Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

FINAL
HUMAN HEALTH RISK ASSESSMENT

PIKE COUNTY COMMUNITY
PIKETON, OHIO

May, 2023

PREPARED FOR:

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Neither the results nor the particular method described herein should be used to assess doses or risks to specific individuals.

It is important to note that the risk calculation method used in this analysis (Risk Assessment Guidance for Superfund, or RAGS) is constructed from a theoretical description of the effects of the listed radionuclides on humans. This description includes numerical descriptions of idealized receptors and their behaviors, as well as estimates of contaminant sources and environmental transport mechanisms.

Neither the results nor the methods presented in this document should be relied upon to accurately portray actual doses and risks to a particular individual. Rather, the methods and results are reserved for its intended purpose of supporting the estimation of generic risks as they are defined under the CERCLA process for selecting "the most appropriate method of achieving protection of human health and the environment at a particular site." (1990)

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LIST OF ACRONYMS

Am-	americium
Auxier	Auxier & Associates, Inc.
BPRG	Building Preliminary Remediation Goal
CCSE	Pike County Community Comprehensive Sampling Evaluation
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
cm^2	square centimeter(s)
Community	Pike County Ohio Community
DOE	U.S. Department of Energy
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
FTSS	fraction transferred surface to skin
g	gram(s)
Handbook	*Exposure Factors Handbook*
HHRA	*Human Health Risk Assessment*
L	liter(s)
L_c	critical value
LET	linear energy transfer
m^3	cubic meter(s)
MARLAP	*Multi-Agency Radiological Laboratory Analytical Protocols*
MARSSIM	*Multi-Agency Radiation Survey and Site Investigation Manual*
µg	microgram(s)
mg	milligram(s)
NCP	National Contingency Plan
NNSA	National Nuclear Security Administration
Np-	neptunium
Pa-	protactinium
pCi	picocurie(s)
PORTS	Portsmouth Gaseous Diffusion Plant in Piketon, Ohio
PRG	Preliminary Remediation Goal
Pu-	plutonium
REAL	Radiological and Environmental Analytical Laboratory
RME	reasonable maximum exposure
RfC	inhalation reference concentration
RfD	oral reference dose
ROCs	radionuclides of concern
SAP	*Sampling and Analysis Plan*
site	PORTS
Solutient	Solutient Technologies, LLC
SwRI	Southwest Research Institute®
Tc-	technetium
Th-	thorium
UCL	upper confidence limit
U-	uranium
ZCMS	Zahn's Corner Middle School

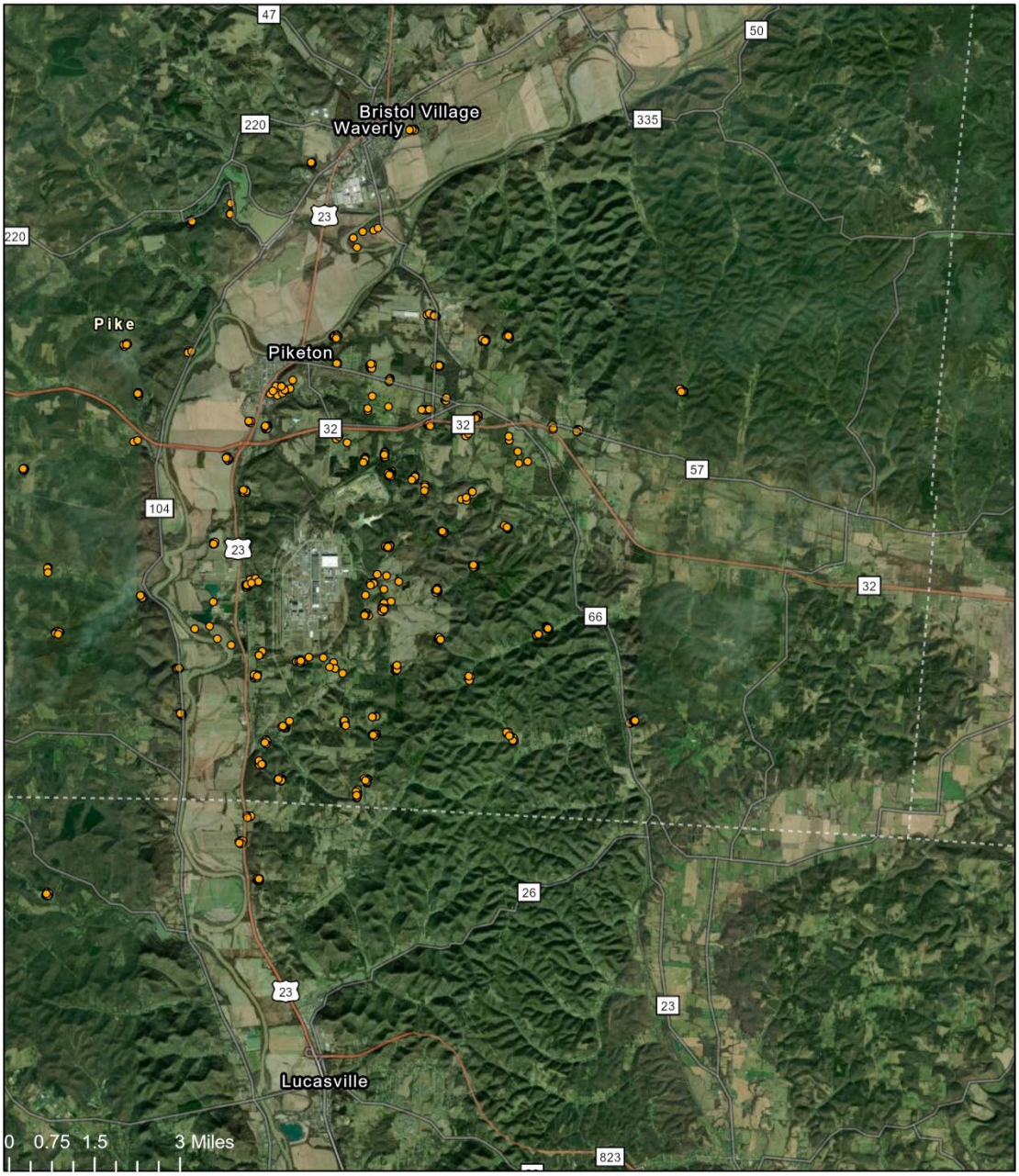
ES 1. EXECUTIVE SUMMARY

This Human Health Risk Assessment Report was prepared by Auxier & Associates, Inc. in response to concerns expressed by members of the Pike County Ohio Community after reports that elevated levels of radionuclides had been found at off-property locations around the former Portsmouth Gaseous Diffusion Plant in Piketon, Ohio (PORTS). This risk assessment was based on data gathered from properties located within six miles of the PORTS facility boundary during the Pike County Community Comprehensive Sampling Evaluation Project. Eleven-hundred and seventy-nine (1,179) samples were collected from four media between October 4, 2020 and February 17, 2022 (Figure ES-1). This includes 112 samples collected from interior surfaces of local schools. These samples were analyzed for an assortment of transuranics (americium-241, neptunium-237, plutonium-238, plutonium-239), technetium-99 and isotopes of uranium (uranium-233/234, uranium-235/236, and uranium- 238).

This risk assessment used EPA's CERCLA risk evaluation methodology and 9,424 analytical results from this sampling and analysis campaign to estimate excess cancer risks to local residents. Calculated risks to hypothetical local receptors from the listed radionuclides, as calculated using EPA's CERCLA risk calculators and reported in this assessment, are generally acceptable under the system EPA uses to evaluate risks within its CERCLA program. Potential subpopulations were identified by the community and the risk assessment team during the course of the investigation, including school children, residents consuming substantial quantities of local foods, life-long residents and recreational users of local streams. Risks to select subpopulations eating unusually large portions of locally grown food can reach risk levels approaching the upper end of EPA's "acceptable" risk range of 10^{-6} to 10^{-4}. The two radionuclides contributing the largest portions to the calculated risks are projected to be technetium-99 and plutonium-238. Risks to other groups, such as students attending schools in the study area and swimmers in local water bodies, were estimated to range between 1×10^{-8} and 8×10^{-7}, which are below EPA's acceptable risk range.

The aforementioned risks to the hypothetical resident were based on a community-wide exposure scenario. The possibility that larger, localized risks may exist was explored by examining the spatial distribution of the radionuclides of concern across the study area. Maps illustrating calculated risks at specific locations were produced and the location symbols on those maps were assigned different colors based on the calculated risk associated with the radionuclides of concern concentration reported at that location. The resulting maps did not indicate a well-defined pattern of distribution within the study area. Rather, the maps suggest a "mottled" distribution across the area, with localized areas of elevated concentrations separated by areas without a noticeable accumulation of radionuclides of concern. This is illustrated by Figure ES-2 which presents the distribution of the radionuclide projected to produce the highest risks (Technetium-99) within the study area.

Based on this evaluation, this study concludes that typical residents within six miles of PORTS are not currently at risk of excess cancer. However, some small areas contained radionuclides at levels that may produce risks at or above the 10^{-4} "acceptable risk range," as calculated for residents consuming large quantities of locally grown food. As these calculations incorporate various assumptions and uncertainties, it is recommended that direct measurements be made of technetium-99 in of locally grown produce and soil, as well as plutonium-238 in local fish flesh. This will reduce the considerable uncertainty imparted by the simple first-order partitioning model used by EPA's calculators to estimate this uptake.



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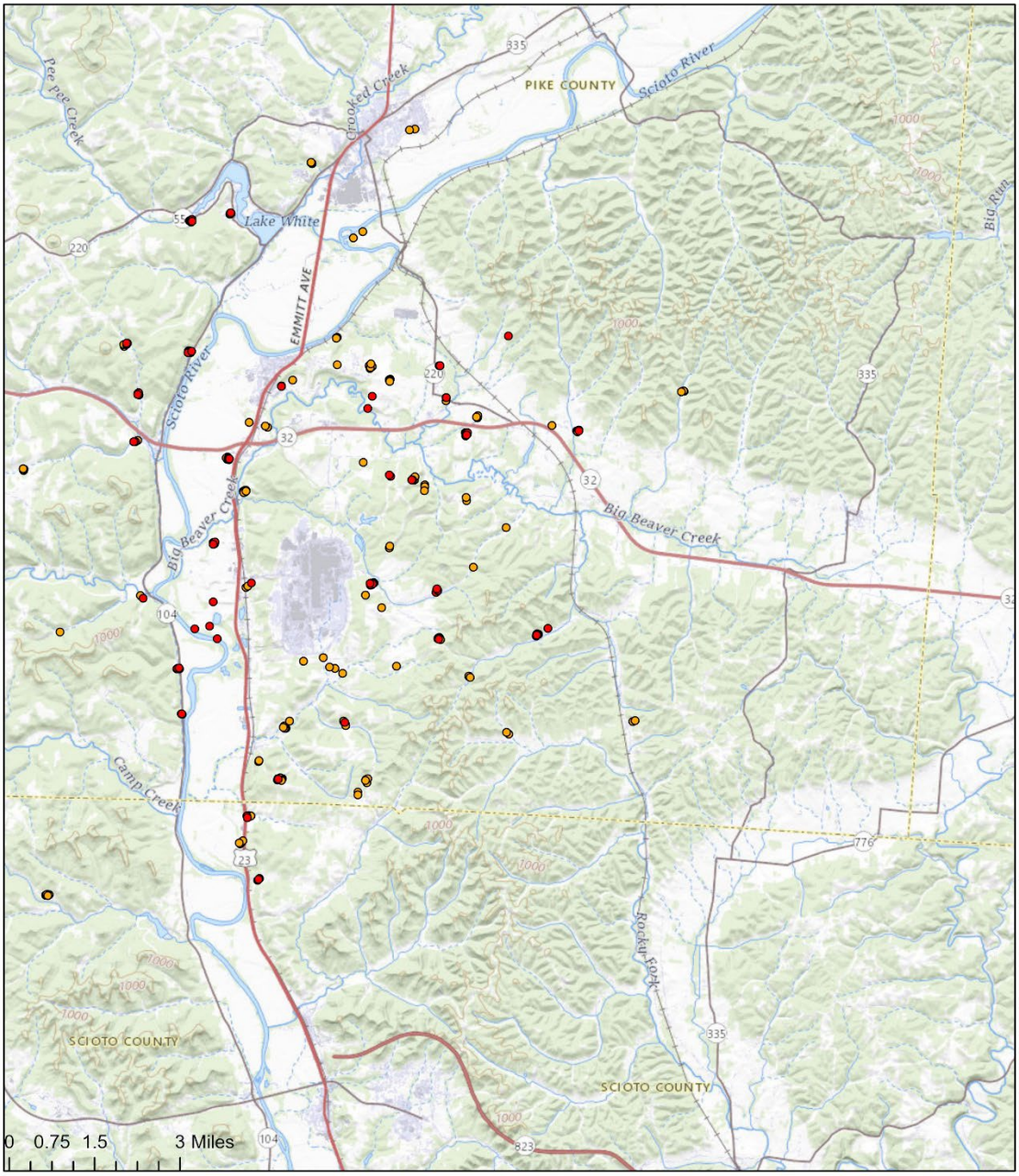
Soil Sampling Locations
Soil

Project:
USA/Ports
Date:
January, 2023
Illustrator:
Eric Majersky

Figure ES-1 All Soil Sampling Locations in Study Area



Auxier & Associates, Inc. Radiological Health, Safety and Environmental Services A USA Environment, L.P. Company	N	Risk Assessment Technetium-99 Soil with Garden 0.037 - 0.327 (Between 10^-4 and 10^-6 Risk) 0.328 - 6.924 (Exceeds 10^-4 Risk)	Project: USA/Ports Date: January, 2023 Illustrator: Eric Majersky

Figure ES-2 Distribution of Technetium-99 within the Study Area

1. INTRODUCTION

1.1 OVERVIEW

This Human Health Risk Assessment (HHRA) Report has been prepared by Auxier & Associates, Inc. (Auxier) and it is based on data gathered during the Pike County Community Comprehensive Sampling Evaluation (CCSE) Project. This work is being performed in response to concerns expressed by members of the Pike County Ohio Community (the "Community") regarding reports of "non-natural uranium" and transuranics[1] at off-property locations around the former Portsmouth Gaseous Diffusion Plant in Piketon, Ohio (PORTS). The study area evaluated in this HHRA is comprised of the area outside of the PORTS boundaries and within six miles of PORTS (Figure 1).

Tasks were performed as described in detail in the Solutient Technologies, LLC (Solutient) *Sampling and Analysis Plan/Quality Assurance Project Plan for the Pike County Community Comprehensive Sampling Evaluation Project* ("the SAP", Solutient 2020a) and the *Background Media Sampling and Analysis Plan for the Pike County Community Comprehensive Sampling Evaluation Project* (the "Background SAP", Solutient 2020b). These tasks included:

- Working closely with Community representatives to identify radionuclides of concern (ROCs) and select locations of interest to be sampled in the study area;
- Collecting samples of soil, sediment, surface water, and settled dust (i.e. smears) on surfaces in the study area and its associated reference area (background samples);
- Processing, tracking and analyzing samples;
- Validating analytical results and
- Collating sample results from the sampling campaign in an on-line database accessible to stakeholders.

In October 2022 Auxier submitted an HHRA Work Plan (Auxier 2022) to establish a structure for the tasks required to perform the HHRA. These tasks included:

- Reviewing the validated analytical results and comparing the reported concentrations to reference criteria such as analytical detection limits and background sample results,
- Using statistical tools and graphical representations to identify patterns and distributions that might produce environmental exposures,
- Describing previously identified ROCs and their potential concentrations at locations where higher exposures are likely to occur,
- Identifying generic receptors within the study area and quantitatively describing their behaviors in the environment,
- Identifying and describing potential exposure pathways for the generic receptors at the greatest risk of exposure,

[1] Transuranics are radionuclides with atomic numbers greater than 92 (i.e. neptunium, plutonium, americium, etc…).

- Characterizing potential risks using the methodology established by the U.S. Environmental Protection Agency (EPA), as expressed in their Preliminary Remediation Goal (PRG) and Building Preliminary Remediation Goal (BPRG) calculators (EPA 2022a and EPA 2022b, respectively), and
- Perform a multi-pathway assessment of radiological doses to the hypothetical "reasonably maximally exposed" receptor identified in the HHRA using RESRAD.[2]

1.2 HISTORY

On July 12, 2015, the Akron Beacon Journal published an article describing the approval of a U.S. Department of Energy (DOE) plan to pursue on-site disposal of some of the waste generated during decontamination and decommissioning at PORTS. In August of 2017, members of the local community approached the Pike County Commissioners "to express their strong opposition" to a waste disposal cell being constructed at PORTS.[3] Other residents have expressed concern that the cleanup of the PORTS property will spread contamination to nearby environmental media.[4]

In March of 2019, the DOE published the *Portsmouth Gaseous Diffusion Plant Annual Site Environmental Report–2017 Piketon, Ohio* (DOE 2019a). The report indicated neptunium-237 (Np-237), plutonium-239/240 (Pu-239/240), technetium-99 (Tc-99), uranium-238 (U-238), U-233/234, and U-235/236 had been detected in various media beyond the PORTS property boundaries. It was concluded in the report that "[p]otential doses to the public from radionuclides detected by the PORTS environmental monitoring program in 2017 are significantly less than the 100 mrem/year limit in DOE Order 458.1." Table 4.2 of that report presents a total dose rate of 0.038 mrem/y "to the public from radionuclides detected by DOE monitoring programs in 2017" (DOE 2019a).

Both the news media and members of the Pike County, Ohio, Community brought details of the report to the attention of the Pike County General Health District. Concerns included the finding that Np-237 was detected at a DOE off-site air monitoring station which is in close proximity to Zahn's Corner Middle School (ZCMS). The air sampler, designated as A41A, is sited approximately 1.5 miles northeast of PORTS property boundary (Figure 2).

The following month Dr. Michael Ketterer, in collaboration with Scott C. Szechenyi and a member of the local community, issued a report entitled *Investigation of Anthropogenic Uranium, Neptunium, and Plutonium in Environmental Samples near Piketon, Ohio* (Ketterer 2019). The report states it was prepared to answer questions about uranium, neptunium and plutonium in media collected from the local environment. The Ketterer report includes a

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[2] RESRAD's user's manual describes RESRAD as "… a computer model designed to estimate radiation doses from residual radioactive materials. Since its release in 1989, RESRAD has been used widely by the U.S. Department of Energy (DOE), its operations and area offices, and its contractors for deriving limits for radionuclides in soil. RESRAD was also used by the U.S. Environmental Protection Agency (EPA) in its 1994 technical support document for the development of radionuclide cleanup levels for soil. Other entities using RESRAD include the U.S. Army Corps of Engineers, the U.S. Nuclear Regulatory Commission (NRC), industrial firms, universities, and foreign government agencies and institutions." As this code was not used in the development of the EPA's PRG, DCC, BPRG, and BDCC calculators, it provides an independent assessment of the potential human health impacts of the site under investigation.

[3] https://www.newswatchman.com/news/article_3863e79b-18c9-5e60-b43d-605fc7675645.html

[4] https://www.dispatch.com/story/news/local/2020/09/01/pike-county-school-district-asks-feds-to-move-middle-school-away-from-radiation/113641168/

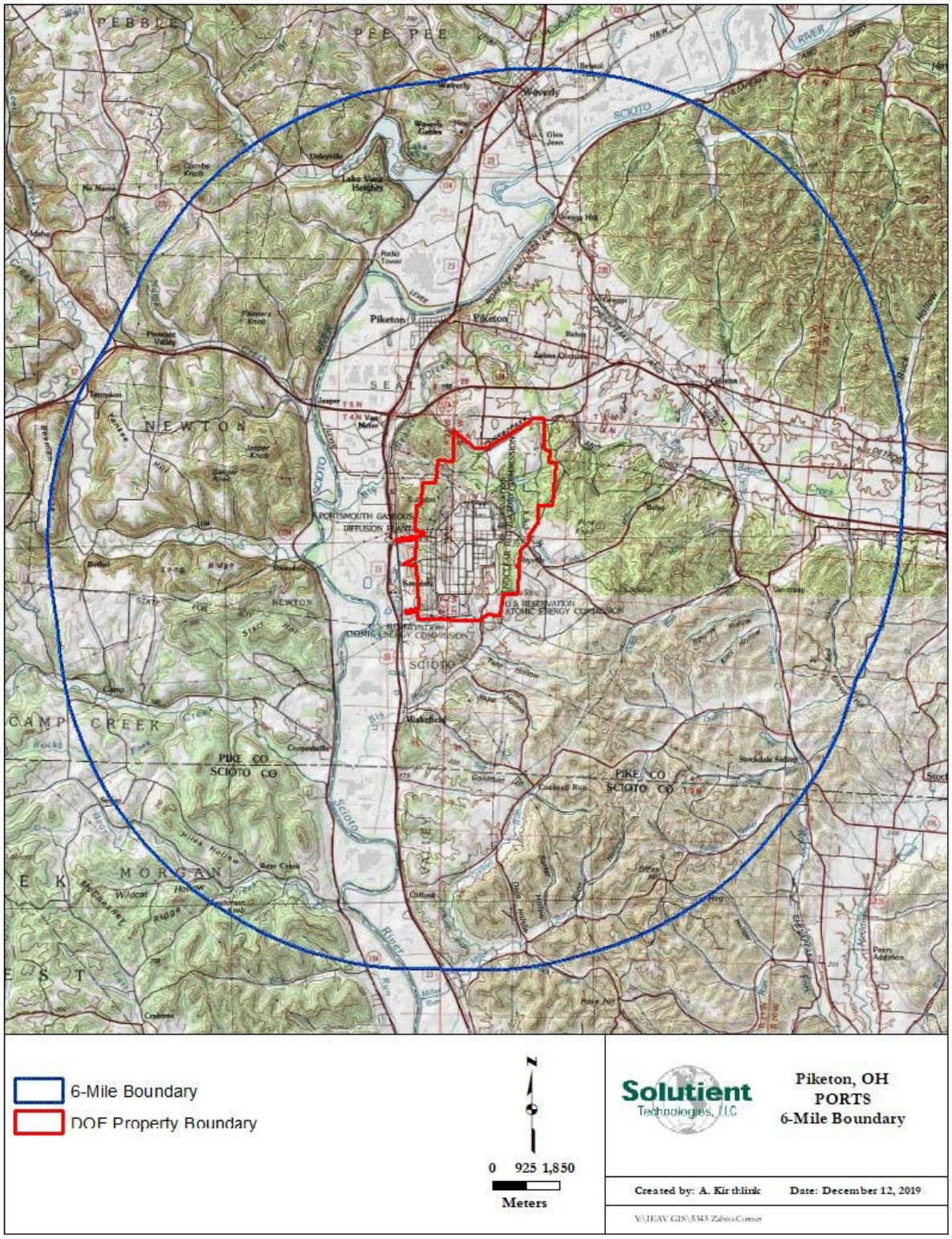


Figure 1 Study Area Surrounding the Portsmouth Gaseous Diffusion Plant

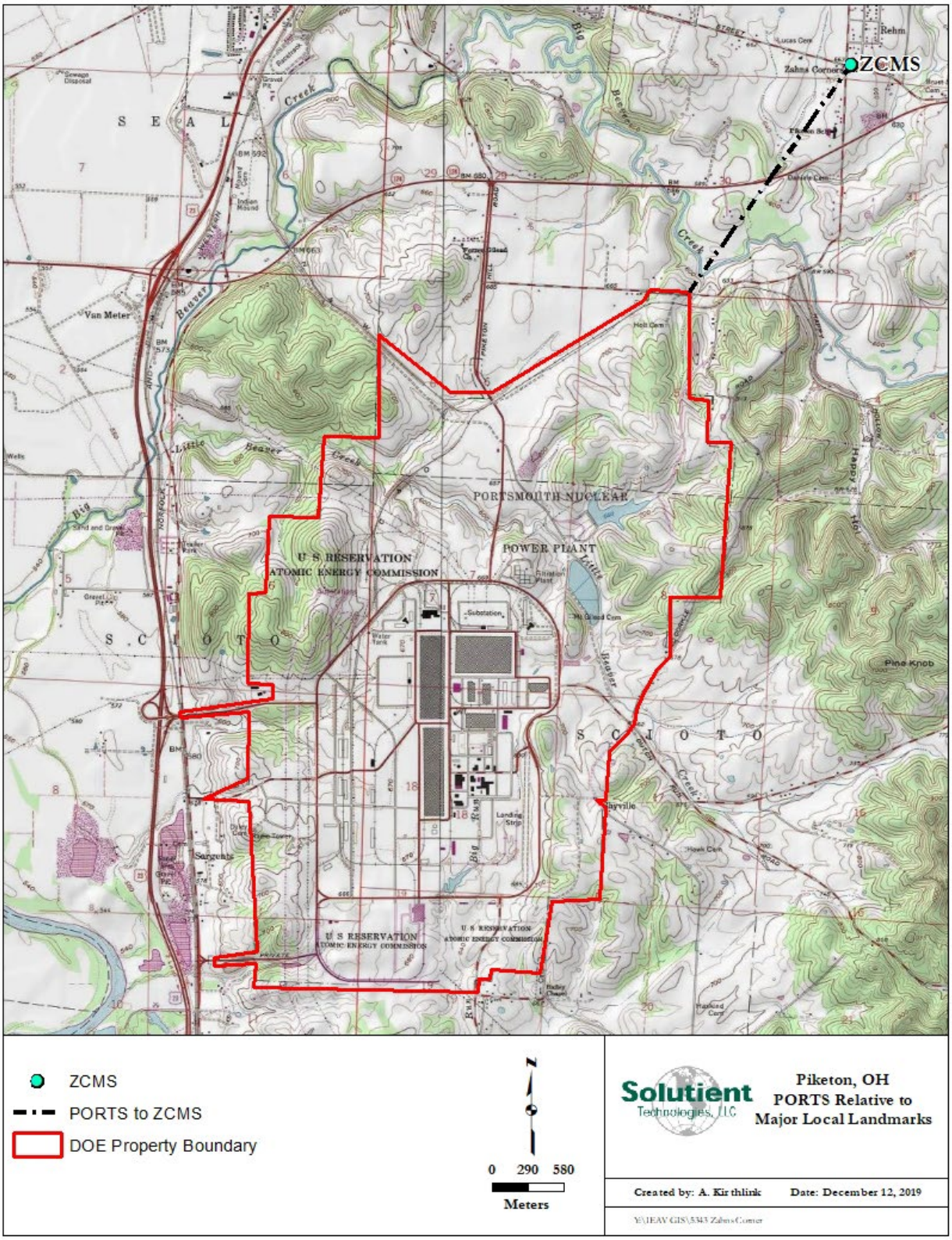


Figure 2 Location of ZCMS Relative to the PORTS Property Boundary (upper right)

description of the author's use of isotope ratios for nuclear forensics and concludes that the PORTS complex was the likely source of off-site radiological contamination.

In early May 2019, local and national media outlets (e.g., News Watchman, Cable News Network [CNN], the Weather Channel, Cincinnati Inquirer, Columbus Dispatch) began reporting on stakeholder concerns regarding off-property radiological contamination, with particular emphasis given to findings published in Dr. Ketterer's 2019 report that enriched uranium was identified inside a local school building. Community concerns led to the decision to close ZCMS for the remainder of the 2018–2019 school year and the entire 2019–2020 school year. The school did not reopen, as of the writing of this document.

In response to community concerns, DOE's national laboratories and the National Nuclear Security Administration (NNSA) sent a team to investigate radiological conditions at Zahn's Corner Middle School in 2019. The DOE published an account of this sampling event and its findings in *Sampling Analysis Report for Zahn's Corner Middle School Sampling Event* (DOE 2019b). The report listed the locations searched, the media sampled, the radionuclides the NNSA team focused on, and the concentrations in the samples collected. "Only naturally occurring radionuclides were found in any of these samples; none of the samples indicated any excess radiological risk above background to the public." (DOE 2019b)

At the request of the Community, DOE also provided funding to the Community via a financial assistance award to Ohio University for an investigation to 1) define the nature and extent of the radionuclides of concern within six miles of the PORTS site and 2) evaluate potential health impacts to members of the Community. As part of the financial assistance reward's terms and conditions, DOE only completes factual accuracy reviews of OU's products. In May 2019, Ohio University's Voinovich School of Leadership and Public Service agreed to work closely with County and Community representatives and serve as the independent coordinator for the project.

As part of that work, Ohio University is providing contract administration services to the project and will assist with the dissemination of results while the Community has retained sole authority over selecting all vendors to perform the sampling, laboratory analyses, data validation, and the HHRA. Under this arrangement, a team of third-party contractors specializing in radiological investigations and evaluations was assembled.

The Community selected Solutient in July 2019 as the third-party contractor to perform an independent sampling campaign called the CCSE project. The Community, in concert with Solutient, jointly defined the sampling area for this investigation as the area within a six-mile radius of the PORTS site (Figure 1) when they developed the Data Quality Objectives (DQO's). Solutient subsequently worked closely with Community representatives to complete the project's SAP (Solutient 2020a) and its subcontractor ORISE (Oak Ridge Institute for Science and Education) were tasked with performing the required environmental sampling within a six-mile radius of PORTS (Figure 1).

In May 2020, Auxier was selected by the Community to perform the Human Health Risk Assessment using the data gathered by Solutient. In association with Solutient, and in support of the CCSE project, Auxier developed a HHRA Work Plan (Auxier 2022) to describe the process to be used to perform the HHRA. Auxier performed the HHRA in accordance with the *Risk Assessment Guidance for Superfund, Human Health Evaluation Manual* (EPA 1989) and its accompanying body of guidance. This included using the EPA's PRG and BPRG calculators to assess potential human health risks (EPA 2022a & 2022b). This HHRA is consistent with guidance presented in that Work Plan.

