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June 19, 1998

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Mr. Jim Quinn
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Subject: Submittal of the Revised Final Project Scoping Plan for Performing a CERCLA Remedial Investigation/Feasibility Study (RI/FS) at the Radioactive Waste Burial Sites (SEAD-12) and the Miscellaneous Components Burial Site (SEAD-63)

Dear Ms. Stuble/Mr. Quinn

Parsons Engineering Science (Parsons ES) is pleased to submit the this revised Final Project Scoping Plan for a CERCLA RI/FS at SEAD-12 and SEAD-63 at the Seneca Army Depot Activity, in Romulus, New York.

This revised Project Scoping Plan contains the proposed RI/FS scope of work for SEAD-12 and SEAD-63. As a result of comments from and meetings with the USEPA and NYSDEC, several changes from the original Final document have been made. Each of the changes is summarized below:

1. The final Multi-Agency Radiological Site and Survey Investigation Manual (MARRSIM) based exterior radiological criteria will be calculated by the Army as part of the RI program.
2. Site data will then be compared to the MARSSIM based radiological criteria, and if the site data meet those MARSSIM requirements, then the baseline risk assessment (BRA) will be performed. If, however, the soil data exceed the MARSSIM based criteria, the Army may implement an interim removal action to eliminate any threats prior to conducting the BRA.
3. The radiological data will be included in the baseline risk assessment, and the radiological baseline risk assessment will be performed using the computer model RESRAD, rather than RAGS.

In addition, the revised Project Scoping Plan now identifies those aspects of the proposed work that deviate from MARSSIM, and it provides the rationale for those deviations.

Exterior Soil Guidelines (Item 1 above)

In NYSDEC's comments on the Final Project Scoping Plan (dated December, 1997) , NYSDEC stated that they would not provide the exterior radiological soil guideline values. This change in now presented in the Site Specific Guideline Values discussion of Section 4.2.3, Radiological Surveys at SEAD-12. As per MARSSIM, the guideline values will be calculated using RESRAD and will be based upon a residential exposure model or a residential farmer

exposure model. Comparison of the site data to these values will be the basis as to whether or not on-site levels of radiation will pose a hazard to future on-site populations. Further, since the Local Redevelopment Authority's (LRA) intended future use of the Q Area is for wildlife conservation, the use of residential/farmer exposure numbers are considered appropriate.

Data Comparison Process (Item 2 above)

The decision process that is now being adopted for SEAD-12 follows the process developed during the Peer Review Evaluation. The Seneca Army Depot Activity Decision Criteria Flowchart is now presented in the document . SEAD-12 is at the "Conduct RI/BRA" action in the flowchart. The flowchart has been amended to add a decision in the "Are Risks Acceptable" portion of the flowchart, which is "Are Site Specific Guideline Values Exceeded?". This decision was added because the radiological dose threshold is 15 mrem/year above background, which equates to a lifetime excess cancer risk of approximately $3x10^{-4}$. Therefore, including any data that exceeded a guideline value would automatically exceed the USEPA's acceptable risk range of 10^{-4} to 10^{-6} . Thus, the Army intends to first demonstrate compliance with the radiological criteria, which may include interim remedial measures to address problem hot spots, then perform the risk assessment. This process will insure that risk management decisions will fully consider all pertinent factors associated with any risks arising from chemical and/or radiological sources.

Radiological Risk Assessment (Item 3 above)

In response to USEPA comments and discussions on this topic, the revised Final Project Scoping Plan now includes a radiological risk assessment as part of the baseline risk assessment. The risk from potential on-site radiological contaminants will be performed using the RESRAD risk model. The risk assessment will only be performed after it has been demonstrated that no area has residual radiation that exceeds the radiological criteria of 15 mrem/year above background.

The changes detailed above, as well as the minor changes that were done in response to NYSDEC and USEPA comments, satisfy all of the concerns identified during the discussions with NYSDEC and the USEPA, as well as those detailed in their comments.

Please note that no changes were effected to the SEAD-63 portion of this revised Final Project Scoping Plan. Parsons understands that this site will now be addressed through a future non time-critical removal action. In order to keep costs to a minimum for the SEAD-12 portion of this revised plan, the SEAD-63 portion has not been not modified (from its original final version) for any of the comments pertaining to that site.

Parsons ES appreciates the opportunity to work with the USACE on this important project and looks forward to a continued relationship on this and other projects.

Sincerely,
PARSONS ENGINEERING SCIENCE, INC.

Michael Duchesneau, P.E.
Project Manager

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Comments by United States Environmental Protection Agency (USEPA) for Seneca Army Depot Draft-Final Seads 12&63 Project Scoping Plan at Building 804 and the Associated Radioactive Waste Burial Sites and the Miscellaneous Components Burial Site for the Seneca Army Depot Activity January 1998

General Comments

Comment #1 It is our understanding that the Army has proceeded with the collection of surface water and sediment samples at SEADs 12 and 63. This work has been conducted prior to the approval of the Work Plan. Considering the number of revisions the Army chose to make to the Work Plan for these SEADs, the Army is proceeding at its own risk with this sampling. This work was also conducted without providing 30 days notice as discussed in our Federal Facility Agreement in order to schedule EPA and NYSDEC collection of split samples. On November 3, 1997, EPA requested a field sampling schedule but it has not been provided. In addition, this work was conducted without providing EPA with documentation of renewed certification for radiological analyses. SEDA's contracted laboratory's certifications for radiological analyses expired April 1, 1997. EPA reminded you of this in our April 9, 1997 letter regarding the Project Scoping Plan for SEADs 12 & 63 and subsequently during our telephone conversations in August and October. For these reasons, if the adequacy of the data is uncertain, re-sampling would be required.

Response #1 Acknowledged. In a effort to advance these remedial investigations, the Army chose to proceed with those portions of the workplan that the USEPA and NYSDEC had no further comments on, or on portions of the workplan that were modified according to USEPA and/or NYSDEC comments. These included the collection of exterior scanning data using FIDLER instruments, in-situ down-hole gamma measurements to attempt to determine the extent of ^{226}Ra contamination in Disposal Pit A (using the guidance document suggested by the USEPA), the collection of surface water and sediment samples, and the collection of background radiological soil samples. In addition, since a personnel, equipment and contractors had already been mobilized to another close-by site, it was decided to transition that crew into the work listed above, thus allowing for significant cost savings from a logistical standpoint. Note that shortly after the decision to proceed with this work, the USEPA was notified of the Army's intention to do so. It was understood that the requisite 30 day notice had not been provided, but every effort was made to adjust the Army's schedule in order to accommodate the USEPA's split sample requirements. To address the radiological laboratory's certification, all of their certifications that had originally been forwarded to the USEPA were renewed to April 1of 1998. The analyses that were performed were completed before that date. Copies of the renewed certificates will be included in the RI report and are included as an attachment to this response to comments document. For these reasons, the adequacy of the data collected is not uncertain, and re-sampling will not be required.

Comment #2

At the Albany, New York, meeting between SEDA, EPA and the NYSDEC on June 26, 1997, the Army advocated the use of a phased approach to implement the Remedial Investigations for SEADs 12 and 63. A phased approach has been incorporated in the revised Work Plan by initially identifying survey classifications in accordance with MARSSIM. A) The revised Work Plan should discuss details on how decisions will be reached to change a survey classification or implement additional phases of investigation. B) It should also be clarified if the implementation of any portion of the scope of work described in the revised Work Plans is intended to be optional or dependent upon the results of earlier phases of the revised Work Plan scope.

Response #2

A) Disagree. The Final Project Scoping Plan already detailed the Army's phased approach on page 4-10 and in the decision trees on pages 4-12 and 4-13 (Figures 4-4 and 4-5). These decision processes, which include the thresholds that will trigger individual actions, explain how the initial work performed in Class One and Class Two areas will be used to decide whether the remaining areas should be reclassified or not. This approach was discussed and agreed to in formal meetings and telephone conferences between the Army, the USEPA, and NYSDEC. During these meetings, it was explained that each area or room within a given structure was used for a specific function, and that each of the activities in each area where highly controlled. The phased survey approach proposed herein provides for a high degree of effort to be expended in those few areas where the potential for radiological contamination is higher, while providing a mechanism to either upgrade (if a release is found to have occurred) or downgrade (if no evidence of a release is found) the level of effort in those areas where there is currently no data, but that had no probability, or only a very small probability, of being contaminated with radioisotopes. This phased approach allowed the Army to program a large scope investigation, while still providing a means to save costs from potentially unnecessary efforts in areas with little to no probability of being contaminated. This is the intent of the Army's use of a phased approach to performing this RI. Note that although the Army's original phased approach has not been changed, the explanation above has now been included in the document (in Section 4.2.3, Radiological Surveys at SEAD-12) to explain why this proposed approach deviates from that prescribed in MARSSIM.

B) Acknowledged. In responding to several of the USEPA comments herein, those portions of the work plan that were intended to be dependent upon the results of initial work are now more clearly stated. In particular, the installation of up to fourteen wells will be dependent upon the result of field measurements and laboratory analyses. Also, the investigation of suspect areas, currently identified only by aerial photo reviews, will only be implemented if data from the geophysical surveys or the exterior surface scanning surveys provide evidence that buried objects or radiological contamination are present.

Comment #3 Throughout the plan, the authors state that MARSSIM will be followed, along with NUREG/CR-5849 and other NUREG documents. However, as the following specific comments point out, there are several activities and procedures included in this plan which are inconsistent with MARSSIM methodology. MARSSIM is not intended to be adopted selectively. Either it is followed, or it should not be cited as the basis for this project.

Response #3 Acknowledged. It was agreed during the February conference phone call that MARSSIM was a guidance document. As such, deviations from MARSSIM would be allowed, as long as the deviation could be explained and the reference cited. Within the Work Plan, any deviations from the stipulated MARSSIM methodology will be explained and a reference cited, as appropriate.

Specific Comments

Comment #1 **(Draft-Final Comment/response #3)** The response to this comment acknowledges that the NYSDEC will use the RESRAD code to determine guideline values for the radiological data at these SEADs. The response further states, however, that "the project scoping plan has been revised and all references to performing a radiological risk assessment as part of the baseline risk assessment have been removed". This implies that a baseline risk assessment will be conducted only for non-radiological chemicals of concern. The output from the NYSDEC's application of RESRAD will not result in a baseline risk assessment for radiological compounds. The USEPA's Risk Assessment Guidance for Superfund, Chapter 10, Radiation Risk Assessment Guidance, discusses summing the estimates of lifetime risk of cancer resulting from radiological and chemical risk assessments in order to determine the overall potential human health hazard associated with a site. The scoping document should be revised to indicate that a radiological baseline risk assessment will also be prepared.

Response #1 **Agreed. A baseline radiological risk assessment will be conducted utilizing RESRAD. The Army will develop this baseline radiological risk assessment.** The text was revised to reflect this change.

Comment #2 **(Draft-Final Comment/response #11)** As referenced in previous comment letters on the draft Remedial Investigation Reports for SEADs 16 & 17 and SEADs 25 & 26, the USEPA's Supplemental Guidance to RAGS: Calculating the Concentration Term (USEPA, 1992; Publication 9285.7-081) should be used as a reference in calculating the 95 percent upper confidence limit. If Parsons is aware of more recent USEPA guidance on this subject, it should be submitted for review. In the absence of such guidance, the document cited above should be used.

Response #2 Agreed. The text has been revised and the methodology used in the most recent issues of the SEADs-16 & 17 and SEADs 25 & 26 RI reports is now proposed herein. This methodology calculates EPCs as the 95th UCL of the mean of a data set, but uses some logic statements to address normal versus lognormal distributions, to test the data sets for unusually high sample quantitation limits, and to address instances where the 95th UCL of the mean exceeds the maximum detected value.

Comment #3 **(Draft-Final Comment/response #14)** Due to the future intended use of these areas as a wildlife conservation/recreation area, the future use will also require the preparation of an ecological risk assessment. The Army should review the applicability of the RESRAD-Ecorisk model in the preparation of such an assessment.

Response #3 Acknowledged. As stated in the USEPA's letter sent to the Army in the spring of 1998, the Army will now use ERAGS as a basis for performing the ecological risk assessment. Although the ecological evaluation originally proposed in this project scoping plan does not differ greatly with that described in ERAGS, incorporation of ERAGS into this RI necessitates a complete re-write of the ecological portion of this project scoping plan. Therefore, in order to expedite the remaining RI investigations detailed in this project scoping plan, the work plan for the ecological investigation will be submitted under separate cover.

Comment #4 Page 3-24: A Ludlum M-19 is called a micro-R beta and gamma rate meter. It is a sodium iodide gamma scintillation detector (it does not respond to beta particles). A Ludlum 2221 is called an alpha scintillation meter. It is a rate meter/scaler (it is not a scintillation detector).

Response #4 Agreed. The text has been revised.

Comment #5 Page 3-56: The text states "Gamma radiation from radium-226 and two of its associated radionuclides were found at levels ranging from 56 pCi/L to 109 pCi/L." Gamma radiation is not expressed as a concentration. The text should be revised.

Response #5 Agreed. The text has been revised.

Comment #6 Page 3-78: See the previous comment on the use of radiation detection equipment.

Response #6 Agreed. The text has been revised.

Comment #7 Page 3-97: Section 3.1.2.3: The language in the introduction to this section contrasts with the discussion in the "Groundwater" subsection. The introduction indicates the groundwater has been affected, whereas the subsection indicates it may have been affected. The elevated gross alpha and gross beta concentrations in some samples may be a reflection of natural levels of radioactivity in the suspended soils, measured in NTUs. The text should consistently indicate this.

Response #7 Agreed. The text has been revised.

Comment #8 Page 3-135, ARARs: 40 CFR 192, the Uranium Mill Tailings Radiation Control Act (UMTRCA), should be deleted in lieu of USEPA's recent OSWER Directive No. 9200.4-18 (Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination), which, in an attachment, indicates that UMTRCA does not apply to CERCLA sites.

Response #8 Agreed. The USEPA had not objected to the use of the 5 pCi/g UMTRCA standard for soils to a depth of 15 cm. The USEPA had stated in their April, 22, 1996 round of comments that they had "specifically chosen not to use the 15 pCi/g standard for the subsurface at many CERCLA sites." The Army agreed to this and removed all references to that portion of the UMTRCA standard. Nowhere was it mentioned that UMTRCA does not apply to CERCLA sites. It should also be noted that NYSDEC has already agreed in writing that the UMTRCA standard would be an appropriate minimum requirement for ^{226}Ra contamination found in SEAD-12 or SEAD-63 soils. However, in reference to USEPA directive 9200.4-25, and to satisfy this comment, UMTRCA has now been deleted from the sources of chemical specific ARARs for this project.

Comment #9 Page 3-142: The text states that "The Null Hypothesis for the radiological survey units at SEADs-12 and -63 is that any residual radiation at a survey unit is below a release criterion." In MARSSIM, the Null Hypothesis used for testing a survey unit is exactly the opposite, i.e., that the residual radioactivity in a survey unit exceeds the release criterion. A survey unit may be released when the Null is rejected. It is recommended that the text be revised to be consistent with MARSSIM.

Response #9 Agreed. It should be noted that whichever way the null and alternative hypotheses are stated, the statistical test is the same, and the results are interpreted in the same manner. Because the Army does not anticipate finding significant residual contamination at SEAD-12 or SEAD-63, it was believed that the "common sense" null hypothesis would be to state that there is no residual radiation present at levels that exceed a release criteria. The text was revised to satisfy this comment.

Comment #10 Page 4-1, p1: The text states that the "investigations are designed to demonstrate that the levels of exposure to radiation...is below the acceptable limits." The word "that" should be changed to "if". The actual conditions are not known, pending an evaluation of the RI data.

Response #10 Agreed. The text has been revised.

Comment #11 Page 4-2: The text states that the radiation survey methodologies of NUREG/CR-5849 and MARSSIM will be followed. The two documents describe methodologies which are similar, but they do have real differences. The SEDA investigations can not be compliant with both. If both are referenced, it should be clear what is included/excluded from NUREG/CR-5849 and MARSSIM.

Response #11 It was agreed during the February conference phone call that MARSSIM was a guidance document. As such, deviations from MARSSIM would be allowed, as long as the deviation could be explained and the reference

cited. Instances where NUREG/CR-5849 are utilized shall be explained within the body of the Work Plan. In the introductory paragraph referenced by this comment, the text was revised to indicate that these deviations shall be referenced and explained within the body of the text.

Comment #12

Page 4-6, p1: The last sentence states that monitoring wells MW12-10, -12 and -13 will be located in areas where the borehole geophysics survey indicates that radium-226 is being transported downgradient of the disposal pit. The scientific literature shows that radium is extremely slow to migrate from soil to groundwater and this sentence, as written, makes the *a priori* assumption that migration has occurred. It is possible, or even likely, that radium migration to groundwater has not occurred. The text should be clarified.

Response #12

Agreed. The text does state that monitoring wells MW12-10, -12 and -13 will be located in areas where the borehole geophysics survey indicates that radium-226 is being transported downgradient of the disposal pit. This sentence does not make the *a prioi* assumption that migration has occurred. It simply states that wells will be located in areas where the geophysical survey indicates that migration is occurring. The text has been revised to clearly state that these wells will be moved to areas where the borehole geophysics indicates that migration is occuring only if such a migration is observed in the borehole geophysical data.

Comment #13

Page 4-9: The text states that the site is divided into survey units and then classified as Class 1, 2 or 3 areas. This sequence is inconsistent with MARSSIM, which calls for classification of areas to precede survey unit designations. Survey unit size is class dependent. The approach should be changed accordingly.

Response #13

As the interior of many of the buildings have not yet been made available to survey, historical data was reviewed by the Army and by Parsons. The historical data available is limited and questions related to the data cannot be assured. Parsons and the Army discussed this problem and decided that the logical manner to handle the data and determine the classifications and survey units would be to deviate from that specified in MARSSIM.

Class 1 areas have been defined in MARSSIM as having the greatest potential for contamination and therefore receive the highest degree of survey effort for the final status survey using a graded approach, followed by Class 2 and Class 3. This delineation of areas and usage of verbiage has been utilized within the Work Plan. A survey area is defined as a physical area consisting of structure and land areas of specified shape and size for which a separate decision will be made as to whether or not that area exceeds the release criterion. Again, this delineation of areas and use of verbiage has been followed within the Work Plan. The deviation occurs in that the survey areas were defined prior to the classifications being made, rather than vice versa as delineated within MARSSIM. While the methodology followed does deviate from MARSSIM, the same ultimate goal is achieved in both

instances. Due to the problems with the lack of data and the quality of some of the historical data, it was decided to deviate from the specified MARSSIM approach.

MARSSIM also provides suggested maximum areas for Class 1, 2, and 3 structures and land areas. The limitation on the survey size unit for Class 1 and 2 areas is to ensure that each area is assigned an adequate number of data points. Utilizing the methodology followed by the Army, each survey unit is comprised of potentially multiple classifications and the number of data points is based upon the classification; therefore, collecting an adequate number of data points from each area of each unit as it is currently classified should be ensured.

The data collected to date has been analyzed in the manner specified in the text. While the utilization of classification and survey units is different than that stated in MARSSIM, ultimately, the same results are obtained. The text of the Work Plan was revised to explain this deviation from MARSSIM.

Comment #14

Figures 4-4 and 4-5, p. 4-10: The strategy to upgrade area classification is inconsistent with MARSSIM. As written, the area 3 and 2 survey units will be upgraded to area 2 and 1 survey units, respectively, when residual radioactivity exceeding 50% of the site specific guideline value, but less than the site specific guideline value, is found. MARSSIM classifies survey units as follows:

Class 1 - Residual activity exceeds guideline value at one or more locations.

