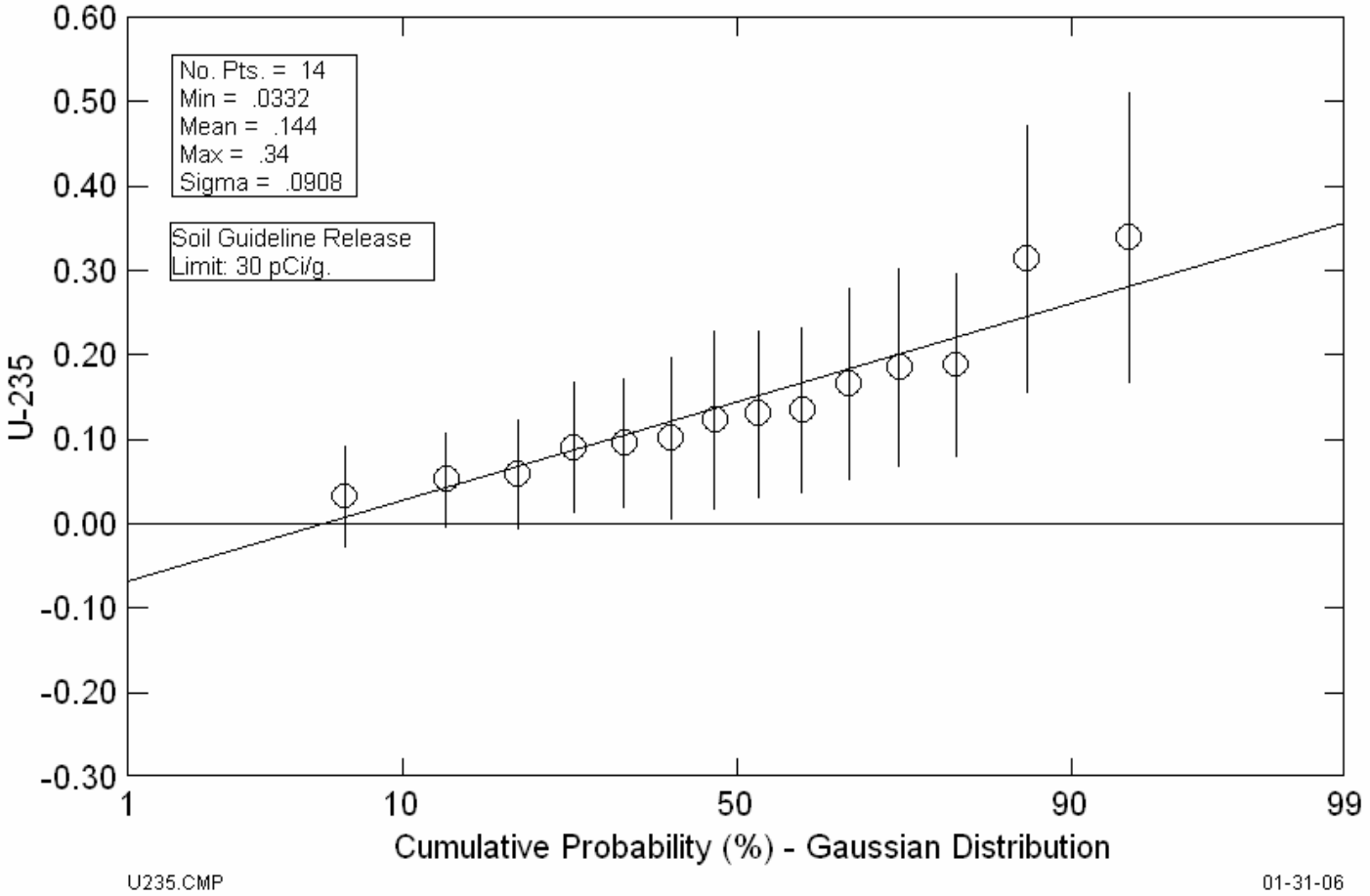


Figure D36. U-235 Soil Results, SU-3

Table D37. U-238 Soil Results, SU-3

Sample #	Survey Unit	Survey Unit Location	Result pCi/g	Error (+/-) pCi/g	MDA pCi/g	Non Detect?
59-05-0004	SU-3	SU 23N, 198E	1.01E+00	2.65E-01	7.85E-02	
59-05-0005	SU-3	SU 32N, 187E	1.36E+00	3.31E-01	7.76E-02	
59-05-0006	SU-3	SU 106N, 199E	9.67E-01	2.61E-01	5.28E-02	
59-05-0007	SU-3	SU 164N, 124E	1.02E+00	2.97E-01	4.05E-02	
59-05-0008	SU-3	SU 177N, 80E	1.17E+00	3.10E-01	6.03E-02	
59-05-0009	SU-3	SU 194N, 204E	1.30E+00	3.56E-01	9.37E-02	
59-05-0011	SU-3	SU 223N, 104E	1.03E+00	2.81E-01	3.41E-02	
59-05-0012	SU-3	SU 224N, 307E	7.75E-01	2.42E-01	3.75E-02	
59-05-0013	SU-3	SU 240N, 149E	1.30E+00	3.44E-01	6.60E-02	
59-05-0014	SU-3	SU 258N, 104E	1.19E+00	3.19E-01	3.74E-02	
59-05-0015	SU-3	SU 286N, 182E	1.01E+00	2.86E-01	7.42E-02	
59-05-0016	SU-3	SU 310N, 84E	1.03E+00	2.90E-01	1.00E-01	
59-05-0017	SU-3	SU 321N, 179E	9.73E-01	3.06E-01	4.63E-02	
59-05-0018	SU-3	SU 371N, 159E	1.11E+00	3.33E-01	7.90E-02	