1.3 ORGANIZATION OF THIS REPORT

The remainder of this report follows the four major steps of a CERCLA-style risk assessment (data collection and evaluation, exposure assessment, toxicity assessment, and risk characterization). This information is organized as follows:

- Section 2 briefly recounts the data collection and analytical phases of the project, describes data validation processes and summarizes the analytical results. It also lists the ROCs to be evaluated in the HHRA and presents the methods used to evaluate the large volume of data and focus the analysis on higher-impact results.
- Section 3 describes the human exposure assessment process (including estimating exposure point concentrations), identifies potential receptors and exposure pathways to be considered, and presents parameters used to describe those exposures by medium.
- Section 4 presents information on the properties and toxicities of the ROCs identified.
- Section 5 contains descriptions of how the EPA's risk assessment methodology was applied in this human health risk characterization and it presents the results of this HHRA.
- Section 6 presents notable sources of uncertainty/bias.
- Section 7 summarizes the findings and recommendations of this HHRA; and
- Section 8 lists the references used in completing this HHRA report.

2. DATA COLLECTION AND EVALUATION

The SAP (Solutient 2020a) developed by the Community and Solutient served as the blueprint for the sampling and analyses that provided the data used in this HHRA. This blueprint:

- Defined the study area to be the area within six miles of the PORTS perimeter;
- Listed the ROCs the Community wanted investigated as americium-241 (Am-241), Np-237, Pu-238, Pu-239, Pu-240, Tc-99, U-234, U-235, U-236, and U-238;
- Identified the media to be investigated as soil, surface water, sediment and settled dust;
- Provided guidance on how and where samples were to be collected;
- Specified the analyses to be performed and named the laboratories to be contracted to perform those analyses; and
- Required formal quality assurance and control checks of analytical results, such as verification and validation in accordance with EPA QA/G-8 and MARLAP, where applicable.

Only validated analytical results from the resulting sampling campaign formed the basis of this HHRA.

The first part of this section presents overviews of sample collection (Subsection 2.1) and analytical activities (Subsection 2.2). Subsequent subsections (Subsections 2.3 through 2.5) describe the methods used to focus the analysis on the subset of data that had the largest potential to produce quantifiable exposures. Summary statistics are presented in Subsection 2.6.

2.1 DATA COLLECTION NARRATIVE

A summary of the sampling efforts described in the *Piketon Comprehensive Community Sampling Evaluation* (Solutient 2022) is provided below. Field activities were conducted in two phases.

The first phase culminated in the June 2020 pilot study sampling event. During this sampling, various sampling and analytical techniques were compared to determine the preferred set of sample collection and analytical methods that would be used during the main sampling campaign. The primary objectives of the pilot study, conducted during the week of June 7, 2020, were to determine how many different types of soil were present in the study area and to evaluate the efficacy of the analytical techniques used. Data collected during the pilot study phase were reviewed by the risk assessment team, but were not used in determining exposure point concentrations (Section 3.2) because various analytical methodologies were being tested and refined during that phase.

The second phase of sampling began by identifying properties to sample. The "background area" is defined in the Background SAP (Solutient 2020b) as the area outside the six-mile radius from PORTS. Background area sample locations were identified between six and roughly 50 miles from PORTS in areas determined to be least likely to have been impacted by PORTS operations. These areas were primarily east and west of PORTS (predominantly upwind from PORTS, see Figure 3).

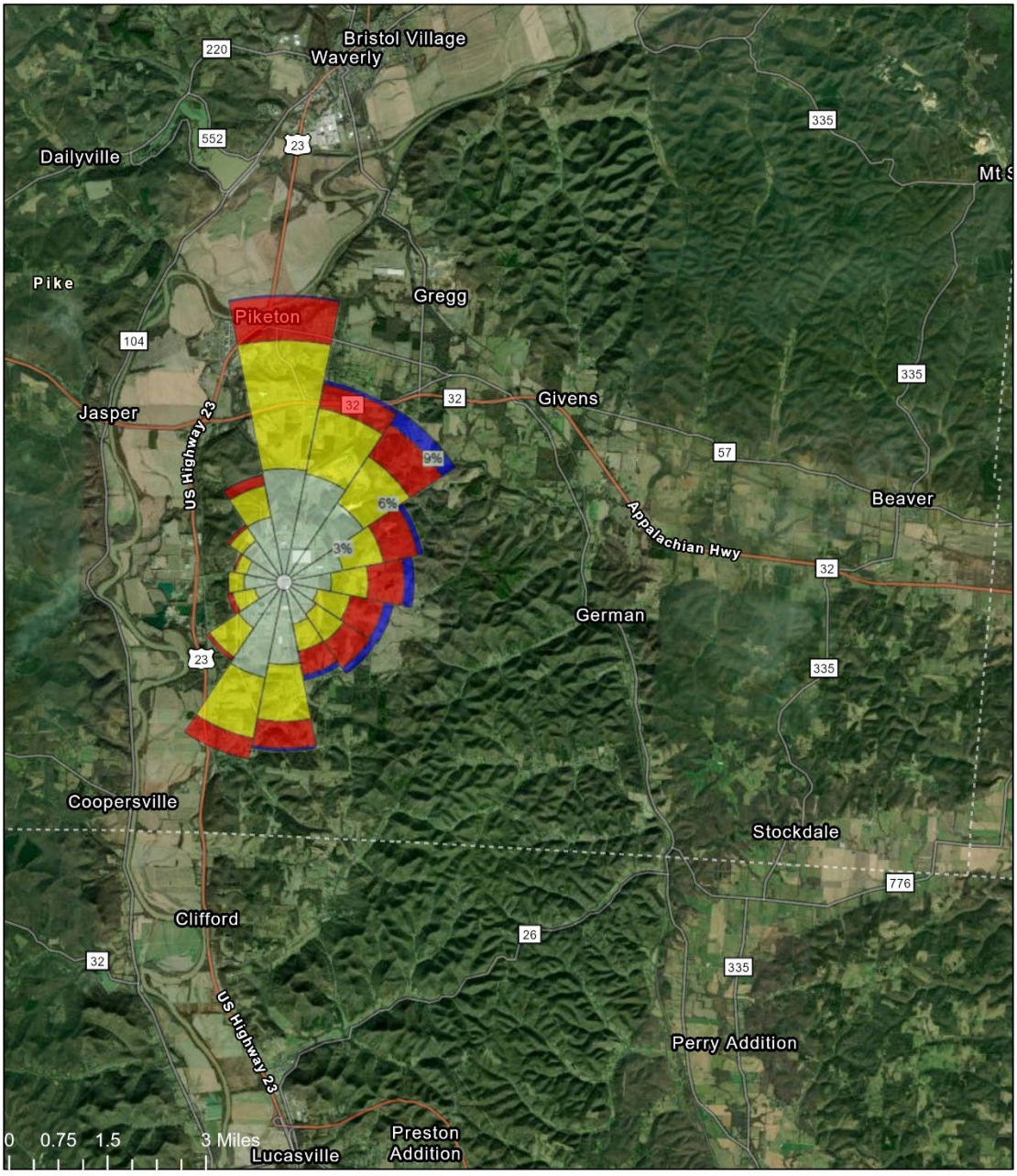


Figure 3 2018 Wind Rose Superimposed on PORTS Facility

Sampling locations used to characterize the six-mile study area around PORTS (the "study area") were identified within physical boundaries set by CCSE project stakeholders and were selected using a combination of community requests, knowledge of the terrain and demographics, meteorological data, and Gaussian plume modeling. Subsequently, access and sampling permissions were gathered from property owners prior to initiating the sampling effort.

Background area sampling efforts began the week of October 4, 2020 and ended mid-month. Sampling within the six-mile study area began in October 2020 and concluded in February 17, 2022. Ten separate field expeditions were required to complete the CCSE main study sampling. Seventeen weeks of actual time in the field collecting samples occurred between October 4, 2020, and February 17, 2022.

Table 1 lists the numbers of soil, sediment, surface water, and smear samples provided to Auxier for the background area and the study area. Figure 4 through Figure 9 depict the known locations of characterization and background area samples relied upon in the HHRA. Additional details of the sample selection process and subsequent field activities are provided in *Piketon Comprehensive Community Sampling Evaluation* (Solutient 2022).

Table 1 Number of Samples Provided to Auxier by Phase and Medium

Phase	Soil	Sediment	Water	Smear	Totals
Background Study	52	11	13	32	108
Main Study	843	20	26	182	1,071
Grand Totals	895	31	39	214	1,179

2.2 ANALYTICAL SUMMARY

Samples collected from soil, sediment, surface water, and settled dust on surfaces (i.e. smears) were sent under chain of custody to the laboratory chosen by the Community, the Radiological and Environmental Analytical Laboratory (REAL) at the Oak Ridge Institute for Science and Education in Oak Ridge, Tennessee. For all media, analyses were performed for Am-241, isotopic plutonium (Pu-238 and Pu-239/240[5]), Np-237, and isotopic uranium (U-233/234[6], U-235/236[7], U-238) by alpha spectrometry and Tc-99 by liquid scintillation counting. Analyses were completed at REAL for all 1,179 samples between June 2020 and May 2022.

Of the 1,179 samples analyzed at REAL, approximately 15% (173) were split and sent to Southwest Research Institute® (SwRI) Department of Analytical and Environmental Chemistry in San Antonio, Texas. For all media, analyses were performed for isotopic plutonium, Np-237, and isotopic uranium by inductively coupled plasma mass spectrometry. Analyses were completed at SwRI for the176 samples between January 2021 and April 2022.

Each laboratory provided analytical results to Solutient in electronic spreadsheet format. In addition, laboratory packages, including case narratives and analytical results, were provided in uneditable electronic format. The original laboratory packages are currently held by Solutient

[5] Pu-239 toxicity was used to represent the Pu-239/240 analysis.

[6] U-234 tox was used to represent the U-233/234 analysis.

[7] U-235 tox was used to represent the U-235/236 analysis.

pending direction by the Community. The data were assembled by Solutient and provided to the risk assessment team in electronic spreadsheet format.

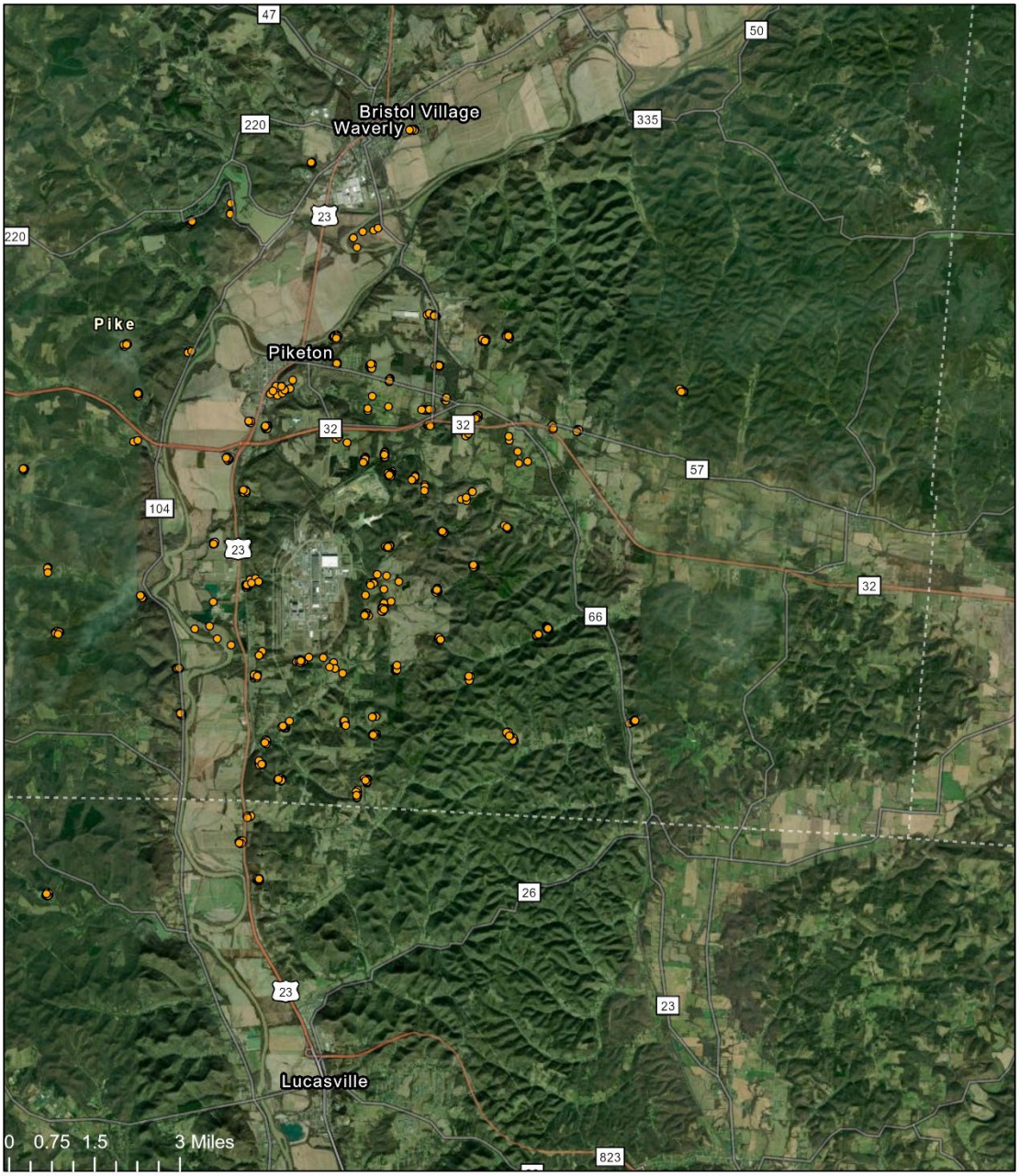
Data from the paired analyses from the two laboratories were plotted and compared visually (Attachment A).

2.3 DATA VALIDATION AND REVIEW

Data collected during the sampling phase of this investigation were evaluated by USA Environment, LLC using a formal data validation process and quality objectives documented in the Project DQO (Solutient 2020c) and SAP (Solutient 2020a) documents, along with guidance and quality control criteria from the *Multi-Agency Radiological Laboratory Analytical Protocols Manual* (MARLAP) (MARLAP 2004). The goal of this validation was to evaluate the quality of individual analytical results and assign data validation qualifiers as necessary to assist in proper data interpretation. The following descriptions provide brief explanations of the qualifiers commonly assigned to results during the data review process.

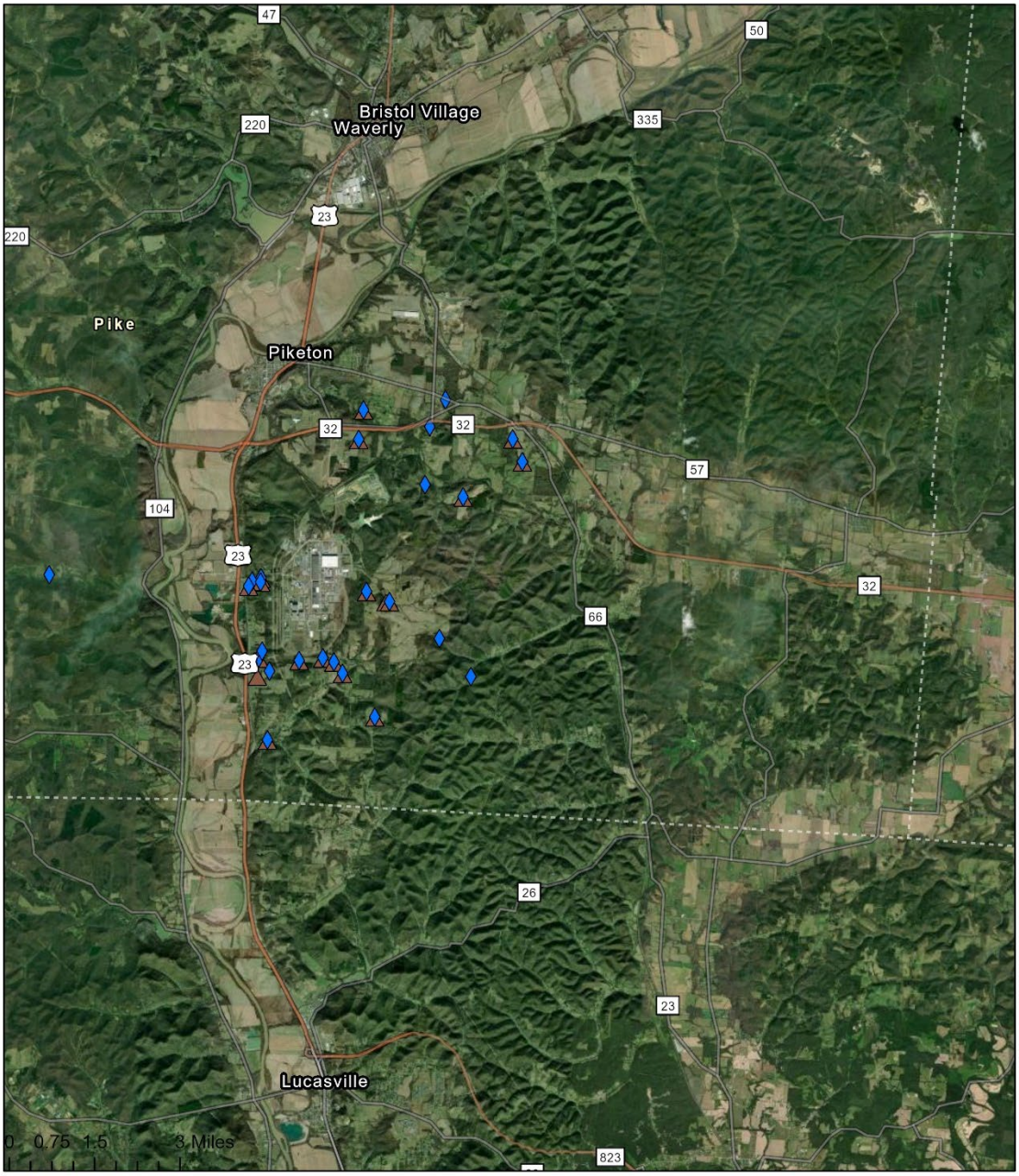
- U — The sample was analyzed but the analyte was not detected. The reported instrument response was indistinguishable from the response of the blank sample.
- UJ — The analyte was not detected above the critical value, but the minimum detectable concentration is greater than the quantification goal, and therefore the numerical value may be approximate.
- J — The analyte was positively identified; but the minimum detectable concentration is greater than quantification goal, and therefore the numerical value may be approximate.
- Q — The total propagated uncertainty at one sigma was greater than the required measurement uncertainty.
- S — Sample result was superseded by another sample.
- R — The sample result was rejected due to serious deficiencies in the ability to analyze the sample and/or meet quality control criteria. The presence or absence of the analyte cannot be verified.

Solutient, working closely with Auxier, collated the validated data in a readily available digital database using commercially available software.



Auxier & Associates, Inc. Radiological Health, Safety and Environmental Services A USA Environment, L.P. Company	N	Soil Sampling Locations Soil	Project: USA/Ports Date: January, 2023 Illustrator: Eric Majersky

Figure 4 Study Area - Soil Sampling Locations



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N

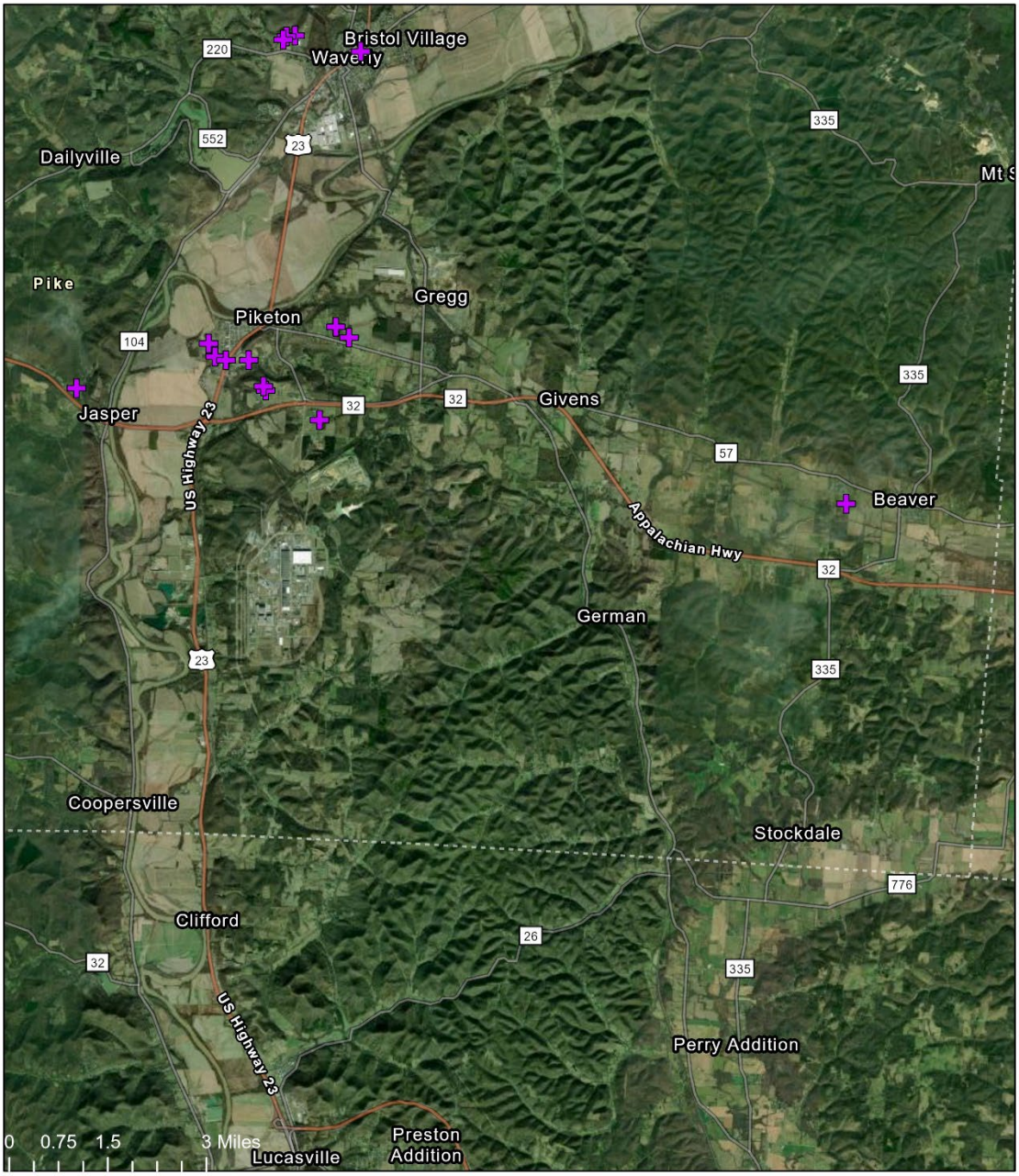
Sediment & Surface Water Sampling Locations

Sediment

Surface Water

Project: USA/Ports
Date: January, 2023
Illustrator: Eric Majersky

Figure 5 Study Area - Sediment & Surface Water Sampling Locations



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Smear Sampling Locations

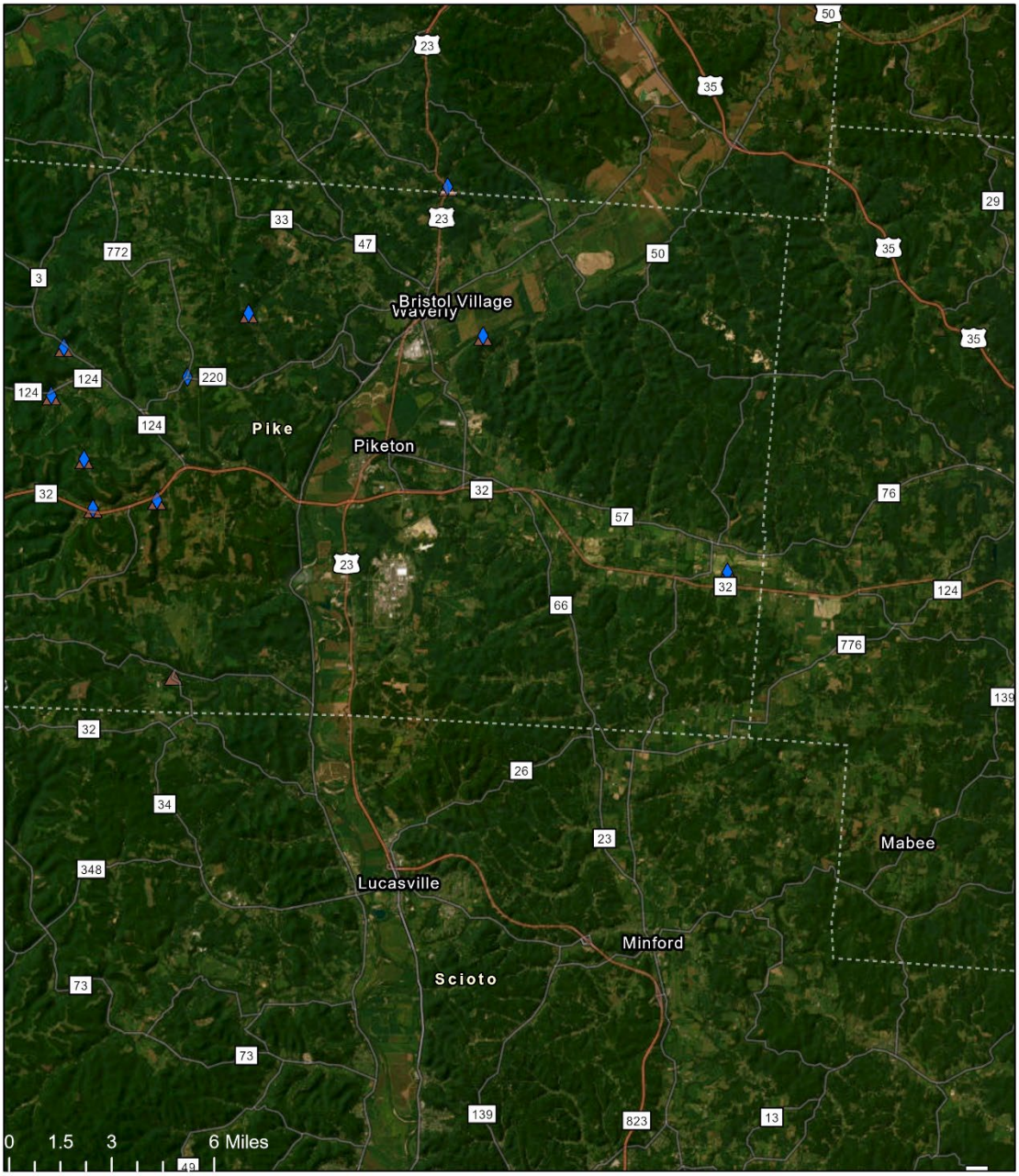
Smears

Project: USA/Ports
Date: January, 2023
Illustrator: Eric Majersky

Figure 6 Study Area - Smear Sampling Locations

Auxier & Associates, Inc. Radiological Health, Safety and Environmental Services A USA Environment, L.P. Company	N	Background Area - Soil Sampling Locations Soil	Project: USA/Ports Date: January, 2023 Illustrator: Eric Majersky

Figure 7 Background Area - Soil Sampling Locations



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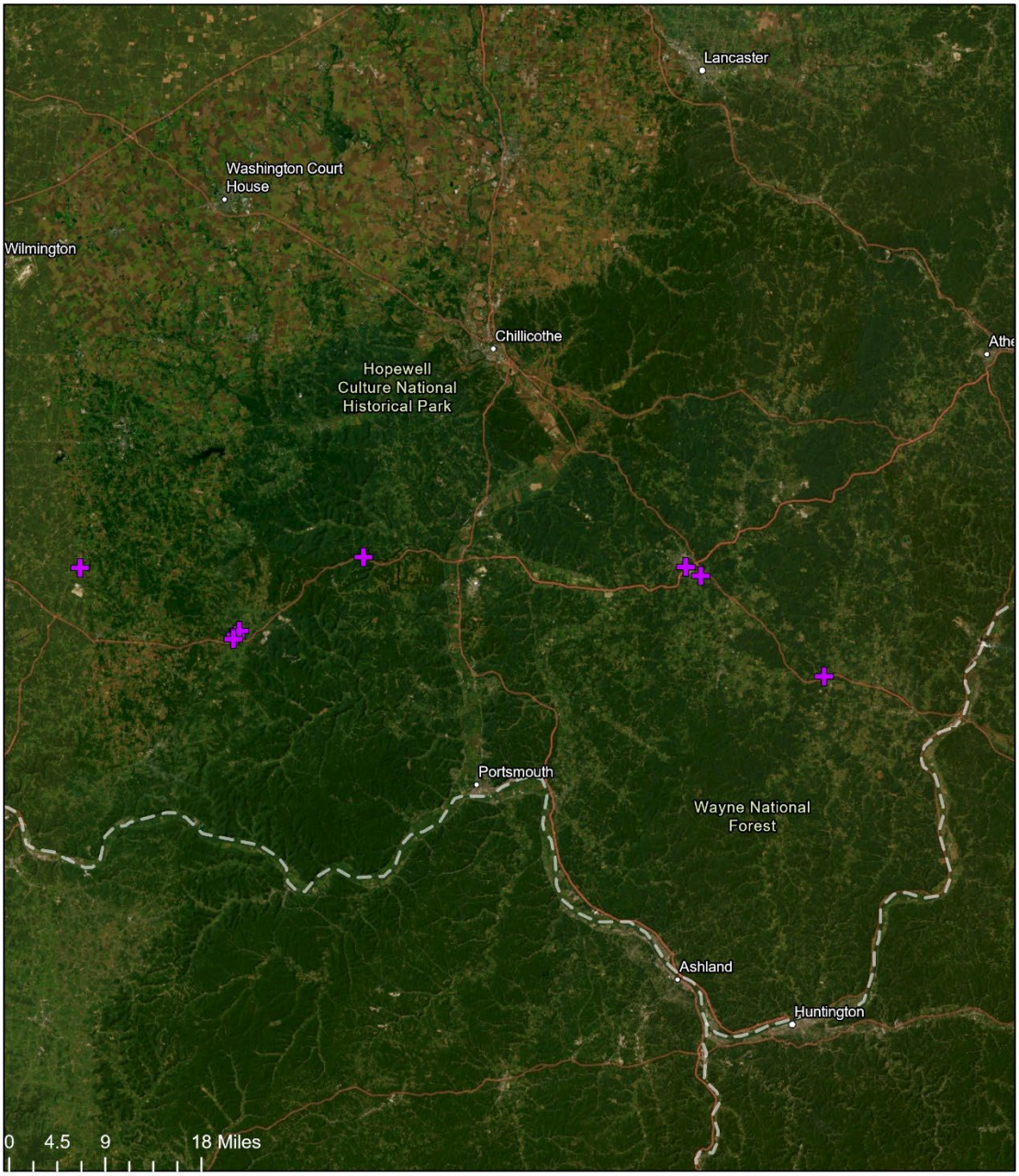
Background Area - Surface Water & Sediments Locations

Sediment

Surface Water

Project: USA/Ports
Date: January, 2023
Illustrator: Eric Majersky

Figure 8 Background Area – Surface Water & Sediments Locations



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N

Background Area - Smear Sampling Locations

Smears

Project: USA/Ports
Date: January, 2023
Illustrator: Eric Majersky

Figure 9 Background Area – Smear Sampling Locations

2.4 DATA USABILITY

Once validated data and relevant qualified records, such as completed questionnaires from the community, were compiled, an evaluation was performed to determine if the quality of the data satisfied the objectives established in the "*Overarching Data Quality Objectives for the Pike County Community Comprehensive Sampling Evaluation"* (Solutient 2020c). Methods offered in EPA guidance were selected to perform this evaluation. As stated by EPA's Office of Research and Development on page 102 of its "*Guidance for Data Usability in Risk Assessment (Part A)*," (EPA 1992a), data…

> *"…must be reviewed at a predetermined level before use in the final risk assessment."*

Thus, a "data usability evaluation" is a standard and necessary task that EPA's risk assessment guidance recommends be performed before using data to finalize risk assessments (EPA 1989).