Class 2 - Residual activity exists, but does not exceed guideline value.

Class 3 - Greater than background residual activity does not exist any where in survey unit.

As currently presented in the document, there will be survey units with relatively equivalent levels of residual radioactivity given different classifications (some Class 1 and some Class 2) simply as a result of the preliminary classification prior to data collection. Furthermore, problems also exist with the strategy proposed to downgrade classification of survey units. The text states that Class 3 survey units in Buildings 806, 812, 800, 802 and 825 will be downgraded to unaffected if Class 1 and Class 2 survey units in Buildings 803, 804, 805, 806, 810 or 812 are found not to have residual radioactivity above 50% of the guideline. To release Class 3 survey units, data must be collected from those survey units and meet the release criterion as specified in MARSSIM.

The classification protocols should be changed to be consistent with MARSSIM methodology.

Response #14 Acknowledged. This comment is addressed in the response to General Comment #2. Note that the use of thresholds that are 50% of guideline values is more conservative than the manner in which decision thresholds are used in MARSSIM, which allows for decision thresholds to be based on the guideline values themselves.

Comment #15 Table 4-3, p. 4-16 and 4-17: Regarding guideline values for building surfaces; Section 8.5.3 of MARSSIM clearly indicates that removable activity data (from wipe or smear samples) are not to be used for comparison to guideline values due to the relatively high degree of error associated with that type of data. Rather, they are a diagnostic tool to determine if further investigation is necessary and should only be used for that purpose. They should not be used to evaluate if a survey unit meets release criteria.

Response #15 Section 8.5.3 of MARSSIM does indicate that removable activity smear samples are difficult to interpret quantitatively and should be used as a diagnostic or guidance tool, rather than for determining compliance. While the smear data will not be utilized to determine compliance, the Army will analyze the data for use as a diagnostic tool. A note was added to Table 4-3 indicating that the removable activity data will be used as a diagnostic tool only. Additionally, appropriate changes were made to the text associated with pages 4-16 and 4-18.

Comment #16 Table 4-4, p. 4-19 and 4-20: Regarding the MDCs; the field investigations include surface scanning for alpha emitters with ZnS and/or gas proportional counters. Page 4-5 of MARSSIM (December 1996) and a recent article by Abelquist and Vitkus in the July/August 1997 issue of Radiation Protection Management which describes the errors which result when one assumes that the alpha detection efficiency determined with a smooth, massless alpha source is achieved in the field. This is because there is a large and variable reduction in alpha efficiency due to the self-attenuation of alpha particles emitted from irregular surfaces. Therefore the scanning data determined in the field often significantly underestimates the true alpha activity levels. Whenever possible, therefore, beta particle measurements should be used as a surrogate for alpha activity; this can be done for radionuclides which are members of the uranium, thorium, and actinium series.

Response #16 Agreed. Field beta particle measurements are typically more accurate than alpha particle measurements due to the potentially irregular nature of the field sources. Most of the alpha emitting isotopes that are of concern also emit beta particles. Beta scans will therefore be performed under these circumstances. Under certain circumstances, however, professional judgment may also require the scanning for alpha particles in addition to the beta particles. This data will be reviewed and utilized only as a health physicist determines appropriate. The text wa revised to reflect this information.

Comment #17 Page 4-24: MARSSIM states that 100% of Class 1 survey units must be scanned. The text states that this will be done for lower walls, but upper wall scans will be done over only 10% of the surface. This approach is

reasonable, but then the upper walls should be classified as Class 2 survey units rather than Class 1.

Response #17

Agreed. The Army chose to survey only 10% of the upper walls. All of the documentation and plans reflect this choice. As indicated within your comment, the EPA agrees that this is a reasonable approach. Based upon MARSSIM, the upper walls should be reclassified to Class 2. The Army chose to deviate from MARSSIM in this instance by not reclassifying the upper walls from Class 1 to Class 2. The detail and level of the scans will be the same whether the classification of the upper walls is Class 1 or Class 2; therefore, any proposed change in verbiage would make no technical difference in the type, quantity, or quality of the data which will be developed. The text was revised to reflect this philosophy.

Comment #18

Page 4-24 and Page 4-25: See previous comment on MDCs. Alpha surveys for radionuclides of concern which include uranium, thorium, and radium would be better served by beta surveys due to the problems with alpha detection efficiency over an irregularly shaped source.

Response #18

Agreed. Field beta particle measurements are typically more accurate than alpha particle measurements due to the potentially irregular nature of the field sources. Most of the alpha emitting isotopes that are of concern also emit beta particles. Beta scans will therefore be performed under these circumstances. Under certain circumstances, however, professional judgement may also require the scanning for alpha particles in addition to the beta particles. This data will be reviewed and utilized only as a health physicist determines appropriate. The text was revised to reflect this information.

Comment #19

Page 4-27, Daily Flag Values: See the previous comments on MDCs. The detection efficiency for surface alpha measurements will differ significantly from location to location due to self-attenuation.

Response #19

Agreed. Field beta particle measurements are typically more accurate than alpha particle measurements due to the potentially irregular nature of the field sources. Most of the alpha emitting isotopes that are of concern also emit beta particles. Beta scans will therefore be performed under these circumstances. Under certain circumstances, however, professional judgement may also require the scanning for alpha particles in addition to the beta particles. This data will be reviewed and utilized only as a health physicist determines appropriate.

Additionally, both source checks and background checks are performed and documented daily. These tests are performed outside SEAD 12 and 63. Count rate instruments must fall within +/- 2 sigma. If the instrument reading falls between +/- 2 sigma and +/- 3 sigma a health physicist must be notified and determine if the instrument may be utilized. If the instrument reading exceeds +/- 3 sigma, the instrument will be taken out of use and tagged as such. Project Management will notify a health physicist as to this situation. The instrument will not be

placed back into service until it has been checked by an instrument technician and recalibrated, as required. Dose/exposure rate instrument function checks must fall within +/- 20%. If the instrument reading falls between +/- 20% and +/- 30% a health physicist must again be notified for determination as to whether the instrument may be utilized. If the instrument reading exceeds +/- 30%, the instrument will be taken out of use, tagged as such and Project Management will notify a health physicist as to the situation. The instrument will not be placed back into service until it has been checked by an instrument technician and recalibrated, as required. Also, background measurements are taken daily in areas which are similar to those being surveyed on that particular day, but in uncontaminated areas. This "working background" provides the surveyor with input as to any variations in the expected versus real background in the areas of concern. The text was revised to reflect this information.

Comment #20

Section 4.2.3.3 Exposure Rate Surveys: Exposure rate measurements may be useful to characterize contamination, which is of course an objective of a remedial investigation. However, for indoor surveys, exposure rate measurements should not be compared to a guideline level for statistical testing designed to test the survey unit against a reference background area to evaluate if it has met the release criterion. It is possible that alpha and/or beta surface contamination could be present at levels exceeding the release criteria, yet the exposure rates at one meter above the surface will not differ from background. The determination of surface activity in survey units and reference areas, which are a part of this project, are sufficient for the buildings investigations.

Response #20

Agreed. Dose/exposure rate surveys in building interiors is not an efficient manner in which to identify areas of contamination. The problems with this methodology are based upon both the types of radiation and their designated energies as well as the geometry of the situation in question. Parsons and the Army intends to perform these surveys and utilize any information collected as a diagnostic tool. Additionally, while the situation is unlikely, from a health safety stand point, it is always best to know the radiation fields that your personnel are working in and any unexpected or incongruous fields can be identified and knowledgeable decisions related to personnel exposures and personnel protective equipment can then be made. In this manner, Parsons intends to ensure that no over exposures related to the survey work at the Seneca Army Depot occur. The text was revised to reflect this philosophy..

Comment #21

Section 4.2.3.4: See previous comment regarding Tables 4-3, page 4-16 and 4-17.

Response #21

Agreed. Section 8.5.3 of MARSSIM does indicate that removable activity smear samples are difficult to interpret quantitatively and should be used as a diagnostic or guidance tool, rather than for determining compliance. While the smear data will not be utilized to determine compliance, The Army will analyze the data for use as a diagnostic tool. The text was revised to reflect this philosophy.

Comment #22

Page 4-33, Surface Soil Sampling Program: A total of 318 surface soil samples will be collected from SEAD-12, of which 250 will be collected from Class 1 and Class 2 areas where, the text states, no residual radiation is expected except in the subsurface of Disposal Pit A. (A) If no residual radiation is expected in most of the area, then, by MARSSIM definition, most of the area should be classified as Class 2. (B) Furthermore, the sampling density of one sample per 10 by 10 meter grid is said to be planned as a means of documenting the surface scanning and exposure rate measurement surveys. If the instruments used to conduct those surveys are operating properly and the appropriate QC checks are performed, then the data which result from those surveys would not require "documentation" by another means. Soil samples should be collected to (1) help delineate contaminated areas, and (2) enable statistical testing of the survey unit.

Response #22

(A) Agreed. Although residual radiation is not expected at these locations, based upon the numerous meetings between the Army, NYSDEC, and EPA, it was the Army's interpretation that these areas should have a Class One grid based soil sampling program planned in order to satisfy regulatory concerns. However, since residual radiation is not expected at these locations, and in response to this comment, the decision tree in Figure 4-4 of in Section 4.2.3 has been revised to include an area reclassification scheme for the exterior Class 1 areas of Buildings 815 and 816. Also, the text of Section 4.2.4.1, Surface Soil Sampling Program, has been revised to reflect this addition. Note that the text of Section 4.2.4.1 already called for the 20 random samples in up to six Class Two areas to be reduced to two confirmatory samples if the results of initial surveys (geophysical and scanning) in those areas do not indicate the presence of buried or radioactive materials.

(B) Acknowledged. It was not the intent to state that the soil samples are to be used to document the surface scanning survey, rather, the intent was to state that the grid used to plan and document the surface scanning survey would also be used to locate the soil sampling locations. Note that the proposed sampling grid was based upon guidance from MARSSIM, which calls for such soil grid based sampling in Class One areas. The text has been changed and now states that Class One gird based sampling will be performed on a 10 meter by 10 meter grid.

Comment #23

Section 4.2.4.4 Soil Sampling Summary: See previous comment concerning the surface soil sampling program.

Response #23

Acknowledged. See response to previous comment concerning the surface soil sampling program. The text has not been changed.

Comment #24

Page 4-46: The text states that "groundwater samples from the ESI contained two principal radionuclides, U-235 and Ra-226, gross alpha, and gross beta radiations at concentrations exceeding state or federal drinking water criteria." It goes on to state that the vertical and lateral extent of potential contamination migration...has not been fully characterized and that up to 41 monitoring wells will be installed to determine the extent of groundwater contamination. At the Albany, New York meeting between SEDA, EPA and the DEC in June 26, 1997, the Army advocated the use of a phased approach to implement the

Remedial investigations for SEADs 12 and 63. The text should discuss how that will effect the installation of 41 monitoring wells. See general comment above.

Response #24

Disagree. The text does not state that the vertical and lateral extent of potential contamination migration...has not been fully characterized and that up to 41 monitoring wells will be installed to determine the extent of groundwater contamination. The text states that the vertical and lateral extent of potential contaminant migration from the disposal pit areas has not been fully characterized. This statement is directed solely to those areas where a release was identified during the ESI. The current extent of the SEAD-12 investigation was expanded from the original ESI SEAD-12A and 12B boundaries based upon those and other ESI findings. To this end, and based upon the current knowledge of this site, the planned intent of the groundwater investigation is to address most, if not all, of the known and expected groundwater monitoring requirements, which encompass an area of approxiamtely 360 acres with potentially up to six additional disposal sites and two chemical release areas (from paint shop operations). The USEPA is referenced to Table 4-5 for the rationales for installing each of the up to 41 proposed groundwater monitoring wells at SEAD-12. Note that the text has been revised to reference the decision process for Areas 2 though 7, detailed in Section 4.2.4.2, Soil Boring Program, which explains how some monitoring wells may be installed only if data from scanning surveys or data from test pits indicate that a monitoring well is warranted.

Comment #25

Section 4.3.2, Radiological Investigations at SEAD-63: All of the comments above regarding radiation characterization activities at SEAD-12 are applicable to the SEAD-63 investigation. These include the comments about instruments, types of measurements and the use of specific types of data.

Response #25

Acknowledged. Since the writing of this comment, the manner in which SEAD-63 will be addressed has changed from an RI/FS to a non time-critical removal action, and therefore, the SEAD-63 portion of this project scoping plan will not be performed. Please note that to minimize the Army's costs for resubmitting the revised SEAD-12 portions of this Final Project Scoping Plan, those portions pertaining to SEAD-63 were left in the document, however, no changes were made.

Comment #26

Section 4.4 Data Reduction, Assessment and Interpretation: MARSSIM is cited and the statistical tests included in the MARSSIM are mentioned. As noted in earlier comments, MARSSIM testing should not be done on parameters which MARSSIM indicates are not quantitative (such as removable surface activity data and indoor exposure rate measurements).

Response #26

Agreed. The Army may perform the indicated tests on non-quantitative data, as determined necessary and/or desirable, for information purposes only and not for the purpose of regulatory comparison. The text was revised to reflect this philosophy.

Hazardous Waste Support Section

Comment #1

1. Modification of Existing Methods to Achieve MCLs

The SEDA response indicates that this issue is addressed under separate cover in a letter to EPA dated 9/9/97 and that the requested information will be incorporated into the generic workplan. However, recent discussions with SEDA have indicated that the subsequent revision of the Generic RI/FS Workplan is not currently possible due to contractual difficulties. This is contradictory to the original intent of the Generic RI/FS Workplan as stated in Section 1.1, page 1-1. "As required, this generic workplan will be updated and/or revised to incorporate specific field sampling procedures and/or analytical methodologies or test procedures used for environmental investigation/construction developments at the SEDA". Therefore, if revision of the generic workplan is not possible, each individual Scoping Plan must contain all relevant and appropriate information to the AOCs and be amended as such.

Review of SEDAs 9/9/97 submittal regarding the analytical method modifications as they apply to SEADs 12 and 63 warrant the following comments.

a. Regarding the validation SOPs to be used on data acquired with the modified NYSDEC ASP methods, the EPA Region II SOPs for Evaluating Organic Data stated in the Generic Workplan, Appendix C, Chemical Data Acquisition Plan, Section 9.2.4, page C-49 remain applicable and must be used.

b. SEDA has not fully addressed item 6 in EPAs letter of 11/15/96. That is, SEDA must provide the scenario which is to exist in order to implement the modified methods. For example, will first round sampling be performed by routine NYSDEC ASP semi-volatile and pesticide/PCB methods? If non-detect results are obtained for those compounds which are an ARAR lower than the achieved quantitation limit, will the modified method then be enacted on subsequent sampling rounds? Or, will the modified semi-volatile and PST/PCB methods be used initially? Please discuss.

c. The PCB reporting limits listed in Attachment C of the SEDA 9/9/97 letter do not agree with those listed in the Pesticide/PCB Analysis SOP, Section 11, page 23 and 24, as provided by Inchcape Testing Services. This information is also inconsistent with the Ar 1260 reporting limit listed in the laboratory's MDL study using the modified NYSDEC ASP methods (Inchcape letter dated 3/25/97). Please clarify.

2. Data Validation

As per the approved Generic Workplan and item 1a above, the Region 2 SOPs for Evaluating Organic Data are to be used in lieu of the National Functional Guidelines which the Army is currently proposing in the Project Scoping Plan. For the data acquired using Method 524.2, the regional organic SOP should be used as a guideline for the topics to

assess and the subsequent qualification actions to perform. The specific QC criteria and acceptance limits are found within M 524.2 and must be used by the validation personnel.

3. TCLP Data

The response provided is acceptable.

4. Radiological Data

The response provided is acceptable.

5. Laboratory Certification

See general comment above.

Response #1

1. Agreed. The modified methods will be issued as an update to the Generic Workplan.
1a. Agreed. The SOPs referenced in the comment and in the Generic Workplan will be used.
1b. The modified pesticide/PCB and semivolatile organics analysis methods for liquid samples and the modified semivolatile organics analysis method for solids samples will be used throughout the SEAD-12 RI process. The text of Section 4.2.8 has been revised accordingly.
1c. Agreed. Pages 23 and 24 of the Pesticide/PCB Analysis SOP have been revised with the correct modified method detection limits. A copy of the entire revised portions of the package is now included in the generic workplan. Addressing the stated MDL for Ar1260 of 0.1 ug.L, the laboratory's MDL study using the modified NYSDEC ASP methods show that this stated MDL can be achieved. Note that some of the reporting limits shown in the laboratories studies were entered incorrectly. The reporting limits now listed in those study results have been revised and verified by the laboratory.

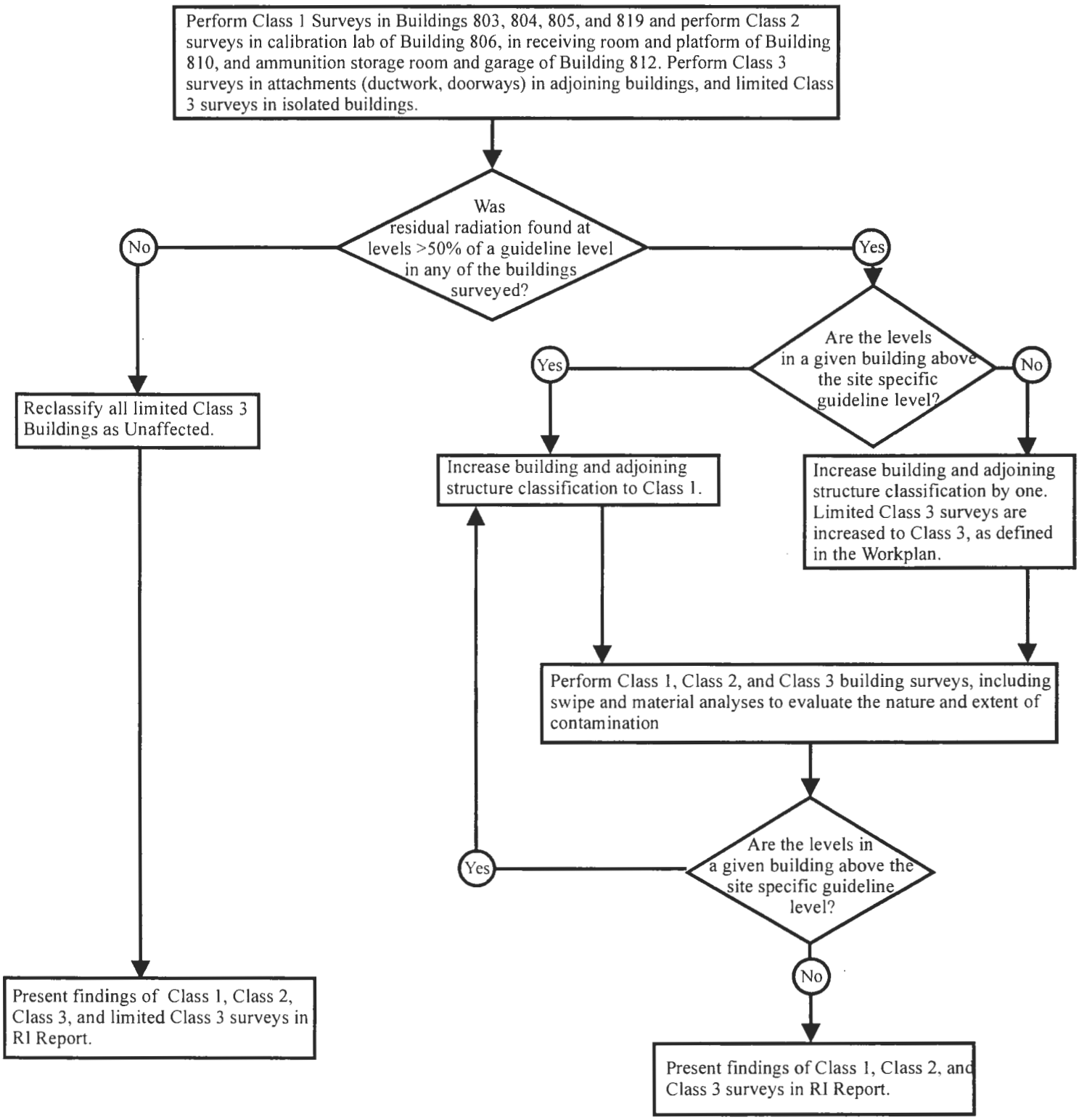
2. Agreed.