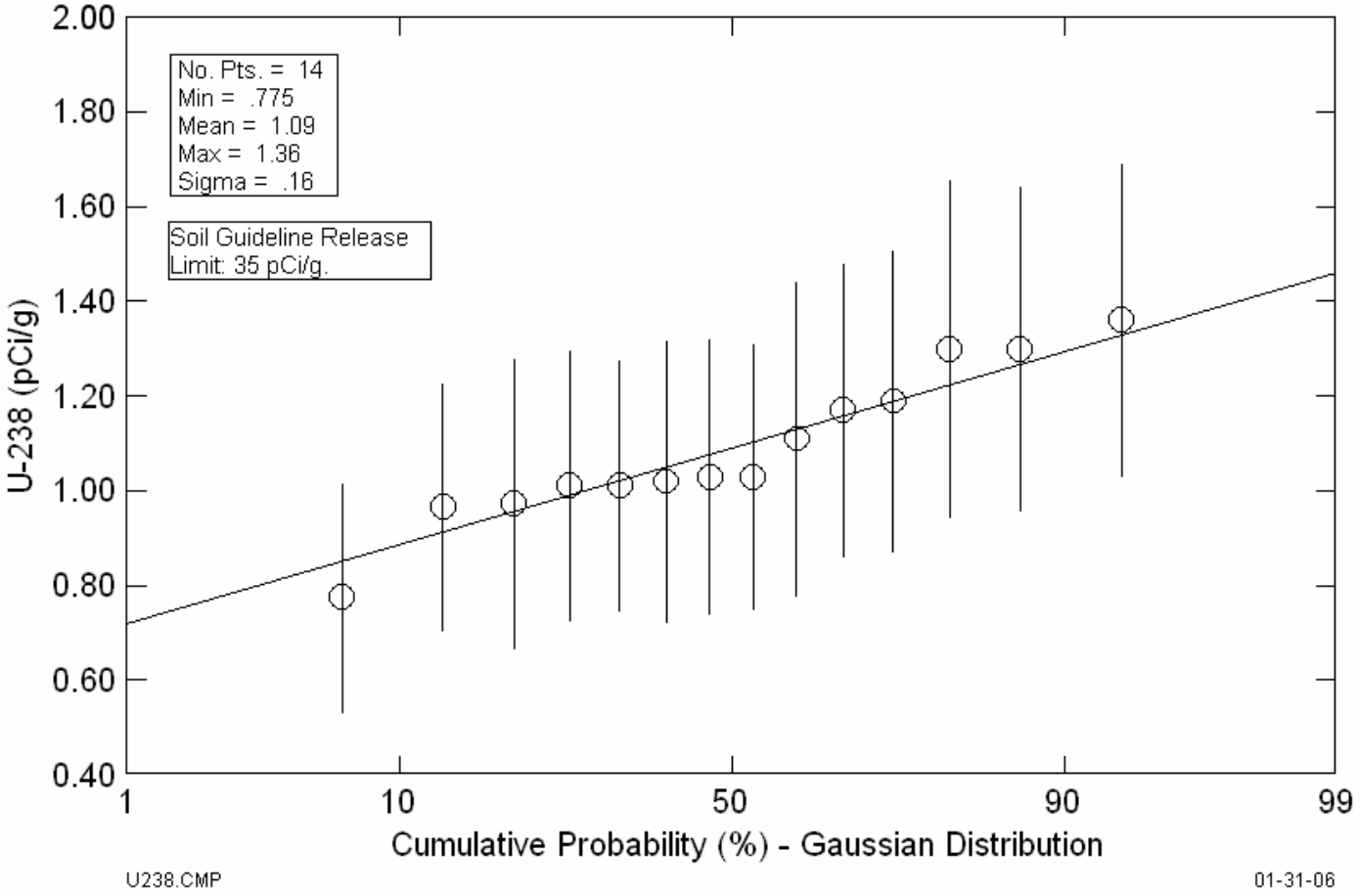


Figure D37. U-238 Soil Results, SU-3

Table D38. U-234 to U-238 Ratio, SU-3

Sample ID	U-234 pCi/g	U-238 pCi/g	U-234/U-238
59-05-0004	1.34E+00	1.01E+00	1.33
59-05-0005	1.52E+00	1.36E+00	1.12
59-05-0006	1.10E+00	9.67E-01	1.14
59-05-0007	1.36E+00	1.02E+00	1.34
59-05-0008	1.30E+00	1.17E+00	1.11
59-05-0009	1.40E+00	1.30E+00	1.08