Although the study area is not an EPA Superfund site, this step is considered appropriate and useful for evaluating the usability of environmental data collected in the study area. In this HHRA, the data usability evaluation provides a means to assess and assure that the quality of data generated during an investigation is known and that data are of sufficient quality to be used for the intended purpose(s) (EPA 1992a).

Validated results were subjected to an additional combination of qualitative examinations and tests to ascertain if specific data points were representative of conditions in the study area. If these examinations identified a result that might be anomalous, a series of additional tests were performed to determine if the anomaly could be explained as an artifact of the sampling or analytical process.

For example, histograms were prepared of isotopic data received from REAL. Visual examination of these graphics indicated some data sets contained results that were above and below the bulk of the results. A numerical test was then run on those data sets to identify individual samples producing these outliers. In other cases, isotopic ratios were used to identify samples producing anomalous results. To add context to the initial result, either the samples were flagged for additional scrutiny and reanalyzed by the laboratory or the sampling team was sent back to those locations to collect confirmatory samples around the original sample location.

Based on the outcome of this verification process, the original sample result was either accepted as representative or the initial database record was annotated with an "S" qualifier to indicate the result had been superseded by new data. This process enhanced the risk assessment team's confidence that the study's data were of sufficient quality and representativeness to be used in the Piketon HHRA. Table 2 presents a summary of the conclusions of the data usability assessment.

Table 2 Data Usability Summary

Category	Number of Results from REAL	Notes
Total Results	9,600	Includes all results from all 1,179 samples.
Challenged Results	169	Less than 2% of the initial samples were challenged (162 Tc-99 soil and 7 Tc-99 surface water) during the data validation and data usability evaluation steps of the data review.
Superseded Results	168	168 of these challenged samples were selected for reanalysis. 161 soil and 7 surface water samples were reanalyzed for Tc-99. The initial sample results were replaced in the dataset by the second analysis. The original results were assigned an "S" qualifier and retained for completeness.
Rejected Results	8	This soil sample was thought to be a background sample when collected. While only the Tc-99 result was challenged, all results for this one sample were rejected.
Accepted Results	9,424	This includes results that passed data evaluation and were initially accepted, 168 results from samples that were reanalyzed and additional results collected during confirmatory sampling.

[a] These results are for soil, sediment, surface water, and settled dust.

2.5 DETERMINING DETECTED CONCENTRATIONS

In this HHRA, the methodology used for determining if an analyte is detected in a sample is consistent with the approach established in the MARLAP (2004).[8] This guidance provides a consistent approach for establishing radioanalytical laboratory data that meet project data requirements. The guidance is scientifically rigorous yet sufficiently flexible for application to diverse projects.

As part of this approach, each laboratory result was evaluated during validation to determine if the analyte was detected in a given sample. The analyte was considered to be detected if the result was greater than a statistical quantity called the critical value, sometime abbreviated as "L_c". The critical value identifies a threshold concentration that divides sample results into two groups; results that are too small to be distinguished from similar results reported for a blank sample, and results that are large enough to indicate the presence of the analyte in the sample. To put it another way, if the laboratory reports the concentration in a sample is above the L_c, it can be said that the radionuclide was detected in that sample with that method. Reported

[8] The *MARLAP Manual* which was developed in cooperation with eight federal entities, including the DOE and the EPA, "…provides a peer-reviewed, nationally consistent guidance for the planning, implementation and assessment phases of projects that require laboratory analysis of radionuclides. MARLAP addresses the need for a nationally consistent approach to producing radioanalytical laboratory data that meet a project's or program's requirements. The guidance provided by MARLAP is both scientifically rigorous and flexible enough to be applied to diverse projects and programs." - *https://www.epa.gov/radiation/multi-agency-radiological-laboratory-analytical-protocols-manual-marlap entitled Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP)*

concentrations that are less than the L_c indicate the analyte was not detected in that particular sample.

This quantity (L_c) is sometimes confused with the Minimum Detectable Concentration, or "MDC," reported by many laboratories. For the purposes of this investigation, the MDC can be thought of as the minimum detectable activity that can be reliably quantified. In cases where the laboratory reports a result that is greater than the L_c and less than the MDC, the sample contains detectable amounts of the analyte but the quantity of the analyte cannot be determined with certainty. Such results are identified in the database as "estimated" by assigning a "J" qualifier to them. The J qualified data values are used as reported, but findings that rely solely on J qualified data are identified as being less certain than findings based on data requiring no qualifiers.

2.6 SUMMARY STATISTICS FOR REPRESENTATIVE DATA

Statistical summaries of validated concentrations reported for ROCs are presented by medium and sampling effort (background area and CCSE) in Table 3. The data sets described in Table 3 form the basis of the risks and doses presented in this HHRA. One of the most remarkable characteristics of these data sets is the large proportion of results that are below the concentrations that can be detected using the analytical methods employed during the study.[9] This reflects the generally low concentrations reported for most ROCs across the study area.

Table 4 has been provided presenting the same statistical metrics for samples where the ROC was detected. The data in Table 4 will be used to illustrate the spatial distribution of ROCs later in the report. The locations of samples containing detectable quantities of the ROCs are presented in Attachment B.

[9] Many of these values are actually reported as negative numbers by the laboratories. Briefly stated, analytical results are determined in the laboratory by subtracting the activity of an analyte in a laboratory blank (background) from the gross activity measured in each sample. If the background measurement exceeds the gross measurement, a negative concentration is reported.

Table 3 Summary Statistics for Data Reported by REAL

Media ROC	No. of Samples	Background Area Range	Median	Average	St. Dev.	No. of Samples	Study Area Range	Median	Average	St.Dev.
Soil		**(pCi/g)**	**(pCi/g)**	**(pCi/g)**	**(pCi/g)**		**(pCi/g)**	**(pCi/g)**	**(pCi/g)**	**(pCi/g)**
Am-241	51	-0.0054 - 0.015	0.004	0.004	0.004	843	-0.0084 - 0.025	0.0046	0.005	0.005
Np-237	51	-0.0035 - 0.0077	0	0.001	0.002	843	-0.0099 - 0.018	0	0.001	0.003
Pu-238	51	-0.0037 - 0.011	0.0019	0.002	0.003	843	-0.014 - 0.016	0.0018	0.001	0.003
Pu-240	51	0 - 0.025	0.0086	0.009	0.006	843	-0.006 - 0.057	0.009	0.01	0.007
Tc-99	51	-0.15 – 0.89	0.015	0.11	0.23	843	-0.26 - 6.9	0.093	0.15	0.41
U-233/234	51	0.67 - 10.3	1.41	1.9	1.6	843	-0.36 - 7.1	1.2	1.2	0.54
U-235/236	51	0.013 - 0.359	0.07	0.085	0.06	843	0.013 - 0.37	0.054	0.057	0.03
U-238	51	0.65 - 8.4	1.44	1.9	1.4	843	0.51 - 7.1	1.2	1.2	0.52
Sediment		**(pCi/g)**	**(pCi/g)**	**(pCi/g)**	**(pCi/g)**		**(pCi/g)**	**(pCi/g)**	**(pCi/g)**	**(pCi/g)**
Am-241	11	0 - 0.0074	0.0039	0.004	0.003	20	-0.0025 - 0.025	0.004	0.005	0.007
Np-237	11	-0.0017 - 0.005	0	0.001	0.002	20	-0.004 - 0.0078	0	0.001	0.002
Pu-238	11	-0.0018 - 0.0037	0.0017	0.001	0.002	20	-0.002 - 0.017	0.0018	0.003	0.004
Pu-240	11	0 - 0.018	0.0069	0.007	0.006	20	0 - 0.028	0.0044	0.006	0.007
Tc-99	11	-0.16 - 0.26	-0.045	0.011	0.14	20	-0.23 - 0.30	-0.042	-0.015	0.13
U-233/234	11	1.1 - 5.3	2.17	2.4	1.3	20	0.607 - 1.55	0.97	1.03	0.22
U-235/236	11	0.041 - 0.20	0.087	0.093	0.047	20	0.018 - 0.075	0.048	0.046	0.012
U-238	11	1.1 – 5.0	2.09	2.3	1.2	20	0.48 - 1.3	0.96	0.962	0.20
Surface Water		**(pCi/L)**	**(pCi/L)**	**(pCi/L)**	**(pCi/L)**		**(pCi/L)**	**(pCi/L)**	**(pCi/L)**	**(pCi/L)**
Am-241	13	-0.021 - 0.1	0.057	0.043	0.039	26	-0.02 - 0.11	0.019	0.03	0.034
Np-237	13	-0.02 - 0.039	0	-0.001	0.02	26	-0.041 - 0.037	0	-0.002	0.017
Pu-238	13	-0.019 - 0.077	0.019	0.026	0.025	26	-0.018 - 0.06	0.027	0.026	0.021
Pu-240	13	0 - 0.095	0.037	0.043	0.025	26	-0.019 - 0.076	0.020	0.028	0.027
Tc-99	13	-4.6 - 1.9	-0.41	-0.74	1.	26	-1.8 - 2.8	0.16	0.102	1.1
U-233/234	13	0.019 - 0.88	0.33	0.38	0.30	26	0 - 1.1	0.17	0.27	0.28
U-235/236	13	0 - 0.09	0.024	0.032	0.029	26	0 - 0.12	0.024	0.026	0.025
U-238	13	0.057 - 0.89	0.24	0.312	0.26	26	0.02 - 0.72	0.12	0.19	0.19
Dust, Interior Surfaces		**(pCi/cm^2)**	**(pCi/cm^2)**	**(pCi/cm^2)**	**(pCi/cm^2)**		**(pCi/cm^2)**	**(pCi/cm^2)**	**(pCi/cm^2)**	**(pCi/cm^2)**
Am-241	32	0 - 0.0001	0.000024	0	0	182	-0.0001 - 0.0001	2.55E-05	0	0
Np-237	32	0 - 0.0001	0	0	0	182	-0.0001 - 0.0001	0	0	0
Pu-238	32	-0.0001 - 0.0001	0.00001	0	0	182	-0.0001 - 0.0001	2.05E-05	0	0
Pu-240	32	0 - 0.0001	0.000053	0	0	182	0 - 0.0002	0.00004	0	0
Tc-99	32	-0.0081 - 0.0021	-0.00205	-0.003	0.003	182	-0.005 - 0.0126	0.001028	0.001	0.003
U-233/234	32	0 - 0.0281	0.000175	0.001	0.005	182	0 - 0.0243	0.00016	0	0.002
U-235/236	32	0 - 0.0009	0.000014	0	0	182	-0.0001 - 0.0008	0	0	0
U-238	32	0 - 0.0043	0.00016	0	0.001	182	0 - 0.024	0.00016	0	0.002

Note: Significant figures presented in this and the next table are provided for QA purposes and do not reflect the precision of the values listed.

Table 4 Summary Statistics for Detected Concentrations Only

Media ROC	No. of Detects[a]	Background Area Range	Median	Average	St. Dev.	No. of Detects	Study Area Range	Median	Average	St.Dev.
Soil		**(pCi/g)**	**(pCi/g)**	**(pCi/g)**	**(pCi/g)**		**(pCi/g)**	**(pCi/g)**	**(pCi/g)**	**(pCi/g)**
Am-241	0	NA[b]	NA	NA	NA	44	0 - 0.025	0.015	0.015	0.005
Np-237	0	NA	NA	NA	NA	13	0 - 0.018	0.01	0.01	0.004
Pu-238	0	NA	NA	NA	NA	18	0 - 0.016	0.01	0.009	0.004
Pu-240	27	0.007 - 0.025	0.012	0.013	0.005	323	0.005 - 0.057	0.015	0.017	0.006
Tc-99	17	0.034 – 0.89	0.27	0.35	0.51	257	0.037 - 6.9	0.26	0.43	0.64
U-233/234	51	0.67 - 10.3	1.4	2.0	1.6	842	0.49 - 7.1	1.15	1.2	0.53
U-235/236	51	0.013 - 0.36	0.07	0.085	0.06	843	0.013 - 0.37	0.054	0.057	0.028
U-238	51	0.65 - 8.37	1.4	1.9	1.4	843	0.505 - 7.1	1.2	1.2	0.52
Sediment		**(pCi/g)**	**(pCi/g)**	**(pCi/g)**	**(pCi/g)**		**(pCi/g)**	**(pCi/g)**	**(pCi/g)**	**(pCi/g)**
Am-241	0	NA	NA	NA	NA	3	0.016 - 0.025	0.017	0.019	0.005
Np-237	0	NA	NA	NA	NA	0	NA	NA	NA	NA
Pu-238	0	NA	NA	NA	NA	1	0.017 - 0.017	0.017	0.017	NA
Pu-240	4	0.009 - 0.018	0.014	0.014	0.004	3	0.007 - 0.028	0.022	0.019	0.011
Tc-99	2	0.20 - 0.26	0.23	0.23	0.044	3	0.038 - 0.30	0.041	0.13	0.15
U-233/234	11	1.1 - 5.3	2.17	2.3	1.3	20	0.61 - 1.6	0.97	1.03	0.22
U-235/236	11	0.041 - 0.204	0.087	0.093	0.047	20	0.018 - 0.075	0.048	0.046	0.012
U-238	11	1.1 – 5.0	2.09	2.3	1.2	20	0.48 - 1.3	0.96	0.96	0.20
Surface Water		**(pCi/L)**	**(pCi/L)**	**(pCi/L)**	**(pCi/L)**		**(pCi/L)**	**(pCi/L)**	**(pCi/L)**	**(pCi/L)**
Am-241	0	NA	NA	NA	NA	0	NA	NA	NA	NA
Np-237	0	NA	NA	NA	NA	0	NA	NA	NA	NA
Pu-238	1	0.077 - 0.077	0.077	0.077	NA	2	0.038 - 0.04	0.039	0.039	0.001
Pu-240	0	NA	NA	NA	NA	0	NA	NA	NA	NA
Tc-99	1	1.9 - 1.9	1.88	1.9	NA	3	1.4 - 2.8	1.4	1.8	0.78
U-233/234	11	0.1 - 0.88	0.34	0.44	0.29	22	0.096 - 1.12	0.20	0.31	0.29
U-235/236	1	0.09 - 0.09	0.09	0.09	NA	1	0.12 - 0.12	0.12	0.12	NA
U-238	9	0.08 - 0.89	0.25	0.37	0.28	14	0.12 - 0.72	0.18	0.30	0.219
Dust, Interior Surfaces		**(pCi/cm^2)**	**(pCi/cm^2)**	**(pCi/cm^2)**	**(pCi/cm^2)**		**(pCi/cm^2)**	**(pCi/cm^2)**	**(pCi/cm^2)**	**(pCi/cm^2)**
Am-241	0	NA	NA	NA	NA	1	0 - 0	0	0	NA
Np-237	0	NA	NA	NA	NA	1	0 - 0	0	0	NA
Pu-238	0	NA	NA	NA	NA	6	0 - 0	0	0	0
Pu-240	0	NA	NA	NA	NA	3	0 - 0	0	0	0
Tc-99	2	0.001 - 0.002	0.001	0.001	0.001	27	0.001 - 0.013	0.003	0.004	0.003
U-233/234	16	0 - 0.028	0	0.002	0.007	82	0 - 0.024	0	0.001	0.003
U-235/236	3	0 - 0.001	0	0	0	5	0 - 0.001	0	0	0
U-238	26	0 - 0.004	0	0	0.001	93	0 - 0.024	0	0	0.002

[a] In this HHRA, an analyte is considered to be detected in a sample if it's concentration is greater than, or equal to, the critical value (L_c) for that analyte in that sample.

[b] NA - Not applicable.

3. HUMAN EXPOSURE ASSESSMENT

Once available data were collected and collated into a data set, the process of identifying and quantifying potential exposures began. This was accomplished by following a phased approach that involves the tasks listed below:

- Characterizing the exposure setting of the study area (Solutient 2022),
- Identifying potentially complete human exposure pathways,
- Estimating the exposure point concentrations at potential receptor locations, and
- Quantifying plausible ROC exposures.

This section presents a brief description of the methods that were used to evaluate exposures from ROCs in the study area. Section 3.1 presents a conceptual model describing sources, release mechanisms, representative receptors, and exposure routes to be evaluated. Section 3.2 presents methods for determining media-specific exposure point concentrations for ROCs. Section 3.3 presents the methods and assumptions applied in quantifying exposures by assumed receptors. All exposures addressed in this document are based on the soil, dust, surface water, and sediment analytical results that are included in the HHRA data set.

3.1 CONCEPTUAL MODEL

Figure 10 presents the conceptual model depicting the exposure media and potential exposure pathways in that scenario. This model was developed with Community questionnaire responses during preparation of the HHRA Work Plan and it traces common routes that radioactive material may take in the local environment and identifies potential exposure mechanisms and routes that may result.

This type of graphic illustrates the potentially complete exposure pathways considered for quantitative evaluation in this HHRA. Each complete exposure pathway evaluated consists of:

- a source (e.g., soil);
- an exposure mechanism (e.g., direct contact, food from local gardens)
- an exposure route (e.g., inhalation, ingestion); and
- a potential receptor (e.g., resident or recreational user).
- For some exposure pathways to be complete, additional elements are required, such as a release mechanism (e.g., wind, erosion) and/or a transport mechanism (e.g., root uptake). If any required element is missing, the exposure pathway under consideration is incomplete and no exposure can occur.

An overview of the elements of the conceptual model depicted in Figure 10 are discussed in the following subsections. This HHRA report's conceptual model describes hypothetical receptor behaviors during theoretical current land use.

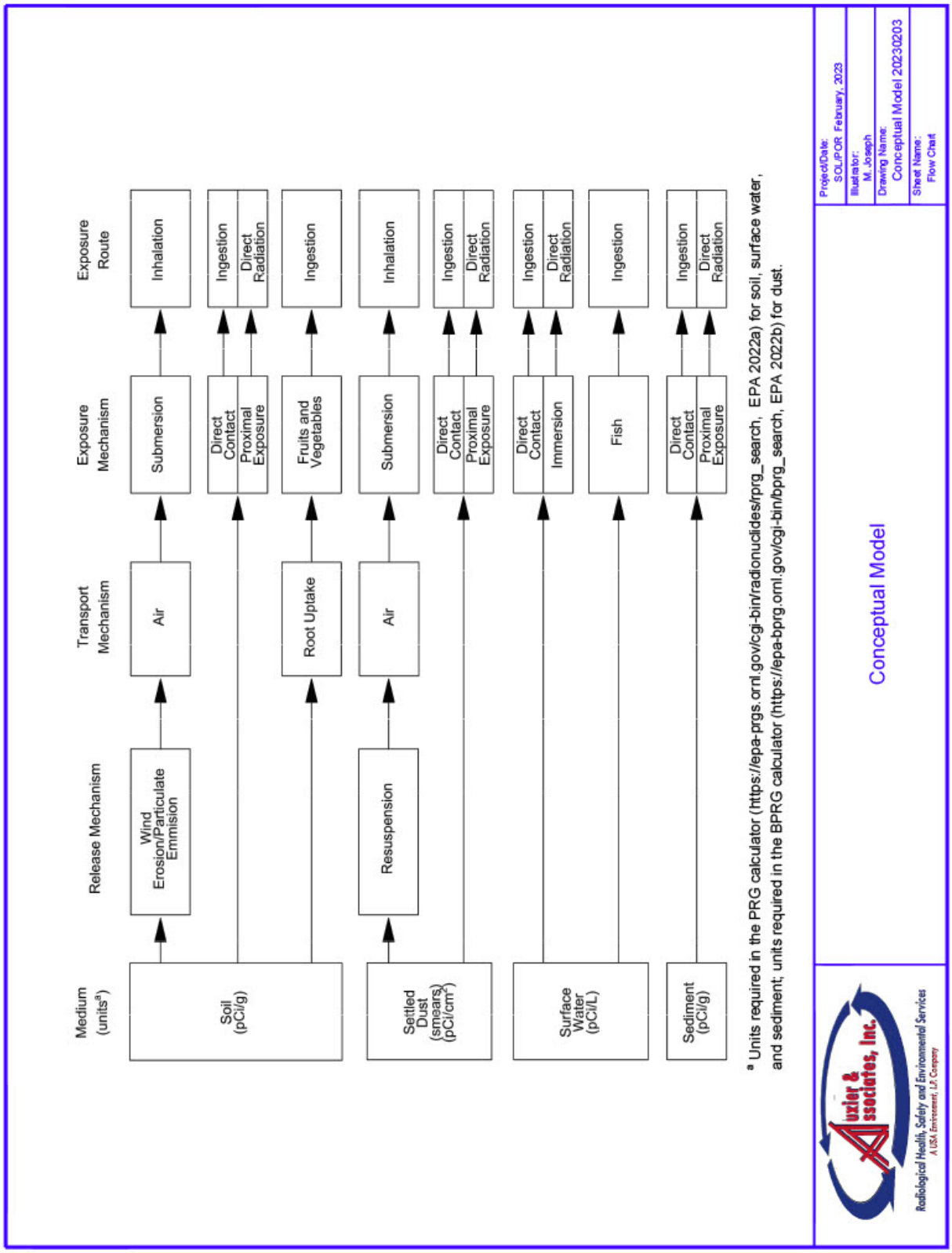

Figure 10 Conceptual Model

The bases for identifying complete exposure pathways from ROCs detected in the study area include the following assumptions:

- Currently, the land within the study area is partially vegetated, contains homes and other structures, and is used primarily for residential purposes.
- Surface water runoff within the study area is currently channeled to existing creeks and the Scioto River.

The text that follows provides the rationale for focusing the analysis on the specific receptors, exposure routes, and constituent sources in addressing contributions to exposure.

3.1.1 Sources

The media considered in this HHRA report are soil, settled dust, surface water, and sediment within the study area. These source media potentially contain the ROCs identified in Section 2.

3.1.2 Potential Release Mechanisms

Radionuclides may be released to the environment from source media in the study area by a number of processes. These processes are referred to as "release mechanisms" in this HHRA report. Release mechanisms in the study area were identified by discerning the potential interactions of the physical environment with the sources of radionuclides. Potential release mechanisms are discussed in the following subsections. Figure 10 identifies release mechanisms evaluated.

3.1.2.1 Resuspension of Soil

Loose surface soil particles containing ROCs can be released by mechanical agitation or picked up by winds passing over areas of exposed loose soil and become suspended for a time in air. Once released, particulates can become airborne and move with the wind. Figure 10 identifies soil release mechanisms that are evaluated in this HHRA.

3.1.2.2 Resuspension of Dust

Dust particles containing ROCs can be stirred by air currents passing over indoor surfaces where exposed loose dust lies. Once stirred, these particulates can become airborne and, with sufficient currents, can shift or travel with air currents. This potential release mechanism is not addressed in this HHRA, as assessment of this pathway is unattainable with given data and is not part of the scope of work. Exposures from outdoor dust are expected to dominate exposures from indoor dust.

3.1.2.3 Surface Water Overflow

Rivers and streams, as well as ditches, can overflow their banks during flooding events like rainstorms. This water may carry both dissolved and suspended materials along with it and some of these materials could deposit on soil outside the waterbody when waters subside. This possibility is addressed in this assessment via sampling soil in selected areas where surface runoff may have occurred, as described in the SAP (Solutient 2020a).

3.1.2.4 Soil Erosion by Surface Water

Soil particles can be picked up by surface water runoff during precipitation events and carried to surface water bodies such as creeks. Such particles may remain suspended in natural water or may be deposited as sediment. In addition, soluble materials in the soil might be dissolved and transported downstream by the flowing water. This possibility is addressed in this assessment via sampling sediments and water in selected creeks and ponds within the watershed, as well as the Scioto River.

3.1.2.5 Leaching from Soil to Groundwater

Water percolating through the soil can dissolve soluble materials within a soil matrix. These dissolved materials can then be carried by water through the soil and enter groundwater. The degree to which materials dissolve in water or remain adsorbed to a soil matrix has been measured during various studies over the past 50 years (IAEA 2014, ATSDR 2013a, and EPA 1996).

Many elements, including plutonium, have been determined to be less insoluble and therefore less mobile in water than many other elements. Others, like technetium, tend to be more mobile and are expected to follow groundwater migration pathways (AECL 1984, EPA 1978, EPA 1999a, Hoeffner 1985, NRC 1992, ORNL 1984). A systematic groundwater sampling effort was not included in the SAP (Solutient 2020a), but sampling of two groundwater wells was performed in response to a request by the Community. As this is an isolated sampling event, Community impacts from this potential release mechanism are not addressed further in this HHRA.

3.1.3 Potential Exposure Routes

An exposure route describes how a ROC is delivered to the receptor. Generally, radiological exposures are divided into two types: direct external exposures and internal exposures.

Direct external radiation exposures occur when a person is irradiated by an external source. They do not require physical contact and can occur when a person is near gamma-emitting radionuclides. Increasing the distance between a radiation source and the receptor reduces the intensity of the radiation field at the point of exposure. (The magnitude of exposure is inversely related to the distance of the receptor from the source.) Direct radiation exposures can also be reduced when shielding, such as soil or water, is placed between the receptor and the source of radioactivity. Sources of direct exposure may include gamma-emitting ROCs contained in soil, settled dust, surface water, and sediment, as well as in airborne particulates borne out of disturbed soil or dust.

Internal radiation exposures occur when ROCs are introduced directly into the human body through, for example, inhalation and inadvertent or intentional ingestion of soil, crops or water. Once inside the body, these ROCs could irradiate organs and tissues. Based on their low permeability through human skin, dermal absorption of these ROCs through the skin was not considered to be a complete exposure pathway.[10]

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[10] The ROCs investigated in this study are metals. Dermal absorption of these metals through skin exposures has not been found to be an important source of internal exposure (EPA 1989).

Several examples of potentially complete, media-specific exposure routes evaluated in the HHRA are presented below:

- Soil: A receptor can be exposed to radioactive materials in soil via direct external radiation. In addition, a receptor may come into physical contact with soil or soil particulates in air and be internally exposed to ROCs via ingestion or inhalation, respectively. Also, a receptor can indirectly consume radioactive materials in soil via root uptake by fruits and vegetables.
- Sediment: A receptor may come into physical contact with sediment while participating in surface water activities and be internally exposed to ROCs via ingestion. As with other media, a receptor can be exposed via direct external radiation to radioactive materials in sediment. However, both the water and the sediment provide shielding between ROCs and an immersed receptor.
- Surface Water: A receptor may come into physical contact with surface water and be internally exposed to ROCs via ingestion. A receptor can be exposed via direct external radiation to radioactive materials while submerged in surface water. However, the water provides shielding between ROCs and an immersed receptor. In addition, fish living in surface water can be caught and consumed by a receptor, thereby exposing the receptor to ROCs in surface water via fish ingestion.
- Settled Dust on Surfaces: A receptor may come into physical contact with settled dust and be internally exposed to ROCs via ingestion or externally exposed due to proximity.

There may be more than one complete exposure pathway for a postulated receptor. An example of a receptor with the potential to be exposed via multiple pathways is a resident with a garden. Potential complete pathways to a gardener include:

- Inhalation: resuspension of soil,
- Direct radiation: proximity to soil, sediment, or settled dust; submersion in air or surface water during recreation,
- Ingestion: incidental or intentional ingestion of soil, sediment, or surface water; root uptake by fruits and vegetables; fish ingestion.

3.1.4 Potential Receptors

The study area is predominately a residential area. The area is primarily zoned R-1 (single-family dwelling district). This and other residential land uses (including preschool and other educational uses) are present within six miles of PORTS. Local creeks and the Scioto River are assumed to be used for recreational purposes, such as wading, swimming, and fishing.

From that description, the most representative receptor type for the HHRA is the resident. The residential receptors in the Community consist of both children and adults. A conservative approach assumes that the residential receptors in the Community maintain residency in childhood and adulthood. A “receptor” in this case is representative of a local population and should not be considered as a specific individual. As such, results are not representative of or applicable to any particular person but are considered representative of an exposed population.