3. Acknowledged

4. Acknowledged

5. See response to general comment above.

Figure 4-5
Radiological Survey Decision Tree
for
Buildings 800, 802, 803, 804, 805, 806, 810, 812, 819 and 825



Note: The guideline levels that will be used are those from NYCRR Title 12, Part 38, Table 5, which are presented in Table 4-3 of this project scoping plan

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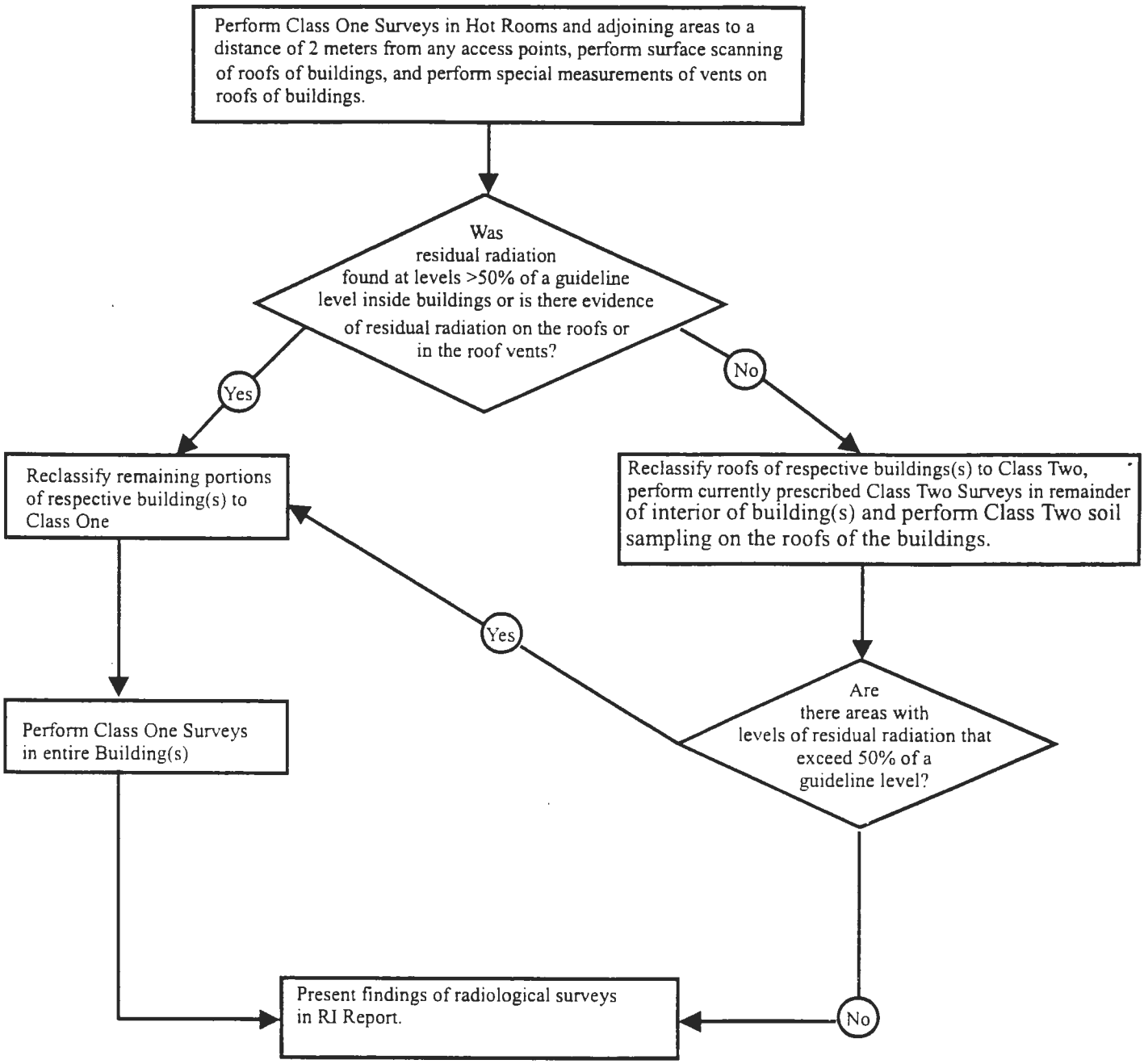
Figure 4-4
Radiological Survey Decision Tree
for
Buildings 815 and 816



Note: The guideline levels that will be used are those from NYCRR Title 12, Part 38, Table 5, which are presented in Table 4-3 of this project scoping plan

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Selection of Representative Reference Areas

For the purposes of establishing reference areas for evaluating gross alpha and gross beta activity and gamma scanning on structure surfaces, Buildings 722, 726,727, and Igloo C0912 have been identified as being of similar construction as those located in SEAD-12. Building 722 will be surveyed as the reference site for SEAD-12 buildings that are constructed of cement blocks. Building 726 or 727, whichever most resembles the current condition of those buildings at SEAD-12 at the time of the survey, will be surveyed as the reference site for buildings that are constructed of metal sheeting. As a reference site for those buildings that are earth covered (Buildings 815 and 816), Igloo C0912 was selected as the appropriate reference site. Although Igloo C0912 was not used for any purpose other than conventional munitions storage, its woven reinforcing bar / poured concrete construction is very similar to that of Buildings 815 and 816. For the land surveys, the North Post's baseball field will be gridded and surveyed as the land scanning reference site. This site is considered to be appropriate as a reference site because it is situated in close proximity to SEAD-12 (and is therefore expected to have similar geological characteristics as SEAD-12), it is located beyond the restricted areas of the Ammo Area and the Q Area, and it is not expected to have been used for any purposes, other than recreation, since the depot was established. In order to collect sufficient data to complete statistical comparisons between site and reference data, the reference area measurements will be collected according to *MARSSIM.*

To establish reference datasets for groundwater, surface water, sediment, surface soil, and subsurface soil, databases for each of these media will be established by collecting 9 background monitoring well samples, 9 background surface water samples, 9 background sediment samples, 15 background subsurface soil samples and 20 background surface soil samples. The 9 monitoring wells will include 6 upgradient monitoring wells that will be located east and north of the Q Area fence and 3 background monitoring wells that have already been installed at the OB ground, the OD grounds, and SEAD-57. The 9 background surface water and sediment samples will be collected from within drainage ditches and Reeder Creek, at locations that are upgradient of SEAD-12. The 15 subsurface soil samples will include one mid depth soil sample to be collected near each of the 3 existing background monitoring wells that will be used for the background groundwater database, and 2 subsurface soil samples to be collected from each of the six upgradient monitoring wells that will be installed east and north of the Q Area fence. The 20 surface soil samples will include one surface soil sample collected from each of the upgradient monitoring wells installed east and north of the Q Area fence, 8 surface soil samples

to be collected from various locations east and north of the Q Area fence, and 6 surface soil samples that will be collected in the scanning reference area (the North Post's baseball field).

The quantity of background data that is proposed above is needed to allow the statistical comparisons to have sufficient power to detect that a survey unit is above a survey unit specific guideline value. The Data Quality Objectives section of this project scoping plan (Section 3.5) and the Data Reduction Assessment and Interpretation section (Section 4.4) discuss in more detail the statistical comparisons that will be performed.

4.2.3.1 Alpha, Beta and Gamma Scanning Surveys

The scanning surveys will be conducted following the schedules detailed below. All scanning measurements will be performed on grid diagrams that will be directly related to the gridding patterns established in each survey unit. Building interior and exterior grid sizes will be 2 meters by 2 meters in areas below 2 meters above floor level unless stated otherwise. Building interior and exterior grid sizes will be 1 meter by 1 meter in areas above 2 meters above floor level unless stated otherwise. Exterior grounds and pavement grid sizes will be 10 meters by 10 meters.

Areas where the scanning measurements indicate that residual radiation may be present will be marked for further investigations. Professional judgement will be used to determine if additional surveys are warranted. The additional surveys may include additional direct measurements, additional surface scanning (such as a 100% coverage using a NaI detector), smear sampling, or material sampling. The purpose of any additional surveys will be to confirm that any residual radiation present is below the survey unit specific guideline value.

Class One Survey Units

Scanning of surfaces and grounds to identify locations of residual surface and near surface activity in Class One survey units will be performed according to the following schedule:

- Lower walls (up to two meters above floor level), floor surfaces, pavement, un-earthen roofs with ventilation ducts, exterior building surfaces within 2 meters of a point of access (windows, ventilation ducts, doors, etc...), horizontal surfaces above 2 meters above floor level where dust or particulates could deposit and upper walls and ceilings of

the hot rooms in Buildings 815 and 816: 100% of surface,

- Upper walls (above two meters above floor level), ceilings (suspended and non-suspended), - 10% of surface to be conducted in randomly located 1 meter by 1 meter areas. These areas will also serve as direct measurement and smear sample locations. (Based upon MARSSIM, the upper walls should be reclassified to Class 2. The Army chose to deviate from MARSSIM in this instance by not reclassifying the upper walls from Class 1 to Class 2. The detail and level of the scans will be the same whether the classification of the upper walls is Class 1 or Class 2; therefore, any proposed change in verbiage would make no technical difference in the type, quantity, or quality of the data which will be developed.)
- Exterior grounds, including earthen covered buildings: 100% of surface

Building interior and exterior surface scanning surveys and pavement surface scanning surveys will be conducted for alpha radiations where ^{241}Am, ^{239}Pu, ^{238}U, ^{235}U, ^{230}Th, or ^{226}Ra are among the radionuclides of concern and for beta radiations where ^{147}Pm, ^{137}Cs, or ^{60}Co are among the radionuclides of concern. All pavement surfaces and building interior and exterior surfaces will also be scanned for gamma radiations. Surveys of exterior grounds will be for gamma radiations.

Instrumentation for the scanning surveys will include proportional detectors for alpha and beta radiations, zinc sulfide scintillators for alpha surveys and FIDLER or equivalent types of detectors for low-energy gamma surveys (detectors having thin NaI(Tl) crystals that are designed to detect low energy gamma and x-ray radiations). For all but the floor surveys and pavement surveys (where a large area gas proportional floor monitor will be used), the instruments having the lowest detection sensitivity will be used for the surveys, wherever physical surface conditions and measurement locations permit. Refer to the Survey Instrumentation-Building Surveys and the Survey Instrumentation-Grounds Surveys sub-sections of Section 4.2.3 for details on the survey methodologies that will be used. Any areas that are identified as having elevated levels of radiation will be noted for further investigation.

Field beta particle measurements are typically more accurate than alpha particle measurements due to the potentially irregular nature of the field sources. Most of the alpha emitting isotopes that are of concern also emit beta particles. Beta scans will therefore be performed under these circumstances. Under certain circumstances, however, professional judgment may also require the scanning for alpha particles in addition to the beta particles. This data will be reviewed and

utilized only as a health physicist determines appropriate.

Class Two Survey Units

Scanning of surfaces and grounds to identify locations of residual surface and near surface activity in Class Two survey units will be performed according to the following schedule:

- Lower walls (up to two meters above floor level), floor surfaces, pavement, access points (such as doors or windows) to a distance of two meters beyond the Class Two survey unit, and interior horizontal surfaces above 2 meters, - 50% of surface.
- Upper walls (above two meters above floor surface), ceilings, and roofs - 10% of surface in randomly located 1 meter by 1 meter areas
- Exterior Grounds - 50% of surface

Building interior and exterior surface scanning surveys and exterior pavement scanning surveys will be conducted for alpha radiations where ^{241}Am, ^{239}Pu, ^{238}U, ^{235}U, ^{230}Th, or ^{226}Ra are among the radionuclides of concern and for beta radiations where ^{147}Pm, ^{137}Cs, or ^{60}Co are among the radionuclides of concern. All pavement surfaces and building interior and exterior surfaces will also be scanned for gamma radiations. Surveys of exterior grounds will be for gamma radiations.

Instrumentation for the scanning surveys will include gas proportional detectors for alpha and beta surveys, zinc sulfide scintillators for alpha surveys and FIDLER or equivalent types of detectors for low-energy gamma surveys (detectors having thin NaI(Tl) crystals that are designed to detect low energy gamma and x-ray radiations). For all but the floor surveys and pavement surveys (where a large area gas proportional floor monitor will be used), the instruments having the lowest detection sensitivity will be used for the surveys, wherever physical surface conditions and measurement locations permit. Refer to the Survey Instrumentation-Building Surveys and the Survey Instrumentation-Grounds Surveys sub-sections of Section 4.2.3 for details on the survey methodologies that will be used. Any areas that are identified as having elevated levels of radiation will be noted for further investigation.
Field beta particle measurements are typically more accurate than alpha particle measurements due to the potentially irregular nature of the field sources. Most of the alpha emitting isotopes that are of concern also emit beta particles. Beta scans will therefore be performed under these circumstances. Under certain circumstances, however, professional judgment may also require

the scanning for alpha particles in addition to the beta particles. This data will be reviewed and utilized only as a health physicist determines appropriate.

Class Three Survey Units

Scanning of surfaces and grounds to identify locations of residual surface and near surface activity in Class Three survey units will be performed according to the following schedule:

- interior surfaces below 2 meters - 10% of surfaces or 15 locations, whichever is greater, in randomly located two meter by two meter grids.
- interior surfaces above 2 meters and roofs -10% of surface in randomly located one meter by one meter grids.
- exterior pavement - 10% of surface, in randomly located 10 meter by 10 meter areas
- exterior grounds - 10% of surface, along survey lines that are separated by approximately 15 meters.

Surface scanning surveys of pavement and building interior and exterior surfaces will be conducted for alpha, beta, and gamma radiations. Surveys of exterior grounds will be for gamma radiations.

Instrumentation for the scanning surveys will include proportional detectors for alpha and beta surveys, zinc sulfide scintillators for alpha surveys and FIDLER or equivalent types of detectors for low-energy gamma surveys (detectors having thin NaI(Tl) crystals that are designed to detect low energy gamma and x-ray radiations). For all but the floor surveys and pavement surveys (where a large area gas proportional floor monitor will be used), the instruments having the lowest detection sensitivity will be used for the surveys, wherever physical surface conditions and measurement locations permit. Refer to the Survey Instrumentation-Building Surveys and the Survey Instrumentation-Grounds Surveys sub-sections of Section 4.2.3 for details on the survey methodologies that will be used. Any areas that are identified as having elevated levels of radiation will be noted for further investigation.

Field beta particle measurements are typically more accurate than alpha particle measurements due to the potentially irregular nature of the field sources. Most of the alpha emitting isotopes that are of concern also emit beta particles. Beta scans will therefore be performed under these circumstances. Under certain circumstances, however, professional judgment may also require

Class Two Survey Units

Direct measurements of alpha and beta surface activity will be performed at selected locations using the same instruments as outlined in Section 4.2.3.1, Alpha ,Beta and Gamma Scanning Surveys.

Direct measurements will be performed according to the following schedule

- lower walls (up to two meters above floor level), floor surfaces, floors and walls to a distance of 2 meters beyond access points to Class Two survey units, and horizontal surfaces above 2 meters - one location per 2 meter by 2 meter grid used to document the surface scanning surveys, situated in the area of the highest surface scanning reading.
- upper walls, ceilings, and roofs - one location per one meter by one meter area that is used to perform the surface scanning surveys, situated in the area of the highest surface scanning reading.
- exterior pavement - one location per 10 meter by 10 meter grid, situated in the area of the highest surface scanning reading

Measurements will be conducted by integrating counts over a 1 minute period.

Field beta particle measurements are typically more accurate than alpha particle measurements due to the potentially irregular nature of the field sources. Most of the alpha emitting isotopes that are of concern also emit beta particles. Beta measurements will therefore be performed under these circumstances. Under certain circumstances, however, professional judgment may also require the measurement for alpha particles in addition to the beta particles. This data will be reviewed and utilized only as a health physicist determines appropriate.

Class Three Survey Units

Direct measurements of alpha and beta surface activity will be performed at selected locations using the same instruments as outlined in Section 4.2.3, Alpha ,Beta and Gamma Scanning Surveys.

Direct measurements will be performed according to the following schedule

- Building surfaces - one location per one meter by one meter area used for the surface scanning surveys, situated in the area of the highest surface scanning reading.
- Exterior Pavement - one location per 10 meter by 10 meter area used in the surface scanning surveys, situated in the area of the highest surface scanning reading.

Measurements will be conducted by integrating counts over a 1 minute period.

Field beta particle measurements are typically more accurate than alpha particle measurements due to the potentially irregular nature of the field sources. Most of the alpha emitting isotopes that are of concern also emit beta particles. Beta measurements will therefore be performed under these circumstances. Under certain circumstances, however, professional judgment may also require the measurement for alpha particles in addition to the beta particles. This data will be reviewed and utilized only as a health physicist determines appropriate.

4.2.3.3 Exposure Rate Surveys

Exposure rate surveys are performed to determine that the exposure rates measured at a location are below the survey unit specific guideline value. Exposure rate measurements will be obtained in the field in units of μRem/hr or counts per minute (cpm). The final exposure rate measurements will be reported in units of μR/hr. The exposure rate survey plans detailed below will provide, at a minimum, the twenty data points from each survey unit that are necessary to meet the DQOs that were selected for SEAD-12.

Dose/exposure rate surveys in building interiors is not an efficient manner in which to identify areas of contamination. The problems with this methodology are based upon both the types of radiation and their designated energies as well as the geometry of the situation in question. The Army intends to perform these surveys and utilize any information collected as a diagnostic tool. Additionally, while the situation is unlikely, from a health safety stand point, it is always best to know the radiation fields that personnel are working in and any unexpected or incongruous fields can be identified and knowledgeable decisions related to personnel exposures and personnel protective equipment can then be made. In this manner, exposure rate measurements will be performed to ensure that no over exposures related to the survey work at SEAD-12 occur.

Class One Survey Units

Gamma exposure rates will be measured at one meter above ground or floor surfaces, using a Bicron microRem/hr meter. Measurements will be uniformly spaced according to the following pattern:

- Lower walls (up to two meters above floor level), floor surfaces, pavement, un-earthen roofs with ventilation ducts - one location per 2 by 2 meter grid used to document the surface scanning and direct measurement surveys, located in the center of the grid,
- Exterior grounds, including earth covered buildings, and paved areas - one location per grid node of the 10 meter by 10 meter grid used to document the surface scanning and direct measurement surveys and at any biased soil sampling locations as defined in the surface soil sampling program (Section 4.2.4.1).