59-05-0011	9.84E-01	1.03E+00	0.95
59-05-0012	9.10E-01	7.75E-01	1.17
59-05-0013	1.22E+00	1.30E+00	0.94
59-05-0014	1.18E+00	1.19E+00	0.99
59-05-0015	9.66E-01	1.01E+00	0.96
59-05-0016	9.62E-01	1.03E+00	0.94
59-05-0017	8.71E-01	9.73E-01	0.90
59-05-0018	1.50E+00	1.11E+00	1.36

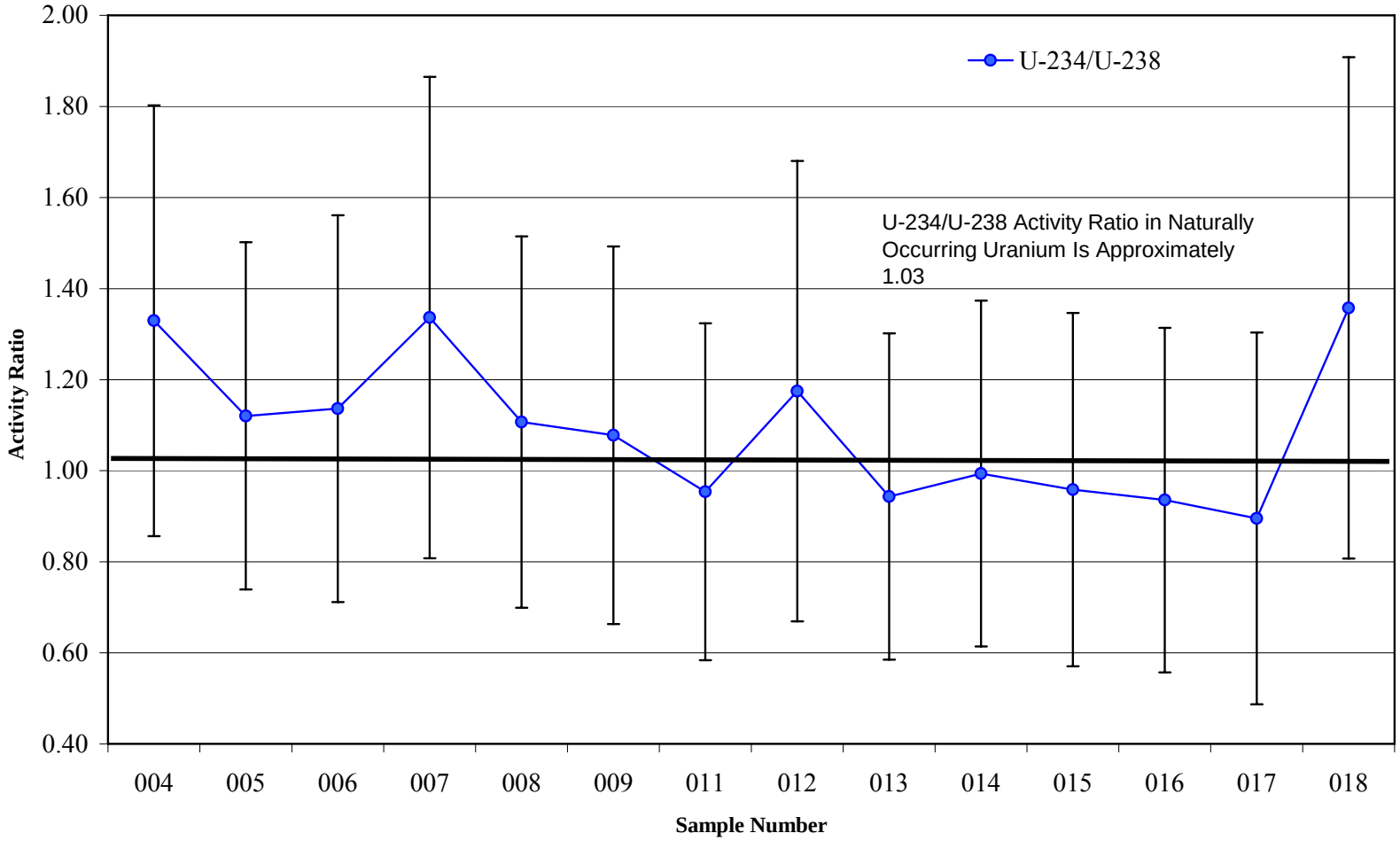


Figure D38. U-234 to U-238 Activity Ratio, SU-3