3.2 EXPOSURE POINT CONCENTRATIONS

The exposure point concentration represents the concentration of a ROC in an exposure medium that may be contacted by a hypothetical receptor. Establishing an exposure point concentration depends on several factors, including:

- The location of a potential receptor (Section 3.1.4),
- The availability of validated and usable data for ROCs (Section 2),
- The population distribution of a particular data set such as Tc-99 in soil and
- Supporting information such as the data on radionuclides in the same radioactive decay series.[11]

For the evaluation of current land use and related study area conditions, exposure point concentrations were determined using available analytical data for each medium. The exposure point concentrations developed in this report are consistent with EPA's concept of Reasonable Maximum Exposure (RME) as presented in EPA guidance (EPA 1989). In that guidance, the EPA remarks that each exposure metric used in describing the RME should be chosen such that the resulting exposure estimate is consistent with the higher end of the array of plausible exposures expected to occur in the area of interest (EPA 1989, EPA 1991a). The method does not require that every exposure factor value used in exposure calculations be upper-bound estimates, but the final results should provide confidence that the RME is equal to or greater than actual exposures (EPA 2019, page 63).[12]

3.2.1 Influence of RME Guidance on Selection of Exposure Point Concentration

In the case of exposure concentrations, EPA recommends the use of the average concentration of a contaminant as the most representative concentration that would be contacted over time. Environmental samples are, by character, subject to variability which leads to uncertainties. While it is not possible to know the "true" average of a contaminant's concentration across a large study area, it is possible to estimate it. Any such estimate will, by its nature, be somewhat uncertain and EPA has stated in its 1992 *Supplemental Guidance to RAGS: Calculating the Concentration Term* (EPA 1992b) that, because of the uncertainty associated with estimating the true average concentration for a study area, the 95% Upper Confidence Limit of the arithmetic average (95% mean UCL concentration) should be used in RME calculations.

The 95% mean UCL concentration is basically a probability statement. It is the concentration where there is a 95% chance that the true mean is at or below the estimated mean. In other words, there is a 95% confidence that the actual distribution of the data set for that analyte in that medium has a mean that is less than or equal to the calculated UCL. All other things being equal, this RME approach generally produces an overestimate of the resulting exposure.

3.2.2 Selection of Exposure Point Concentration

Column 2 of Table 5 presents the 95% mean UCL concentration for each ROC in soil listed in Table 2, as estimated using the most recent version of EPA's *Statistical Software ProUCL 5.2*

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[11] For more information on what a decay series is, see Section 4.

[12] *Guidelines for Human Exposure Assessment* (EPA 2019)

for Environmental Applications for Data Sets with and without Nondetect Observations (EPA 2022c). As can be seen in the data, ProUCL reports some 95% mean UCL values as negative concentrations. This reflects the high number of negative values reported by the laboratory.

The ProUCL Users Guide (EPA 2022c) encourages users to seek assistance from a professional statistician when impractical results, such as negative means, occur. Splitstone & Associates was retained to determine more appropriate values to represent exposure point concentrations within the study area. Splitstone employed the commercially available statistical software package Systat® to calculate basic statistical summaries of the radionuclide concentrations by sampled media. Splitstone's estimated exposure point concentrations are reproduced in Column 3 of Table 5.[13] Attachment C contains the report detailing the statistical analysis provided by Splitstone and Associates.

Typically the exposure point concentration can not be greater than the maximum concentration detected. If the ROC's 95%UCL in Column 3 of Table 5 is greater than the maximum detected value, the exposure point concentration is set to the maximum. In the cases where the ROC was not detected, the exposure point concentration in Column 4 of Table 5 was set to zero. Column 4 of Table 5 lists the concentration selected to represent the media-specific exposure point concentrations for each ROC.

3.3 QUANTIFICATION OF EXPOSURE

This section presents general rationale and assumptions that can be used to quantify the magnitude of exposures expected to result from all reasonable exposure pathways. As noted in Section 3.1.3, exposures include both internal exposures and direct external exposures. Internal exposures require the intake of ROCs. Pathway-specific intake calculations may vary due to differences in exposure methods and types of media. Specific equations used in this HHRA are part of the EPA's PRG and BPRG calculators (EPA 2022a and EPA 2022b, respectively), whose algorithms are incorporated by reference and are presented in Attachment D.

The HHRA includes numerical descriptions of the residential receptor during the periods of childhood and adulthood and the respective behaviors (such as inhalation rate, ingestion rate, and the time spent outdoors each day). The selection of parameter values introduces some uncertainty in calculations. These parameter values are selected to yield exposure estimates that are intended to produce risk estimates that are in the higher range of the distribution of risk but not greater than the highest conceivable risk (i.e., the RME). If the RME is determined to be acceptable, as defined in Section 3.2, then it is likely that all other lesser exposures within the study area will also be acceptable.

[13] A parallel evaluation was performed at Auxier & Associates. All negative concentration values in the data set were set to zero (0) creating a series of censured data sets. Additional ProUCL 5.2 runs were performed on this censured data. These results are not reported here, as this approach has questionable statistical value, but it did produce positive concentration results that were used to provide additional context and confidence in Splitstone's Systat results.

Table 5 Exposure Point Concentrations in the Study Area

Radionuclide	ProUCL's Recommended Concentration Using HHRA Data Set	Statistician's Selections Using Systat® & HHRA Data Set	Selected Exposure Point Concentration
Soil (pCi/g)			
Am-241	-0.00674	0.005811	0.005811
Np-237	-0.00943	0.000925	0.000925
Pu-238	-0.0133	0.001702	0.001702
Pu-239/240	0.0036	0.010701	0.010701
Tc-99	-0.0165	0.179273	0.179273
U-233/234	1.247	1.253277	1.253277
U-235/236	0.059	0.059291	0.059291
U-238	1.272	1.277565	1.277565
Sediment (pCi/g)			
Am-241	0.00454	0.0086	0.0086
Np-237	ND [a]	0.0023	--[b]
Pu-238	0.017[c]	0.0048	0.0048
Pu-239/240	0.00657	0.0097	0.0097
Tc-99	-0.105	0.04537	0.04537
U-233/234	1.116	1.134273	1.134273
U-235/236	0.0501	0.05103	0.05103
U-238	1.04	1.05639	1.05639
Surface Water (pCi/L)			
Am-241	ND	0.04337	--[b]
Np-237	ND	0.00451	--[b]
Pu-238	-0.00339	0.03488	0.03488
Pu-239/240	ND	0.03832	--[b]
Tc-99	-0.874	0.54298	0.54298
U-233/234	0.361	0.38381	0.38381
U-235/236	0.12[c]	0.03568	0.03568
U-238	0.238	0.26671	0.26671
Settled Dust (pCi/cm^2)			
Am-241	0.00014[c]	0.000040	0.000040
Np-237	0.0001[c]	0.000008	0.000008
Pu-238	-0.00005633	0.000026	0.000026
Pu-239/240	-0.00001632	0.000048	0.000048
Tc-99	-0.00393	0.001413	0.001413
U-233/234	0.00048797	0.000578	0.000578
U-235/236	-0.00004698	0.000027	0.000027
U-238	0.00045534	0.000557	0.000557

[a] ND – This radionuclide was not found in any CCSE sample of this medium.
[b] As this radionuclide was not detected in any sample, the exposure point concentration has been set to zero. This is consistent with the HHRA Work Plan (Auxier 2022) which states risks will be assessed from ROCs detected in the study area.
[c] ProUCL requires a minimum of three detected concentrations. For the specified medium, the value presented is the single highest detected concentration in the HHRA data set.

Quantitative estimates of exposure are based on: (i) radionuclide exposure point concentrations in media at the exposure points, as discussed in Section 3.2, and (ii) quantifiable receptor behaviors expressed as exposure parameters. Notable exposure parameters used are presented by medium in Section 3.3.2. Parameter values were extracted from EPA PRG calculators, including the BPRG calculator for dust, unless noted otherwise.

The impact of multiple ROCs within a decay series (discussed as daughters in Section 4) on the output from the EPA's PRG and BPRG calculators can lead to erroneous conclusions unless exposure point concentrations are selected considering the assumptions made within the calculators. Additional considerations in the exposure point concentration calculation process are discussed below.

3.3.1 Quantification Exposures from Multiple Pathways

The receptor is initially assumed to be exposed to all media and via all pathways included in the HHRA. Thus, multi-media and multi-route exposures are assumed to be additive. In other words, EPA's web-based calculators, specifically the PRG calculator and the BPRG calculator, assume the receptors may be exposed to more than one exposure pathway and provides both intermediate results for individual pathways and aggregate results. These EPA web-based calculators and their algorithms are incorporated by reference. Attachment D presents pertinent equations used in the calculators.

The EPA web-based PRG calculators require certain types of input including media concentrations. As each medium is discussed below, the medium for which an input concentration is required will be identified along with the required units.

3.3.2 Medium-Specific Assumptions and Exposure Parameters

Exposure parameters are dependent upon medium-specific assumptions and limitations within the PRG and BPRG calculators. As stated in the HHRA Work Plan (cite), these calculators are populated with EPA's recommended parameter values. For example, as 90% of people in the U.S. move at least once every 26 years, the EPA recommends the use of 26 years to represent the residential exposure duration in CERCLA-style risk evaluations. [14]

Exposures across this 26-year period are summed by medium to produce the calculated risks for a residential receptor. Where appropriate, these parameter values are age-adjusted to include a receptor's exposures as a child (6 years) and later as an adult (20 years). In the case of incidental soil ingestion, recommended soil intake rates for these ages vary over time, ranging from 100 to 200 milligrams per day (Section 3.3.2.1). The EPA recommends risk assessors use age-specific soil intake rates when calculating the quantity of soil ingested over the 26-year exposure period, $IFS_{res\text{-}adj}$ (EPA 2022a).

3.3.2.1 Exposure to Soil

The EPA PRG calculator was used to calculate exposure to soil from a variety of receptor-specific exposure pathways (i.e., incidental ingestion of soil, inhalation of resuspended

[14] CERCLA – EPA's 1980 Comprehensive Environmental Response, Compensation, and Liability Act.

particulates, direct radiation exposure, and via root uptake into produce). The calculator requires that the user select the receptor type, exposure media, the ROCs, and the representative concentrations prior to running. For example, when evaluating potential impacts across the study area the resident receptor was selected and the exposure point concentrations, in picoCuries per gram (pCi/g), of the identified ROCs were input. Some parameter values can be changed from default in the PRG calculator (EPA 2022a). While the default (temperate) climate zone was selected, the results were confirmed with two additional applications, once using Cleveland, Ohio (temperate) and once using Huntington, WV (temperate). These three applications produced similar results. Once required parameter values were input, the calculator then evaluated exposures from complete soil pathways.

As stated previously, risks of exposure to ROCs are related to the receptor's behavior. Behavior determines how much time receptors might spend in potentially impacted areas, how rapidly they breathe, how much local food they consume, etc. Aspects of these behaviors can be quantified for receptors like the resident, as shown in Table 6.

Table 6 Parameters Used to Estimate Potential Soil Exposure

Pathway (units)	Adult[a]	Child[a]
Resident Exposure Duration (years)	20	6
Resident Exposure Frequency (days/year)	350	350
Resident Exposure Time (inhalation) (hours/day)	24	24
Resident Exposure Time (direct exposure) - indoor (hours/day)	16.4	16.4
Resident Exposure Time (direct exposure) - outdoor (hours/day)	1.75	1.75
Inhalation Rate of Resuspended Particles (m^3/day)	20	10
Intake/Ingestion Rate (mg/day)	100	200
Resident Produce Ingestion Rate (g/day)	1,486	816.4
Resident Produce Exposure Frequency (day/yr)	92	92

[a] With the exception of produce, these are default value in the EPA PRG Calculator (https://epa-prgs.ornl.gov/cgi-bin/radionuclides/rprg_search) (EPA 2022a). Produce exposure frequency is one-fourth of a 365-day year.

The EPA has compiled a database of parameters describing human physiology and behaviors (EPA 2011). It has used this information to populate its calculators with default values intended to produce liberal exposure estimates. Unless noted, these default parameters will be used in this evaluation. One notable group of exceptions are the parameters describing ingestion of local produce. In the PRG calculator, the default value for this time is 350 days per year. For southern Ohio, this value does not represent a typical growing season. Rather than including an unrealistic parameter value of 350 days per year, a lesser value must be considered. One-fourth of a 365-day year, or 92 days per year, is more a reasonable estimate of the harvest period for a given crop and will be the time set for the resident receptor's exposure to produce grown in the study area. The soil input values for the resident in the PRG calculator represent this intake rate as the "produce exposure frequency". In the PRG calculator, the list of default produce consumed daily by a resident includes 6 fruits, 3 leafy vegetables, and 14 other vegetables, all of which are included in this HHRA.

3.3.2.2 Exposure to Dust on Surfaces

The EPA's BPRG calculator was used to calculate exposure to dust on surfaces (ingestion and direct radiation exposure). The user selected the resident receptor and the ROCs for exposure to dust then input exposure point concentrations. For all parameters except the fraction transferred surface to skin (FTSS), default parameters were used. The default values for the FTSS for hard surfaces is 0.4 for the adult and 0.64 for the child. For the adult, this means that 40% of the dust on a hard surface (i.e., wood, concrete, etc.) can be transferred to skin. The default values for the FTSS for soft surfaces (such as carpet, fabric, etc.) is 0.08 for the adult and 0.14 for the child. For the adult, this means that 8% of the dust on a soft surface can be transferred to the skin. In the HHRA, the value for all FTSS parameters were very conservatively set at one (1) for the adult and for the child, meaning 100% of the dust on surfaces can be transferred to skin.

The BPRG calculator includes a parameter of "hand to mouth" events. It represents the number of times per day a receptor (adult or child) is likely to insert fingers into the receptor's own mouth. For the child, the BPRG calculator includes 17 events per day and, for the adult, 3 events per day.

Table 7 contains a summary of the primary dust exposure parameter values for the resident.

Table 7 Parameters Used to Estimate Potential Dust Exposure

Pathway (units)	Adult[a]	Child[a]
Resident Exposure Duration (years)	20	6
Resident Exposure Frequency (days/year)	350	350
Resident Exposure Time (direct exposure) (hours/day)	24	24
Resident Exposure Time (ingestion) - hard surface (hours/day)	6	6
Resident Exposure Time (ingestion) - soft surface (hours/day)	10	10
Resident Frequency of Hand to Mouth (events/hour)	3.025	17.7
Fraction Transferred Surface to Skin (hard surfaces) (unitless)	1	1
Fraction Transferred Surface to Skin (soft surfaces) (unitless)	1	1
Fraction of Hand to Mouth (unitless)	1	1

[a] With the exception of the Fraction Transferred Surface to Skin (hard and soft surfaces) and the Fraction of Hand to Mouth, these are default value in the EPA BPRG Calculator (https://epa-bprg.ornl.gov/cgi-bin/bprg_search) (EPA 2022b).

For the medium under discussion, settled dust, the PRG calculator requires concentrations to be entered in units of pCi per square centimeter (pCi/cm^2).

3.3.2.3 Exposure to Surface Water, Swimming

The EPA PRG calculator (EPA 2022a) was used to calculate exposure to radionuclides in surface water while swimming (ingestion and direct radiation exposure). The user selected the recreational receptor, surface water medium, and the ROCs. Medium-specific exposure point concentrations, in picoCuries per liter (pCi/L), were entered into the calculator.

Given that the PRG calculator contains default parameter values only for the rates of incidental ingestion of water while swimming (one for the child and one for the adult), an additional source of information for other required parameter values was needed. Swimming in surface water is primarily recreational. The EPA's *Exposure Factors Handbook* (EPA 2011, the *Handbook*) contains recommended parameter values for swimming that are based on published studies of time spent swimming. The *Handbook* does not present recommended parameter values for swimming in natural water bodies vs swimming pools separately. To be conservative, all time reported as "swimming" is designated herein as swimming in natural water bodies within the study area, specifically creeks and the Scioto River.

There are three parameters that necessitate a detailed calculation for swimming because there is no direct correlation between the required parameters (and units) in the PRG calculator and the parameters provided in the *Handbook*. To aid in organizing the information, Table 8 lists the parameters and their respective units of measure required by the PRG calculator for the recreational swimmer.

Table 8 Default Surface Water Units in the PRG Calculator

Parameter Name	Required Units
EV	events/day
Exposure Frequency	days/year
Exposure Time	hours/event

An "event" is one use of a water body for the purpose of swimming.

The *Handbook* shows tabulated information for swimming events in units of minutes per month. Although information concerning swimming events in natural water bodies is unavailable, the *Handbook* does contain information about swimming in pools. That information was used herein to assess exposures from swimming in natural water bodies.

The information provided in the *Handbook* must be converted into the units of measure required by the PRG calculator. The conversions used in this evaluation for each of the three parameters listed in Table 8 are addressed separately below.

EV – The *Handbook* offers no direct numerical guidance on this parameter. Consequently, an assumption must be made. To simplify the calculations and stay within the realm of reason it is assumed that a receptor only swims once on a given day and does not swim intermittently throughout the day; hence one event per day.

Exposure Frequency – Section 16.3.2.6 of the *Handbook* presents the timeframe for outdoor activities as April through October. As the water temperatures in local waters are expected to be uncomfortably cool during April, May, September, and October, swimming was assumed to be a viable exposure pathway for the three remaining months per year. As the *Handbook* provides no direct recommendation on exposure frequency, a reasonable regularity for swimming in natural water bodies during the summer months is assumed to be four times per month, or 12 times per year, as shown below.

$$Exposure\ frequency\ = \frac{4\ events}{month} x \frac{3\ months}{year} x \left(\frac{1\ day}{1\ event}\right) = 12 \frac{days}{year}$$

Exposure Time, Adult – The swimming duration provided in Table 16-1 of the *Handbook* is age-specific. Exposure times associated with the adult age range are 6 years old to adult. The *Handbook* provides three entries in that range, as shown in Table 9. The time-weighted average of the swimming durations over a 15-year period published in the *Handbook* produced a monthly duration of 145 minutes.

Table 9 Swimming Durations for the Adult

Age range	Swimming Duration [a] (minutes/month)
6 to <11 years	151
11 to <16 years	139
16 to <21 years	145
Time-weighted average for adult	145

[a] Table 16-1 of the EPA's *Exposure Factors Handbook* (EPA 2011).

Assuming four events per month, the exposure time for "time in the water" is 36.25 minutes per event, as shown below.

$$(Exposure\ Time)_{adult} = \left(\frac{145\ minutes}{1\ month}\right)_{adult} x \left(\frac{1\ month}{4\ events}\right) = 36.25\ \frac{minutes}{event}$$

The PRG calculator requires exposure time for swimming to be entered as hours per event. Converting the previous result and rounding to the nearest tenth of an hour, this becomes:

$$(Exposure\ Time)_{adult} = \left(\frac{36.25\ minutes}{event}\right)_{adult} x \left(\frac{1\ hour}{60\ minutes}\right) = 0.6\ \frac{hours}{event}$$

Exposure Time, Child – There are, likewise, four swimming durations provided for the child in Table 16-1 of the *Handbook*. Exposure times associated with the child age range are birth to <6 years old, as shown in Table 10. As with the adult, the time-weighted average of the swimming durations over a 6-year period published in the *Handbook*, produces a monthly exposure duration of approximately 121.3 minutes.

Table 10 Swimming Durations for the Child

Age range	Swimming Duration[a] (minutes/month)
Birth to <1 year	96
1 to <2 years	105
2 to <3 years	116
3 to <6 years	137
Time-weighted average	113.5

[a] Table 16-1 of the EPA's *Exposure Factors Handbook* (EPA 2011).

Given that there are four events per month, the child exposure time for swimming was established at 0.5 hours per event, as shown below.

$$(Exposure\ Time)_{child} = \left(\frac{113.5\ min}{1\ month}\right)_{child} x \left(\frac{1\ month}{4\ events}\right) x \left(\frac{1\ hour}{60\ min}\right) = 0.5\ \frac{hours}{event}$$

Table 11 contains a summary of the primary parameters describing recreational use of surface water, expressed in the PRG calculator.

Table 11 Parameters Used to Estimate Exposures to Hypothetical Swimmer

Pathway (units)	Adult	Child
Recreational Exposure Duration (years)[a]	20	6
Recreational Exposure Frequency (days/year)[b]	12	12
Recreational Exposure Time (hours/event)[b]	0.6	0.5
Recreational Exposure Events per Day (events/day) [b]	1	1
Recreational Incidental Water Intake Rate (liters/hour) [a]	0.11	0.12
Recreational Incidental Sediment Intake Rate (mg/day) [c]	100	200

[a] These are default values in the EPA PRG Calculator (https://epa-prgs.ornl.gov/cgi-bin/radionuclides/rprg_search) (EPA 2022a).

[b] Section 3.3.2.3.

[c] This is the default value for soil ingestion in the EPA PRG Calculator (https://epa-prgs.ornl.gov/cgi-bin/radionuclides/rprg_search) (EPA 2022a), and is very conservatively applied to sediment in this assessment.

3.3.2.4 Exposure to Sediment

Exposure to sediment (ingestion and direct radiation exposure) were estimated using the EPA PRG calculator and the ROC exposure point concentrations in sediment. Given that the receptor would be exposed to both surface water and sediment simultaneously, it is reasonable to perform the assessment for both media simultaneously.

Table 11 contains a summary of the primary sediment parameter values used to assess exposures for hypothetical receptors using local water bodies for recreational activities. It should be noted that the PRG calculator does not offer ingestion rates for sediment, but it does offer ingestion rates for soil. Lacking study area-specific ingestion rates for sediment during recreational use of

local water bodies, the default rates for residential soil ingestion were used to represent sediment ingestion (Table 6). Considering the very limited access for ingesting sediment in comparison with ingesting soil, this approach likely overestimates the amount of sediment incidentally ingested during recreational use of local water bodies.

3.3.2.5 Exposure to Surface Water, Fish Ingestion

The SAP (Solutient 2020a) does not include sampling fish, so exposure point concentrations from fish flesh are not possible. Exposures from consumption of fish were estimated using the EPA PRG calculator (EPA 2022a) and its default parameters. The hypothetical farmer option allows the user to input water concentrations to estimate exposures from eating fish. Surface water sampling is included in the SAP (Solutient 2020a) and the fish pathway in the PRG calculator (farmer receptor) was used to evaluate exposure to surface water via fish ingestion.

To be consistent with other pathway evaluations, the exposure duration for fishing was set at 20 years.

The EPA's *Handbook* recommends using the months of April through October for outdoor activities like fishing and, for the purpose of this evaluation it was assumed that a receptor may consume fish daily during those months. Summing the number of days in those months provides an exposure frequency of 214 days, as shown in Table 12. As no local anglers reported that they fished and ate their catch every day of the season, a 214-day exposure frequency very likely exaggerates exposures from consumption of fish.

Table 12 Exposure Frequency for Fish Consumption

Month	Number of Days	Month	Number of Days
April	30	August	31
May	31	September	30
June	30	October	31
July	31	Total:	214 days

The mass of fish ingested per day is another parameter to be considered. Table 10-5 of the *Handbook* provides a summary of relevant studies on freshwater recreational fish intake. The nearest state to Ohio that was included in the study is Indiana. The recommended 95th percentile ingestion rate for Indiana is 61 grams/day. No age distinction is provided, so 61 grams/day is set as the freshwater fish ingestion rate for both adults and children. Parameters used in estimating exposure to surface water via fish ingestion are provided in Table 13.

Table 13 Parameters Used to Estimate Potential Exposure via Fish Ingestion

Pathway	Adult	Child
Fishing Exposure Duration (years)[a]	20	6
Fishing Exposure Frequency (days/year)[b]	214	214
Fish Ingestion Rate (grams/day)[c]	61	61
Contaminated Fraction of Fish (unitless)[d]	1	1

[a] These are consistent with the exposure duration for other pathways assessed in the HHRA.

[b] Assumes daily fish consumption during months of outdoor activities, April through October (EPA 2011).

[c] Recommended 95th percentile freshwater recreational fish intake rate for adults in Indiana, the closest state offered in Table 10-5 of the EPA *Exposure Factors Handbook* (EPA 2011). Adult rate applied to child likely to greatly overestimate fish consumption by children.

[d] This is the default value in the EPA PRG Calculator (https://epa-prgs.ornl.gov/cgi-bin/radionuclides/rprg_search) (EPA 2022a).

4. TOXICITY ASSESSMENT

A toxicity assessment is an integral part of a risk assessment. It provides a description of the relationship between the exposure received and the potential to experience an adverse health effect.

In the EPA system of risk assessment, the toxicity assessment yields a quantitative estimate of the inherent toxicity of radionuclides for use in risk characterization. This estimate is embodied in a radionuclide-specific numerical value referred to as an EPA "slope factor" in this assessment.

"The chemical properties of the radionuclide (or the compound in which it may be incorporated) determine its behavior within the body, including absorption, elimination route, elimination rate and also transfer to and retention at deposition sites and subsequent redistribution." (WHO 2001)

Chemical properties establish the absorption characteristics and destination(s) of elements/compounds, as well as their elimination from the body. Once in the body, elimination occurs at a rate called the biological half-time. Whether the atoms have been deposited, absorbed, ingested, or inhaled, when one biological half-time has passed, half of the atoms have been eliminated from the body. After seven biological half-times, essentially none of the original material remains in the body (CDC 2015).

To provide context to this approach, this Section provides brief overviews of the physical and toxicological properties of each ROC assessed in this HHRA. It then presents a compendium of the EPA slope factors used to convert radionuclide intakes and exposures to risks in the CERCLA assessment system.

4.1 RADIONUCLIDES AND RADIATION

Radionuclides (also called isotopes) are radioactive atoms of a single type, often identified by their element name and atomic mass (i.e. uranium-238). Radioactive atoms are unstable atoms that spontaneously transform into other another type of atom in a variety of processes known collectively as "radioactive decay". Radioactive atoms decay at radionuclide-specific rates, called half-lives. A radionuclide's half-life is the length of time required for half of the atoms in the material to decay into atoms of a different element. A short half-life (days, minutes, seconds, etc.) means a high activity (rapid decay). When seven half-lives have passed, the original radionuclide is essentially gone, with less than one percent remaining (CDC 2015).

As radionuclides decay, they often emit radiation. This radiation includes charged particles (electrons, alpha particles, beta particles and protons), uncharged particles (neutrons), electromagnetic radiation emissions (gamma and x-rays), or a combination thereof during their transformation to a more stable state.

Alpha particles are emitted at a consistent radionuclide-specific energy level. Of the emitted particles, the alpha particle is of substantial size and carries a +2 electrical charge. Alpha particles can react with and/or ionize other molecules. Due to their large size, they have little penetrating power, lacking even the capacity to pass through a sheet of paper. While unable to penetrate the skin's surface, alpha particles are of concern for internal exposure via inhalation or

ingestion of the alpha-emitting radionuclide. Also due to their large size and charge, alpha particles deposit their energies in dense concentrations. This characteristic is called high linear energy transfer (LET) and thus results in short travel paths with highly localized ionizations. High LET increases the probability of cell damage. For example, the alpha-emitting radionuclide polonium-210 is common in tobacco products and may contribute to cancer incidence in smokers. In addition, high LET may also be the reason for increased cancer incidence caused by inhalation of radon gas, a natural radionuclide that emits alpha particles.

Beta emissions generally refer to negatively charged beta particles. Beta particles originate in the nucleus of the atom and their energy and mass are essentially the same as electrons. Comparatively, alpha particles are roughly 8,000 times the size of beta particles. Beta radiation, like alpha radiation, is directly ionizing but differ significantly in track length. Beta particles have low LET because they deposit their energy over a much longer track length, thus giving rise to fewer ionizations over the same distance traveled (i.e., more distance between ionization events). Beta particles deposit most of their energy in the medium through which they pass. Beta-emitting radionuclides can penetrate and deposit energy in the skin from outside the body, but pathways of greater concern are inhalation and ingestion.

Gamma emissions (or gamma rays) are produced in the nucleus of an atom and consist of energy. While gamma rays and x-rays behave similarly, their points of origin differ, as x-rays are produced through changes in the orbiting electron structure, rather than the nucleus. Gamma rays are highly penetrating in human tissues and able to reach every internal body organ. As such, gamma rays can produce both internal and external effects. Neither ingestion nor inhalation is required for gamma rays to penetrate sensitive organs because, without proper shielding, gamma radiation can penetrate the body from the outside. Shielding types include appropriate thicknesses and placement of lead, concrete, or steel. While characterized as low-LET radiation, like beta particles, gamma rays often escape the medium due to their higher energies.

Emissions from radioactive decay can interact with surrounding matter by either colliding directly with atoms or by ionizing nearby atoms as they pass. [15] In most cases, such interactions with living cells produce no noticeable macro affect but, given ample energies deposited within in a critical volume of a cell (such as an industrial or medical radiography exposure), such reactions within a cell can disrupt the overall health of the cell. In addition, free radicals can interact with deoxyribonucleic acid (DNA), potentially triggering cell death, inducing cancer, or causing genetic damage.

4.2 HEALTH EFFECTS FROM RADIATION

Radiation exposures are often measured in units of dose, which express the quantity of energy absorbed by an object or a person. The amount of energy absorbed without regard to the sensitivity of the target material is called absorbed dose. The units used to describe quantities of

[15] Ionization is the process through which a neutral atom or molecule gains or loses at least one electron, resulting in a charge (negative or positive), often concurrently with other chemical changes. The resulting charged atom/ molecule is known as an ion. Some charged ions (also known as free radicals) are exceedingly reactive and readily combining with other elements or compounds.

absorbed dose are either "gray" (Gy, international system) or "rad" (rad, U.S. unit). A second type of dose, called the effective dose takes the absorbed dose and adjusts it for to account for the radiation type and radiosensitivity of living tissue. The resulting effective dose, expressed as Sieverts (Sv, international system) or rem, (rem, U.S. unit) is an indicator of potential long-term health effects (i.e., cancer and hereditary effects) from an exposure.

Radiological health effects can be divided into outcomes related to dose (stochastic effects) and those not related to dose (nonstochastic effects). When the probability of an effect increases with dose, the effect is stochastic. Any dose, without a threshold, has a probability of producing a stochastic effect. The risk of development of cancer from exposure to radiation is a stochastic effect. Conversely, nonstochastic effects depend on dose for their incidence and severity, but there is a threshold dose below which there is no effect. Examples of nonstochastic effects include acute radiation syndrome and cataract formation, which occur only at high levels of exposures.