Class Two Survey Units

Gamma exposure rates will be measured at one meter above ground or floor surfaces using a Bicron microRem/hr meter. Measurements will be spaced according to the following pattern:

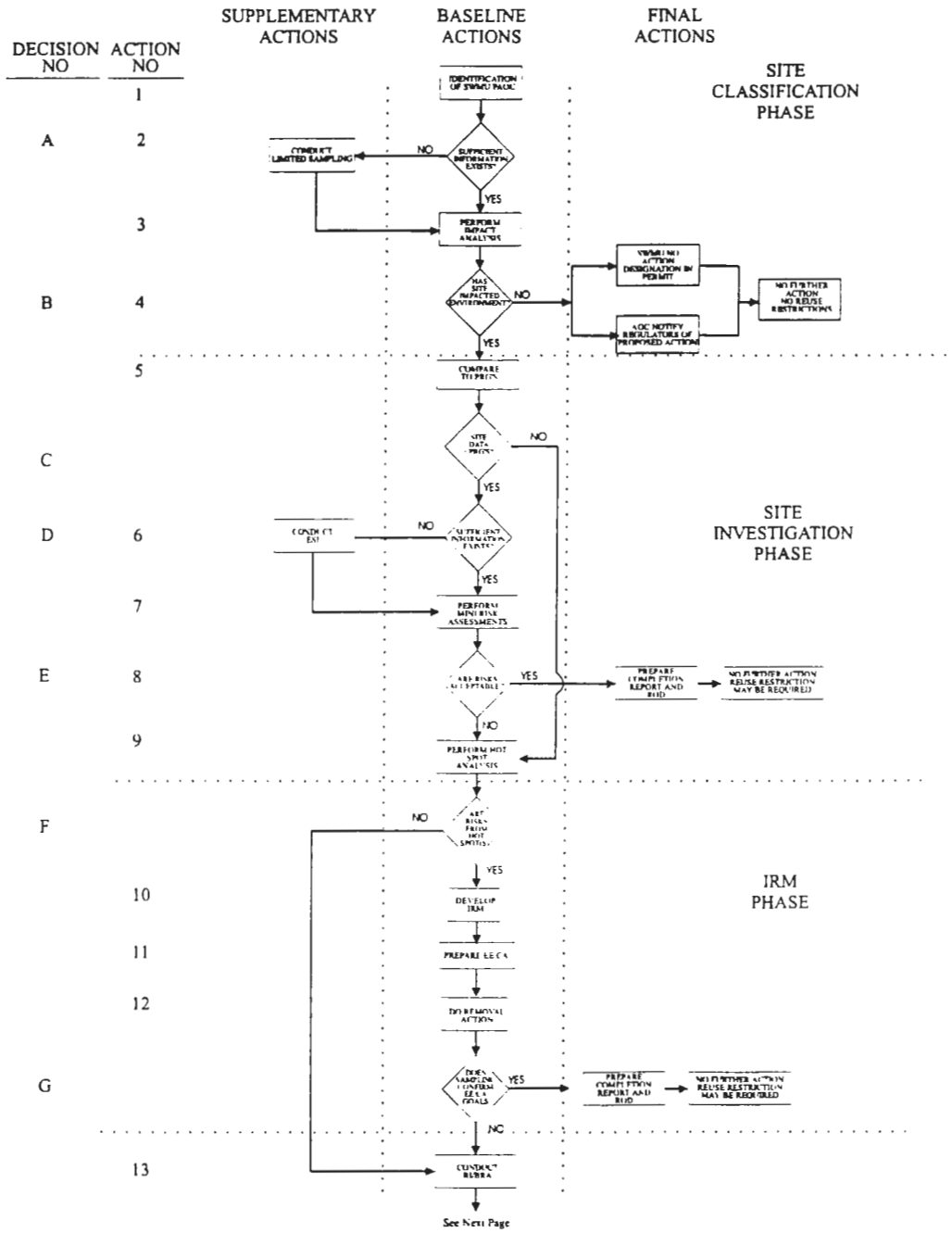
- building floors and lower walls (up to two meters above floor level) - one per survey grid used for the scanning and direct measurement surveys, located in the center of the grid,
- pavement - one per 10 meter by 10 meter grid used for the scanning and direct measurement surveys, located in the center of the grid,
- grounds -one per grid node of the 10 meter by 10 meter grid used to document the scanning surveys and at any biased soil sampling locations as defined in the surface soil sampling program (Section 4.2.4.1) and surface water and sediment sampling locations as defined in the surface water and sediment sampling program (Section 4.2.4.3).

Class Three Survey Units

Gamma exposure rates will be measured at one meter above ground or floor surfaces using a Bicron microRem/hr meter. Measurements will be spaced according to the following pattern:

- building floors and lower walls (up to two meters above floor level) - one per survey area used for the scanning and direct measurement surveys, located in the center of the area,

SENECA ARMY DEPOT ACTIVITY
Decision Criteria Flowchart



PARSONS ENGINEERING SCIENCE, INC.

SENECA ARMY DEPOT ACTIVITY

ENVIRONMENTAL ENGINEERING

FIGURE 4-12
DECISION CRITERIA
REMEDIATION FLOWCHART

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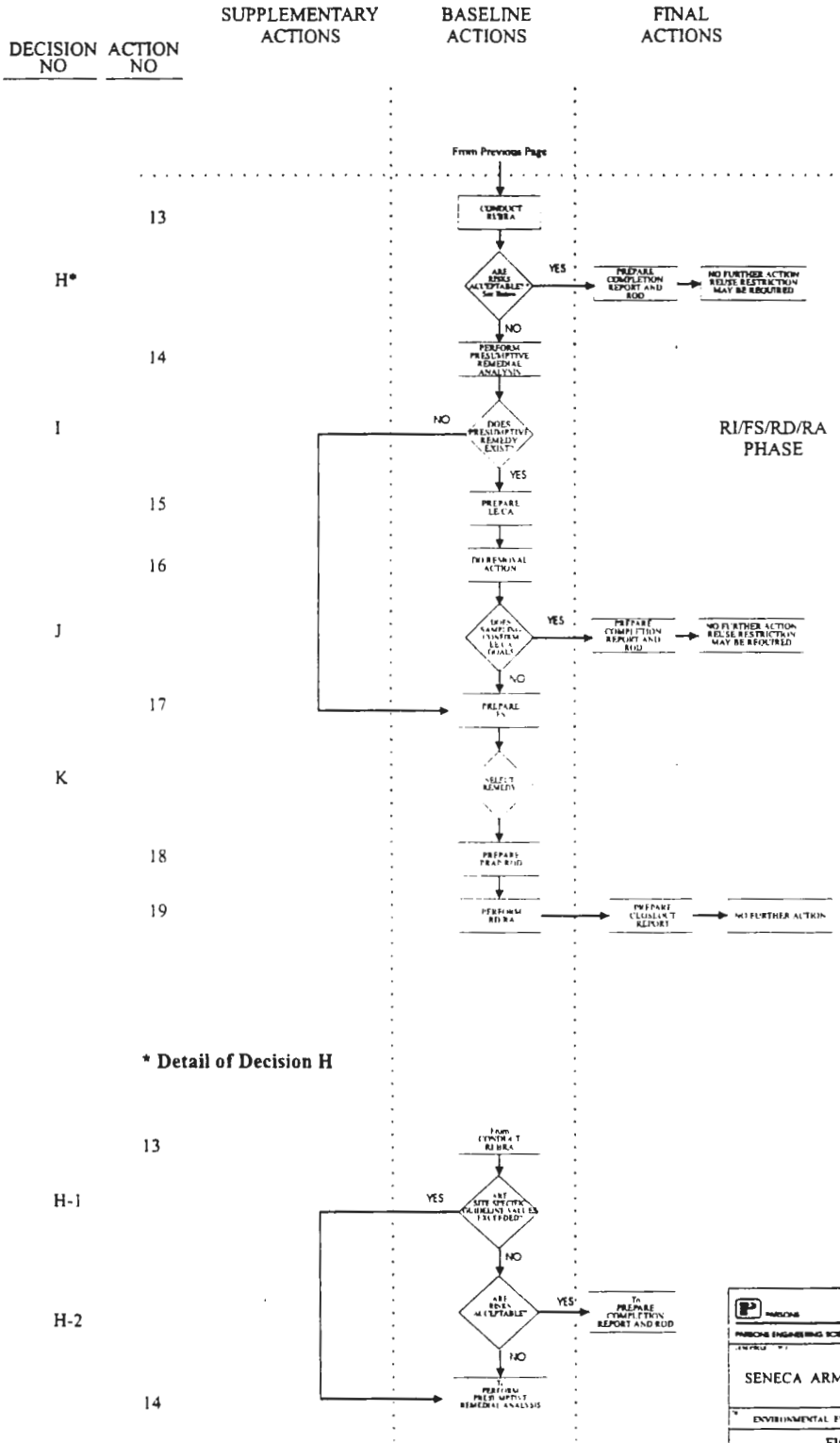
SENECA ARMY DEPOT ACTIVITY
Deccision Criteria Flowchart



SENECA ARMY DEPOT ACTIVITY

ENVIRONMENTAL ENGINEERING

FIGURE 4-12
DECISION CRITERIA
REMEDIATION FLOWCHART

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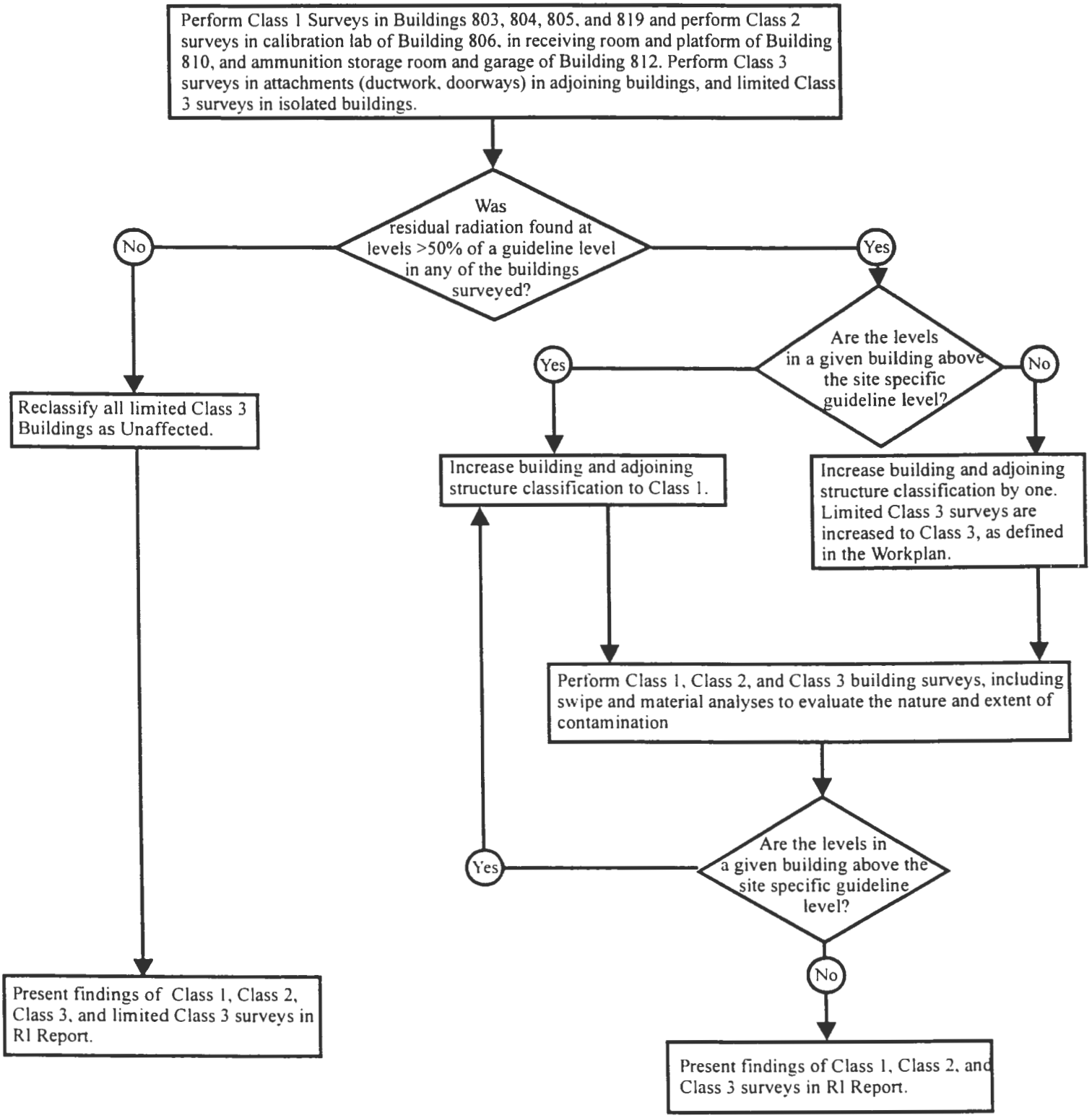
Figure 4-5
Radiological Survey Decision Tree
for
Buildings 800, 802, 803, 804, 805, 806, 810, 812, 819 and 825



Note: The guideline levels that will be used are those from NYCRR Title 12, Part 38, Table 5, which are presented in Table 4-3 of this project scoping plan

Enroth, Thomas R NAN02

From: Jacqueline Travers[SMTP:Jacqueline.Travers@parsons.com]
Sent: Friday, January 14, 2000 5:25 PM
To: absoloms@seneca-hp.army.mil
Cc: Michael Duchesneau; Enroth, Thomas R
Subject: Pu-239/240 results

punorend.xls

Steve:

Attached are the results from the four soil samples we collected for re-analysis of Pu-239/240 in the North End (ballfield). I have shown the original results from these locations (a duplicate was collected at one location - so there are five original results). The new results are shown below the original results. The new results are from the same four locations as the original results but, unfortunately, I cannot match them one to one right now since our field notes are still at the trailer.

The original results were all non-detect for Pu-239/240 (as were the rest of our results from the North End for Pu-239/240 in soil). We re-sampled these locations, because the requested detection limits in the original sampling were higher than NYSDOH would have liked. The new results confirm the original results. New reported levels of Pu-239/240 are below the detection limits requested in the original data (in other words, these samples are non-detect at the original detection limit).

The new data ranges from 0.005 to 0.009 pCi/g, except for Sample ID 123504 where the result was 0.077 pCi/g. This result is an order of magnitude higher than the others and the only sample higher than the new requested detection limit (0.01 pCi/g). It appears to be higher than what Brookhaven found in background sediments (0.03 pCi/g), but there really isn't much background data around to say what is truly Pu-239/240 background in soil.

Please call me or Mike Monday to discuss. (Steve, I also faxed you this information on Friday.)

Jackie

Comparison of Original Sampling Data from the North End to Re-sampling data at Same Four North End Locations.

Original Pu-239/240 Data - Requested D.L = 0.1 pCi/g

Sample ID	*Radionuclide*	*Value(pCi/g)*	*Error*	*Lab Qualifier*	*Parsons Qualfier*
SS12-13	Plutonium-239/240	0.3	0.1	ND	UJ
SS12-2	Plutonium-239/240	0.2	0.2		UJ
SS12-13	Plutonium-239/240	0.2	0.1	ND	U
SS12-9	Plutonium-239/240	0.2	0.1	ND	U
SS12-14	Plutonium-239/240	0.3	0.1	ND	UJ

New Re-sampling Results - Requested D.L. = 0.01 pCi/g

Sample ID	*Radionuclide*	*Value(pCi/g)*	*Error*	*Lab Qualifier*	*Parsons Qualfier*
123506	Plutonium-239/240	0.007	0.00412	none	NA
123508	Plutonium-239/240	0.005	0.00348	none	NA
123504	Plutonium-239/240	**0.077**	0.0156	none	NA
123502	Plutonium-239/240	0.009	0.00538	none	NA

Notes:
NA - Not available at this time.
Background levels at Brookhaven Nat'l Labs established at 0.03 pCi/g for Sediment.

PARSONS ENGINEERING SCIENCE, INC.

30 Dan Road • Canton, Massachusetts 02021-2809 • (781) 401-3200 • Fax: (781) 401-2575

December 7, 1999

Commander
U.S. Army Corps of Engineers
Engineering and Support Center, Huntsville
Attn: Ms. Dorothy Richards, CEHNC-PM
4820 University Square
Huntsville, AL 35816-1822,

SUBJECT: **Response to NYSDEC Comments Dated October 27, 1999 on Background Sample Analyses for Plutonium-239/240 at SEAD-12, Seneca Army Depot Activity**

Dear Ms. Richards:

Parsons Engineering Science is pleased to provide you with responses to NYSDEC comments dated October 27, 1999 on background sample analyses for Plutonium-239/240 (July 2, 1999). These responses were prepared under Delivery Order 5 under Contract No. DACA87-95-D-0031.

If you have any questions or concerns regarding these comments, please do not hesitate to call me at (781) 401-2535 or Michael Duchesneau at (781) 401-2492.

Sincerely,

PARSONS ENGINEERING SCIENCE, INC.

Jacqueline Travers

Jacqueline Travers, P.E.
Task Order Manager

cc: Mr. Tom Enroth, CENAN-PP-HE
Mr. Stephen Absolom, SEDA
Mr. Keith Hoddinott, USACHPPM (Prov.)
Mr. John Buck, USAEC

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PARSONS ENGINEERING SCIENCE, INC.

30 Dan Road • Canton, Massachusetts 02021-2809 • (781) 401-3200 • Fax: (781) 401-2575

December 7, 1999

Mr. Julio Vazquez
USEPA Region II
Superfund Federal Facilities Section
290 Broadway, 18th Floor
New York, NY 10007-1866

Mr. James Quinn
New York State Department of Environmental Conservation
Bureau of Eastern Remedial Action
Division of Hazardous Waste Remediation
50 Wolf Road
Albany, NY 12233-7010

SUBJECT: Response to NYSDEC Comments Dated October 27, 1999 on Background Sample Analyses for Plutonium-239/240 at SEAD-12, Seneca Army Depot Activity

Dear Mr. Vazquez/Mr. Quinn:

Please find enclosed responses to NYSDEC comments dated October 27, 1999 on background sample analyses for Plutonium-239/240 (July 2, 1999).

If you have any questions or concerns regarding these comments, please do not hesitate to call me at (781) 401-2535 or Michael Duchesneau at (781) 401-2492.

Sincerely,

PARSONS ENGINEERING SCIENCE, INC.

Jacqueline Travers

Jacqueline Travers, P.E.
Task Order Manager

cc: Mr. Tom Enroth, CENAN-PP-HE
Mr. Stephen Absolom, SEDA
Ms. Dorothy Richards, CEHNC-PM-ND
Mr. Keith Hoddinott, USACHPPM (Prov.)
Mr. John Buck, USAEC

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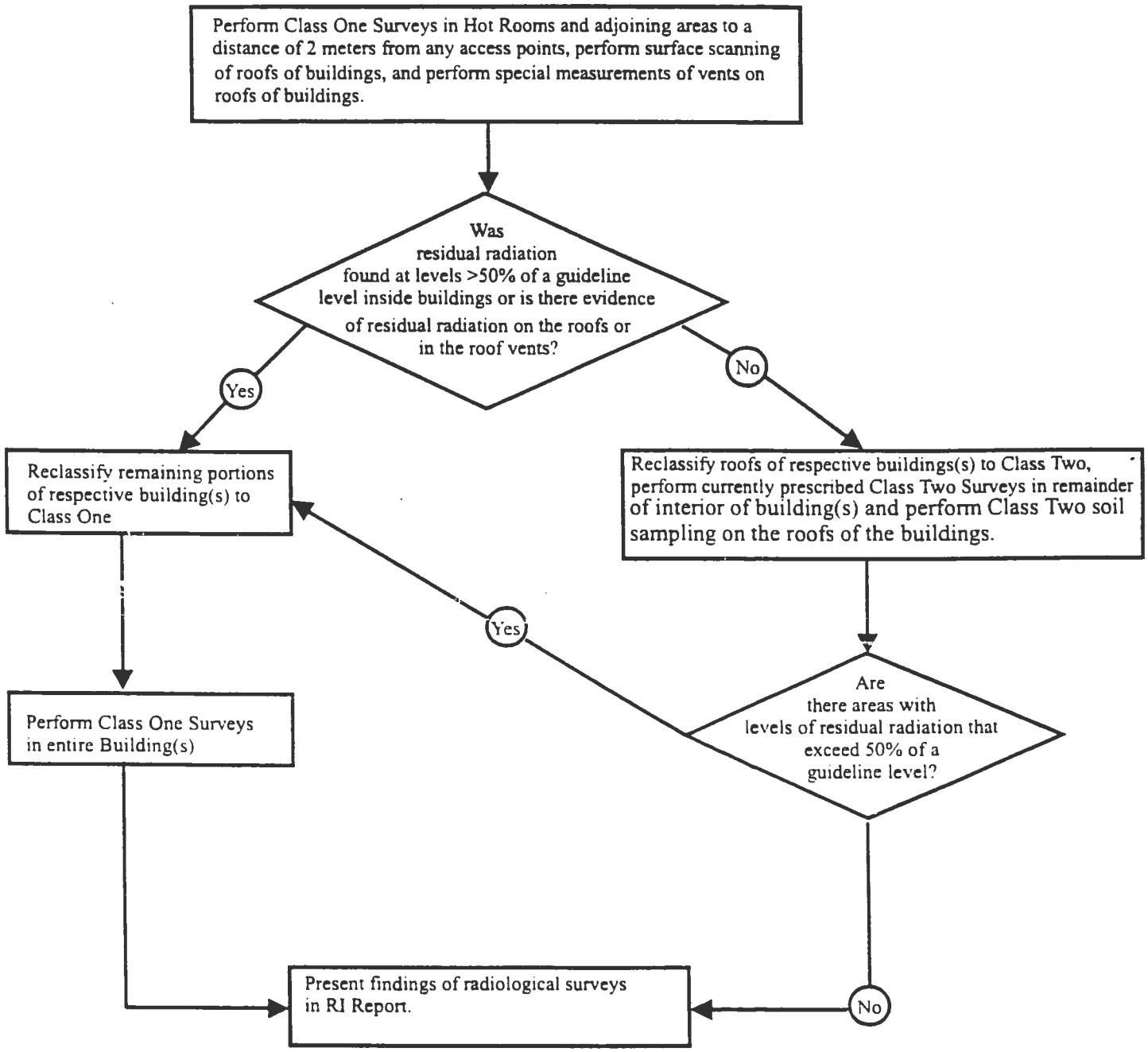
Figure 4-4
Radiological Survey Decision Tree
for
Buildings 815 and 816



Note: The guideline levels that will be used are those from NYCRR Title 12, Part 38, Table 5, which are presented in Table 4-3 of this project scoping plan

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Response to the Comments from New York State Department of Environmental Conservation

Subject: Background Sample Analyses for Plutonium 239/240 at SEAD-12, Seneca Army Depot, Romulus, New York, July 2, 1999.

Date Comments Submitted: October 27, 1999

Date of Comment Response: December 7, 1999

NYSDEC Comments:

1. Comment: The New York State Departments of Health (NYSDOH) and Environmental Conservation (NYSDEC) have reviewed the report titled Background Sample Analyses for Plutonium 239/240 at SEAD-12. This report presents the Quality Control/Quality Assurance reports for background sample analyses at SEAD-12, while the cover letter transmitting the report notes concerns with the data and proposes two plans to resolve these concerns.

   First, the State expresses concern about the timing of the release of this information for regulatory review. Many of the samples reported in this document were collected in late 1997 with Core Laboratory completing analysis as early as February 1998. It wasn't until the May 1999 BRAC Clean-up Team meeting, upon the regulatory agencies' query regarding preliminary sampling data available from the investigation of SEAD-12, that SEDA shared sample results with the NYSDOH, NYSDEC, and the USEPA. Not only is this delay contrary to the obligations of the Army under Paragraph 24.2 of the Seneca Army Depot Federal Facilities Agreement (FFA), but also (and more important to the community) it can only delay the ultimate resolution of site-related issues. Resolution of the questions raised by this report is of particular importance in light of the proposed reuse of the adjacent North End parcel as a residence for children. The Army and its consultants are well aware of the community's concerns regarding the potential for radiological contamination at the Seneca Army Depot as well as the community's desire to productively reutilize Depot property. Earlier involvement of the regulators would have facilitated a more timely response to the questions raised by this data.

   Response: It is true that the analysis of these samples were performed as early as February 1998. There are several reasons these data were not disclosed earlier. First, with respect to the Army's obligations under Paragraph 24.2 of the FFA, the Army, years ago, used to provide such data packages to the agencies on a regular basis. Due to volume of raw data that was generated during such an exchange, it was informally decided that this exchange was not useful and that data presented in report format would be more meaningful. If the State would like to resume execution of this Paragraph of the FFA, please notify the Army. Second, although the data were collected almost two years ago, the Army collected this data at its own risk because a Project Scoping Plan had not yet been approved. In fact, the Project Scoping Plan for SEAD-12 has just recently received comments form EPA concerning the ecological risk assessment. Because of the radionuclides potentially present at this site, SEAD-12 presents some complicated issues that have taken to date, over four years to resolve with NYSDEC and USEPA. Given the status of the Project Scoping Plan, review and presentation of the radiochemistry data did not become a priority until transfer of the North End parcel became an issue. It was at that time that presentation of the North End data became pertinent.

The following comments on the Background Sample Analyses Report are provided by the NYSDOH's Bureau of Environmental Radiation Protection:

1. Comment: The most important factor in obtaining data, whether to establish background or for closeout surveys, is defining, in detail, the Data Quality Objectives (DQO's) prior to issuing analysis contracts. By not adhering to detailed objectives the contract laboratory will perform analysis per their standard procedures, which may not have a suitable lower limit of detection. This seems to be the case in this instance since the reported values of 0.1 to 0.2 pCi/g are at least an order of magnitude higher than typical background levels of Pu-239/240 from worldwide fallout.

   Response: Core Laboratories, who performed the analyses presented in the document, did meet requested lower limits of detection. Parsons ES requested a detection limit of 0.5 pCi/g for Pu-239/240 analyses in soil. This limit of detection was established based on two factors: 1) the soil guideline value for the radionuclide of concern; and (2) the limit of detection that could reasonably be achieved by a commercial laboratory at the time (this project was bid in late 1995). The preliminary soil guideline value for Pu-239/240 in soil is 1.89 pCi/g based on NUREG 1500 and as established in Table 4-3 of the SEAD-12 Project Scoping Plan. Section 7.2 of NUREG 5849 recommends targeting detection limits between 10 to 25% of the guideline value. Section 7.2.2.6 of MARSSIM recommends targeting detection limits between 10 and 50% of the guideline value. A detection limit of 0.5 pCi/g is within these guidelines. It was with these guidelines in mind, not atmospheric fallout levels, that the detection limit for Pu-239/240 was established. These guidelines were applied to both site samples as well as those collected from background locations.

2. Comment: The Pu-239/240 results should also indicate the ratio of Pu-240 and Pu-239 which should be approximately 0.18 +/- 0.02 from atmospheric fallout.

   Response: During our telephone conference call on November 4, 1999, NYSDOH rescinded this comment.

3. Comment: Upon reviewing the data package supplied by Core Laboratories under the banner, "Quality Control Footer", it was noted that under comment #3, Soil and Sludge samples, that unless otherwise noted, all samples are reported on a "wet" or as received basis. Under many, if not most circumstances, a wet sample will have a much lower reported concentration than a dry sample. In most instances, the derived cleanup levels are based on a dry sample result. The values reported are not typically acceptable to regulatory agencies, unless both values are reported.

   Response: Parsons ES contacted Core Laboratories about this issue and they clarified that the footer in the report is referring to wet chemistry methods. All the values for radiochemistry analysis are reported on a dry weight basis.

   If the "wet" results are also required by NYSDOH, please inform us at your earliest convenience. We do have the estimated moisture content of these samples so it would be possible to go back and provide the wet weight information if necessary. However, we believe your comment implies that they dry weight results are the desired results.

4. Comment: There are a number of samples that show elevated levels of Promethium-147. Since the procedure for this analysis was not provided we have to assume it was a Beta counting method. Since this isotope was used extensively at Seneca in gauges, siting devices and such, and since it

does not exist normally in nature, the source of this isotope is in question. However, it is possible that since the gross beta results of the same sample are low, it may not be present at all.

Response: The Promethium–147 beta is very low energy and the samples are prepared by isolation of the Promethium by column extraction and then counting by liquid scintillation counting which allows detection of the low energy beta. A gross beta analysis is performed on a gas flow proportional counter and this instrumentation cannot detect the low energy beta such as the Promethium-147 due to the effect of a mylar window which shields the low energy betas. Because of the broad spectra of beta emissions, it is difficult to unequivocally identify the specific beta contributor by liquid scintillation and if there were some other beta compound present in the samples that follows the Promethium-147, it would tend to bias the data high.

Pm-147 results from the soil at SEAD-12 are provided in Table 1 attached and background locations are indicated. Pm-147 data in the soil ranges from 0.4 to 17.8 pCi/g. There is one exception at SB12-6 from 3 to 6 feet a level of 95.7 pCi/g was reported. This sample is located in what is formerly known as SEAD-12B. A preliminary guideline value for Pm-147 in soil, according to NUREG 1500, is 7,290 pCi/g (shown in Table 4-3 of the SEAD-12 Project Scoping Plan). All results shown in Table 1 are two orders of magnitude lower than this preliminary guideline value.

We agree that Pm-147 should not be present in background samples. However, there is doubt within the method used that the beta emissions actually observed are from Pm-147 due to the nature of the method. The State has requested that the Army consider re-sampling for Pm-147, if necessary. It is our opinion that re-sampling would not provide any additional information for two reasons. First, given the fact that any detection of Pm-147 in background was 100 times below the preliminary action level for Pm-147, we do not feel re-analysis is necessary. Second, we are not confident that radiochemical methods are available to detect Pm-147 unequivocally. The method for Pm-147 that is commercially available has a relatively high detection limit (about 10 pCi/g) and may detect beta emissions from sources other than Pm-147. The Environmental Measurements Laboratory (EML) has no program in place to monitor laboratory performance of this method and it is not clear with what certainty Pm-147 results may be obtained.

5. Comment: We would also like to point out the Core Laboratories, while ELAP certified for some radiochemical and gamma spectroscopy procedures, is not specifically certified to perform plutonium analysis in soil. In fact there are but a few labs in the country that can consistently perform these analyses at the levels required.

   Response: We are not aware of any certification programs for Plutonium in soil. The only type of quality assurance program we are aware of is through Environmental Measurements Laboratory (EML). Core Laboratories does participate in EML's program.

6. Comment: There are a number of samples listed in the July 2, 1999 memo from Parsons Engineering which show samples from on-site and off-site locations which were obtained up to a depth of 10 feet. If these were obtained to characterize potential contamination in known burial sites or potential groundwater impacts then both the background and sample depths might be justified. However, if the samples were taken to interpret the impacts from fallout or contamination from activities in the past, there would be no need to analyze samples from these depths.

Response: Samples from these depths were collected from on-site locations to characterize potential contamination in known burial sites or locations where geophysical anomalies were observed. Samples from these depths collected from off-site locations were collected to establish a representative background dataset that would be used to characterize all soils at the site. The same parameter list was used for surface and subsurface samples. We felt it prudent to perform such analyses on off-site subsurface samples, since we were collecting such data for on-site subsurface samples. Our sampling and analysis plan for subsurface soil sampling at this site was outlined in Section 4.2.4.2 of the SEAD-12 Project Scoping Plan and the list of analytes is provided in Table 4-6 of the Scoping Plan.

7. Comment: It is important that the Army establish ahead of time, what their clean up criteria will be based on, risk or dose limit (such as the DEC's TAGM of 10 mRem/yr or EPA's 25 mRem/yr). If not, they run the risk of having to clean up the site to background levels, if one can be established. However, please keep in mind that levels of plutonium that do not pose a risk to human health are often found to be unacceptable to the community. The bottom line is that we have doubts about the validity of the positive results of Plutonium 239/240 as well as the high detection limits for radium 226 in soil. The historical cleanup limit for radium 226 is 5 pCi/g (dry) in the top 1 cm of soil or 15 pCi/g in any layer below the top layer. These concentrations were based on a 100 mRem/yr limit. Reported values in soil for both background and site samples exceed 1.0 to 2.0 pCi/g, which are much higher than typical background values.

   Response: Clean up criteria will be based on dose limits. USEPA has informed the Army in comments on the SEAD-12 Scoping Plan that the UMTRCA standards referenced above for Ra-226 do not apply to this site. Preliminary guidelines established in the SEAD-12 Project Scoping Plan were based on 15 mrem/yr after discussions with USEPA and NYSDEC (p. 4-16 of the Project Scoping Plan). We understand, however, that NYSDEC's soil clean up goal is set at 10 mrem/yr. Site specific clean up goals based on both the 10 mrem/yr NYSDEC goal and the 15 mrem/yr dose limit will be developed and submitted to EPA and NYSDEC for review in the near future.

   With respect to Pu-239/240, a re-sampling and re-analysis plan was submitted on November 22, 1999 to address NYSDEC and EPA's concerns over the validity of the Pu-239/240 detections.

   With respect to Ra-226, background values in soil ranged from 1 to 2.6 pCi/g with an average value of 1.34 pCi/g (assigning a value of one half the detection limit to non-detect values). Soil data from SEAD-12 is provided in Table 2. While site specific soil guideline values have not yet been derived, NUREG 1500 gives a value of 5.62 pCi/g in soil to be equivalent to 15 mrem/yr under a residential scenario. Detection limits for Ra-226 in soil were based on targeting a percentage of the preliminary soil cleanup guideline (5.62 pCi/g). In most cases, the detection limit was between 0.1 and 0.3 pCi/g (2 to 5% of the preliminary soil guideline value). A portion of the values for Ra-226 reported as non-detect from the laboratory were the only samples where detection limits were an order of magnitude higher. These higher detection limits were reported for only 15 of the 500 plus soil sample results.

   According to Eisenbud and Gesell, average activities of Ra-226 in shales is 1.08 pCi/g (Environmental Radioactivity, 1997). NCRP Report No. 129 cites background activities of Ra-226 between 0.2 and 1.9 pCi/g (National Council on Radiation Protection and Measurements, January 1999). Although some of the background data from SEAD-12 exceed these values, they are not tremendously higher. NCRP Report No. 129 provides screening limits for Ra-226 in soil for

different scenarios, some of which are lower than the NUREG 1500 guideline value, and closer to background levels. The report states screening limits may be undistinguishable from background and emphasizes that limits are to be applied to levels in excess of natural background radiation.

8. Comment: In order to achieve a good detection limit for Pu isotopes you need to use an appreciable sample size, a long count time, have a good chemical yield, use an appropriate sample digestion, have good detector resolution and a low instrument background. It will be difficult or impossible to measure Pu-239/240 at the desired detection limit if these conditions are not achieved. The detection limits may be improved by recounting the same samples for a longer time.

   Response: General Engineering Laboratories (GEL) will be performing the Pu-239/240 analysis during the re-sampling. GEL's method that will be used to achieve the lower detection limits requested for Pu-239/240 in soil and sediment (0.01pCi/g) has been submitted in the Sampling and Analysis Plan for re-sampling Pu-239/240 dated November 22, 1999. General Engineering Laboratories will use 5 to 10 g of prepped sample and a counting time of 16 hours. The analyses performed previously at this site for Pu-239/240 in soil used 1 g of sample and a counting time of 2 hours.

9. Comment: It appears that some of the tritium data may not be valid. The reporting of activities in the range of a few pCi/L is not valid since the method lower limit of detection is given as 214 pCi/L (given 40% efficiency, 20 min. count time, background of 5 cpm and a 10 ml volume). How can the results be 100 times less?

   Response: It is not clear to which sample the NYSDOH is referring. However, validated tritium data for surface water has been included in these responses as Table 3. This table provides qualifiers for tritium data that were not provided in the raw data package submitted in the July 2, 1999 submittal. Parsons ES has discussed the reporting of data below the detection limit with Core Laboratories and they have informed us that although the usual detection limit for tritium in water is between 200 and 300 pCi/L, the actual value can range from 10 to 300 depending on the counting statistics. When the detected value is reported less than the detection limit, Core has suggested that the detection limit be used as the reportable level and designate this sample as non-detect. The Parsons ES validator has elected to qualify such data with a "J" (estimated) as is done when chemical data are reported below the detection limit.

10. Comment: Radium 226 in water is calculated by either of two methods. The gamma spectroscopy method uses a peak energy from Bi-214 progeny. Inaccurate data may be generated in a situation where there is an appreciable quantity of radon dissolved in the water sample, especially if the sample is counted shortly after collection. In this situation the value reported for Ra-226 will be inaccurate (too high). The other Ra-226 method uses a chemical separation. Radon in water will not interfere with that measurement, although Radium 224 may contribute to the counts. In the situation where both methods were used for water samples there is a discrepancy between the Radium 226 result and the Bi-214 result with the later being higher.

    Response: Parsons ES contacted Core Laboratories regarding this comment. Core does not recommend analysis of Ra-226 in water by gamma spectroscopy. In order to provide a defensible analysis by gamma it is essential that the geometry of the sample is identical to the standard utilized for calibration. The gamma spectroscopy analysis of Ra-226 measures Ra-226 as well as the Bi-214

and Pb-214 radon decay products. These are highly charged particles and tend to plate out on the sides of the counting container as well as precipitant with any materials that fall out during any in growth period. The result is an invalid spectra with a very high error associated with the data. The wet chemistry separation provides a very accurate measurement as well as a much lower detection limit. There is a small concern about Ra-224 interference or contribution to the Ra-226 alpha, however, this is usually negligible due to the in growth of the radon decay products and increased efficiency of the alpha counting. If there are questions about this on specific sample the samples can be recounted after a week and the Ra-224 will have decayed out and no longer a contributor.

11. Comment: What is the method for Promethium-147, chemical separation and proportional counting? Why are Gross Beta results much lower than the Pm-147 results for a given sample? Since Pm-147 is a beta emitter it should have been detected by the Gross Beta method.

    Response: Please see response to comment #4 above.

(End of verbatim iteration of NYSDOH's Bureau of Environmental Radiation protection comments.)

Continuation of NYSDEC Comments:

The cover page to the Background Sample Analyses Report presents two plans for the resolution of this matter: 1) compare Parsons' analytical results to data generated from the split samples collected by EPA and NYSDEC, and 2) re-sample the background/off-site sediment and soil locations where Pu-239/240 was detected based on the Parsons data.

However, none of the samples obtained by the NYSDEC have been subjected to Plutonium analysis. Also, it is our understanding from conversations with SEDA that the Army is now proposing a larger sampling effort than that proposed by plan 2 above. Therefore, rather than comment on the proposals included in the cover page to the Background Sample Analyses Report, we look forward to a revised sampling proposal for our review from SEDA to help resolve issues at this site.