Irradiated cells can respond in one of four ways. The cell may exhibit no effect; it may be able to recover via self-repair and function normally; it may die; or it may survive but function abnormally. Division and reproduction of an abnormally functioning cell could generate a tumor or mutation in the tissue. It is during division that cells are the most likely to experience damage or death from ionizing radiation. Therefore, rapidly dividing cells are most sensitive to radiation. For example, blood cells in bone marrow and cells that line the intestines and stomach are extremely sensitive to radiation. Damage to individual cells can produce organ damage. Such results have been reported from acute doses of 10 to 500 rads (0.1 to 5.0 gray, in SI units). Acute doses exceeding 70 rads (0.7 gray) are required for acute radiation sickness (CDC 2018a). Such doses are typically attained only from a nuclear incident or explosion.

Radiation-damaged reproductive cells can produce genetic damage in the offspring of the exposed individual. Given the inherent rapid cell division, a developing fetus is extremely sensitive to radiation. Upon exposure, the cells that are differentiating are of particular importance when considering the type of aberration that may occur. Possibilities include impaired growth, impaired brain function, and disfigurements (CDC 2020). The unborn child(ren)'s dose is in direct relation to the pregnant mother's dose, but is not necessarily equal (CDC 2020).

Atomic bomb survivors from Hiroshima and Nagasaki, Japan, form the most extensively studied human group that is known to have significant exposure to radiation. Gathered data suggest rate increases for development of leukemia and other cancers. The acute exposures experienced by this group, however, cannot be assumed to predict impacts on cancer incidence from chronic low-level exposures. The potential for cancer due to natural background radiation and impacts from industrially contaminated areas is uncertain. Additional information regarding radionuclides of concern in this assessment are provided in the following subsections. More information on radiation, radioactive materials, and radiation protection can be found at https://hps.org/publicinformation/.

The EPA classifies all radionuclides as Group A carcinogens. The bases for this classification lie in both their ionizing radiation emissions and the substantial weight of evidence gleaned from human epidemiological studies of cancers produced by high doses of radiation. A summary of

the properties and health effects associated with ROCs evaluated in this HHRA is presented in the following subsections.

4.3 RADIONUCLIDES OF CONCERN

4.3.1 Americium-241

Americium (CAS 014596-10-2) is a radioactive element not found in nature, but measurable quantities have been introduced into the environment through nuclear weapons testing. It is a silvery metal with two important isotopes, Am-241 and Am-243. The isotope of interest herein, Am-241 with a half-life of 432 years, is commonly used in smoke detectors. Per the EPA (2022d), radiation in "smoke detectors poses no radiation health risk when they are properly handled." While Am-241 does emit low-energy gamma rays, its radioactive decay produces Np-237 (produced through alpha-particle emission).

Given americium's global distribution through nuclear weapons testing, humans can be exposed to it through inhalation and ingestion. Individuals who handle americium in smoke detectors or at nuclear facilities may be exposed to higher levels than those who do not handle the material. (ATSDR 2012)

Some forms of americium are soluble and, if inhaled, can remain in the lungs for months or years. Whether by inhalation or ingestion, americium can enter the bloodstream over a period of a few days. In animal studies, it was found that equal percentages (45%) of the americium in the blood finds as its target organs (points of deposition) the bone and the liver. Biological half-time for removal from the bones is 50 years and for the liver, 20 years. (ICRP 1988a)

Internal and external cancer slope factors are presented in Section 4.3.7. A cancer slope factor from dermal exposure was not calculated, as dermal exposure to radionuclides is not considered significant and is, therefore, not evaluated in this HHRA. Non-cancer systemic toxicity from Am-241 exposure is not quantified herein because oral, dermal, and inhalation RfDs are unavailable.

4.3.2 Neptunium-237

Neptunium (CAS 013994-20-2) is a hard, yet ductile, silvery radioactive metal that is primarily introduced as a byproduct of nuclear reactions, but has been found in trace amounts in nature (Stoll 2017), specifically in association with uranium ores (ANL 2007). Neptunium is quite reactive, often combining with other elements. As the direct daughter of Am-241 discussed in Section 4.3.1, Np-237 is found in smoke detectors. With a half-life of two million years, Np-237 decays by alpha emission to protactinium-233.

Sources of neptunium include spent nuclear fuel, radioactive wastes commonly associated with reactor operations and the (re)processing of spent nuclear fuel (ANL 2007) and it is widely distributed from nuclear weapons testing. As an alpha emitter, its potential for impacting health is primarily from internal exposure via inhalation and ingestion, more the latter than the former. This radionuclide also emits gamma radiation and can produce external exposures (ANL 2007). The major health concern, however, stems from internal deposits in the liver and on bone surfaces (ANL 2007).

As previously stated, neptunium can enter the body through inhalation and ingestion. While data from human studies were not found in literature, some animal studies have been performed. Using a soluble compound of neptunium nitrate, rats were found to absorb between 1% and 3% of the material's mass (ICRP 1988a). However, when rats were exposed to lower masses of the compound, absorption fell to 0.1%, which was accepted as the most appropriate estimate of absorption of neptunium via the gastrointestinal tract (ICRP 1988a). Over the body, it is accepted by the ICRP (1988) that of the neptunium that leaves the blood, 75% goes to bone and 15% goes to the liver. As with americium, the biological half-time for removal of neptunium from the bone is 50 years and for the liver, 20 years.

Internal and external cancer slope factors are presented in Section 4.3.7. A cancer slope factor from dermal exposure was not calculated, as dermal exposure to radionuclides is not considered significant and is, therefore, not evaluated in this HHRA. Non-cancer systemic toxicity from Np-237 exposure is not quantified herein because oral, dermal, and inhalation RfDs are unavailable.

4.3.3 Plutonium-238, 239, and 240

Plutonium (CAS 013981-16-3, 015117-48-3, and 014119-33-6) is a silvery-gray radioactive metal that, when exposed to air, changes to a yellowish color (EPA 2022e). By far, its presence is due to human production via nuclear weapons, but plutonium has been found in trace amounts in nature (EPA 2022e). Uses of plutonium include providing power to satellites and providing heat to sensitive electrical components in satellites (EPA 2022e). Plutonium-238 decays to U-234; Pu-239 decays to U-235, and Pu-240 decays to U-236, all of which are radioactive. Half-lives of Pu-238, Pu-239, and Pu-240 are approximately 88 years, 24,000 years, 6,600 years, respectively.

As with previously discussed radionuclides, plutonium can be taken into the body through inhalation or ingestion due to its pervasive presence and uptake from media into foodstuffs. Ingested plutonium poses no serious threat to human health because the stomach does not absorb plutonium easily, thus it is excreted (CDC 2018b and ICRP 1972). As an alpha-emitter, internal exposure via inhalation is of primary concern for human health. In addition to lung exposure, plutonium can travel through the blood and kidneys, ultimately finding as its primary target organs which are the bones and liver (CDC 2018b and ICRP 1988a). Soluble forms tend to enter the bloodstream while insoluble forms remain in the lungs. Like americium, 45% of the plutonium that enters the blood is deposited in the bones and 45% in the liver. As with americium and neptunium, the biological half-time for removal of plutonium from the bone is 50 years and for the liver, 20 years (ICRP 1988a).

Internal and external cancer slope factors are presented in Section 4.3.7. A dermal cancer slope factor was not calculated because this route of exposure is not considered significant for radionuclides and is not evaluated in the HHRA. Oral, dermal, and inhalation RfDs are not available for plutonium; therefore, systemic toxicity is not quantified in the HHRA.

4.3.4 Technetium-99

Technetium (CAS 014133-76-7) is a platinum-colored radioactive metal exhibiting anti-corrosive and, at very low temperatures, superconducting properties (EPA undated). At room temperature, it is used as a coating to protect carbon steels from corroding (EPA undated).

Technetium-99 is a by-product of nuclear fission and rarely found in nature. The meta-stable form of technetium (Tc-99m) is produced and harvested from molybdenum-99 by the radiopharmaceutical industry. The half-life of Tc-99 is 213,000 years.

Per the EPA, "Organic matter in soils and sediments plays a significant role in controlling the mobility of technetium-99. In soils rich in organic matter, technetium-99 is retained and does not have high mobility. Under aerobic conditions, technetium compounds in soils are readily transferred to plants." (EPA undated) This radionuclide is quite mobile in the environment, particularly when oxygen is present, and can travel downward with percolating water due to its aversion to binding with soil particles (ANL 2007).

Technetium-99 emits low-energy beta particles and its absorption within the body following an intake varies by its compound (chemical form). Approximately 80% of technetium that enters the gastrointestinal tract is readily absorbed. Of the technetium leaving the bloodstream, roughly 4% finds its destination in the thyroid, with 10% depositing in the stomach and 3% in the liver. The biological half-time of technetium in the thyroid is 0.5 days. In other organs and tissues, the highest biological half-time found in literature is 22 days (ICRP 1980).

Internal and external cancer slope factors are presented in Section 4.3.7. A dermal cancer slope factor was not calculated because this route of exposure is not evaluated in the HHRA. Oral, dermal, and inhalation RfDs are not available for technetium; therefore, systemic toxicity due to exposure to technetium-99 is not quantified in the HHRA.

4.3.5 Uranium and Its Isotopes

Uranium is a mildly radioactive metallic element that occurs widely in the earth's crust. It is found in all soils (IAEA 2023), most rocks, and, in lesser concentrations, in water, vegetation, and animals - including humans. In its metallic form, uranium is a hard, silvery white amphoteric radioactive metal. Unlike other contaminants of concern in this study, uranium salts and oxides occur naturally in measurable quantities and it is ubiquitous in soil.

For most common forms of uranium found in an oxygenated environment, uranium is poorly absorbed via inhalation, ingestion or dermal absorption. Human exposure to uranium in non-occupational environments occurs primarily through ingestion. Since it is natural and ubiquitous, uranium is found in trace amounts in many plants, particularly cereals (NCBI 1988). However, root crops contribute the highest amounts of uranium in human diets (ATSDR 2015).

The majority of inhaled uranium is retained in the lungs where it is slowly removed by physical processes like mucociliary clearance, coughing, and migration to the lymphatic system. Most of the uranium eventually passed through the gut where it is excreted in the feces. Inhalation of uranium can be a concern in occupational settings where more soluble forms can be used in manufacturing (ICRP 1988b).

After being taken into the body, absorption is dependent on the chemical form of the uranium compound and the route of exposure, with soluble compounds being more readily absorbed through the gut than insoluble compounds. For example, the retention time of uranium particulates in the lungs can vary widely, depending on the chemical form of uranium in the inhaled compound. Of the portion that does reach the bloodstream, approximately 67% of uranium in the blood leaves the body via excretion through the kidneys in the first 24 hours of exposure (ATSDR 2013a). Bones, liver, and kidney become the primary destinations for the

remaining material. Over 90% of the uranium remaining in systemic tissues at one day after exposure is excreted with a biological half-time ranging from two to six days and the remainder is excreted with half-lives ranging from 30 to 340 days (Mettler 2008). Typical adults maintain an equilibrium of uranium in the body (meaning intake and excretion are roughly equal), approximately 90 micrograms (Kathren 2008 and ATSDR 2013a).

Uranium is a heavy metal that exhibits toxic chemical effects in sufficiently high doses and it is classified as a Group A carcinogen by the EPA (1991b). This uranium toxicity profile continues in two parts that separately present the chemical and radiological health effects from uranium exposures.

4.3.5.1 Chemical Toxicity of Uranium (metal and soluble salts)

Studies of humans exposed to an average of 100-600 micrograms per liter (µg/L) of uranium (CAS 007440 61 1) in drinking water for many years suggest uranium may cause minor damage to kidney tissue, including a mild decrease in the kidney's ability to hold onto proteins, sugar, and other compounds. However, this damage is reversible after the exposure to uranium stops. Studies performed after long-term consumption of drinking water containing high levels of uranium studies found no specific symptoms.

Studies of workers exposed to uranium as part of their jobs "…have not shown any evidence of serious kidney disease or other health effects…" from their uranium exposures (VDH 2018). For measurable effects, kidney concentrations should exceed 3 micrograms (µg) of uranium per gram of kidney tissue. Likewise, for life endangerment, a threshold of 50 micrograms of uranium per gram of kidney tissue was selected. Both of these thresholds are based primarily on human exposure studies (Kathren 2008).

Under the system used by EPA to evaluate health effects, a contaminant can be considered to produce adverse or toxic effects if it reaches particular end points in the human body at or above a minimum (threshold) dose and after an adequate duration to yield such an effect. This approach can be used to derive allowable limits for various exposure scenarios. For example, EPA's Maximum Concentration Limit for uranium in drinking water is 30 micrograms per liter (approximately 20 pCi/L uranium in water).

An EPA weight-of-evidence classification for uranium metal was not located in the available literature, but EPA has published oral and inhalation reference values (i.e., RfDs and RfCs) for uranium. Table 14 reproduces the latest EPA reference doses for both inhalation and ingestion of uranium. These toxicity values can be used to estimate the potential for systemic toxicity or noncarcinogenic risk.

Table 14 Uranium Metal Noncancer Toxicity Values from ATSDR

Metal	Chronic Oral Reference Dose (RfD) (mg/kg-day)	Chronic Inhalation Reference Concentration (RfC) (mg/m^3)
Uranium	2.00E-04	4.00E-5

Source: ATSDR 2013b https://www.atsdr.cdc.gov/toxguides/toxguide-150.pdf

Note: As uranium is a metal and dermal exposure to metals is not a significant exposure pathway, EPA has not recommended a uranium dermal absorption value that may be used to calculate dermal exposure. Therefore, systemic toxicity due to exposure to uranium is not quantified in the HHRA.

4.3.5.2 Radiotoxicity of Isotopic Uranium: U-234, U-235, U-236, and U-238

While this HHRA assessed risks from both ingestion and inhalation, it should be noted that inhalation of insoluble uranium compounds is the only circumstance in which uranium's radiogenic health effects are commonly thought to equal or exceed its chemical effects (Kathren 2008). In its natural state, uranium consists of three isotopes: U-234 (CAS 013966-29-5), U-235 (CAS 15117-96-1), and U-238 (CAS 24678-82-8). Natural uranium contains the uranium isotopes U-238 (which averages 99.27 percent of total uranium mass), U-235 (0.72 percent), and U-234 (0.0055 percent) (ANL 2007). These isotopes are weakly radioactive, have very long half-lives, ranging from 250,000 years to 4.5 billion years, and exhibit a relatively slow rate of decay[16]. Uranium-236 is not naturally occurring and is formed from thermonuclear weapons and plutonium-240 decay.

Uranium primarily emits alpha particles as it decays, but does also emit gamma rays. Since alpha particles are unable to penetrate skin and travel exceptionally short distances, uranium represents a significant carcinogenic hazard only when taken into the body. Once inside, alpha particle energy can be absorbed by relatively small volumes of adjacent living tissue.

Uranium miners provide an uncontrolled study group for potential effects of uranium. While uranium miners have death rates from lung cancer that are considered higher than expected, the impact is attributed to radiological impacts of radon gas and its decay products. Such studies have not been shown to assess competing carcinogenic impacts of tobacco smoking or inhalation of diesel engine exhaust in the mine. Studies of uranium mill workers, however, show "…no significant increase in overall deaths attributable to exposure to uranium…" (ATSDR 2013a).

Internal and external cancer slope factors published by the EPA are presented in Section 4.3.7. A dermal cancer slope factor was not calculated because this route of exposure is not considered significant for radionuclides and is not evaluated in the HHRA.

[16] Uranium that has remained undisturbed for 30 days is accompanied by radionuclide daughter products produced by the decay of U-238 and U-235 (Section 4.3.6). Other uranium decay products found in older uranium deposits like uranium ore (thorium-230, radium-226, protactinium-231 and their daughters) were removed from PORTS uranium feed stock before its arrival at the plant and therefore are not included in this assessment.

4.3.6 Health Effects from Short-lived Decay Products

Care must be taken to include all pertinent radionuclides when using the EPA PRG and BPRG risk calculators. The development of a toxicity assessment for this report began with the development of the ROC's listed in the SAP (Solutient 2020a). They are Am-241, Np-237, Pu-238, Pu-239, Pu-240, Tc-99, U-234, U-235, U-236, and U-238.

The selected radionuclides of concern have relatively long half-lives. As discussed previously in this section, the EPA has assigned slope factor values to many radionuclides using information drawn from *Calculation of Slope Factors and Dose Coefficients* prepared by the Center for Radiation Protection Knowledge (ORNL 2014). These slope factors are incorporated as default values in EPA's PRG and BPRG calculators.

However, some of these radionuclides produce other, shorter lived, radioactive decay products as they decay. In some cases those decay products, also known as "daughters", can contribute additional exposures to humans. Table 15 presents a list of the parent radionuclides included in the risk evaluation portion of the HHRA, as well as their short-lived daughters. This assessment accounts for these additional exposures by assigning each decay daughter's potential health effects to the appropriate "parent" radionuclide. Thus, the values used to convert intakes and exposures to risk in this HHRA include the additional effects from their various daughters.

Table 15 Assignment of Potential Health Effects from Decay Products

Radionuclide			
Progenitor	**Daughter**	**Daughter Half-life**	**Radiotoxicity Assigned to:**
Am-241			Am-241
Np-237			Np-237
	Pa-233	27 days	Np-237
Pu-238			Pu-238
Pu-239			Pu-239
	U-235m[a]	26 minutes	Pu-239
Pu-240			Pu-239
Tc-99			Tc-99
U-233/234			U-234
U-235/236			U-235
	Th-231	1.1 days	U-235
U-238			U-238
	Th-234	24 days	U-238
	Pa-234m	1.2 minutes	U-238
	Pa-234	6.7 hours	U-238

[a] m – metastable

4.3.7 Slope Factors Used in HHRA

Information provided in this section of the HHRA draws from EPA's website *Preliminary Remediation Goals for Radionuclide Contaminants at Superfund Sites* (EPA 2022a).[17] The EPA expresses the relationship between exposures and contaminant intakes and probabilistic cancer

[17] https://epa-prgs.ornl.gov/radionuclides/ (EPA 2022a)

risks as a deterministic numeric ratio called a "slope factor", as presented in *Calculation of Slope Factors and Dose Coefficients* prepared by the Center for Radiation Protection Knowledge (ORNL 2014).[18] The EPA's slope factors represent the excess lifetime cancer risk[19] corresponding to a unit (such as a pCi) of intake or to an external exposure. These slope factors, sometimes referred to as risk coefficients, are derived from values published in the Federal Guidance Report 13 (EPA 1999b), supplemented by updated data from the International Commission on Radiological Protection 107 publication (ICRP 2008). Relevant slope factors associated with internal and external exposure addressed in this HHRA report are presented in Table 16 and Table 17, respectively. External exposure slope factors are used to calculate direct radiation risks.

Table 16 Internal Slope Factors for Radionuclides of Concern

Isotope	Inhalation Slope Factor (risk/pCi)	Food Ingestion Slope Factor (risk/pCi)	Soil Ingestion Slope Factor (risk/pCi)	Water Ingestion Slope Factor (risk/pCi)
Am-241	3.77E-08	1.34E-10	1.84E-10	1.04E-10
Np-237	2.87E-08	8.29E-11	1.25E-10	6.22E-11
Pa-233	1.53E-11	8.95E-12	1.65E-11	6.14E-12
Pa-234	1.20E-12	3.00E-12	5.37E-12	2.07E-12
Pa-234m	0	0	0	0
Pu-238	5.22E-08	1.69E-10	2.25E-10	1.31E-10
Pu-239	5.55E-08	1.74E-10	2.28E-10	1.35E-10
Tc-99	3.81E-11	4.00E-12	7.25E-12	2.75E-12
Th-231	1.50E-12	3.22E-12	5.96E-12	2.19E-12
Th-234	3.08E-11	3.39E-11	6.25E-11	2.31E-11
U-234	2.78E-08	9.55E-11	1.48E-10	7.07E-11
U-235	2.50E-08	9.44E-11	1.48E-10	6.96E-11
U-235m	1.87E-18	1.06E-17	1.65E-17	7.62E-18
U-238	2.36E-08	8.66E-11	1.34E-10	6.40E-11

[18] Assigning a carcinogenic category to an element or chemical is the culmination of numerous investigative steps designed to assemble and evaluate historic documentation, including the mechanics and results of studies, directly associated with the carcinogenic impact that element or chemical has on humans and/or animals. High-quality studies are allocated greater weight than those of lesser quality. Greater significance is placed on similarities of effects among both humans and animals and greater credence is offered to studies wherein the mechanisms generating the effect(s) are well-characterized.

[19] Excess cancer risk, also called incremental cancer risk, is an increase in cancer risk in the exposed population over the cancer risk that would occur in the absence of the exposure.

Table 17 External Slope Factors for Radionuclides of Concern

Isotope	Soil External Exposure Slope Factor (risk/yr per pCi/g)	Water Immersion Slope Factor (risk/yr per pCi/L)	Dust External Exposure Slope Factor (Ground Plane) (risk/yr per pCi/cm^2)
Am-241	2.77E-08	1.32E-13	1.87E-08
Np-237	5.17E-08	1.72E-13	2.10E-08
Pa-233	8.03E-07	1.87E-12	1.88E-07
Pa-234	6.62E-06	1.35E-11	1.28E-06
Pa-234m	9.06E-08	1.82E-13	2.86E-08
Pu-238	6.91E-11	5.95E-16	3.68E-10
Pu-239	2.09E-10	7.25E-16	2.06E-10
Tc-99	8.28E-11	5.62E-16	5.34E-11
Th-231	2.49E-08	8.89E-14	1.24E-08
Th-234	1.77E-08	6.39E-14	7.33E-09
U-234	2.53E-10	1.17E-15	3.82E-10
U-235	5.51E-07	1.39E-12	1.39E-07
U-235m	0	0	0
U-238	1.24E-10	5.98E-16	2.48E-10

5. HEALTH RISK CHARACTERIZATION

Potential human health effects resulting from exposure to ROCs were estimated using methods established by the EPA. These methods are published in a series of guidance documents, including the *Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual* ("RAGS", EPA 1989) and integrated into web-based calculators hosted by the EPA (EPA 2022a and EPA 2022b).

This EPA method is designed to allow the estimation of health effects from both chemical and radiological exposures. In this study, no ROCs were present in quantities that exceeded chemical toxicity thresholds and the investigation focused on potential carcinogenic effects from radiological exposures.

Cancer is regrettably common among humans. The American Cancer Society estimates that one in three Americans will experience cancer during their lifetime and one in five will die of the disease. This baseline cancer incidence rate of 1 in 3 or 3.3×10^{-1} should be considered when reviewing the results of any risk assessment.

The EPA has developed risk assessment methodology to comply with requirements set forth in the 1980 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This risk assessment methodology was selected to estimate hypothetical risks during this assessment. Using this established methodology, risks attributed to exposure to radiological carcinogens are estimated and expressed as a probability of excess cancers above the baseline cancer risk in a population during a lifetime. This probability is also called the Incremental Lifetime Cancer Risk or "ILCR" in this HHRA.

The procedures prescribed by the EPA use specific algorithms to calculate the excess human health risks as a function of radionuclide concentration, various human exposure parameters, and radionuclide-specific characteristics. This approach is designed to be health-protective and the estimates produced are likely to overestimate risks in an exposed population.

5.1 GENERAL METHODOLOGY

The general approach for estimating ILCR, expressed as a unitless probability, resulting from chronic or periodic exposures to a radionuclide depends on the radiation source's position relative to the receptor. One method applies when the radiation source is inside the human body and another when the source is located outside the body. The general forms of the two methods are presented below:

5.1.1 General Form of Internal Radiation Exposure Risk Calculation

At low dose rates, risks from internal exposures to radionuclides in exposure media (e.g., intake via inhalation or ingestion) are calculated using the following general form:

$$ILCR_{i,r} = \left(Intake_{i,r}\right) * \left(SF_{i,r}\right)$$

where:

$ILCR_{i,r}$ = incremental lifetime cancer risk, for radionuclide "i" via exposure route "r"
$Intake_{i,r}$ = intake for radionuclide "i" via exposure route "r" (pCi)
$SF_{i,r}$ = cancer slope factor for radionuclide "i" via exposure route "r" (pCi^{-1})

Specific equations and pathway-specific considerations are available in the previously cited web calculators and incorporated by reference.

5.1.2 General Form of External Radiation Exposure Calculation

Risks from external exposure to gamma-emitting radionuclides in contaminated media are calculated as follows:

where:

$$ILCR_{i,ext} = (A_{i,ext}) * (B_{i,ext,x}) * (SF_{i,ext})$$

$ILCR_{i, ext}$ = incremental lifetime cancer risk, for radionuclide "i"
$A_{i, ext}$ = activity concentration of radionuclide "i" (pCi/g)
$B_{i, ext, x}$ = combined geometry and shielding term for isotope "i" and overburden thickness "x" (y)
$SF_{i, ext}$ = cancer slope factor (external) of radionuclide "i" (g/pCi-y)

Specific equations and pathway-specific considerations are available on the previously cited web calculators and incorporated by reference.

5.1.3 Multiple Pathways

Multiple exposure pathways included in the conceptual model for the hypothetical receptors are evaluated in this assessment. By convention, risks from various exposure pathways are assumed to be additive with a receptor receiving exposures from more than one pathway. Risks and hazards from multiple pathways are summed to determine the total risk/hazard to that receptor.

5.2 RISK CALCULATION METHODS

The EPA PRG and BPRG on-line calculators (EPA 2022a and EPA 2022b) were utilized to determine the estimated incremental lifetime cancer risks (ILCRs). These calculators use the equations presented in Attachment D as well as radionuclide-specific data, such as half-life and transport characteristics to estimate ROC intakes and exposures to hypothetical receptors.

While these calculators contain pre-selected default values that quantitatively describe various exposure scenarios and receptor types, the calculators allow the substitution of "site-specific" values that better describe a scenario or receptor of interest. Section 3.3 lists study area-specific values used in the calculators to describe the behavior of potential types of receptors that may be found in the local community.

5.2.1 Additive Effects of Multiple Radionuclides

Concentrations of the ROCs were found to display variations across the study area. These variations sometimes coincided with variations displayed by other ROCs but sometimes they did

not. In keeping with the conservative assumption in this HHRA, the hypothetical receptor was assumed to be exposed to every ROC at the respective exposure point concentration.

5.2.2 Inclusion of Short-lived Decay Products Not Listed in the ROC List

As discussed in Section 4.3.6, the EPA risk assessment methodology converts intakes and exposures to a risk estimate using radionuclide-specific slope factors. These slope factors do not always account for risks from a radionuclide's decay products. For example, any long-term risk presented for uranium-238 in this evaluation must also include the risk created by the ingrowth of its short-lived decay products thorium-234, protactinium-234m and protactinium-234.

While the EPA calculators used in this evaluation offer various options that account for risks from decay products, these options are generic and can erroneously include risks from decay products that are not present. To continue the example in the previous paragraph, feedstock received by PORTS consisted of processed uranium. This uranium had been separated from its decay products by chemical extractions before its arrival at PORTS. Most of those decay products have not had time to re-accumulate and including those daughters in this HHRA would not be appropriate. Thus care must be taken when using the EPA web calculators to account for risks from all decay products likely to be present without omitting or double-counting their projected effects.

The calculator option selected for use in this HHRA was labeled "Does not assume secular equilibrium, provides results for selected isotopes only". This option allowed assessors to calculate risks for all ROCs and their decay products, as listed in Table 15, by manually entering the exposure point activity concentration (in pCi/g or pCi/L) for each short-lived daughter present. The resulting risk estimates generated by the EPA PRG and BPRG calculators were summed within a medium for each parent ROC and associated daughters specified in Table 15.

5.3 RISK CALCULATION RESULTS

Hypothetical receptor populations were quantitatively evaluated in this HHRA. All exposures addressed in this section are based on the exposure point concentrations selected for each medium (Section 3.2) and behavioral parameters chosen for each exposure pathway (Section 3.3). Media evaluated include soil, surface water, sediment, and settled dust. Calculated risks are summed within each medium and across media, allowing for the possibility that Community members are involved in activities spanning every complete pathway evaluated herein.

5.3.1 Risks to Hypothetical Resident

The hypothetical resident is an idealized human living in the study area, whose behaviors and physiological characteristics are a composite of behavior and characteristics drawn from national databases and supplemented by information gathered from local community members (Section 3.1). Risks to this receptor from representative concentrations of ROCs in soil in the study area and interior dust within structures are presented in Table 18. Similar risks from background area soils and dust are presented in Table 19 for context.

Comparing results in these two tables, it appears the sum of the calculated risks from background area soil and dust are slightly higher than the sum of the risks calculated from soil ROC's in the study area. This is largely attributable to the observation that the average concentrations of

isotopic uranium are higher in background area soil than their corresponding concentrations in the CCSE study area soil. It is important to note that these differences are within the margin of error for the study area. As these risk values are comparable, risks to most local residents from soil and dust, as calculated using EPA's assessment methodology, are expected to be indistinguishable from background area risks from the same media.

5.3.2 Potentially Critical Subpopulations

Critical subpopulations are groups of people within a larger group that that may be at higher risk than most people in the larger group. This may be due to a greater susceptibility to external stressors like contamination or a propensity to experience larger exposures due to unique behaviors or higher localized exposures. This study cannot comment on variable sensitivities to radiological exposures among subpopulations but it did query the Piketon community about behaviors that might produce higher exposures. Four additional receptor types were identified and selected for evaluation: those who eat a lot of local produce, those who eat a lot of locally grown fish, life-long residents of the study area and those who swim and wade in local streams and ponds. Risks were assessed for each of those receptor types.

5.3.2.1 Potential Risks from Vegetables Grown in Family Garden

This hypothetical receptor was assumed to consume 1,486 g/day of local vegetables and fruit during the growing season (300 lbs each year). Using EPA's CERCLA risk assessment system, the calculated risks for this scenario are more than an order of magnitude greater than the calculated risks from all other residential activities combined (Table 20), even after subtracting comparable background area risks which are presented in Table 21.