A work plan should be submitted which includes a detailed description of the analytical methods to be used by the selected laboratory. As indicated above, future sample analysis must be sensitive enough to determine if reported levels of plutonium are attributable to atmospheric fallout. Due to the uncommon nature of plutonium are attributable to atmospheric analysis. In fact, the NYSDOH Wadsworth Center for Research and Laboratories Environmental Laboratory Approval Program (ELAP) has not certified any laboratories to conduct plutonium in soils analysis. It is imperative that future samples be analyzed by a laboratory with proven capability to conduct this analysis and that the results be defensible.

Response: A sampling and analysis plan was submitted on November 22, 1999 outlining the plan for re-analysis of soil and sediment samples for Pu-239/240. In addition, a letter was submitted on November 19, 1999 informing you that we would be using General Engineering Laboratories for radiological analyses and providing their experience in performing Plutonium analyses in soil.

Table 1
Pm-147 Results in Soil at SEAD-12
Seneca Army Depot Activity, Romulus, NY

Sample Location	Top Depth (ft)	Bottom Depth (ft)	Radionuclide	Laboratory Value (pCi/g) (1)	Error +/- (pCi/g)	Lower Limit of Detection (pCi/g)	Laboratory Qualifier	Parsons ES Validator Qualifier	Background Location (2)?
SS12-13	0	0.2	Promethium-147	10.5	5.2	8.3		U	yes
MW12-1	0	0.2	Promethium-147	14.4	5.1	8.2		U	yes
MW12-3	0	0.2	Promethium-147	8.3	5	8.2		U	yes
MW12-2	0	0.2	Promethium-147	10.3	5	8.2		U	yes
SS12-2	0	0.2	Promethium-147	12.8	5.2	8.3			yes
SS12-3	0	0.2	Promethium-147	10.1	5.1	8.3		U	yes
SS12-6	0	0.2	Promethium-147	9.5	5.1	8.3		U	yes
SS12-7	0	0.2	Promethium-147	16.8	5.3	8.3			yes
SS12-11	0	0.2	Promethium-147	15.2	5.2	8.3		U	yes
SS12-13	0	0.2	Promethium-147	7.7	5.1	8.3		U	yes
SS12-10	0	0.2	Promethium-147	7.8	5.1	8.3		U	yes
SS12-9	0	0.2	Promethium-147	11.5	5.2	8.3		U	yes
SS12-8	0	0.2	Promethium-147	12.4	5.2	8.3		U	yes
MW12-4	0	0.2	Promethium-147	7.9	5	8.2		U	yes
SS12-5	0	0.2	Promethium-147	12	5.2	8.3			yes
SS12-14	0	0.2	Promethium-147	9.5	5.1	8.3		U	yes
SS12-12	0	0.2	Promethium-147	17.8	5.3	8.3			yes
SS12-4	0	0.2	Promethium-147	15.5	5.2	8.3			yes
MW12-5	0	0.2	Promethium-147	8.9	5	8.2		U	yes
SS12-1	0	0.2	Promethium-147	13.4	5.2	8.3			yes
MW12-1	0.2	2	Promethium-147	13.3	5.1	8.2		U	yes
MW12-3	0.2	2	Promethium-147	5.6	5	8.2		U	yes
MW34/MW35	1.5	2	Promethium-147	10.3	5.1	8.3			yes
MW12-5	2	3.5	Promethium-147	10	3.9	6.1			yes
MW12-2	2	4	Promethium-147	5.1	5	8.2		U	yes
MW57-1	2	2.5	Promethium-147	11.4	5.2	8.3			yes
MW45-4	2	2.5	Promethium-147	8	5.1	8.3		U	yes
MW12-4	4	5.4	Promethium-147	3.2	3.7	6.1			yes
MW12-1	4	6	Promethium-147	9.6	5	8.2		U	yes
MW12-4	6	8	Promethium-147	2.1	3.7	6.1			yes
MW12-3	6	8	Promethium-147	6.5	5	8.2		U	yes
MW12-5	8	9.7	Promethium-147	2.1	3.7	6.1			yes
SB12-6	0	3	Promethium-147	5.1	3.8	6.1			
SB12-10	0	0	Promethium-147	7.7	4.5	7.7	ND	UJ	
SB12-5	0	0.2	Promethium-147	1.3	5	8.4		UJ	
MW12-14	0	0.2	Promethium-147	6.9	5.2	8.4		UJ	
SB12-2	0	0.2	Promethium-147	3.7	5.1	8.4		UJ	
MW12-40	0	0.2	Promethium-147	0.4	5	8.4		UJ	
SS12-237	0	0.2	Promethium-147	6.5	3.7	6.5	ND	U	
SS12-241	0	0.2	Promethium-147	6.5	3.8	6.5	ND	U	
SS12-241	0	0.2	Promethium-147	6.5	3.7	6.5	ND	U	
SS12-256	0	0.2	Promethium-147	7.7	4.5	7.7	ND	UJ	
SS12-260	0	0.2	Promethium-147	1.2	3.9	6.5			
SS12-260	0	0.2	Promethium-147	1.2	3.9	6.5			
SS12-261	0	0.2	Promethium-147	6.5	3.8	6.5	ND	U	
SS12-262	0	0.2	Promethium-147	6.5	3.7	6.5	ND	U	
SS12-263	0	0.2	Promethium-147	6.5	3.8	6.5	ND	U	
SS12-264	0	0.2	Promethium-147	1.3	3.9	6.5		U	
SS12-265	0	0.2	Promethium-147	6.5	3.8	6.5	ND	U	
SS12-266	0	0.2	Promethium-147	1.4	4	6.5			
SS12-267	0	0.2	Promethium-147	6.5	2.8	6.5	ND	U	
SS12-268	0	0.2	Promethium-147	7.7	4.5	7.7	ND	UJ	
SS12-269	0	0.2	Promethium-147	1	3.9	6.5		U	

Table 1
Pm-147 Results in Soil at SEAD-12
Seneca Army Depot Activity, Romulus, NY

Sample Location	Top Depth (ft)	Bottom Depth (ft)	Radionuclide	Laboratory Value (pCi/g) (1)	Error +/- (pCi/g)	Lower Limit of Detection (pCi/g)	Laboratory Qualifier	Parsons ES Validator Qualifier	Background Location (2)?
SS12-269	0	0.2	Promethium-147	1	3.9	6.5		U	
SS12-271	0	0.2	Promethium-147	7.7	4.5	7.7	ND	UJ	
SS12-272	0	0.2	Promethium-147	7.7	4.5	7.7	ND	UJ	
SS12-273	0	0.2	Promethium-147	0.4	4.6	7.7		J	
SS12-274	0	0.2	Promethium-147	6.5	3.8	6.5	ND	U	
SS12-274	0	0.2	Promethium-147	6.5	3.8	6.5	ND	U	
SS12-274	0	0.2	Promethium-147	6.5	3.8	6.5	ND	U	
SS12-274	0	0.2	Promethium-147	6.5	3.8	6.5	ND	U	
SS12-275	0	0.2	Promethium-147	7.7	4.5	7.7	ND	UJ	
SS12-276	0	0.2	Promethium-147	6.5	3.8	6.5	ND	U	
SS12-276	0	0.2	Promethium-147	6.5	3.8	6.5	ND	U	
SS12-277	0	0.2	Promethium-147	7.7	4.5	7.7	ND	UJ	
SS12-278	0	0.2	Promethium-147	7.7	4.5	7.7	ND	UJ	
SS12-279	0	0.2	Promethium-147	6.5	3.8	6.5	ND	U	
SS12-279	0	0.2	Promethium-147	6.5	3.8	6.5	ND	U	
SB12-5	0	3	Promethium-147	1.7	3.7	6.1			
TP12-11C	0.5	0.5	Promethium-147	6.6	5.2	8.4		UJ	
TP12-12A	0.5	0.5	Promethium-147	2.5	5	8.4		UJ	
TP12-9A	0.5	0.5	Promethium-147	16.5	5.4	8.4		J	
TP12-12B	1.5	1.5	Promethium-147	2	5	8.4		UJ	
MW12-40	2	4	Promethium-147	4.1	5.1	8.4		UJ	
SB12-5	3	6	Promethium-147	2.6	3.7	6.1			
SB12-6	3	6	Promethium-147	95.7	6.1	6.1			
TP12-12C	4	4	Promethium-147	2.8	5.1	8.4		UJ	
MW12-40	4	6	Promethium-147	4.7	5.1	8.4		UJ	
SB12-6	6	9	Promethium-147	1.4	3.7	6.1			
TP12-11A	6	6	Promethium-147	5.9	5.1	8.4		UJ	
SB12-5	6	8	Promethium-147	2	5	8.4		UJ	
SB12-2	6	8	Promethium-147	3.9	5.1	8.4		UJ	
SB12-5	6	9	Promethium-147	4.7	3.8	6.1			
TP12-11B	6.5	6.5	Promethium-147	5.4	5.1	8.4		UJ	
MW12-14	8	10	Promethium-147	3.3	5.1	8.4		UJ	
SB12-6	9	12	Promethium-147	7	3.8	6.1			
SB12-5	9	12	Promethium-147	4.5	3.8	6.1			
MW12-14	10	12	Promethium-147	3	5.1	8.4		UJ	
SB12-2	10	12	Promethium-147	3	5.1	8.4		UJ	
SB12-5	12	14	Promethium-147	6.1	3.6	6.1	ND	U	
SB12-5	12	14	Promethium-147	0.6	5	8.4		UJ	
SB12-6	12	14.3	Promethium-147	4.6	3.8	6.1			

Notes:
(1) According to Core Laboratories, Core assigned a qualifier of "ND" whenever a result was either zero or negative. In these instances, Parsons ES assigned a value equal to the detection limit.
(2) Background locations SB12-7, SB12-8, SB12-9, and MW12-6 were not analyzed for Pm-147.

Table 2
Ra-226 in Soil Samples at SEAD-12
Seneca Army Depot Activity, Romulus, NY

Sample Location	Top Depth (ft)	Bottom Depth (ft)	Radionuclide	Laboratory Value (pCi/g) (1)	Error +/- (pCi/g)	Lower Limit of Detection (pCi/g)	Laboratory Qualifier	Parsons ES Validator Qualifier	Background Location?
SS12-13	0	0.2	Radium-226	1.3	0.3	0.1		J	yes
MW12-5	2	3.5	Radium-226	1.2	0.3	0.2		J	yes
MW12-4	6	8	Radium-226	1	0.3	0.2		J	yes
MW12-5	8	9.7	Radium-226	1.1	0.4	0.1		J	yes
MW12-1	0.2	2	Radium-226	1.2	0.3	0.1		J	yes
MW12-1	0	0.2	Radium-226	1.3		1.3	ND	UJ	yes
MW12-3	0	0.2	Radium-226	1.4	0.4	0.3		J	yes
MW12-3	0.2	2	Radium-226	1.5	0.4	0.2		J	yes
MW12-2	0	0.2	Radium-226	1.1	0.4	0.2		J	yes
MW12-2	2	4	Radium-226	1.6		1.6	ND	UJ	yes
SS12-2	0	0.2	Radium-226	1.7	0.5	0.2		J	yes
SS12-3	0	0.2	Radium-226	2.6	0.4	0.1		J	yes
SS12-6	0	0.2	Radium-226	1.8	0.5	0.2		J	yes
SS12-7	0	0.2	Radium-226	1.4	0.5	0.2		J	yes
SS12-11	0	0.2	Radium-226	1.2		1.2	ND	UJ	yes
SS12-13	0	0.2	Radium-226	1.6		1.6	ND	UJ	yes
SS12-10	0	0.2	Radium-226	1.4		1.4	ND	UJ	yes
SS12-9	0	0.2	Radium-226	2.5		2.5	ND	UJ	yes
SS12-8	0	0.2	Radium-226	1.6	0.5	0.2		J	yes
MW57-1	2	2.5	Radium-226	1.6	0.3	0.2		J	yes
MW34/M	1.5	2	Radium-226	1.5	0.4	0.2		J	yes
MW45-4	2	2.5	Radium-226	1.3		1.3	ND	UJ	yes
MW12-6	0	0.2	Radium-226	1.7	0.4	0.1			yes
SB12-7	4	5	Radium-226	1.6	0.5	0.2			yes
SB12-9	4	6	Radium-226	2.2	0.6	0.3			yes
MW12-6	4	6	Radium-226	1.2	0.4	0.2			yes
SB12-8	4	6	Radium-226	2.3	0.3	0.1			yes
MW12-6	6	8	Radium-226	1.4	0.4	0.2			yes
MW12-4	4	5.4	Radium-226	1	0.3	0.1		J	yes
MW12-4	0	0.2	Radium-226	1.9	0.4	0.1		J	yes
MW12-1	4	6	Radium-226	1.4	0.3	0.2		J	yes
MW12-3	6	8	Radium-226	1.5	0.4	0.2		J	yes
SS12-5	0	0.2	Radium-226	1.5		1.5	ND	UJ	yes
SS12-14	0	0.2	Radium-226	1.5		1.5	ND	UJ	yes
SS12-12	0	0.2	Radium-226	1.4	0.4	0.2		J	yes
SS12-4	0	0.2	Radium-226	1.3	0.3	0.1		J	yes
MW12-5	0	0.2	Radium-226	1.5	0.2	0.1		J	yes
SS12-1	0	0.2	Radium-226	1.6	0.3	0.1		J	yes
SB12-1	0	0.2	Radium-226	1.9	0.4	0.2			
SB12-6	0	3	Radium-226	1.3		1.3	ND	UJ	
SB12-6	6	9	Radium-226	1.9		1.9	ND	UJ	
SB12-6	9	12	Radium-226	2.1	0.5	0.2		J	
SB12-5	3	6	Radium-226	1.6		1.6	ND	UJ	
SB12-5	9	12	Radium-226	1.5	0.4	0.2		J	
SB12-5	12	14	Radium-226	1.1	0.4	0.2		J	
SB12-3	0	0.2	Radium-226	2.3	0.5	0.3			
SB12-3	10	11.9	Radium-226	2.2	0.5	0.2			
SB12-4	0	0.2	Radium-226	1.3		1.3	ND	U	
SB12-2	0.2	2	Radium-226	2.4	0.3	0.1			
SB12-2	8	10	Radium-226	1.5		1.5	ND	U	
SB12-10	0	0	Radium-226	2	0.4	0.1			
MW12-10	0	0.2	Radium-226	1.4	0.5	0.2			
MW12-11	0	0.2	Radium-226	1.6	0.4	0.2			
MW12-12	0	0.2	Radium-226	1.7	0.4	0.2			
MW12-13	0	0.2	Radium-226	1.6	0.4	0.2			
MW12-15	0	0.2	Radium-226	1.6	0.4	0.2			

Table 2
Ra-226 in Soil Samples at SEAD-12
Seneca Army Depot Activity, Romulus, NY

Sample Location	Top Depth (ft)	Bottom Depth (ft)	Radionuclide	Laboratory Value (pCi/g) (1)	Error +/- (pCi/g)	Lower Limit of Detection (pCi/g)	Laboratory Qualifier	Parsons ES Validator Qualifier	Background Location?
MW12-18	0	0.2	Radium-226	1.2	0.3	0.2		J	
MW12-19	0	0.2	Radium-226	2.3	0.6	0.2		J	
MW12-18	0	0.2	Radium-226	1.8	0.4	0.1		J	
MW12-20	0	0.2	Radium-226	1.8	0.3	0.1		J	
MW12-27	0	0.2	Radium-226	2.5	0.4	0.1			
SB12-28	0	0.2	Radium-226	2.1	0.4	0.1			
MW12-22	0	0.2	Radium-226	1.2	0.3	0.1			
SB12-5	0	0.2	Radium-226	1.2	0.4	0.2		J	
MW12-14	0	0.2	Radium-226	1.9	0.6	0.2			
SS12-16	0	0.2	Radium-226	1.9	0.4	0.1		J	
SS12-18	0	0.2	Radium-226	1.3	0.4	0.2		J	
SS12-19	0	0.2	Radium-226	1.6	0.4	0.1		J	
SS12-43	0	0.2	Radium-226	2.5	0.7	0.2		J	
SS12-55	0	0.2	Radium-226	2.1	0.5	0.2		J	
SS12-65	0	0.2	Radium-226	1.9	0.5	0.2		J	
SS12-67	0	0.2	Radium-226	1.9	0.4	0.1		J	
SB12-2	0	0.2	Radium-226	2.1	0.5	0.2			
MW12-40	0	0.2	Radium-226	2.2	0.4	0.1			
MW12-29	0	0.2	Radium-226	1.9	0.8	0.3			
MW12-30	0	0.2	Radium-226	1.4	0.5	0.3		J	
MW12-30	2	3.5	Radium-226	3.3	0.5	0.1		J	
MW12-30	0	0.2	Radium-226	1.5	0.5	0.3		J	
MW12-16	0	0.2	Radium-226	1.8	0.6	0.2		J	
MW12-17	0	0.2	Radium-226	1.2	0.4	0.2		J	
MW12-9	0	0.2	Radium-226	1.9	0.5	0.2			
MW12-24	0	0.2	Radium-226	1.6	0.4	0.2			
MW12-25	0	0.2	Radium-226	1.6	0.6	0.3			
MW12-26	0	0.2	Radium-226	1.7	0.5	0.2			
MW12-31	0	0.2	Radium-226	1.2	0.4	0.2		U	
MW12-32	0	0.2	Radium-226	1.2	0.5	0.3		U	
MW12-32	0	0.2	Radium-226	1.9	0.5	0.3		U	
MW12-7	0	0.2	Radium-226	1.8	0.4	0.1			
MW12-8	0	0.2	Radium-226	2	0.5	0.2			
MW12-35	0	0.2	Radium-226	1.7	0.7	0.3			
MW12-33	0	0.2	Radium-226	2.1	0.6	0.3			
MW12-34	0	0.2	Radium-226	1.7	0.4	0.2			
MW12-37	0	0.2	Radium-226	1.8	0.4	0.2			
MW12-37	0	0.2	Radium-226	1.2	0.3	0.2			
SS12-15	0	0.2	Radium-226	2	0.3	0.1		J	
SS12-17	0	0.2	Radium-226	2.2	0.5	0.2		J	
SS12-68	0	0.2	Radium-226	1.9	0.4	0.2		J	
SS12-20	0	0.2	Radium-226	2.1	0.5	0.2		J	
SS12-21	0	0.2	Radium-226	1.9	0.7	0.2		J	
SS12-22	0	0.2	Radium-226	3	0.6	0.2		J	
SS12-23	0	0.2	Radium-226	2.4	0.6	0.3		J	
SS12-24	0	0.2	Radium-226	1.8	0.4	0.1		J	
SS12-25	0	0.2	Radium-226	2.3	0.5	0.2		J	
SS12-26	0	0.2	Radium-226	1.7	0.5	0.3		J	
SS12-27	0	0.2	Radium-226	1.3	0.4	0.2		J	
SS12-27	0	0.2	Radium-226	3	0.4	0.1		J	
SS12-28	0	0.2	Radium-226	2.8	0.6	0.3		J	
SS12-29	0	0.2	Radium-226	3	0.6	0.3		J	
SS12-30	0	0.2	Radium-226	1.3	0.3	0.1		J	
SS12-31	0	0.2	Radium-226	1.8	0.5	0.2		J	
SS12-32	0	0.2	Radium-226	2.4	0.5	0.2		J	
SS12-33	0	0.2	Radium-226	1.3	0.3	0.1			

Table 2
Ra-226 in Soil Samples at SEAD-12
Seneca Army Depot Activity, Romulus, NY

Sample Location	Top Depth (ft)	Bottom Depth (ft)	Radionuclide	Laboratory Value (pCi/g) (1)	Error +/- (pCi/g)	Lower Limit of Detection (pCi/g)	Laboratory Qualifier	Parsons ES Validator Qualifier	Background Location?
SS12-34	0	0.2	Radium-226	0.3	0.2	0.1			
SS12-35	0	0.2	Radium-226	1.6	0.3	0.1			
SS12-36	0	0.2	Radium-226	0.1		0.1	ND	U	
SS12-37	0	0.2	Radium-226	2.8	0.6	0.2			
SS12-38	0	0.2	Radium-226	2.4	0.5	0.2			
SS12-39	0	0.2	Radium-226	0.5	0.2	0.1			
SS12-40	0	0.2	Radium-226	2.4	0.6	0.3		J	
SS12-41	0	0.2	Radium-226	0.4	0.2	0.1			
SS12-42	0	0.2	Radium-226	2.8	0.7	0.3			
SS12-44	0	0.2	Radium-226	0.1		0.1	ND	U	
SS12-45	0	0.2	Radium-226	0.2		0.2	ND	U	
SS12-46	0	0.2	Radium-226	2.7	0.6	0.3			
SS12-47	0	0.2	Radium-226	1.1	0.4	0.2			
SS12-48	0	0.2	Radium-226	0.8	0.2	0.1		J	
SS12-49	0	0.2	Radium-226	0.1		0.1	ND	UJ	
SS12-49	0	0.2	Radium-226	1.4	0.4	0.2			
SS12-50	0	0.2	Radium-226	2.3	0.6	0.3		J	
SS12-51	0	0.2	Radium-226	2.2	0.5	0.2		J	
SS12-52	0	0.2	Radium-226	1.7	0.4	0.2		J	
SS12-53	0	0.2	Radium-226	1.7	0.4	0.1		J	
SS12-54	0	0.2	Radium-226	1.6	0.3	0.1		J	
SS12-56	0	0.2	Radium-226	1.9	0.6	0.3		J	
SS12-57	0	0.2	Radium-226	1.8	0.6	0.2		J	
SS12-58	0	0.2	Radium-226	1.8	0.3	0.1		J	
SS12-59	0	0.2	Radium-226	1.4	0.4	0.1		J	
SS12-60	0	0.2	Radium-226	1.5	0.5	0.2		J	
SS12-61	0	0.2	Radium-226	1.7	0.4	0.2			
SS12-62	0	0.2	Radium-226	2.4	0.6	0.2		J	
SS12-63	0	0.2	Radium-226	0.6	0.5	0.2			
SS12-66	0	0.2	Radium-226	1.1	0.3	0.1		J	
SS12-70	0	0.2	Radium-226	1.2	0.3	0.1		J	
SS12-72	0	0.2	Radium-226	1.6	0.4	0.2		J	
SS12-73	0	0.2	Radium-226	1.2	0.2	0.1		J	
SS12-74	0	0.2	Radium-226	1.3	0.4	0.2		J	
SS12-75	0	0.2	Radium-226	1.4	0.5	0.2		J	
SS12-68	0	0.2	Radium-226	1.8	0.6	0.2		J	
SS12-77	0	0.2	Radium-226	1.1	0.3	0.2		J	
SS12-78	0	0.2	Radium-226	1.2	0.3	0.2		J	
SS12-79	0	0.2	Radium-226	1.5	0.5	0.2		J	
SS12-80	0	0.2	Radium-226	0.9	0.3	0.2		J	
SS12-81	0	0.2	Radium-226	1.7	0.4	0.2		J	
SS12-82	0	0.2	Radium-226	0.7	0.2	0.1		J	
SS12-83	0	0.2	Radium-226	1	0.3	0.2		J	
SS12-84	0	0.2	Radium-226	2.5	0.6	0.2		J	
SS12-85	0	0.2	Radium-226	1.2	0.5	0.2		J	
SS12-86	0	0.2	Radium-226	1.3	0.5	0.2		J	
SS12-87	0	0.2	Radium-226	1.6	0.3	0.1		J	
SS12-88	0	0.2	Radium-226	0.9	0.2	0.1		J	
SS12-89	0	0.2	Radium-226	2.8	0.3	0.1			
SS12-87	0	0.2	Radium-226	2.3	0.5	0.2		J	
SS12-90	0	0.2	Radium-226	1.8	0.6	0.3		J	
SS12-91	0	0.2	Radium-226	2.4	0.4	0.2		J	
SS12-92	0	0.2	Radium-226	1.3	0.4	0.1		J	
SS12-93	0	0.2	Radium-226	1	0.4	0.1		J	
SS12-94	0	0.2	Radium-226	1.4	0.4	0.2		J	
SS12-94	0	0.2	Radium-226	1.6	0.3	0.1		J	

Table 2
Ra-226 in Soil Samples at SEAD-12
Seneca Army Depot Activity, Romulus, NY

Sample Location	Top Depth (ft)	Bottom Depth (ft)	Radionuclide	Laboratory Value (pCi/g) (1)	Error +/- (pCi/g)	Lower Limit of Detection (pCi/g)	Laboratory Qualifier	Parsons ES Validator Qualifier	Background Location?
SS12-95	0	0.2	Radium-226	1.2	0.4	0.2		J	
SS12-96	0	0.2	Radium-226	1.8	0.4	0.2		J	
SS12-97	0	0.2	Radium-226	1.6	0.3	0.1		J	
SS12-98	0	0.2	Radium-226	1.1	0.2	0.1		J	
SS12-99	0	0.2	Radium-226	1.6	0.6	0.2		J	
SS12-100	0	0.2	Radium-226	1.3	0.4	0.2		J	
SS12-101	0	0.2	Radium-226	1.4	0.3	0.1		J	
SS12-102	0	0.2	Radium-226	1.6	0.3	0.1		J	
SS12-103	0	0.2	Radium-226	1.4	0.4	0.1		J	
SS12-104	0	0.2	Radium-226	2.3	0.5	0.2		J	
SS12-105	0	0.2	Radium-226	1.2	0.3	0.2		J	
SS12-106	0	0.2	Radium-226	1.4	0.3	0.1		J	
SS12-107	0	0.2	Radium-226	1.2	0.3	0.1		J	
SS12-108	0	0.2	Radium-226	1.9	0.4	0.2		J	
SS12-109	0	0.2	Radium-226	1.6	0.3	0.1			
SS12-110	0	0.2	Radium-226	2.2	0.5	0.1		J	
SS12-111	0	0.2	Radium-226	2.3	0.5	0.2		J	
SS12-112	0	0.2	Radium-226	2	0.4	0.2		J	
SS12-113	0	0.2	Radium-226	1.8	0.6	0.3		J	
SS12-114	0	0.2	Radium-226	2.6	0.7	0.3		J	
SS12-115	0	0.2	Radium-226	1.6	0.4	0.2			
SS12-116	0	0.2	Radium-226	1.7	0.4	0.2		J	
SS12-117	0	0.2	Radium-226	2	0.4	0.1		J	
SS12-118	0	0.2	Radium-226	2.1	0.5	0.2		J	
SS12-119	0	0.2	Radium-226	1.4	0.3	0.1		J	
SS12-121	0	0.2	Radium-226	1.6	0.3	0.1		J	
SS12-122	0	0.2	Radium-226	1.7	0.4	0.1			
SS12-123	0	0.2	Radium-226	2.1	0.5	0.1		J	
SS12-124	0	0.2	Radium-226	1	0.3	0.1			
SS12-125	0	0.2	Radium-226	1.3	0.3	0.1			
SS12-126	0	0.2	Radium-226	2.2	0.5	0.2			
SS12-123	0	0.2	Radium-226	1.2	0.4	0.2		J	
SS12-127	0	0.2	Radium-226	1.6	0.5	0.2			
SS12-128	0	0.2	Radium-226	1.8	0.3	0.1			
SS12-129	0	0.2	Radium-226	3.5	0.6	0.2		J	
SS12-130	0	0.2	Radium-226	1.3	0.3	0.1			
SS12-131	0	0.2	Radium-226	1.5	0.5	0.2			
SS12-132	0	0.2	Radium-226	1.8	0.4	0.2			
SS12-133	0	0.2	Radium-226	1.3	0.3	0.1			
SS12-134	0	0.2	Radium-226	2.9	0.6	0.2			
SS12-135	0	0.2	Radium-226	1.5	0.3	0.1			
SS12-136	0	0.2	Radium-226	1.5	0.3	0.1			
SS12-137	0	0.2	Radium-226	1.5	0.4	0.1		J	
SS12-138	0	0.2	Radium-226	1.5	0.4	0.2			
SS12-139	0	0.2	Radium-226	1.8	0.5	0.2			
SS12-140	0	0.2	Radium-226	1.2	0.4	0.2			
SS12-141	0	0.2	Radium-226	1	0.3	0.2			
SS12-141	0	0.2	Radium-226	1.6	0.4	0.2			
SS12-142	0	0.2	Radium-226	1.9	0.5	0.1			
SS12-143	0	0.2	Radium-226	1.2	0.2	0.1			
SS12-144	0	0.2	Radium-226	1	0.2	0.1			
SS12-145	0	0.2	Radium-226	2.8	0.4	0.1		J	
SS12-146	0	0.2	Radium-226	1.5	0.3	0.1			
SS12-147	0	0.2	Radium-226	1.8	0.5	0.2			
SS12-148	0	0.2	Radium-226	1.8	0.5	0.2		J	
SS12-149	0	0.2	Radium-226	1.5	0.2	0.1			

Table 2
Ra-226 in Soil Samples at SEAD-12
Seneca Army Depot Activity, Romulus, NY

Sample Location	Top Depth (ft)	Bottom Depth (ft)	Radionuclide	Laboratory Value (pCi/g) (1)	Error +/- (pCi/g)	Lower Limit of Detection (pCi/g)	Laboratory Qualifier	Parsons ES Validator Qualifier	Background Location?
SS12-150	0	0.2	Radium-226	2.3	0.4	0.1		J	
SS12-151	0	0.2	Radium-226	1.8	0.5	0.2			
SS12-152	0	0.2	Radium-226	1	0.2	0.1			
SS12-153	0	0.2	Radium-226	1.7	0.4	0.1			
SS12-154	0	0.2	Radium-226	1.3	0.3	0.2			
SS12-155	0	0.2	Radium-226	1.9	0.4	0.1		J	
SS12-156	0	0.2	Radium-226	1.1	0.2	0.1			
SS12-157	0	0.2	Radium-226	1.4	0.4	0.2			
SS12-158	0	0.2	Radium-226	5.8	0.8	0.3		J	
SS12-159	0	0.2	Radium-226	1.8	0.4	0.1			
SS12-160	0	0.2	Radium-226	2.5	0.5	0.2			
SS12-162	0	0.2	Radium-226	1.3	0.4	0.2			
SS12-163	0	0.2	Radium-226	1.2	0.3	0.1			
SS12-164	0	0.2	Radium-226	1.7	0.3	0.1			
SS12-165	0	0.2	Radium-226	2	0.5	0.3			
SS12-166	0	0.2	Radium-226	1.5	0.4	0.1			
SS12-120	0	0.2	Radium-226	1.2	0.3	0.1		J	
SS12-168	0	0.2	Radium-226	1.3	0.5	0.3			
SS12-169	0	0.2	Radium-226	1.7	0.4	0.2		J	
SS12-170	0	0.2	Radium-226	1.8	0.6	0.2			
SS12-172	0	0.2	Radium-226	1	0.3	0.1		J	
SS12-173	0	0.2	Radium-226	2.5	0.4	0.1			
SS12-174	0	0.2	Radium-226	1.4	0.3	0.1			
SS12-175	0	0.2	Radium-226	1.7	0.5	0.2			
SS12-176	0	0.2	Radium-226	1.3	0.5	0.2			
SS12-177	0	0.2	Radium-226	2	0.5	0.1			
SS12-178	0	0.2	Radium-226	1.8	0.5	0.2			
SS12-179	0	0.2	Radium-226	1.4	0.4	0.1			
SS12-180	0	0.2	Radium-226	1.3	0.4	0.2			
SS12-181	0	0.2	Radium-226	2.1	0.5	0.2			
SS12-182	0	0.2	Radium-226	1.8	0.4	0.1			
SS12-183	0	0.2	Radium-226	2.9	0.5	0.1		J	
SS12-184	0	0.2	Radium-226	1.2	0.2	0.1			
SS12-185	0	0.2	Radium-226	2.3	0.5	0.1			
SS12-186	0	0.2	Radium-226	1.2	0.3	0.1			
SS12-187	0	0.2	Radium-226	2.1	0.4	0.1			
SS12-188	0	0.2	Radium-226	1.7	0.3	0.1			
SS12-189	0	0.2	Radium-226	1.5	0.4	0.1			
SS12-190	0	0.2	Radium-226	2.3	0.4	0.1			
SS12-191	0	0.2	Radium-226	2	0.4	0.2			
SS12-192	0	0.2	Radium-226	1.1	0.2	0.1			
SS12-193	0	0.2	Radium-226	3.1	0.7	0.3			
SS12-194	0	0.2	Radium-226	1.3	0.3	0.1			
SS12-195	0	0.2	Radium-226	1.5	0.3	0.1		J	
SS12-196	0	0.2	Radium-226	1.5	0.3	0.2			
SS12-197	0	0.2	Radium-226	1.2	0.3	0.1			
SS12-198	0	0.2	Radium-226	1.1	0.3	0.2			
SS12-199	0	0.2	Radium-226	1.6	0.3	0.1			
SS12-200	0	0.2	Radium-226	1.9	0.4	0.1			
SS12-201	0	0.2	Radium-226	1.5	0.4	0.2			
SS12-169	0	0.2	Radium-226	1.2	0.3	0.1		J	
SS12-202	0	0.2	Radium-226	1.6	0.5	0.2			
SS12-203	0	0.2	Radium-226	1	0.6	0.2			
SS12-204	0	0.2	Radium-226	2	0.5	0.2			
SS12-205	0	0.2	Radium-226	1.4	0.4	0.2			
SS12-206	0	0.2	Radium-226	1.7	0.5	0.2			

Table 2
Ra-226 in Soil Samples at SEAD-12
Seneca Army Depot Activity, Romulus, NY

Sample Location	Top Depth (ft)	Bottom Depth (ft)	Radionuclide	Laboratory Value (pCi/g) (1)	Error +/- (pCi/g)	Lower Limit of Detection (pCi/g)	Laboratory Qualifier	Parsons ES Validator Qualifier	Background Location?
SS12-207	0	0.2	Radium-226	2.6	0.5	0.3		J	
SS12-208	0	0.2	Radium-226	1.8	0.4	0.1			
SS12-234	0	0.2	Radium-226	1.5	0.3	0.2			
SS12-210	0	0.2	Radium-226	1.9	0.5	0.2		J	
SS12-211	0	0.2	Radium-226	1.3	0.3	0.1		J	
SS12-212	0	0.2	Radium-226	1.7	0.4	0.2			
SS12-213	0	0.2	Radium-226	1.6	0.3	0.1		J	
SS12-214	0	0.2	Radium-226	1.6	0.3	0.1		J	
SS12-215	0	0.2	Radium-226	2.1	0.6	0.2		J	
SS12-216	0	0.2	Radium-226	3.3	0.5	0.3		J	
SS12-217	0	0.2	Radium-226	2.2	0.6	0.2		J	
SS12-218	0	0.2	Radium-226	1.7	0.3	0.1		J	
SS12-219	0	0.2	Radium-226	1.8	0.3	0.1			
SS12-220	0	0.2	Radium-226	0.9	0.3	0.2		J	
SS12-237	0	0.2	Radium-226	1.7	0.6	0.3			
SS12-223	0	0.2	Radium-226	4.8	0.6	0.1			
SS12-224	0	0.2	Radium-226	1.8	0.5	0.2		J	
SS12-225	0	0.2	Radium-226	1.4	0.5	0.3			
SS12-226	0	0.2	Radium-226	1.9	0.5	0.2			
SS12-227	0	0.2	Radium-226	1.6	0.3	0.1		J	
SS12-228	0	0.2	Radium-226	2.8	0.6	0.3		J	
SS12-229	0	0.2	Radium-226	2.2	0.6	0.2			
SS12-230	0	0.2	Radium-226	1.6	0.5	0.2		J	
SS12-232	0	0.2	Radium-226	1.8	0.5	0.3			
SS12-232	0	0.2	Radium-226	1.8	0.4	0.1			
SS12-233	0	0.2	Radium-226	1.3	0.3	0.1		J	
SS12-201	0	0.2	Radium-226	1.4	0.3	0.1			
SS12-167	0	0.2	Radium-226	2.6	0.6	0.3		J	
SS12-235	0	0.2	Radium-226	1.4	0.3	0.1		J	
SS12-236	0	0.2	Radium-226	1.6	0.5	0.2		J	
SS12-238	0	0.2	Radium-226	2.9	0.6	0.2		J	
SS12-239	0	0.2	Radium-226	1.6	0.5	0.2			
SS12-240	0	0.2	Radium-226	1.5	0.5	0.2			
SS12-241	0	0.2	Radium-226	1.5	0.3	0.1			
SS12-241	0	0.2	Radium-226	1	0.3	0.1			
SS12-242	0	0.2	Radium-226	1.2	0.4	0.1			
SS12-243	0	0.2	Radium-226	2	0.5	0.3			
SS12-244	0	0.2	Radium-226	2	0.6	0.2			
SS12-245	0	0.2	Radium-226	2.2	0.4	0.1			
SS12-246	0	0.2	Radium-226	1.6	0.4	0.1			
SS12-247	0	0.2	Radium-226	1.7	0.5	0.2			
SS12-248	0	0.2	Radium-226	1.7	0.4	0.1			
SS12-249	0	0.2	Radium-226	2.5	0.5	0.1			
SS12-250	0	0.2	Radium-226	3.8	1	0.4			
SS12-251	0	0.2	Radium-226	1.7	0.4	0.1		J	
SS12-252	0	0.2	Radium-226	1.7	0.5	0.1		J	
SS12-253	0	0.2	Radium-226	1.7	0.4	0.3		J	
SS12-254	0	0.2	Radium-226	1.4	0.3	0.1		J	
SS12-255	0	0.2	Radium-226	1.1	0.3	0.1		J	
SS12-256	0	0.2	Radium-226	2.4	0.5	0.2			
SS12-257	0	0.2	Radium-226	1.7	0.5	0.2		J	
SS12-258	0	0.2	Radium-226	1.5	0.4	0.2		J	
SS12-259	0	0.2	Radium-226	1.5	0.3	0.1		J	
SS12-260	0	0.2	Radium-226	2.4	0.5	0.1		J	
SS12-260	0	0.2	Radium-226	1.1	0.4	0.1		J	
SS12-261	0	0.2	Radium-226	1.6	0.4	0.2			

Table 2
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Seneca Army Depot Activity, Romulus, NY