5.3.2.2 Potential Risks from Eating Locally Caught Fish

This hypothetical receptor was assumed to consume fish flesh from local streams and ponds that are downstream from PORTS outfalls. These risks are comparable to, or slightly larger than, risks from all other residential activities combined after subtracting comparable background area risks from eating local fish caught outside the 6-mile study area (Table 22 and Table 23).

5.3.2.3 Potential Risks from 78-year Residency

This hypothetical receptor was assumed to live in the study area for longer than the default residency time used by the EPA to assess risks under the CERCLA program. Hypothetical risks to this receptor were calculated using a 78-year exposure duration. The calculated risks to this receptor are approximately double the corresponding values calculated for the more typical resident. Calculated risks for the study area and background are presented in Table 24 and Table 25, respectively.

5.3.2.4 Potential Risks from Attending Local Schools

After consulting the Pike County School District calendar of 2022-2023, this hypothetical receptor was assumed to attend a local school in the study area for 7.5 hours/day, 178 days/year, with a duration of 13 years. Default values were maintained for other parameters with the exception of the FTSS, which was incorporated as presented in Section 3.3.2.2.

For this hypothetical receptor, only dust samples collected within local schools were considered. Complexities with the full data set, including negative exposure point concentrations described in Section 2.6, were also encountered with this subset of results. Combining the few detections and the negative analytical results, as well as acknowledging the Community's sensitivity to this type of receptor, a highly conservative diversion from the RME method was taken by the risk assessment team. The maximum detected settled dust concentrations in schools within the study area were used as the exposure point concentrations, offering a method likely to produce estimated risks that significantly overestimate potential risks to this subpopulation. Calculated risks associated with settled dust in local schools for the study area and the background area are presented in Table 26 and Table 27. Additional details concerning radiological conditions in local schools is provided in Attachment F.

Table 18 Estimated Study Area Risks to Hypothetical Resident Receptor

	Soil				Settled Dust			
Isotope	**Soil Concentration (pCi/g)**	**Ingestion Risk**	**Inhalation Risk**	**External Exposure Risk**	**Dust Concentration (pCi/cm^2)**	**Ingestion Risk**	**External Exposure Risk**	**Summed Risk**
Am-241	0.00581	1.17E-09	2.54E-11	1.36E-09	0.000040	8.19E-08	1.82E-11	8.45E-08
Np-237	0.000925	1.29E-10	3.14E-12	4.13E-10	0.000008	1.13E-08	4.19E-12	1.18E-08
Pa-233	0.000925	6.99E-14	6.86E-18	2.63E-11	0.000008	6.13E-12	1.54E-13	3.27E-11
Pa-234	1.28	3.26E-13	7.70E-18	3.10E-09	0.000557	1.44E-12	7.57E-13	3.10E-09
Pa-234m	1.28	«[a]	«	1.24E-13	0.000557	«	4.91E-17	1.24E-13
Pu-238	0.00170	3.87E-10	9.51E-12	9.19E-13	0.000026	5.99E-08	2.16E-13	6.03E-08
Pu-239/240	0.0107	2.73E-09	7.03E-11	1.93E-11	0.000048	1.24E-07	2.46E-13	1.27E-07
Tc-99	0.179	1.46E-09	8.09E-13	1.28E-10	0.001413	1.16E-07	1.88E-12	1.18E-07
Th-231	0.0593	6.40E-14	1.71E-18	2.06E-12	0.000027	2.95E-13	1.35E-15	2.42E-12
Th-234	1.28	3.28E-10	1.71E-14	7.18E-10	0.000557	1.45E-09	3.73E-13	2.50E-09
U-233/234	1.25	2.08E-07	4.13E-09	2.74E-09	0.000578	9.73E-07	5.50E-12	1.19E-06
U-235/236	0.0593	9.80E-09	1.76E-10	2.82E-07	0.000027	4.52E-08	9.35E-11	3.37E-07
U-235m	0.0107	5.43E-22	6.50E-27	«	0.000048	2.47E-20	0.00E+00	2.52E-20
U-238	1.28	1.92E-07	3.58E-09	1.37E-09	0.000557	8.49E-07	3.44E-12	1.05E-06
Summed Risk	**---**	**4.16E-07**	**8.00E-09**	**2.92E-07**	**---**	**2.26E-06**	**1.28E-10**	**2.98E-06**

[a] The slope factor in EPA's PRG or BPRG Calculator (EPA 2022a and EPA 2022b, respectively) is zero or does not exist.

Table 19 Estimated Background Area Risks to Hypothetical Resident Receptor

Isotope	Soil				Settled Dust			Summed Risk
	Soil Concentration (pCi/g)	Ingestion Risk	Inhalation Risk	External Exposure Risk	Dust Concentration (pCi/cm^2)	Ingestion Risk	External Exposure Risk	
Am-241	-[a]	-	-	-	-	-	-	-
Np-237	-	-	-	-	-	-	-	-
Pa-233	-	-	-	-	-	-	-	-
Pa-234	1.919	4.89E-13	1.16E-17	4.66E-09	0.000380	9.83E-13	5.17E-13	4.66E-09
Pa-234m	1.919	«[b]	«	1.86E-13	0.000380	«	3.35E-17	1.86E-13
Pu-238	-	-	-	-	-	-	-	-
Pu-239/240	0.0092	2.35E-09	6.05E-11	1.66E-11	-	-	-	2.43E-09
Tc-99	0.110	8.93E-10	4.96E-13	7.87E-11	neg[c]	neg	neg	9.72E-10
Th-231	0.085	9.17E-14	2.45E-18	2.95E-12	0.000049	5.38E-13	2.45E-15	3.58E-12
Th-234	1.919	4.92E-10	2.56E-14	1.08E-09	0.000380	9.89E-10	2.55E-13	2.56E-09
U-233/234	1.952	3.24E-07	6.43E-09	4.27E-09	0.001250	2.10E-06	1.19E-11	2.43E-06
U-235/236	0.085	1.41E-08	2.52E-10	4.05E-07	0.000049	8.24E-08	1.70E-10	5.02E-07
U-235m	0.0092	4.67E-22	5.59E-27	«	-	-	-	4.67E-22
U-238	1.919	2.89E-07	5.37E-09	2.05E-09	0.000380	5.79E-07	2.35E-12	8.75E-07
Summed Risk	**---**	**6.31E-07**	**1.21E-08**	**4.17E-07**	**---**	**2.76E-06**	**1.85E-10**	**3.82E-06**

[a] There are no detected concentrations of this analyte in this medium within the background area.
[b] The slope factor in EPA's PRG or BPRG Calculator (EPA 2022a and EPA 2022b, respectively) is zero or does not exist.
[c] The average concentration of Tc-99 from background area samples in this medium is negative.

Table 20 Estimated Study Area Risks from Eating 300 lbs of Local Produce

Isotope	Soil		Summed Risk
	Soil Concentration (pCi/g)	Produce Consumption Risk	
Am-241	0.00581	2.51E-09	2.51E-09
Np-237	0.000925	2.53E-09	2.53E-09
Pa-233	0.000925	1.17E-12	1.17E-12
Pa-234	1.28	5.61E-12	5.61E-12
Pa-234m	1.28	«[a]	«
Pu-238	0.00170	7.81E-10	7.81E-10
Pu-239/240	0.0107	5.58E-09	5.58E-09
Tc-99	0.179	5.44E-05	5.44E-05
Th-231	0.0593	1.41E-13	1.41E-13
Th-234	1.28	7.29E-10	7.29E-10
U-233/234	1.25	2.97E-06	2.97E-06
U-235/236	0.0593	1.39E-07	1.39E-07
U-235m	0.0107	7.74E-21	7.74E-21
U-238	1.28	2.74E-06	2.74E-06
Summed Risk	**---**	**6.03E-05**	**6.03E-05**

[a] The slope factor in the EPA PRG Calculator (EPA 2022a) is zero or does not exist.

Table 21 Estimated Background Area Risks from Eating 300 lbs of Local Produce

Isotope	Soil		Summed Risk
	Soil Concentration (pCi/g)	Produce Consumption Risk	
Am-241	-[a]	-	-
Np-237	-	-	-
Pa-233	-	-	-
Pa-234	1.92	8.42E-12	8.42E-12
Pa-234m	1.92	«[b]	«
Pu-238	-	-	-
Pu-239/240	0.0092	4.80E-09	4.80E-09
Tc-99	0.110	3.34E-05	3.34E-05
Th-231	0.085	2.03E-13	2.03E-13
Th-234	1.92	1.09E-09	1.09E-09
U-233/234	1.95	4.62E-06	4.62E-06
U-235/236	0.085	1.99E-07	1.99E-07
U-235m	0.0092	6.65E-21	6.65E-21
U-238	1.92	4.12E-06	4.12E-06
Summed Risk	---	**4.23E-05**	**4.23E-05**

[a] There are no detected concentrations of this analyte in this medium within the background area.
[b] The slope factor in the EPA PRG Calculator (EPA 2022a) is zero or does not exist.

Table 22 Estimated Study Area Risks from Eating 28.8 lbs/y of Fish Flesh

Isotope	Surface Water		Summed Risk
	Surface Water Concentration (pCi/L)	Finfish Ingestion Risk	
Am-241	-[a]	-	-
Np-237	-	-	-
Pa-233	-	-	-
Pa-234	0.267	2.72E-09	2.72E-09
Pa-234m	0.267	«[b]	«
Pu-238	0.0349	4.21E-05	4.21E-05
Pu-239/240	-	-	-
Tc-99	0.543	1.10E-08	1.10E-08
Th-231	0.0357	2.34E-10	2.34E-10
Th-234	0.267	1.84E-08	1.84E-08
U-233/234	0.384	1.19E-08	1.19E-08
U-235/236	0.0357	1.10E-09	1.10E-09
U-235m	-	-	-
U-238	0.267	7.52E-09	7.52E-09
Summed Risk	**---**	**4.22E-05**	**4.22E-05**

[a] There are no detected concentrations of this analyte in this medium.

[b] The slope factor in the EPA PRG Calculator (EPA 2022a) is zero or does not exist.

Table 23 Estimated Background Area Risks to Eating 28.8 lbs/y of Fish Flesh

Isotope	Surface Water		Summed Risk
	Surface Water Concentration (pCi/L)	Finfish Ingestion Risk	
Am-241	-[a]	-	-
Np-237	-	-	-
Pa-233	-	-	-
Pa-234	0.312	3.18E-09	3.18E-09
Pa-234m	0.312	«[b]	«
Pu-238	0.026	3.14E-05	3.14E-05
Pu-239/240	-	-	-
Tc-99	neg[c]	neg	neg
Th-231	0.032	2.10E-10	2.10E-10
Th-234	0.312	2.16E-08	2.16E-08
U-233/234	0.377	1.17E-08	1.17E-08
U-235/236	0.032	9.84E-10	9.84E-10
U-235m	-	-	-
U-238	0.312	8.80E-09	8.80E-09
Summed Risk	---	**3.14E-05**	**3.14E-05**

[a] There are no detected concentrations of this analyte in this medium within the background area.
[b] The slope factor in the EPA PRG Calculator (EPA 2022a) is zero or does not exist.
[c] The concentration for this analyte in this medium is negative; the input concentration is zero.

Table 24 Estimated Study Area Risks to Hypothetical Long-Term Resident Receptor

	Soil				Settled Dust			
Isotope	**Soil Concentration (pCi/g)**	**Ingestion Risk**	**Inhalation Risk**	**External Exposure Risk**	**Dust Concentration (pCi/cm^2)**	**Ingestion Risk**	**External Exposure Risk**	**Summed Risk**
Am-241	0.00581	2.96E-09	7.96E-11	3.92E-09	0.000040	1.64E-07	5.25E-11	1.71E-07
Np-237	0.000925	3.39E-10	1.02E-11	1.24E-09	0.000008	2.36E-08	1.26E-11	2.52E-08
Pa-233	0.000925	6.12E-14	7.46E-18	2.63E-11	0.000008	4.25E-12	1.54E-13	3.08E-11
Pa-234	1.28	2.85E-13	8.37E-18	3.10E-09	0.000557	9.99E-13	7.57E-13	3.10E-09
Pa-234m	1.28	«[a]	«	1.24E-13	0.000557	«	4.91E-17	1.24E-13
Pu-238	0.00170	8.39E-10	2.56E-11	2.28E-12	0.000026	1.03E-07	5.34E-13	1.04E-07
Pu-239/240	0.0107	7.16E-09	2.29E-10	5.79E-11	0.000048	2.58E-07	7.37E-13	2.65E-07
Tc-99	0.179	3.82E-09	2.64E-12	3.85E-10	0.001413	2.42E-07	5.64E-12	2.46E-07
Th-231	0.0593	5.60E-14	1.85E-18	2.06E-12	0.000027	2.05E-13	1.35E-15	2.32E-12
Th-234	1.28	2.87E-10	1.86E-14	7.18E-10	0.000557	1.00E-09	3.73E-13	2.01E-09
U-233/234	1.25	5.47E-07	1.35E-08	8.23E-09	0.000578	2.03E-06	1.65E-11	2.60E-06
U-235/236	0.0593	2.57E-08	5.73E-10	8.47E-07	0.000027	9.42E-08	2.81E-10	9.68E-07
U-235m	0.0107	4.75E-22	7.07E-27	«	0.000048	1.71E-20	«	1.76E-20
U-238	1.28	5.04E-07	1.17E-08	4.10E-09	0.000557	1.77E-06	1.03E-11	2.29E-06
Summed Risk	**---**	**1.09E-06**	**2.61E-08**	**8.69E-07**	**---**	**4.69E-06**	**3.81E-10**	**6.67E-06**

[a] The slope factor in EPA's PRG or BPRG Calculator (EPA 2022a and EPA 2022b, respectively) is zero or does not exist.

Table 25 Estimated Background Area Risks to Hypothetical Long-Term Resident Receptor

Isotope	Soil				Settled Dust			Summed Risk
	Soil Concentration (pCi/g)	Ingestion Risk	Inhalation Risk	External Exposure Risk	Dust Concentration (pCi/cm^2)	Ingestion Risk	External Exposure Risk	
Am-241	-[a]	-	-	-	-	-	-	-
Np-237	-	-	-	-	-	-	-	-
Pa-233	-	-	-	-	-	-	-	-
Pa-234	1.92	4.28E-13	1.26E-17	4.66E-09	0.000380	6.82E-13	5.17E-13	4.66E-09
Pa-234m	1.92	«[b]	«	1.86E-13	0.000380	«	3.35E-17	1.86E-13
Pu-238	-	-	-	-	-	-	-	-
Pu-239/240	0.0092	6.16E-09	1.97E-10	4.98E-11	-	-	-	6.41E-09
Tc-99	0.110	2.34E-09	1.62E-12	2.36E-10	neg[c]	neg	neg	2.58E-09
Th-231	0.085	8.01E-14	2.65E-18	2.95E-12	0.000049	3.73E-13	2.45E-15	3.57E-12
Th-234	1.92	4.31E-10	2.79E-14	1.08E-09	0.000380	6.86E-10	2.55E-13	2.50E-09
U-233/234	1.952	8.51E-07	2.10E-08	1.28E-08	0.001249	4.38E-06	3.57E-11	2.98E-06
U-235/236	0.085	3.68E-08	8.20E-10	1.21E-06	0.000049	1.72E-07	5.11E-10	1.33E-06
U-235m	0.0092	4.08E-22	6.08E-27	«	-	-	-	4.08E-22
U-238	1.92	7.58E-07	1.75E-08	6.16E-09	0.000380	1.21E-06	7.04E-12	1.36E-06
Summed Risk	**---**	**1.65E-06**	**3.95E-08**	**1.23E-06**	**---**	**5.76E-06**	**5.54E-10**	**8.69E-06**

[a] There are no detected concentrations of this analyte in this medium within the background area.

[b] The slope factor in EPA's PRG or BPRG Calculator (EPA 2022a and EPA 2022b, respectively) is zero or does not exist.

[c] The concentration for this analyte in this medium is negative; the input concentration is zero.

Table 26 Estimated Study Area Risks to Hypothetical Student at Local Schools

Isotope	Settled Dust			Summed Risk
	Dust Concentration (pCi/cm^2)	Ingestion Risk	External Exposure Risk	
Am-241	0.000140	2.40E-08	5.13E-12	2.40E-08
Np-237	-[a]	-	-	-
Pa-233	-	-	-	-
Pa-234	0.000720	3.08E-13	1.56E-13	4.63E-13
Pa-234m	0.000720	«b	1.01E-17	1.01E-17
Pu-238	0.000100	2.00E-08	6.93E-14	2.00E-08
Pu-239/240	0.000160	3.42E-08	6.51E-14	3.42E-08
Tc-99	0.008234	5.60E-08	8.70E-13	5.60E-08
Th-231	0.000110	1.99E-13	8.72E-16	2.00E-13
Th-234	0.000720	3.10E-10	7.67E-14	3.10E-10
U-233/234	0.000570	7.94E-08	4.31E-13	7.94E-08
U-235/236	0.000110	1.52E-08	3.03E-11	1.53E-08
U-235m	0.000160	1.36E-20	«	1.36E-20
U-238	0.000720	9.08E-08	3.53E-13	9.08E-08
Summed Risk	**---**	**3.20E-07**	**3.75E-11**	**3.20E-07**

[a] There are no detected concentrations of this analyte in this medium within the background area.
[b] The slope factor in the EPA's BPRG Calculator (EPA 2022b) is zero or does not exist.

Table 27 Estimated Study Area Risks to Hypothetical Student at Local Schools

Isotope	Settled Dust			Summed Risk
	Dust Concentration (pCi/cm^2)	Ingestion Risk	External Exposure Risk	
Am-241	-[a]	-	-	-
Np-237	-	-	-	-
Pa-233	-	-	-	-
Pa-234	0.00028	1.20E-13	6.05E-14	1.80E-13
Pa-234m	0.00028	«[b]	3.92E-18	3.92E-18
Pu-238	-	-	-	-
Pu-239/240	-	-	-	-
Tc-99	-	-	-	-
Th-231	-	-	-	-
Th-234	0.00028	1.20E-10	2.98E-14	1.20E-10
U-233/234	0.00043	5.99E-08	3.25E-13	5.99E-08
U-235/236	-	-	-	-
U-235m	-	-	-	-
U-238	0.00028	3.53E-08	1.37E-13	3.53E-08
Summed Risk	**---**	**9.53E-08**	**5.52E-13**	**9.53E-08**

[a] There are no detected concentrations of this analyte in this medium within the background area.
[b] The slope factor in the EPA's BPRG Calculator (EPA 2022b) is zero or does not exist.

5.3.2.5 Potential Risks from Swimming and Wading in Local Streams and Ponds

This hypothetical receptor was assumed to spend time during the summer swimming and wading in local streams and ponds that are downstream from PORTS outfalls. These risks (Table 28) are much lower that than risks from all residential activities even before subtracting comparable background area risks (Table 29).

Table 28 Estimated Study Area Risks to Hypothetical Swimmer

	Swimming						
	Sediment			Surface Water			
Isotope	**Sediment Concentration (pCi/g)**	**Ingestion Risk**	**External Exposure Risk**	**Surface Water Concentration (pCi/L)**	**Ingestion Risk**	**External Exposure Risk**	**Summed Risk**
Am-241	0.00860	5.96E-11	4.79E-12	-[a]	-	-	6.44E-11
Np-237	-	-	-	-	-	-	-
Pa-233	-	-	-	-	-	-	-
Pa-234	1.06	9.24E-15	6.10E-12	0.267	1.11E-11	7.42E-14	1.73E-11
Pa-234m	1.06	«[b]	2.43E-16	0.267	«	9.98E-16	1.24E-15
Pu-238	0.00480	3.74E-11	6.16E-15	0.0349	9.24E-11	4.27E-19	1.30E-10
Pu-239/240	0.00970	8.49E-11	4.16E-14	-	-	-	8.49E-11
Tc-99	0.0454	1.26E-11	7.72E-14	0.543	3.01E-11	6.27E-18	4.28E-11
Th-231	0.0510	1.89E-15	4.22E-15	0.0357	1.58E-12	6.51E-17	1.59E-12
Th-234	1.06	9.30E-12	1.41E-12	0.267	1.24E-10	3.50E-16	1.35E-10
U-233/234	1.13	6.46E-09	5.91E-12	0.384	5.47E-10	9.20E-18	7.01E-09
U-235/236	0.0510	2.89E-10	5.78E-10	0.0357	5.00E-11	1.02E-15	9.17E-10
U-235m	0.0097	1.69E-23	«	-	-	-	1.69E-23
U-238	1.06	5.45E-09	2.69E-12	0.267	3.44E-10	3.28E-18	5.80E-09
Summed Risk	**---**	**1.24E-08**	**5.99E-10**	**---**	**1.20E-09**	**7.67E-14**	**1.42E-08**

[a] There are no detected concentrations of this analyte in this medium.
[b] The slope factor in the EPA PRG Calculator (EPA 2022a) is zero or does not exist.

Table 29 Estimated Background Area Risks to Hypothetical Swimmer

	Swimming						
	Sediment			Surface Water			
Isotope	Sediment Concentration (pCi/g)	Ingestion Risk	External Exposure Risk	Surface Water Concentration (pCi/L)	Ingestion Risk	External Exposure Risk	Summed Risk
Am-241	-[a]	-	-	-	-	-	-
Np-237	-	-	-	-	-	-	-
Pa-233	-	-	-	-	-	-	-
Pa-234	2.29	2.00E-14	1.32E-11	0.312	1.30E-11	8.68E-14	2.63E-11
Pa-234m	2.29	«[b]	5.26E-16	0.312	«	1.17E-15	1.70E-15
Pu-238	-	-	-	0.026	6.88E-11	3.18E-19	6.88E-11
Pu-239/240	0.007	6.12E-11	3.01E-14	-	-	-	6.12E-11
Tc-99	0.011	3.06E-12	1.87E-14	neg[c]	neg	neg	3.08E-12
Th-231	0.093	3.44E-15	7.68E-15	0.032	1.42E-12	5.84E-17	1.43E-12
Th-234	2.29	2.01E-11	3.05E-12	0.312	1.45E-10	4.09E-16	1.68E-10
U-233/234	2.33	1.33E-08	1.21E-11	0.377	5.37E-10	9.04E-18	1.38E-08
U-235/236	0.093	5.27E-10	1.05E-09	0.032	4.49E-11	9.14E-16	1.62E-09
U-235m	0.007	1.22E-23	«	-	-	-	1.22E-23
U-238	2.29	1.18E-08	5.81E-12	0.312	4.03E-10	3.83E-18	1.22E-08
Summed Risk	**---**	**2.57E-08**	**1.08E-09**	**---**	**1.21E-09**	**8.94E-14**	**2.80E-08**

[a] There are no detected concentrations of this analyte in this medium within the background area.
[b] The slope factor in the EPA PRG Calculator (EPA 2022a) is zero or does not exist.
[c] The concentration for this analyte in this medium is negative; the input concentration is zero.

6. UNCERTAINTY ASSESSMENT

There are uncertainties associated with the information and data used in each phase of a risk assessment. These uncertainties are due to a number of factors, including parameter bias, parameter variability (random errors or natural variations) and artifacts of the modeling process.

As this HHRA progressed, some parameters were identified as having a noticeable influence on calculated risks. Changes in the values of these more "sensitive" parameters produced larger changes in the risk results than other, less-sensitive, parameters. Research data on many of these parameters are expressed as ranges of plausible values. To reduce the chances that risks are underestimated, EPA's risk calculators incorporate parameter values that follow the RME approach and those values were often selected that yielded higher risk estimates.

Some of the more influential uncertainties are presented below:

6.1 SOIL-TO-PLANT UPTAKE FACTORS

One of the most influential values in this HHRA is the value of the soil-to-plant transfer factor of Tc-99. This factor is used to convert the concentration of technetium in soil to a concentration of technetium in plants growing in that soil. Technetium, in the form of pertechnetate, is soluble in water. According to the values found in the EPA PRG calculator's database, it is absorbed much more readily by plants than other water-soluble elements like sodium, potassium and chloride. Thus, a soil-to-plant transfer factor that predicts a relatively high bio-concentration of technetium in food crops, particularly leafy vegetables, was used in this HHRA. This may result in a calculated risk result that overestimates the actual exposure potential of consuming local produce. If additional investigations into radiological exposures are planned, sampling of local leafy vegetables and the soil around their roots should be considered.

6.2 COMPOUNDING EFFECT OF THE RME APPROACH

The practice of overestimating individual exposure parameter values to minimize the possibility of underestimating its contribution to the calculated risk can, if taken to extremes, produce a compounded estimate that greatly overestimates exposures and risks. This conservatism is intended, and this HHRA recognizes this tendency as a necessary artifact of the EPA's risk assessment process. Where possible, input from the local community was used to reduce the net uncertainty associated with calculated risks.

6.3 SLOPE FACTORS

The EPA methodology for estimating radionuclide carcinogenic risks is currently being re-evaluated by EPA and its contractors. The current dose-response relationship between cancer and ionizing radiation has been extrapolated from the cancer risk established using data on past exposures like the Japanese Atomic Bomb Survivors database and a relative risk projection model.

As stated by the EPA, "…*so far as is known, any dose of ionizing radiation, no matter how small, might give rise to a cancer or to a genetic effect in future generations. Conversely, there is no way to be certain that a given dose of radiation, no matter how large, has caused an observed cancer in an individual or will cause one in the future.*" (EPA 1989)

The EPA's current interpretation follows the historic "linear-no-threshold model", which has come under increasing criticism from scientific professionals in recent years (Doss 2018). Most objections to the linear-no-threshold model focus on its failure to account for biological repair processes and its potential to overestimate risks from low levels of radiation.

6.4 POSSIBLE EXISTENCE OF CRITICAL SUBPOPULATIONS WITHIN THE STUDY AREA

Risks to the larger group of receptors in the study area may not be representative of risks to a smaller group with unique behaviors or susceptibilities. For example, some receptors' behaviors may produce more frequent or more intense exposures than those experienced by the larger group. This was explored in this HHRA by evaluating risks from eating local food like vegetables and fish.

The EPA's PRG calculator contains a list of 25 types of fruits and vegetables that risk assessors may include when calculating exposures from produce consumption. The intent of this large variety is to allow selection of those vegetables commonly consumed by the local population being assessed. In this HHRA, the 23 types of produce included in default parameters within the PRG calculator are included in the assessment of risks from consuming local produce (even those unlikely to grow in southern Ohio). This yields an ingestion rate of 1,485 grams (3.27 pounds) of produce per day for an adult. For a child residential receptor, the rate is 816 grams (1.8 pounds) of produce per day. While it can be said that these generous portions would be likely to overestimate risks to a typical residential receptor from local produce, the additional conservativism is offered to acknowledge a subpopulation that may exist in the rural study area.

Similarly, consumption of local fish was assessed to address the possibility that a sub-set of the local population may exhibit atypical behaviors that bring them into sustained contact with less frequented locations and media. In an effort to minimize the possibility that calculated risks would underestimate actual risks from consumption of local fish, generous portions were assumed when calculating risk estimates. This HHRA assumed a consumption rate of 13.1 kg/y[20] (28.8 lbs of fish flesh per year), which is approximately 50% greater than the 8.8 kg/y (19.5 lbs/y) limit recommended by the Ohio EPA due to methylmercury and PCBs levels reported in Ohio fish (ODH 2019).

Some receptors could display an increased susceptibility to an external stressor like radiation. This uncertainty is partially off-set by use of the RME approach, but stake-holders may wish to explore this possibility in a subsequent investigation.

6.5 BACKGROUND AREA RISKS

Radiation from natural sources is ubiquitous in the global environment. It is supplemented by smaller amounts of radiation from human activities such as the application of fertilizer on fields and fallout generated by weapons-testing and other large-scale nuclear events around the world. The EPA's risk assessment methodology suggests subtracting background area concentrations from concentrations in similar media collected within the study area, where practicable. In this case, that technique is impractical for most of the ROCs evaluated, as concentrations of these

[20] 61 g of fish per day for 214 d/y

ROCs in the study area are often indistinguishable from the range of concentrations found in background area samples collected outside the study area.

This HHRA presents calculated risks to evaluated receptors from the background area (Section 2.1) and study area concentrations separately rather than subtracting an average background concentration from representative concentrations reported in the study area. This treatment produced two sets of risks, one representative of background area conditions and one including contributions of both background area and study area ROCs. The resulting presentation allows stakeholders to compare the relative magnitude of the study area risks with the ever-present risks from background area concentrations of ROCs in soils.

7. CONCLUSIONS AND RECOMMENDATIONS

At the request of the Community, DOE provided funding to the Community via a financial assistance award Ohio University for an investigation to 1) define the nature and extent of the radionuclides of concern within six miles of the PORTS site and 2) evaluate potential health impacts to members of the Community, as described in Section 1.2. In May 2019, Ohio University's Voinovich School of Leadership and Public Service agreed to work closely with County and Community representatives and serve as the independent coordinator for the project. In addition, DOE monitors progress through regular reporting and meetings with OU. However, no technical direction, such as methods, choices of parameter values, selection of pathways, or use of analytical results, was provided by the DOE. Therefore, this HHRA was performed without computational or conclusional input or influence by the DOE. It is based on data collected by a third-party contractor with guidance from local community members. Risks were calculated using EPA methodology and calculational tools. Results, observations, conclusions and recommendations are summarized below.

7.1 RADIONUCLIDES OF CONCERN

In March of 2019, the DOE published the *Portsmouth Gaseous Diffusion Plant Annual Site Environmental Report – 2017 Piketon, Ohio* (DOE 2019a). The report indicated Np-237, Pu-239/240, Tc-99, U-233/234, U-235/236, and U-238 had been detected beyond the PORTS property boundaries. The Community started with DOE's list of detected radionuclides and expanded it to include Am-241 and Pu-238 (Solutient 2020a) during a series of planning discussions. The list of radionuclides the Community established for investigation was included in this HHRA. For completeness, the effects of additional short-lived daughters were incorporated via the respective parent's concentration (Section 4.3.6). The full list of radionuclides regarded in this HHRA is presented in Table 30.