Sample Location	Top Depth (ft)	Bottom Depth (ft)	Radionuclide	Laboratory Value (pCi/g) (1)	Error +/- (pCi/g)	Lower Limit of Detection (pCi/g)	Laboratory Qualifier	Parsons ES Validator Qualifier	Background Location?
SS12-262	0	0.2	Radium-226	1.6	0.4	0.1			
SS12-263	0	0.2	Radium-226	1.8	0.6	0.3			
SS12-264	0	0.2	Radium-226	1.7	0.5	0.2			
SS12-265	0	0.2	Radium-226	1.8	0.5	0.2			
SS12-266	0	0.2	Radium-226	1.7	0.4	0.1			
SS12-267	0	0.2	Radium-226	2.8	0.5	0.2			
SS12-268	0	0.2	Radium-226	2.2	0.6	0.2			
SS12-269	0	0.2	Radium-226	1.8	0.3	0.1			
SS12-269	0	0.2	Radium-226	1.8	0.3	0.1			
SS12-270	0	0.2	Radium-226	1.6	0.3	0.1		J	
SS12-271	0	0.2	Radium-226	1.8	0.5	0.2			
SS12-272	0	0.2	Radium-226	1.9	0.4	0.1			
SS12-273	0	0.2	Radium-226	2.2	0.6	0.3			
SS12-274	0	0.2	Radium-226	2.5	0.3	0.1			
SS12-274	0	0.2	Radium-226	2.5	0.3	0.1			
SS12-274	0	0.2	Radium-226	1.3	0.3	0.1			
SS12-274	0	0.2	Radium-226	1.3	0.3	0.1			
SS12-275	0	0.2	Radium-226	0.8	0.2	0.1			
SS12-276	0	0.2	Radium-226	2.2	0.5	0.2			
SS12-276	0	0.2	Radium-226	2.2	0.5	0.2			
SS12-277	0	0.2	Radium-226	2.1	0.6	0.2			
SS12-278	0	0.2	Radium-226	3	0.6	0.1			
SS12-279	0	0.2	Radium-226	1.6	0.5	0.2			
SS12-279	0	0.2	Radium-226	1.6	0.5	0.2			
SS12-155	0	0.2	Radium-226	1.2	0.3	0.1		J	
SS12-64	0	0.5	Radium-226	1.7	0.5	0.3			
SS12-64	0	0.5	Radium-226	1.5	0.5	0.2			
MW12-21	0	0.8	Radium-226	1.9	0.7	0.4			
MW12-23	0	2	Radium-226	2	0.5	0.1			
TP12-20A	0.5	0.5	Radium-226	1.2	0.4	0.3			
TP12-14A	0.5	0.5	Radium-226	2	0.6	0.2			
TP12-20A	0.5	0.5	Radium-226	1.3	0.4	0.1			
TP12-18A	0.5	0.5	Radium-226	1.4	0.4	0.1			
TP12-19A	0.5	0.5	Radium-226	1.4	0.3	0.1			
TP12-17B	0.5	0.5	Radium-226	2.3	0.4	0.1		U	
TP12-22A	0.5	0.5	Radium-226	2.1	0.6	0.3			
TP12-22B	0.5	0.5	Radium-226	1.9	0.4	0.1			
TP12-25A	0.5	0.5	Radium-226	1.7	0.5	0.2			
TP12-26A	0.5	0.5	Radium-226	1.6	0.3	0.1			
TP12-25A	0.5	0.5	Radium-226	1.5	0.4	0.2			
TP12-4A	0.5	0.5	Radium-226	2.2	0.3	0.1			
TP12-5A	0.5	0.5	Radium-226	1.6	0.4	0.1			
TP12-5A	0.5	0.5	Radium-226	1.7	0.3	0.1			
TP12-24A	0.5	0.5	Radium-226	1.4	0.4	0.2		J	
TP12-24B	0.5	0.5	Radium-226	2.1	0.4	0.2		J	
TP12-11C	0.5	0.5	Radium-226	2.4	0.4	0.1			
TP12-12A	0.5	0.5	Radium-226	2.3	0.7	0.3			
TP12-9A	0.5	0.5	Radium-226	1.9	0.6	0.2			
TP12-1A	0.5	0.5	Radium-226	2.4	0.5	0.2		J	
TP12-16C	0.5	2	Radium-226	1.3	0.4	0.2			
TP12-16A	0.6	0.6	Radium-226	1.7	0.3	0.1			
TP12-21A	0.7	0.7	Radium-226	1.2	0.3	0.1			
TP12-15C	0.8	0.8	Radium-226	1.9	0.4	0.1		J	
TP12-13A	0.8	0.8	Radium-226	1.5	0.5	0.2		J	
TP12-3A	0.8	0.8	Radium-226	2.4	0.4	0.1		U	
TP12-3A	0.8	0.8	Radium-226	1.6	0.3	0.1		U	

Table 2
Ra-226 in Soil Samples at SEAD-12
Seneca Army Depot Activity, Romulus, NY

Sample Location	Top Depth (ft)	Bottom Depth (ft)	Radionuclide	Laboratory Value (pCi/g) (1)	Error +/- (pCi/g)	Lower Limit of Detection (pCi/g)	Laboratory Qualifier	Parsons ES Validator Qualifier	Background Location?
TP12-10A	1	1	Radium-226	1.9	0.4	0.1			
TP12-10A	1	1	Radium-226	1.5	0.4	0.2			
TP12-25B	1	1	Radium-226	1.3	0.3	0.1			
TP12-24C	1	1	Radium-226	1.1	0.3	0.1		J	
TP12-9B	1	1	Radium-226	1.6	0.5	0.3			
TP12-7BA	1	1	Radium-226	0.9	0.4	0.2			
TP12-7AA	1	1	Radium-226	2	0.5	0.2			
TP12-8A	1	1	Radium-226	1.1	0.3	0.1			
TP12-23A	1	1	Radium-226	1.6	0.4	0.4		J	
MW12-38	1	1.2	Radium-226	1	0.3	0.1		U	
TP12-26B	1.3	1.3	Radium-226	2	0.5	0.1			
TP12-14B	1.5	1.5	Radium-226	2.2	0.4	0.1			
TP12-13C	1.5	1.5	Radium-226	1.2	0.3	0.1		J	
TP12-22B	1.5	1.5	Radium-226	1.6	0.6	0.2			
TP12-12B	1.5	1.5	Radium-226	1.9	0.6	0.3			
MW12-39	1.5	2.4	Radium-226	2.3	0.5	0.2			
TP12-14C	2	2	Radium-226	1.7	0.6	0.3			
TP12-19B	2	2	Radium-226	1.4	0.5	0.2			
TP12-15B	2	2	Radium-226	2.6	0.6	0.3		J	
TP12-17A	2	2	Radium-226	2.1	0.4	0.1		U	
TP12-16B	2	2	Radium-226	2.6	0.4	0.1		J	
TP12-10B	2	2	Radium-226	1.4	0.5	0.2			
TP12-25C	2	2	Radium-226	2.2	0.5	0.2			
TP12-5B	2	2	Radium-226	2	0.6	0.2			
TP12-7BB	2	2	Radium-226	1.3	0.4	0.2			
TP12-8C	2	2	Radium-226	1.3	0.4	0.2			
TP12-23B	2	2	Radium-226	1	0.3	0.1		J	
MW12-32	2	3	Radium-226	2.5	0.8	0.2		U	
MW12-27	2	4	Radium-226	1.7	0.3	0.1			
MW12-22	2	4	Radium-226	1.7	0.3	0.1			
MW12-23	2	4	Radium-226	1.6	0.3	0.1			
MW12-40	2	4	Radium-226	1.8	0.4	0.1			
MW12-24	2	4	Radium-226	1.6	0.4	0.1			
MW12-25	2	4	Radium-226	1.8	0.6	0.2			
MW12-26	2	4	Radium-226	2.4	0.6	0.2			
MW12-31	2	4	Radium-226	2.2	0.5	0.2		U	
MW12-37	2	4	Radium-226	1.8	0.3	0.1			
TP12-20B	2.5	2.5	Radium-226	1.6	0.3	0.1			
TP12-9C	2.5	2.5	Radium-226	1.4	0.4	0.2			
TP12-6A	2.5	2.5	Radium-226	1.7	0.4	0.2			
TP12-21B	3	3	Radium-226	1.6	0.4	0.3			
TP12-17C	3	3	Radium-226	1.8	0.4	0.1		U	
TP12-26C	3	3	Radium-226	1	0.3	0.1			
TP12-8B	3	3	Radium-226	1.1	0.3	0.1			
TP12-23C	3	3	Radium-226	1.7	0.5	0.2		J	
TP12-1B	3	3	Radium-226	1.8	0.4	0.2		J	
TP12-2A	3	3	Radium-226	1.7	0.4	0.2		J	
TP12-6B	3	3	Radium-226	2	0.3	0.1			
MW12-38	3	4	Radium-226	1.7	0.5	0.2			
TP12-15A	3.5	3.5	Radium-226	1.5	0.4	0.1		J	
TP12-2B	3.5	3.5	Radium-226	1.9	0.5	0.3		J	
TP12-6C	3.5	3.5	Radium-226	1.7	0.5	0.2			
TP12-18B	4	4	Radium-226	1.6	0.3	0.1			
TP12-3C	4	4	Radium-226	1.4	0.5	0.2		U	
TP12-12C	4	4	Radium-226	2.3	0.6	0.3			
MW12-11	4	5.6	Radium-226	1.3	0.3	0.1			

Table 2
Ra-226 in Soil Samples at SEAD-12
Seneca Army Depot Activity, Romulus, NY

Sample Location	Top Depth (ft)	Bottom Depth (ft)	Radionuclide	Laboratory Value (pCi/g) (1)	Error +/- (pCi/g)	Lower Limit of Detection (pCi/g)	Laboratory Qualifier	Parsons ES Validator Qualifier	Background Location?
MW12-10	4	5.7	Radium-226	2.8	0.6	0.2			
MW12-12	4	6	Radium-226	1.7	0.5	0.3			
MW12-13	4	6	Radium-226	1.2	0.2	0.1			
MW12-20	4	6	Radium-226	2.1	0.4	0.1			
MW12-21	4	6	Radium-226	1.6	0.4	0.2			
MW12-27	4	6	Radium-226	2.1	0.6	0.3			
MW12-40	4	6	Radium-226	1.7	0.5	0.2			
MW12-16	4	6	Radium-226	1.8	0.5	0.3		J	
MW12-7	4	6	Radium-226	1.4	0.5	0.2			
MW12-8	4	6	Radium-226	2.1	0.5	0.2			
MW12-34	4	6	Radium-226	1.8	0.5	0.2			
TP12-18C	4.5	4.5	Radium-226	1.4	0.4	0.2			
TP12-21C	5.5	5.5	Radium-226	2.1	0.4	0.1			
TP12-19C	5.5	5.5	Radium-226	1.5	0.3	0.1			
TP12-13B	5.5	5.5	Radium-226	1.9	0.5	0.1		J	
TP12-10C	5.5	5.5	Radium-226	1.8	0.5	0.2			
TP12-3B	5.5	5.5	Radium-226	1.6	0.4	0.2		U	
TP12-20C	6	6	Radium-226	1.8	0.4	0.2			
TP12-4B	6	6	Radium-226	1.4	0.3	0.1			
TP12-11A	6	6	Radium-226	1.8	0.4	0.2			
TP12-1C	6	6	Radium-226	1.9	0.5	0.2		J	
TP12-2C	6	6	Radium-226	2.2	0.5	0.1		J	
MW12-15	6	8	Radium-226	1.3	0.4	0.1			
MW12-18	6	8	Radium-226	1.7	0.5	0.2		J	
MW12-19	6	8	Radium-226	1.6	0.5	0.3		J	
MW12-20	6	8	Radium-226	2.8	0.7	0.2			
MW12-21	6	8	Radium-226	1.5	0.3	0.1			
SB12-5	6	8	Radium-226	1.7	0.6	0.2		J	
SB12-2	6	8	Radium-226	1.3	0.4	0.2			
MW12-16	6	8	Radium-226	1.9	0.4	0.3		J	
MW12-17	6	8	Radium-226	1.5	0.4	0.1			
MW12-9	6	8	Radium-226	1.4	0.4	0.2			
MW12-24	6	8	Radium-226	1.8	0.5	0.2			
MW12-25	6	8	Radium-226	1.3	0.5	0.3			
MW12-26	6	8	Radium-226	1.6	0.7	0.3			
MW12-33	6	8	Radium-226	1.9	0.5	0.2			
TP12-11B	6.5	6.5	Radium-226	1.5	0.7	0.4			
TP12-4C	8	8	Radium-226	1.8	0.5	0.3			
TP12-5C	8	8	Radium-226	1.9	0.5	0.2			
MW12-13	8	9.6	Radium-226	2.8	0.4	0.1			
MW12-10	8	9.8	Radium-226	1.5	0.4	0.1			
MW12-11	8	10	Radium-226	2	0.5	0.3			
MW12-15	8	10	Radium-226	1.8	0.4	0.2			
MW12-19	8	10	Radium-226	2.3	0.6	0.2		J	
MW12-14	8	10	Radium-226	1.7	0.5	0.2			
MW12-7	8	10	Radium-226	1.9	0.4	0.2			
MW12-8	8	10	Radium-226	1.5	0.4	0.2			
MW12-12	9	11	Radium-226	1.7	0.4	0.1			
MW12-33	10	0	Radium-226	1.9	0.5	0.2			
MW12-18	10	12	Radium-226	2.5	0.6	0.2		J	
MW12-14	10	12	Radium-226	1.3	0.4	0.2			
SB12-2	10	12	Radium-226	1.5	0.4	0.3			
MW12-17	10	12	Radium-226	1.6	0.4	0.1			
MW12-9	10	12	Radium-226	2.2	0.5	0.2			
MW12-35	10	12	Radium-226	2.1	0.6	0.2			
MW12-34	10	12	Radium-226	1.5	0.3	0.1			

Table 2
Ra-226 in Soil Samples at SEAD-12
Seneca Army Depot Activity, Romulus, NY

Sample Location	Top Depth (ft)	Bottom Depth (ft)	Radionuclide	Laboratory Value (pCi/g) (1)	Error +/- (pCi/g)	Lower Limit of Detection (pCi/g)	Laboratory Qualifier	Parsons ES Validator Qualifier	Background Location?
SB12-5	12	14	Radium-226	1.6	0.4	0.2		J	
MW12-35	14	15.5	Radium-226	1.4	0.3	0.1			
SS12-71	0	0.2	Radium-226	2.1	0.5	0.2		J	
SS12-69	0	0.2	Radium-226	1.3	0.3	0.1		J	
SS12-161	0	0.2	Radium-226	1.1	0.3	0.1			
SS12-222	0	0.2	Radium-226	2.1	0.5	0.2		J	
SB12-6	3	6	Radium-226	1.6	0.4	0.1		J	
SB12-6	12	14.3	Radium-226	1		1	ND	UJ	
SB12-5	6	9	Radium-226	1.3	0.4	0.3		J	
SB12-3	1	4	Radium-226	1.3	0.3	0.1			
SB12-4	2	4	Radium-226	1.1	0.3	0.1			
SB12-2	0	0.2	Radium-226	39.8	1.9	0.4			
SB12-1	0	0.2	Radium-226	1.7	0.4	0.2			
SB12-4	4	6	Radium-226	1.7	0.4	0.2			
SB12-5	0	3	Radium-226	2.1	0.5	0.2		J	

(1) According to Core Laboratories, Core assigned a qualifier of "ND" whenever a result was either zero or negative. In these instances, Parsons ES assigned a value equal to the detection limit.

Table 3
Tritium Results in Surface Water at SEAD-12
Seneca Army Depot Activity, Romulus, NY

Sample Location	Radionuclide	Laboratory Value (pCi/L) (1)	Error +/- (pCi/L)	Lower Limit of Detection (pCi/L)	Laboratory Qualifier	Parsons ES Validator Qualifier	Off-Site Location?
SW12-63	Tritium	289	169	289	ND	UJ	yes
SW12-59	Tritium	158	184	302		J	yes
SW12-65	Tritium	153	177	290		UJ	yes
SW12-66	Tritium	58.6	173	290		UJ	yes
SW12-50	Tritium	149	179	296		J	yes
SW12-49	Tritium	85.6	174	291		J	yes
SW12-48	Tritium	36	169	284		J	yes
SW12-58	Tritium	207	168	268		J	yes
SW12-57	Tritium	234	170	269		J	yes
SW12-55	Tritium	261	169	263		J	yes
SW12-52	Tritium	324	173	267		J	yes
SW12-53	Tritium	140	165	269		J	yes
SW12-51	Tritium	81.1	174	290		J	yes
SW12-63	Tritium	13.5	181	310		J	yes
SW12-61	Tritium	113	176	292		UJ	yes
SW12-51	Tritium	176	187	310		J	yes
SW12-56	Tritium	270	170	266		J	yes
SW12-54	Tritium	243	171	271		J	yes
SW12-67	Tritium	113	186	310		J	yes
SW12-60	Tritium	63.1	180	303		J	yes
SW12-64	Tritium	286	167	286	ND	UJ	yes
SW12-41	Tritium	49.5	179	299		J	
SW12-33	Tritium	40.5	183	311		J	
SW12-32	Tritium	31.5	179	301		J	
SW12-31	Tritium	13.5	179	303		J	
SW12-30	Tritium	299	177	299	ND	UJ	
SW12-28	Tritium	4.5	178	300		J	
SW12-34	Tritium	63.1	184	310		J	
SW12-24	Tritium	63.1	188	317		J	
SW12-23	Tritium	313	182	313	ND	U	
SW12-7	Tritium	67.6	192	326		J	
SW12-6	Tritium	321	185	321	ND	U	
SW12-10	Tritium	369	194	309		J	
SW12-39	Tritium	225	180	292		J	
SW12-38	Tritium	67.6	172	289		J	
SW12-16	Tritium	85.6	172	287		J	
SW12-37	Tritium	293	182	290		J	
SW12-36	Tritium	81.1	171	286		J	
SW12-36	Tritium	167	176	289		J	
SW12-17	Tritium	432	230	382		J	
SW12-35	Tritium	342	210	347		J	
SW12-15	Tritium	279	183	293		J	
SW12-14	Tritium	104	172	285		J	

Table 3
Tritium Results in Surface Water at SEAD-12
Seneca Army Depot Activity, Romulus, NY

Sample Location	Radionuclide	Laboratory Value (pCi/L) (1)	Error +/- (pCi/L)	Lower Limit of Detection (pCi/L)	Laboratory Qualifier	Parsons ES Validator Qualifier	Off-Site Location?
SW12-4	Tritium	297	180	285		J	
SW12-1	Tritium	225	180	292		J	
SW12-19	Tritium	4.5	184	315		UJ	
SW12-13	Tritium	171	196	326		UJ	
SW12-12	Tritium	108	189	316		UJ	
SW12-46	Tritium	176	175	285		J	
SW12-20	Tritium	203	176	286		J	
SW12-47	Tritium	302	184	292		J	
SW12-45	Tritium	36	176	295		J	
SW12-43	Tritium	310	179	310	ND	UJ	
SW12-44	Tritium	266	172	270		J	
SW12-11	Tritium	207	186	301		J	
SW12-42	Tritium	207	187	303		J	
SW12-18	Tritium	31.5	178	301		J	
SW12-29	Tritium	49.5	159	263		J	
SW12-27	Tritium	67.6	182	304		J	
SW12-5	Tritium	207	177	287		J	
SW12-40	Tritium	310	179	310	ND	UJ	
SW12-22	Tritium	176	207	350		J	
SW12-9	Tritium	149	180	298		J	
SW12-3	Tritium	108	178	294		J	

(1) According to Core Laboratories, Core assigned a qualifier of "ND" whenever a result was either zero or negative. In these instances, Parsons ES assigned a value equal to the detection limit.