Table 30 Radionuclides Included in this HHRA

Radionuclides (Parent of short-lived daughter)
Am-241
Np-237
Pa-233 (short-lived daughter of Np-237)
Pa-234 (short-lived daughter of U-238)
Pa-234m (short-lived daughter of U-238)
Pu-238
Pu-239/240
Tc-99
Th-231 (short-lived daughter of U-235)
Th-234 (short-lived daughter of U-238)
U-233/234
U-235/236
U-235m (short-lived daughter of Pu-239)
U-238

[a] m – metastable

7.2 EXPOSURE ASSESSMENT

The description of the exposure assessment offered in Section 3 outlines the types of data needed to estimate risks and processes used to gather and evaluate that information. During the initial stages of the project, the resident was determined to be the most appropriate receptor type and a conceptual model of potential exposures (Figure 10) was constructed as described in Section 3.1. As part of this step, risk assessors gathered information about potential receptors in the study area and the exposure pathways identified during construction of the conceptual model. Questionnaires about behavior patterns and diet were circulated among Community members. Information gathered from responses to those questionnaires was supplemented by data from peer-reviewed EPA data sources to create the quantitative descriptions of exposure parameters to be used in the risk assessment (Section 3.3).

Background area and exposure point concentrations of ROCs were then determined in the media identified in the SAP (Solutient 2020a) and the conceptual model (Figure 10); soil, sediment, surface water, and dust. Given that the laboratories reported a number of analytical results as negative values, and many other results were reported within the range of background, the EPA's preferred analytical tool, ProUCL, calculated some negative 95% UCL values. Following the recommendation of the EPA ProUCL Users Guide (EPA 2022c), a professional statistician was then retained to provide more appropriate, media-specific 95% UCLs for ROCs detected in the study area (Section 3.2).

7.3 TOXICITY ASSESSMENT

The toxicity assessment presented in Section 4 provides a general description of radiological cancer induction and introduces EPA's approach to quantitatively assess risks from various exposures to the ROCs evaluated in this HHRA. The EPA's approach assumes a linear relationship exists between exposure and risk and that a simple ratio of risk/unit of exposure, expressed as a "Slope Factor" can be used to convert exposures to risk.

Section 4 presents abbreviated toxicity profiles for the five radioelements evaluated in this HHRA: americium, neptunium, plutonium, technetium and uranium. Radioelements are processed in the body per their respective chemical properties. Some are eliminated with little or no retention. Others deposit in a specific organ, such as bone or a kidney, and are either eliminated from the body at element-specific rates or remain in the organ. These profiles also contain information about the types of health-effects such exposures may produce. Table 16 and Table 17 present the Slope Factors used to convert the exposures quantified in Section 3 to estimates of potential risk.

7.4 RISK CHARACTERIZATION

Concentrations of ROCs in the study area could include contributions from background and non-background sources. The EPA focuses on the extra risks added by non-background sources. Typically, these extra risks are calculated by subtracting background concentrations from the concentrations reported in a study area. In this case, this was not always possible as the study area concentrations were indistinguishable from, or in some cases less than, background concentrations. (An example of U-234 and U-238 soil results is provided in Table 31.) Therefore, the decision was made to calculate and present the total risk and corresponding background risks separately.

Table 31 Comparative Example of Soil Concentrations

Analyte	Soil Average Conc ± StDev [a] Background (pCi/g)	Study Area (pCi/g)	Statistician's UCL for Study Area Soil (pCi/g)
U-234	1.9±1.6	1.2±1.2	1.25
U-238	1.9±1.4	1.2±1.2	1.28

Potential human health effects from exposure to ROCs were estimated using methods established by the EPA. The EPA PRG and BPRG on-line calculators (EPA 2022a and 2022b) were utilized to determine estimated cancer risks.

Projected risks to a hypothetical receptor consuming relatively large portions of food grown within areas of the study area may exceed EPA's allowable risk range of 10^{-4} (Table 32). As calculated, the greatest contributors to these receptors risk are Tc-99 via produce ingestion (soil) and Pu-238 via ingestion of fish flesh (surface water). For risks from eating produce to exceed 10^{-4}, crops must be grown in soil containing more than 0.327 pCi/g of Tc-99 and hundreds of pounds of local produce must be consumed annually over a lifetime before this pathway is projected to produce risks in excess of 10^{-4}.

It should be noted that the influence of local produce on these projected risks is heavily dependent on the amount of Tc-99 that plants actually absorb through their roots. The EPA's models contain a method to estimate this quantity, but the method uses a single parameter value to represent a phenomenon that has been shown to vary between plant species, soil types and moisture levels (IAEA 2009).

Table 32 Summary of Calculated Risks within the Study Area

Isotope	Resident: Risk from Soil	Resident: Risks from Settled Dust	Gardener: Risks from Produce Consumption	Fisher: Risks from Finfish Ingestion	Swimmer: Risks from Sediment	Swimmer: Risks from Surface Water	Summed Risk
Am-241	2.56E-09	2.31E-08	2.51E-09	-	6.44E-11	-	2.82E-08
Np-237	5.45E-10	3.19E-09	2.53E-09	-	-	-	6.27E-09
Pa-233	2.64E-11	1.88E-12	1.17E-12	-	-	-	2.94E-11
Pa-234	3.10E-09	1.16E-12	5.61E-12	2.72E-09	6.11E-12	1.12E-11	5.84E-09
Pa-234m	1.24E-13	4.91E-17	-	-	2.43E-16	9.98E-16	1.25E-13
Pu-238	3.97E-10	1.69E-08	7.81E-10	4.21E-05	3.74E-11	9.24E-11	4.21E-05
Pu-239/240	2.82E-09	3.50E-08	5.58E-09	-	8.49E-11	0.00E+00	4.35E-08
Tc-99	1.59E-09	3.28E-08	5.44E-05	1.10E-08	1.27E-11	3.01E-11	5.44E-05
Th-231	2.12E-12	8.46E-14	1.41E-13	2.34E-10	6.11E-15	1.58E-12	2.38E-10
Th-234	1.05E-09	4.08E-10	7.29E-10	1.84E-08	1.07E-11	1.24E-10	2.07E-08
U-234	2.15E-07	2.74E-07	2.97E-06	1.19E-08	6.47E-09	5.47E-10	3.48E-06
U-235/236	2.92E-07	1.29E-08	1.39E-07	1.10E-09	8.67E-10	5.00E-11	4.46E-07
U-235m	5.43E-22	6.96E-21	7.74E-21	-	1.69E-23	-	1.53E-20
U-238	1.97E-07	2.39E-07	2.74E-06	7.52E-09	5.45E-09	3.44E-10	3.19E-06
Summed Risk	**7.28E-07**	**6.84E-07**	**6.04E-05**	**4.22E-05**	**1.34E-08**	**1.25E-09**	**1.04E-04**

For comparative purposes, calculated risks for the hypothetical resident exposed within the background area are presented in Table 33.

Table 33 Summary of Calculated Risks within the Background Area

	Resident		Gardener	Fisher	Swimmer		
Isotope	**Risk from Soil**	**Risks from Settled Dust**	**Risks from Produce Consumption**	**Risks from Finfish Ingestion**	**Risks from Sediment**	**Risks from Surface Water**	**Summed Risk**
Am-241	-	-	-	-	-	-	-
Np-237	-	-	-	-	-	-	-
Pa-233	-	-	-	-	-	-	-
Pa-234	4.66E-09	1.50E-12	8.42E-12	3.18E-09	1.32E-11	1.31E-11	7.88E-09
Pa-234m	1.86E-13	3.53E-17	-	-	5.26E-16	1.17E-15	1.88E-13
Pu-238	-	-	-	3.14E-05	-	6.88E-11	3.14E-05
Pu-239240	2.43E-09	-	4.80E-09	-	6.12E-11	-	7.29E-09
Tc-99	9.72E-10	-	3.34E-05	-	3.08E-12	-	3.34E-05
Th-231	3.04E-12	5.40E-14	2.03E-13	2.10E-10	1.11E-14	1.42E-12	2.15E-10
Th-234	1.57E-09	9.89E-10	1.09E-09	2.16E-08	2.32E-11	1.45E-10	2.54E-08
U-234	3.35E-07	2.10E-06	4.26E-06	1.17E-08	1.33E-08	5.37E-10	6.72E-06
U-235/236	4.19E-07	8.26E-08	1.99E-07	9.84E-10	1.58E-09	4.49E-11	7.03E-07
U-235m	4.67E-22	-	6.65E-21	-	1.22E-23	-	7.13E-21
U-238	2.96E-07	5.79E-07	4.12E-06	8.80E-09	1.18E-08	4.03E-10	5.02E-06
Summed Risk	**1.06E-06**	**2.76E-07**	**4.23E-05**	**3.14E-05**	**2.68E-08**	**1.21E-09**	**7.51E-05**

7.5 DOSE ASSESSMENT

The results of a companion dose assessment have been provided in Attachment E. The dose assessment uses a different set of metrics (dose rates instead of risks) to evaluate the health protectiveness of an exposure scenario. This is offered to provide a way to evaluate the reasonableness of the risk assessment results.

Peak dose rates were projected to be < 1 mrem/y, with isotopes of uranium and Tc-99 contributing the largest shares. These dose rates are far below the 25 mrem/y Nuclear Regulatory Commission limit for doses from inactive sites (10 CFR 20.1402).

7.6 SPATIAL DISTRIBUTION OF ROCS IN STUDY AREA

In accordance with the SAP (Solutient 2020a), a great deal of concentration data has been collected in preparation for this HHRA. Many of the ROC concentrations reported in samples collected from the study area are indistinguishable from background samples collected outside the study area. To provide some context to the results that are above the range of background, the concentration results (Conc) for each ROC were divided into four "bins" and plotted on maps of the study area using different colors for each bin. These bins are described and listed in ascending order below:

- $\underline{Conc < L_c}$ (Samples in which the ROC was not detected.)
- $\underline{L_c \leq Conc < 10^{-6}}$ (Samples in which the ROC was detected at concentrations less than the concentration corresponding to EPA's 10^{-6} risk value for that ROC.
- $\underline{10^{-6} \leq Conc < 10^{-4}}$ (Samples in which the ROC was detected at concentrations greater than or equal to the concentration corresponding to EPA's 10^{-6} risk value for that ROC but less than the concentration corresponding to EPA's 10^{-4} risk value for that ROC.)
- $\underline{Conc \geq 10^{-4}}$ (Samples in which the ROC was detected at concentrations greater than the concentration corresponding to EPA's 10^{-4} risk value for that ROC.)

7.6.1 Use of the Critical Value, L_c

As discussed in Section 2.5, the critical value, L_c, identifies a threshold concentration that divides sample results into two groups; results that are too small to be distinguished from blank samples (i.e. not detected), and results that are large enough to indicate the presence of the analyte in the sample (i.e. detected).

7.6.2 Use of EPA's 10^{-6} to 10^{-4} Risk Range

Under the CERCLA program (42 USC §9601), EPA compares calculated risks to a range of risks that it considers to be health protective. This risk range has been designated by the EPA as the "acceptable" risk range for sites regulated by the CERLA Program. This is a legal term, as defined in the National Contingency Plan (the "NCP" 40 CFR 300), which is the regulation that provides the organizational structure and procedures for responding to releases of contaminants in the environment. Acceptable risk levels should not be interpreted as a stringent boundary that separates harm and safety. To exceed the acceptable risk level in the HHRA does not necessarily suggest a potential for harm. Likewise, meeting the acceptable risk levels does not necessarily assure that exposure is harmless.

In the NCP, an acceptable exposure level is defined as the "…concentration level of a contaminant to which the human population, including sensitive subgroups, may be exposed without adverse effect during a lifetime or part of a lifetime..." For known or suspected carcinogens, like radionuclides, acceptable exposure levels are generally expressed as an excess lifetime cancer risk range starting at 10^{-6} (1 in 1,000,000) and extending up to 10^{-4} (1 in 10,000).

As stipulated in the NCP, the "… 10^{-6} risk level shall be used as the point of departure for determining remediation goals [in] the presence of multiple contaminants at a site or multiple pathways of exposure…". The EPA has further clarified the extent of the acceptable risk range by stating that the upper boundary generally is not a discrete line at $1x10^{-4}$. Risks slightly greater

than $1x10^{-4}$ may be considered to be health protective on a case-by-case basis for purposes of a risk assessment performed in accordance with CERCLA.

The ROC concentrations corresponding to EPA's "acceptable risk range" for a receptor eating local produce were selected as reference concentrations to provide perspective for the concentration data collected during this study. This does not signify that risks in the vicinity of a particular data point correspond to the listed risk level. An estimation of risk at that location would require additional measurements sufficient to characterize concentrations in a large garden.

7.6.3 Observations Regarding Spatial Distribution of ROCs in Study Area

Attachment B contains maps of sample locations where individual samples contained ROC concentrations corresponding to $1x10^{-6}$ and $1x10^{-4}$ risk values. This compilation allows stakeholders to identify individual samples, sample groups and spatial trends in the data.

Concentrations of ROCs are unevenly distributed across the study area. This uneven distribution can be seen by examining a map of Tc-99 results plotted within the study area (Figure 11). This is further illustrated by zooming into the area around ZCMS (Figure 12). Soil samples collected approximately 200 feet to the north of ZCMS contained relatively low concentrations of Tc-99 (-0.51 to 0.206 pCi/g), while the highest reported Tc-99 soil concentration was measured in a sub-surface soil sample approximately 2,000 feet to the northeast of ZCMS.[21]

7.7 CONCLUSIONS

Concentrations of ROCs are not evenly distributed across the study area. This mottled pattern does not conclusively implicate a particular source, but the presence of above background levels of the fission product Tc-99 in local soils, combined with the knowledge that PORTS handled recycled uranium from reactor fuel, suggests PORTs may have been a source of the Tc-99.

Calculated risks to typical residents in the study area, as described in Section 3, from the ROCs listed in Section 2 can be expected to be less than the point of departure (1 in a million or 10^{-6}) used by EPA to identify potentially harmful situations evaluated under the CERCLA program.

Potential subpopulations were identified by the community and the risk assessment team during the course of the investigation, including school children, residents consuming substantial quantities of local foods, life-long residents and recreational users of local streams. Of these groups, the highest projected risks were projected to residents eating more than 300 pounds of produce from local sources each year (approximately 6 in 100,000). Similarly, risks to an individual eating 29 pounds of fish flesh per year were calculated to approach 5 in 100,000. Risks to other groups, such as students attending schools in the study area and swimmers in local water bodies were estimated to range between 1×10^{-8} to 8×10^{-7}, which are below EPA's acceptable risk range.

[21] Additional samples were collected from the first foot of soil at that location and Tc-99 was found throughout that 12-inch interval. The highest Tc-99 concentration in soil (6.9 pCi/g) was reported in sample SJ22-SO-J-06-A, which was collected from the 8-12 inch interval below ground surface.

An initial survey of items in Zahn's Corner Middle School was conducted by Solutient at the request of the Scioto Valley Local Board of Education. Solutient concluded "(t)here was no evidence of radioactive contamination identified. All surveyed materials removed from the school and those remaining are free from any radioactive contamination above background." (Exhibit A in Attachment F). A subsequent investigation by Solutient collected dust samples from a variety of surfaces in other local schools. A composite risk from all ROC's in this dust was calculated using a compilation of the highest concentration reported for each radionuclide. This approach was designed to produce an estimate of the maximum credible risk to local students in the schools (Attachment F). Using this approach, risks to students were calculated to be 3.2×10^{-7}, which is less than the lower end of EPA's acceptable risk range.

Technetium-99 in local produce was the largest contributor to both risks and doses, followed by Pu-238 in fish. Large amounts of these foods must be consumed over a lifetime before calculated risks approach the upper end of EPA's acceptable risk range of 10^{-6} to 10^{-4}.

7.8 RECOMMENDATIONS

It is recommended that supplemental sampling of plants and associated soil be conducted in gardens and farms within the study area and the Tc-99 content of the samples collected be measured. This will directly measure Tc-99 concentrations in food crops and produce a site-specific soil-to-plant transfer factor for this potentially important pathway, thus reducing the considerable uncertainty imparted by the simple first-order partitioning model used by EPA's calculators to estimate this uptake.

It is recommended that supplemental sampling of fish in surface waters that are downstream of PORTS outfalls and non-point sources and that the Pu-238 content of the fish flesh be measured. This will address uncertainties in the pathway producing the second highest exposure potential estimated during the course of this investigation.

If the community still has questions about the radiological condition of ZCMS, it will be important to verify that the interior of ZCMS is not contaminated. It is recommended that access to the interior of the school be granted and additional sampling be conducted inside the building. In lieu of such verification sampling, a *Multi-Agency Radiation Survey and Site Investigation* Manual (MARSSIM 2000)[22] closure of the building should be considered prior to any demolition or local disposal. The MARSSIM methodology provides guidance for assessing radiological contamination on building surfaces and is intended to demonstrate that a site meets the regulatory requirements.

[22] As of the writing of this document, the MARSSIM Revision 2, published in May 2020, is still listed as proposed on the EPA website (https://www.epa.gov/radiation/multi-agency-radiation-survey-and-site-investigation-manual-marssim-proposed-revision-2). Therefore, the MARSSIM 2000 is cited.

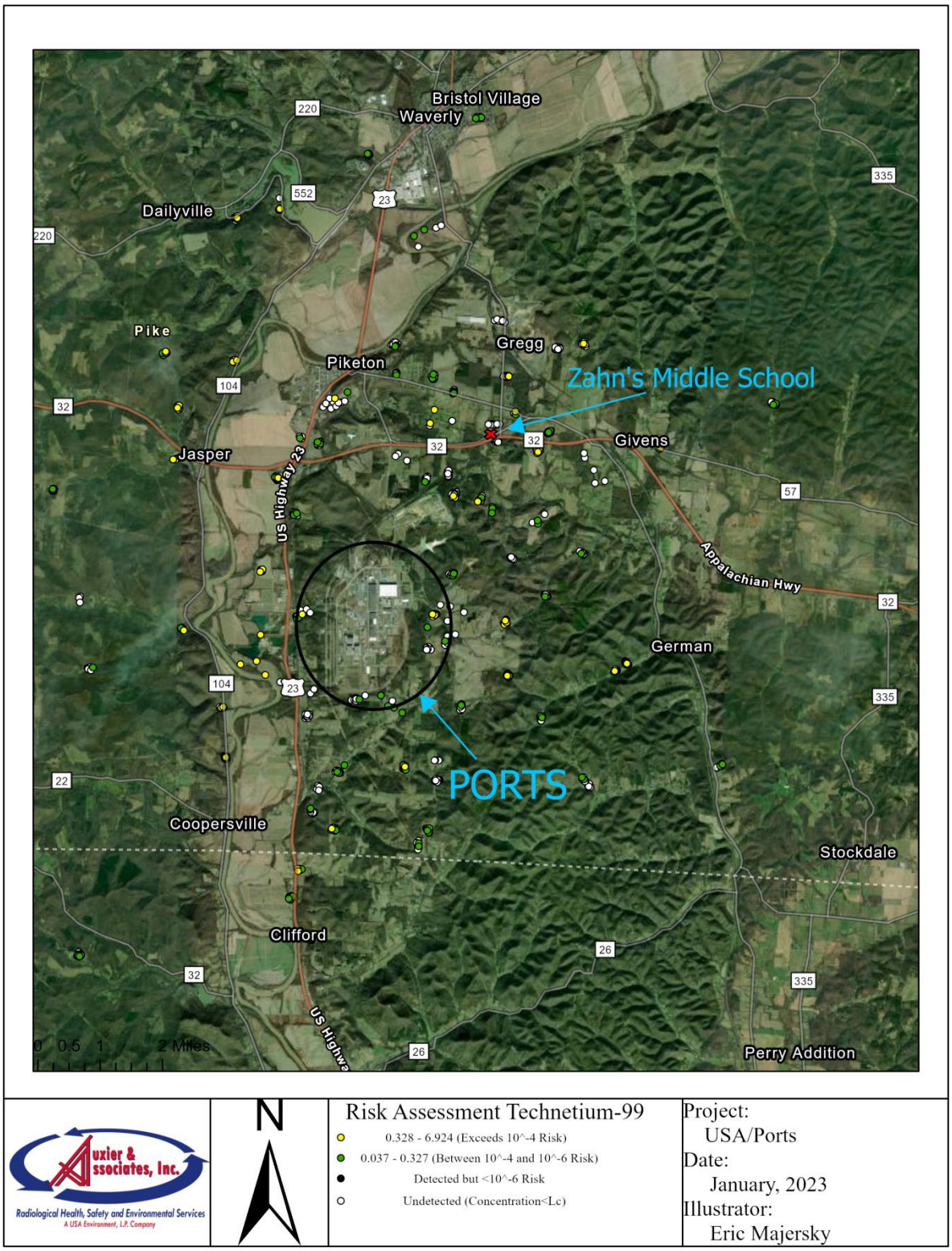

Figure 11 Distribution of Tc-99 within Study Area

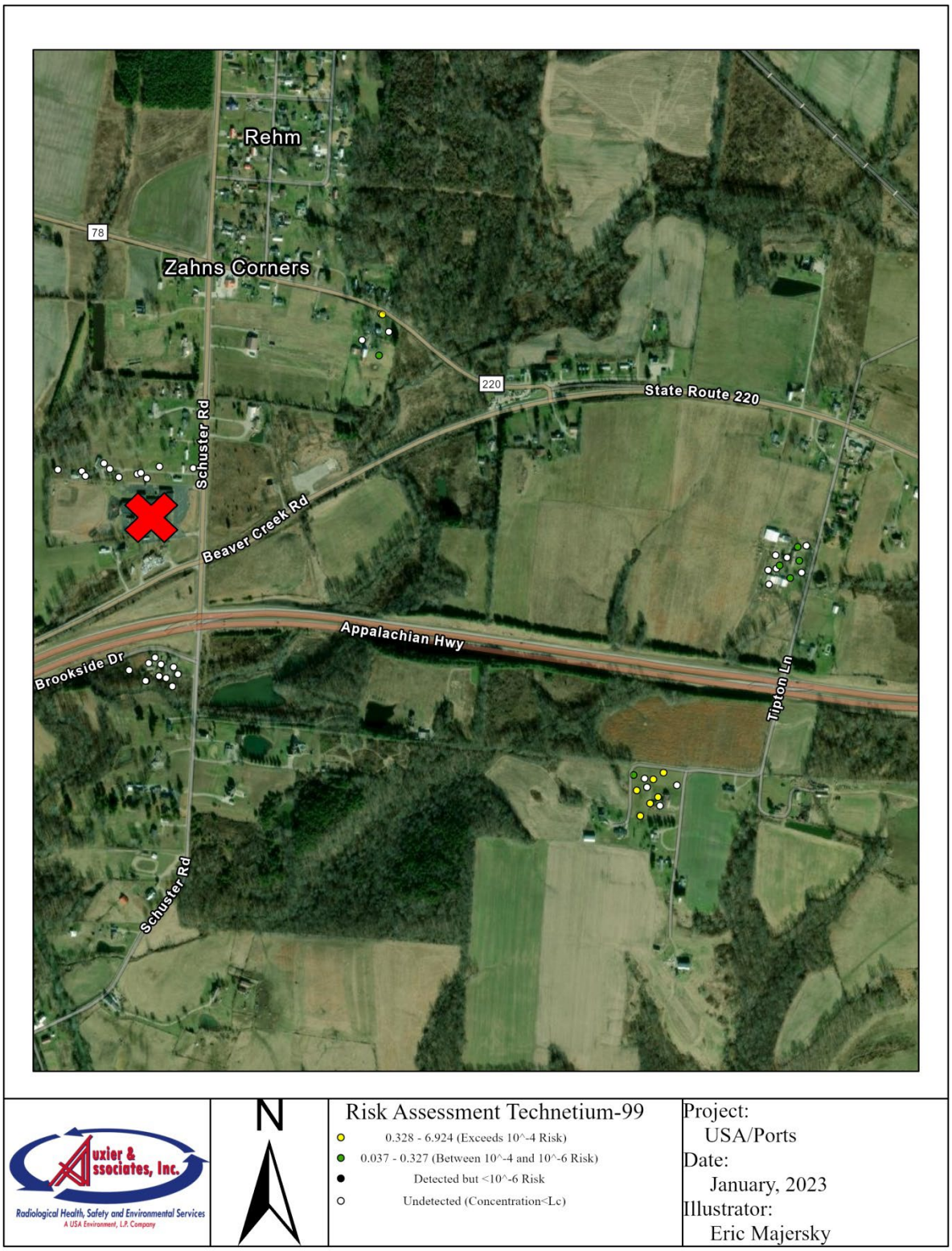

Figure 12 Distribution of Tc-99 near ZCMS

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Attachment A

Inter-Laboratory Comparison

Attachment A
Comparison of REAL and SWRI Results

Environmental measurements are required to determine the nature and extent of radionuclides in the environment. The quality of the measurement data must be known if it is to be used to assess radiological conditions. Interlaboratory comparison testing is one method used to evaluate the accuracy and precision of results obtained from a laboratory. As part of that comparison, results reported by two or more laboratories analyzing the same samples can be compared and variances in those results can influence the confidence stakeholders have in evaluations and conclusions regarding the nature and extent of radionuclides in the environment.

In this study, approximately ten percent of the samples shipped to the REAL laboratory[1] were homogenized and divided into smaller portions when they were received. One of these portions was retained and analyzed by the REAL laboratory and one portion was sent to SWRI for a separate analysis. Both labs reported their findings and those results were compared with the other lab's results for the same sample.

This attachment presents a compendium of results from both labs, followed by graphical comparisons of the REAL and SWRI results for the same samples.

A.1 Tabulated Real Results

During the course of this study, 1,179 samples were sent to REAL Laboratory in Oak Ridge, TN[2]. Samples were analyzed for the presence of americium-241 (Am-241), neptunium-237 (Np-237), plutonium-238 (Pu-238), Pu-239/240, technetium-99 (Tc-99), uranium-233/234 (U-233/234), U-235/236, and U-238. Tables A-1 and A-2 present this information in two different ways. Table A-1 lists radionuclide concentrations in all samples where that radionuclide was detected. Samples that did not contain detectable quantities of the radionuclide were assigned a ~BLANK label, signifying the reported result was indistinguishable from the blank sample result that accompanied that sample. Samples in which the radionuclide was detected in quantities too small to measure were listed using the format:

$$< \text{MDA (Result} \pm 2 \text{ StDev)}$$

where:

MDA = Minimum detectable activity that is quantifiable
Result = Reported result
StDev = Standard deviations of the result

[1] The REAL laboratory was affiliated with the Oak Ridge Institute for Science and Education (ORISE).

[2] There are 1,179 samples, one of which is background area sample BK10-SO-R-01-A that was ultimately rejected, such that calculations were performed using the remaining 1,178 samples.

Samples in which the radionuclide was detected in measureable quantities were listed using the format:

Result ± 2 Standard Deviations

Table A-2 lists the same REAL data without consideration of the respective analytical methods' detection limitations. All ~BLANK labels are replaced by the "< MDA (Result ± 2 StDev)" format presented above.

Of the 1,178 samples included in calculations, 107 were collected in the background area and 1,071 were collected in the study area. The frequency of detection varied significantly among the analytes, but for a given analyte, offered little variation between the background area and the study area. For example, Pu-239/240 was detected in 29% of the background area samples and 31% of the study area samples. The only exception is U-235, which was detected in 66% of the background samples and in 81% of the study area samples. More detail is provided in the following subsections.

Background Area

Neither Am-241 nor Np-237 was detected in background area samples. Plutonium-238 was detected once in the background area, in surface water, while Pu-239/240 was detected only in soil and sediment (53% of soil samples and 36% of sediment). Remaining analytes, Tc-99, U-233/234, U-235/236, and U-238, were detected in all media. Their detection frequencies varied from 21% (Tc-99) to 92% (U-238) across all media, yet the three uranium isotopes were detected in all background area soil and sediment samples.

Study Area

All eight analytes were detected in soil and dust (smears) within the study area, yet with widely varying detection frequencies ranging from 1% (Am-241 and Np-237 in dust) to 100% (all three uranium isotopes in soil[3]). Seven analytes were detected in sediment (excluding Np-237) and five in surface water (excluding three transuranics). In addition to soil, the three uranium isotopes were detected in 100% of sediment samples. Plutonium-238 was detected in 3% of study area samples while Pu-239/240 was detected in 31%. The Pu-239/240 detections were more heavily weighted in soil (38%), as the analyte was not detected in surface water (0%). Technetium-99 was detected in 30% of soil samples and between 12 and 15% of samples in other study area media.

[3] For the study area, U-234 and U-238 were detected in 843 of the 843 soil samples while U-235 was detected in 842 of 843 soil samples.

A.2 Tabulated SWRI Results

A second laboratory, Southwest Research Institute (SWRI) was tasked to analyze a subset of the samples sent to REAL Laboratory. SWRI analyzed 173 samples for the presence of Am-241, Np-237, Pu-238, Pu-239/240, Tc-99, U-233/234, U-235/236, and U-238. Table A-3 presents the results of their ICP/MS analyses and Table 4 presents their results using other techniques. These tables list results that are at or above the minimum quantifiable level for the sample.

Table A-5 lists all reported concentration results. Samples in which the radionuclide was detected in quantities too small to measure were listed using the form:

< MDA (Result ± 2 Standard Deviations)

where:

MDA = Minimum detectable activity that is quantifiable
Result = Reported result
StDev = Standard deviations of the result

Samples in which the radionuclide was detected in measureable quantities were listed using the form:

Result ± 2 Standard Deviations

A.3 Comparison of Real and ORISE Results

The ORISE laboratory and the SWRI laboratory results for each radionuclide were plotted side by side as paired bars to provide a visual comparison of soil sample analytical results for both CCSE and background samples. For a sample's results to be included in a graphic, the radionuclide must have been analyzed by both laboratories and the radionuclide reported above the minimum detectable concentration in that sample in at least one laboratory. If the analyte was not detected in either laboratory, it is not included in the respective chart.

Table A. 1 Summary Data Table of Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical

		Analytical Method ➔	ORISE AP11							ORISE AP5
		Radionuclide ➔	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Technetium-99
Matrix	Sample ID	Units ⬇	Result	Result	Result	Result	Result	Result	Result	Result
SE	BK01-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	<0.0176 (0.0092 ± 0.0096)	1.970 ± 0.210	0.0870 ± 0.0300	1.930 ± 0.210	~Blank
	BK03-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	2.170 ± 0.230	0.1050 ± 0.0330	2.090 ± 0.230	~Blank
	BK04-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	5.290 ± 0.530	0.2040 ± 0.0490	4.980 ± 0.500	<0.264 (0.202 ± 0.158)
	BK04-SD-J-02-A	pCi/g	~Blank	~Blank	~Blank	0.018 ± 0.012	3.890 ± 0.470	0.1470 ± 0.0430	3.900 ± 0.470	<0.302 (0.264 ± 0.181)
	BK05-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.010	1.280 ± 0.150	0.0650 ± 0.0240	1.190 ± 0.140	~Blank
	BK06-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	2.710 ± 0.280	0.0940 ± 0.0310	2.720 ± 0.280	~Blank
	BK07-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	2.340 ± 0.250	0.0890 ± 0.0290	2.340 ± 0.250	~Blank
	BK08-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	2.250 ± 0.240	0.0800 ± 0.0270	2.310 ± 0.240	~Blank
	BK30-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	<0.017 (0.012 ± 0.010)	1.120 ± 0.130	0.0500 ± 0.0220	1.100 ± 0.130	~Blank
	BK50-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.260 ± 0.150	0.0620 ± 0.0230	1.220 ± 0.140	~Blank
	BK51-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.340 ± 0.160	0.0410 ± 0.0210	1.350 ± 0.160	~Blank
	SJ10-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	0.970 ± 0.120	0.0480 ± 0.0210	0.980 ± 0.120	~Blank
	SJ12-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.130 ± 0.130	0.0470 ± 0.0190	1.030 ± 0.120	~Blank
	SJ13-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.080 ± 0.130	0.0490 ± 0.0220	1.130 ± 0.140	~Blank
	SJ13-SD-J-02-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.140 ± 0.140	0.0550 ± 0.0240	1.040 ± 0.130	0.296 ± 0.151
	SJ14-SD-J-01-A	pCi/g	0.016 ± 0.011	~Blank	~Blank	~Blank	1.190 ± 0.150	0.0500 ± 0.0230	1.150 ± 0.140	~Blank
	SJ15-SD-J-01-A	pCi/g	0.017 ± 0.011	~Blank	~Blank	~Blank	1.150 ± 0.140	0.0410 ± 0.0210	1.030 ± 0.130	~Blank
	SJ15-SD-J-02-A	pCi/g	~Blank	~Blank	0.017 ± 0.012	~Blank	1.310 ± 0.150	0.0420 ± 0.0200	1.310 ± 0.150	~Blank
	SJ16-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	0.920 ± 0.120	0.0310 ± 0.0170	0.850 ± 0.110	<0.298 (0.041 ± 0.176)
	SJ16-SD-J-02-A	pCi/g	~Blank	~Blank	~Blank	<0.018 (0.007 ± 0.009)	0.870 ± 0.110	0.0300 ± 0.0170	0.750 ± 0.100	~Blank
	SJ16-SD-J-03-A	pCi/g	~Blank	~Blank	~Blank	~Blank	0.920 ± 0.120	0.0500 ± 0.0220	0.820 ± 0.110	<0.306 (0.038 ± 0.181)
	SJ17-SD-J-01-A	pCi/g	0.025 ± 0.016	~Blank	~Blank	0.028 ± 0.016	0.850 ± 0.110	0.0420 ± 0.0210	0.710 ± 0.100	~Blank
	SJ17-SD-J-02-A	pCi/g	~Blank	~Blank	~Blank	~Blank	0.910 ± 0.120	0.0370 ± 0.0190	0.880 ± 0.110	~Blank
	SJ18-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.080 ± 0.130	0.0560 ± 0.0230	1.140 ± 0.140	~Blank
	SJ19-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	0.022 ± 0.013	0.950 ± 0.120	0.0500 ± 0.0230	0.890 ± 0.120	~Blank
	SJ20-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.390 ± 0.160	0.0750 ± 0.0280	1.170 ± 0.140	~Blank
	SJ23-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	0.607 ± 0.090	0.0180 ± 0.0140	0.479 ± 0.076	~Blank
	SJ24-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	0.880 ± 0.120	0.0430 ± 0.0210	0.940 ± 0.120	~Blank
	SR27-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.550 ± 0.180	0.0520 ± 0.0220	1.250 ± 0.150	~Blank
	SR29-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	0.750 ± 0.100	0.0550 ± 0.0240	0.820 ± 0.110	~Blank
	SR34-SD-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	0.960 ± 0.120	0.0390 ± 0.0200	0.870 ± 0.120	~Blank
SO	BK09-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	0.016 ± 0.011	1.420 ± 0.170	0.0720 ± 0.0270	1.470 ± 0.170	~Blank
	BK10-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.360 ± 0.160	0.0560 ± 0.0240	1.400 ± 0.160	2.274 ± 0.216
	BK11-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	0.025 ± 0.014	1.200 ± 0.140	0.0770 ± 0.0270	1.390 ± 0.160	~Blank
	BK12-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	0.960 ± 0.120	0.0550 ± 0.0240	0.940 ± 0.120	~Blank
	BK15-SO-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.070 ± 0.130	0.0290 ± 0.0170	1.170 ± 0.140	~Blank
	BK16-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	2.300 ± 0.250	0.1060 ± 0.0320	1.410 ± 0.160	~Blank
	BK18-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	0.009 ± 0.008	1.410 ± 0.160	0.0740 ± 0.0260	1.490 ± 0.170	~Blank
	BK21-SO-J-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.330 ± 0.160	0.0530 ± 0.0230	1.460 ± 0.170	~Blank
	BK22-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	0.019 ± 0.012	2.010 ± 0.220	0.0880 ± 0.0300	2.060 ± 0.230	~Blank
	BK23-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.011	1.600 ± 0.180	0.0780 ± 0.0280	1.510 ± 0.170	~Blank
	BK24-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	0.021 ± 0.012	0.990 ± 0.120	0.0620 ± 0.0240	1.070 ± 0.130	~Blank
	BK25-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	<0.017 (0.009 ± 0.009)	1.350 ± 0.160	0.0520 ± 0.0220	1.400 ± 0.160	~Blank
	BK27-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.010	0.990 ± 0.120	0.0420 ± 0.0210	1.030 ± 0.130	~Blank
	BK28-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.010	1.180 ± 0.140	0.0410 ± 0.0220	1.280 ± 0.150	~Blank
	BK29-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	0.024 ± 0.013	0.940 ± 0.120	0.0390 ± 0.0190	0.980 ± 0.120	<0.252 (0.034 ± 0.146)
	BK37-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	<0.017 (0.013 ± 0.011)	0.980 ± 0.120	0.0340 ± 0.0180	1.000 ± 0.120	~Blank
	BK38-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	<0.018 (0.011 ± 0.010)	0.990 ± 0.120	0.0560 ± 0.0230	1.030 ± 0.130	~Blank
	BK39-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	0.011 ± 0.009	1.020 ± 0.130	0.0520 ± 0.0230	0.940 ± 0.120	~Blank
	BK40-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	0.870 ± 0.110	0.0260 ± 0.0150	0.920 ± 0.120	~Blank
	BK41-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	0.018 ± 0.012	1.120 ± 0.140	0.0480 ± 0.0230	1.160 ± 0.140	~Blank
	BK42-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	0.009 ± 0.008	1.280 ± 0.150	0.0300 ± 0.0170	1.300 ± 0.150	~Blank
	BK43-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.150	0.0730 ± 0.0260	1.300 ± 0.150	<0.250 (0.063 ± 0.146)
	BK44-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	0.011 ± 0.009	10.300 ± 1.100	0.3590 ± 0.0800	8.370 ± 0.900	~Blank
	BK44-SO-R-02-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.940 ± 0.240	0.0970 ± 0.0330	1.870 ± 0.240	0.752 ± 0.176
	BK44-SO-R-03-A	pCi/g	~Blank	~Blank	~Blank	~Blank	2.090 ± 0.260	0.0820 ± 0.0310	2.130 ± 0.270	~Blank
	BK44-SO-R-04-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.550 ± 0.200	0.0460 ± 0.0220	1.610 ± 0.210	~Blank
	BK44-SO-R-05-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.420 ± 0.190	0.0700 ± 0.0270	1.440 ± 0.190	~Blank
	BK45-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	4.930 ± 0.510	0.2230 ± 0.0530	5.250 ± 0.540	~Blank
	BK45-SO-R-02-A	pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	3.710 ± 0.450	0.1560 ± 0.0450	3.530 ± 0.430	0.889 ± 0.181
	BK45-SO-R-03-A	pCi/g	~Blank	~Blank	~Blank	~Blank	3.820 ± 0.460	0.1110 ± 0.0360	3.770 ± 0.450	~Blank
	BK45-SO-R-04-A	pCi/g	~Blank	~Blank	~Blank	~Blank	4.210 ± 0.510	0.1930 ± 0.0510	4.170 ± 0.500	0.566 ± 0.177
	BK45-SO-R-05-A	pCi/g	~Blank	~Blank	~Blank	~Blank	4.310 ± 0.520	0.2060 ± 0.0520	4.400 ± 0.530	0.600 ± 0.177
	BK46-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	2.680 ± 0.280	0.1150 ± 0.0340	2.740 ± 0.290	~Blank
	BK46-SO-R-02-A	pCi/g	~Blank	~Blank	~Blank	~Blank	2.750 ± 0.340	0.1100 ± 0.0360	2.680 ± 0.330	<0.301 (0.240 ± 0.181)
	BK46-SO-R-03-A	pCi/g	~Blank	~Blank	~Blank	~Blank	2.810 ± 0.350	0.1380 ± 0.0420	2.930 ± 0.360	~Blank
	BK46-SO-R-04-A	pCi/g	~Blank	~Blank	~Blank	~Blank	3.860 ± 0.460	0.2030 ± 0.0510	3.570 ± 0.430	~Blank
	BK46-SO-R-05-A	pCi/g	~Blank	~Blank	~Blank	~Blank	3.750 ± 0.450	0.1660 ± 0.0450	3.790 ± 0.450	~Blank

Notes:

1) "nr" no result reported by laboratory"

2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 1 Summary Data Table of Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical

		Analytical Method →	1.							ORISE AP11 ORISE AP5
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Technetium-99
Matrix	Sample ID	Units ↓	Result	Result	Result	Result	Result	Result	Result	Result
BK47-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	0.011 ± 0.009	1.800 ± 0.200	0.0720 ± 0.0260	1.810 ± 0.200	~Blank
BK48-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	<0.018 (0.007 ± 0.009)	2.210 ± 0.240	0.1020 ± 0.0330	2.070 ± 0.230	~Blank
BK49-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	<0.018 (0.009 ± 0.010)	1.860 ± 0.200	0.0840 ± 0.0290	1.580 ± 0.180	0.333 ± 0.179
BK55-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.667 ± 0.091	<0.0210 (0.0130 ± 0.0120)	0.653 ± 0.090	0.311 ± 0.158
BK56-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.050 ± 0.130	0.0480 ± 0.0210	1.020 ± 0.130	~Blank
BK57-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	1.450 ± 0.170	0.0580 ± 0.0240	1.570 ± 0.180	<0.265 (0.243 ± 0.159)
BK58-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.580 ± 0.180	0.0730 ± 0.0260	1.490 ± 0.170	<0.259 (0.238 ± 0.156)
BK59-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.738 ± 0.096	0.0400 ± 0.0180	0.800 ± 0.100	~Blank
BK62-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	0.950 ± 0.120	0.0370 ± 0.0180	1.100 ± 0.130	0.267 ± 0.159
BK63-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	0.011 ± 0.009	0.940 ± 0.120	0.0490 ± 0.0210	1.070 ± 0.130	<0.265 (0.259 ± 0.159)
BK64-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	0.011 ± 0.009	1.090 ± 0.130	0.0450 ± 0.0200	1.020 ± 0.130	<0.263 (0.202 ± 0.157)
BK65-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	0.010 ± 0.009	1.210 ± 0.140	0.0550 ± 0.0230	1.320 ± 0.150	~Blank
BK66-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	0.010 ± 0.008	1.110 ± 0.130	0.0440 ± 0.0210	1.230 ± 0.140	0.375 ± 0.179
BK71-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.450 ± 0.160	0.0860 ± 0.0280	1.460 ± 0.160	0.267 ± 0.157
BK72-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	<0.017 (0.012 ± 0.011)	1.080 ± 0.130	0.0640 ± 0.0240	1.120 ± 0.130	<0.260 (0.224 ± 0.156)
SJ10-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	<0.017 (0.007 ± 0.009)	1.120 ± 0.140	0.0380 ± 0.0190	1.170 ± 0.140	~Blank
SJ10-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	0.016 ± 0.010	1.100 ± 0.130	0.0540 ± 0.0220	1.100 ± 0.130	0.312 ± 0.139
SJ10-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	0.012 ± 0.010	1.110 ± 0.140	0.0870 ± 0.0320	1.150 ± 0.150	~Blank
SJ10-SO-J-04-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.010	1.000 ± 0.130	0.0300 ± 0.0180	1.020 ± 0.130	<0.227 (0.084 ± 0.135)
SJ11-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.270 ± 0.150	0.0540 ± 0.0220	1.170 ± 0.140	0.252 ± 0.139
SJ11-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	0.012 ± 0.009	2.050 ± 0.220	0.0730 ± 0.0250	1.200 ± 0.140	<0.234 (0.224 ± 0.141)
SJ11-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.010	1.080 ± 0.130	0.0670 ± 0.0250	1.080 ± 0.130	<0.227 (0.119 ± 0.135)
SJ12-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.500 ± 0.170	0.0690 ± 0.0260	1.440 ± 0.170	~Blank
SJ12-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.980 ± 0.210	0.0910 ± 0.0290	1.800 ± 0.200	3.107 ± 0.214
SJ12-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	0.022 ± 0.013	1.200 ± 0.140	0.0520 ± 0.0210	1.200 ± 0.140	0.949 ± 0.188
SJ12-SO-J-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.543 ± 0.078	0.0310 ± 0.0170	0.705 ± 0.094	~Blank
SJ13-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.230 ± 0.150	0.0510 ± 0.0230	1.210 ± 0.150	~Blank
SJ13-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	0.009 ± 0.008	1.220 ± 0.140	0.0420 ± 0.0200	1.100 ± 0.130	~Blank
SJ13-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	<0.018 (0.009 ± 0.010)	1.850 ± 0.210	0.0870 ± 0.0300	1.400 ± 0.170	<0.240 (0.230 ± 0.144)
SJ13-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	<0.025 (0.008 ± 0.011)	1.150 ± 0.140	0.0370 ± 0.0200	1.230 ± 0.150	~Blank
SJ13-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.110 ± 0.140	0.0440 ± 0.0210	1.190 ± 0.140	~Blank
SJ13-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.180 ± 0.150	0.0580 ± 0.0250	1.250 ± 0.150	~Blank
SJ13-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	0.960 ± 0.120	0.0450 ± 0.0210	1.160 ± 0.140	~Blank
SJ13-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.020 ± 0.130	0.0540 ± 0.0260	1.160 ± 0.140	~Blank
SJ13-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	0.009 ± 0.008	1.010 ± 0.130	0.0460 ± 0.0210	1.020 ± 0.130	~Blank
SJ13-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	0.016 ± 0.011	2.430 ± 0.260	0.0880 ± 0.0300	1.130 ± 0.140	~Blank
SJ13-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.110 ± 0.140	0.0660 ± 0.0270	1.180 ± 0.140	~Blank
SJ13-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	0.028 ± 0.015	1.050 ± 0.130	0.0560 ± 0.0240	1.180 ± 0.150	~Blank
SJ13-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	1.160 ± 0.140	0.0680 ± 0.0260	1.120 ± 0.140	~Blank
SJ13-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.150 ± 0.140	0.0460 ± 0.0230	1.140 ± 0.140	<0.242 (0.092 ± 0.144)
SJ13-SO-R-12-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.120 ± 0.160	0.0450 ± 0.0220	1.180 ± 0.160	~Blank
SJ14-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	0.019 ± 0.012	1.160 ± 0.150	0.0290 ± 0.0180	1.040 ± 0.140	~Blank
SJ14-SO-J-02-A		pCi/g	0.19 ± 0.012	~Blank	~Blank	0.012 ± 0.010	1.310 ± 0.160	0.0810 ± 0.0300	1.220 ± 0.150	<0.429 (0.155 ± 0.255)
SJ14-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.012	0.780 ± 0.110	0.0370 ± 0.0200	0.740 ± 0.110	~Blank
SJ14-SO-J-04-A		pCi/g	~Blank	~Blank	~Blank	0.016 ± 0.012	1.090 ± 0.140	0.0580 ± 0.0250	1.250 ± 0.150	~Blank
SJ14-SO-J-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.190 ± 0.170	0.0690 ± 0.0290	1.170 ± 0.170	~Blank
SJ14-SO-J-06-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.011	1.220 ± 0.170	0.0820 ± 0.0310	1.200 ± 0.170	~Blank
SJ14-SO-J-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.300 ± 0.180	0.0510 ± 0.0240	1.240 ± 0.170	~Blank
SJ14-SO-J-08-A		pCi/g	~Blank	~Blank	~Blank	<0.019 (0.014 ± 0.012)	1.160 ± 0.160	0.0610 ± 0.0260	1.150 ± 0.160	~Blank
SJ14-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.011	1.280 ± 0.160	0.0400 ± 0.0210	1.240 ± 0.160	<0.247 (0.102 ± 0.147)
SJ14-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	0.016 ± 0.011	0.980 ± 0.120	0.0430 ± 0.0210	0.980 ± 0.120	~Blank
SJ14-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.010	1.120 ± 0.140	0.0530 ± 0.0260	1.200 ± 0.150	~Blank
SJ14-SO-R-04-A		pCi/g	~Blank	0.009 ± 0.008	~Blank	0.021 ± 0.012	2.800 ± 0.290	0.1040 ± 0.0320	1.310 ± 0.150	0.889 ± 0.185
SJ14-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	0.011 ± 0.009	0.800 ± 0.100	0.0560 ± 0.0230	0.850 ± 0.110	2.152 ± 0.203
SJ14-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	1.180 ± 0.140	0.0430 ± 0.0210	1.290 ± 0.140	0.594 ± 0.182
SJ14-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	0.012 ± 0.011	1.200 ± 0.140	0.0670 ± 0.0260	1.120 ± 0.140	0.420 ± 0.181
SJ14-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	0.020 ± 0.012	1.050 ± 0.130	0.0350 ± 0.0180	1.040 ± 0.130	0.745 ± 0.182
SJ14-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	<0.018 (0.013 ± 0.011)	1.360 ± 0.160	0.0500 ± 0.0220	1.500 ± 0.170	<0.426 (0.206 ± 0.254)
SJ14-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.011	1.280 ± 0.150	0.0480 ± 0.0220	1.310 ± 0.150	<0.421 (0.325 ± 0.252)
SJ14-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	0.030 ± 0.015	1.010 ± 0.130	0.0630 ± 0.0250	1.000 ± 0.120	0.303 ± 0.179
SJ14-SO-R-12-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.340 ± 0.180	0.0420 ± 0.0240	1.330 ± 0.180	~Blank
SJ14-SO-R-13-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.240 ± 0.170	0.0420 ± 0.0240	1.130 ± 0.160	~Blank
SJ14-SO-R-14-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.270 ± 0.170	0.0580 ± 0.0250	1.390 ± 0.190	~Blank
SJ14-SO-R-15-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.220 ± 0.170	0.0500 ± 0.0230	1.360 ± 0.180	0.472 ± 0.173
SJ14-SO-R-16-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.420 ± 0.190	0.0540 ± 0.0250	1.400 ± 0.190	0.648 ± 0.177
SJ14-SO-R-17-A		pCi/g	~Blank	~Blank	~Blank	0.024 ± 0.016	1.390 ± 0.180	0.0430 ± 0.0220	1.240 ± 0.170	0.739 ± 0.177
SJ14-SO-R-18-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.260 ± 0.170	0.0560 ± 0.0250	1.360 ± 0.180	0.400 ± 0.173
SJ14-SO-R-19-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.240 ± 0.170	0.0720 ± 0.0280	1.360 ± 0.180	~Blank

Notes:

1) "nr" no result reported by laboratory"

2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 1 Summary Data Table of Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical

		Analytical Method →	2.							ORISE AP11 ORISE AP5
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Technetium-99
Matrix	Sample ID	Units ↓	Result	Result	Result	Result	Result	Result	Result	Result
SJ15-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.420 ± 0.170	0.0680 ± 0.0280	1.430 ± 0.170	~Blank
SJ15-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	0.010 ± 0.009	1.160 ± 0.140	0.0540 ± 0.0230	1.110 ± 0.140	<0.415 (0.130 ± 0.246)
SJ15-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.190 ± 0.150	0.0720 ± 0.0290	1.170 ± 0.150	<0.429 (0.197 ± 0.255)
SJ15-SO-J-04-A		pCi/g	~Blank	~Blank	~Blank	0.011 ± 0.010	0.960 ± 0.120	0.0420 ± 0.0210	0.800 ± 0.110	<0.420 (0.123 ± 0.249)
SJ16-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	<0.025 (0.006 ± 0.011)	0.980 ± 0.120	0.0350 ± 0.0190	1.020 ± 0.130	~Blank
SJ16-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	0.022 ± 0.013	1.160 ± 0.140	0.0720 ± 0.0280	1.180 ± 0.150	~Blank
SJ16-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	0.022 ± 0.013	0.970 ± 0.120	0.0460 ± 0.0210	0.900 ± 0.120	~Blank
SJ16-SO-J-04-A		pCi/g	~Blank	~Blank	~Blank	<0.025 (0.014 ± 0.013)	0.840 ± 0.110	0.0410 ± 0.0210	0.970 ± 0.120	~Blank
SJ16-SO-J-05-A		pCi/g	~Blank	~Blank	~Blank	0.010 ± 0.009	1.900 ± 0.210	0.0670 ± 0.0270	0.980 ± 0.130	~Blank
SJ16-SO-J-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.890 ± 0.130	0.0360 ± 0.0200	0.890 ± 0.130	0.506 ± 0.188
SJ17-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.060 ± 0.130	0.0580 ± 0.0250	1.170 ± 0.140	~Blank
SJ17-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.010	1.160 ± 0.140	0.0580 ± 0.0250	1.180 ± 0.150	~Blank
SJ17-SO-J-03-A		pCi/g	0.022 ± 0.015	~Blank	0.013 ± 0.010	0.057 ± 0.022	1.160 ± 0.140	0.0360 ± 0.0190	1.100 ± 0.140	~Blank
SJ17-SO-J-04-A		pCi/g	~Blank	~Blank	~Blank	0.022 ± 0.013	1.040 ± 0.130	0.0390 ± 0.0190	1.060 ± 0.130	~Blank
SJ18-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.980 ± 0.130	0.0570 ± 0.0240	1.080 ± 0.130	~Blank
SJ18-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	0.012 ± 0.010	1.140 ± 0.140	0.0620 ± 0.0260	1.220 ± 0.150	~Blank
SJ18-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.100 ± 0.140	0.0600 ± 0.0260	1.170 ± 0.150	~Blank
SJ19-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	<0.023 (0.011 ± 0.012)	0.651 ± 0.091	0.0310 ± 0.0170	0.642 ± 0.090	~Blank
SJ19-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.040 ± 0.130	0.0560 ± 0.0250	1.070 ± 0.140	~Blank
SJ19-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	<0.020 (0.010 ± 0.011)	0.850 ± 0.120	0.0410 ± 0.0210	0.820 ± 0.110	~Blank
SJ20-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.687 ± 0.097	0.0280 ± 0.0170	0.709 ± 0.099	~Blank
SJ20-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	0.730 ± 0.100	0.0520 ± 0.0230	0.800 ± 0.110	~Blank
SJ21-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.110 ± 0.140	0.0440 ± 0.0210	1.130 ± 0.140	~Blank
SJ21-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.060 ± 0.130	0.0800 ± 0.0280	1.140 ± 0.140	~Blank
SJ21-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.140 ± 0.140	0.0510 ± 0.0240	1.110 ± 0.140	~Blank
SJ21-SO-J-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.120 ± 0.140	0.0530 ± 0.0240	1.150 ± 0.140	~Blank
SJ22-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.200 ± 0.150	0.0440 ± 0.0220	1.290 ± 0.160	~Blank
SJ22-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	4.130 ± 0.420	0.1800 ± 0.0450	4.150 ± 0.420	1.513 ± 0.195
SJ22-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	1.350 ± 0.150	0.0780 ± 0.0290	1.330 ± 0.150	~Blank
SJ22-SO-J-04-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.011	1.470 ± 0.180	0.0620 ± 0.0260	1.450 ± 0.170	<0.305 (0.275 ± 0.183)
SJ22-SO-J-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	4.930 ± 0.490	0.2370 ± 0.0540	4.700 ± 0.470	3.668 ± 0.223
SJ22-SO-J-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	5.150 ± 0.510	0.2020 ± 0.0480	5.230 ± 0.510	6.924 ± 0.273
SJ22-SO-J-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	3.940 ± 0.470	0.1850 ± 0.0490	3.930 ± 0.470	1.219 ± 0.195
SJ22-SO-J-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	4.930 ± 0.580	0.2330 ± 0.0560	4.990 ± 0.590	0.794 ± 0.194
SJ22-SO-J-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	7.140 ± 0.830	0.2990 ± 0.0660	7.080 ± 0.820	2.046 ± 0.210
SJ22-SO-J-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	6.330 ± 0.730	0.3650 ± 0.0730	6.220 ± 0.720	1.294 ± 0.199
SJ23-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.760 ± 0.100	0.0460 ± 0.0220	0.740 ± 0.100	~Blank
SJ23-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.250 ± 0.150	0.0580 ± 0.0240	1.290 ± 0.150	~Blank
SJ24-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.120 ± 0.140	0.0490 ± 0.0230	1.120 ± 0.140	~Blank
SJ24-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.010 ± 0.130	0.0590 ± 0.0250	1.160 ± 0.140	~Blank
SJ24-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	<0.021 (0.011 ± 0.012)	1.050 ± 0.130	0.0520 ± 0.0240	1.140 ± 0.140	~Blank
SJ25-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.970 ± 0.120	0.0420 ± 0.0210	1.090 ± 0.140	<0.342 (0.233 ± 0.204)
SJ25-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.940 ± 0.120	0.0490 ± 0.0220	0.980 ± 0.120	~Blank
SJ25-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.980 ± 0.120	0.0270 ± 0.0160	0.970 ± 0.120	~Blank
SJ25-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.540 ± 0.180	0.0560 ± 0.0250	1.600 ± 0.180	<0.338 (0.286 ± 0.203)
SJ25-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.011	0.890 ± 0.110	0.0380 ± 0.0200	0.860 ± 0.110	0.360 ± 0.206
SJ25-SO-R-06-A		pCi/g	0.024 ± 0.016	~Blank	~Blank	~Blank	1.050 ± 0.130	0.0580 ± 0.0260	1.090 ± 0.130	~Blank
SJ25-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.140 ± 0.140	0.0700 ± 0.0280	1.160 ± 0.150	<0.341 (0.054 ± 0.202)
SJ25-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.950 ± 0.120	0.0340 ± 0.0200	1.020 ± 0.130	<0.342 (0.136 ± 0.203)
SJ25-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	<0.018 (0.011 ± 0.011)	1.050 ± 0.130	0.0330 ± 0.0190	1.080 ± 0.130	~Blank
SJ25-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.840 ± 0.110	0.0440 ± 0.0220	0.900 ± 0.120	0.412 ± 0.206
SJ25-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.280 ± 0.150	0.0690 ± 0.0260	1.330 ± 0.160	~Blank
SJ26-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.270 ± 0.160	0.0610 ± 0.0270	1.350 ± 0.160	~Blank
SJ26-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	0.025 ± 0.015	1.180 ± 0.140	0.0520 ± 0.0230	1.280 ± 0.150	<0.311 (0.235 ± 0.186)
SJ26-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.011	1.050 ± 0.130	0.0530 ± 0.0240	1.190 ± 0.150	<0.311 (0.109 ± 0.184)
SJ26-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.011	1.260 ± 0.150	0.0560 ± 0.0230	1.180 ± 0.140	<0.312 (0.159 ± 0.186)
SJ26-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.010 ± 0.130	0.0840 ± 0.0300	1.020 ± 0.130	<0.311 (0.143 ± 0.185)
SJ26-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	0.012 ± 0.009	1.100 ± 0.140	0.0500 ± 0.0230	1.110 ± 0.140	~Blank
SJ26-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.960 ± 0.120	0.0460 ± 0.0220	1.070 ± 0.130	~Blank
SJ26-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.080 ± 0.140	0.0480 ± 0.0220	1.040 ± 0.130	<0.310 (0.109 ± 0.184)
SJ26-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.010 ± 0.130	0.0380 ± 0.0190	1.030 ± 0.130	<0.310 (0.192 ± 0.185)
SJ26-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.140 ± 0.140	0.0500 ± 0.0230	1.210 ± 0.150	<0.309 (0.103 ± 0.184)
SJ26-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.900 ± 0.110	0.0320 ± 0.0170	0.890 ± 0.110	~Blank
SJ27-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.970 ± 0.120	0.0320 ± 0.0170	0.920 ± 0.120	~Blank
SJ27-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	0.012 ± 0.009	0.650 ± 0.089	0.0170 ± 0.0120	0.677 ± 0.091	~Blank
SJ27-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	0.033 ± 0.016	1.030 ± 0.130	0.0290 ± 0.0180	1.010 ± 0.130	~Blank
SJ27-SO-J-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.940 ± 0.110	0.0540 ± 0.0210	1.010 ± 0.120	<0.310 (0.234 ± 0.186)
SJ28-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.100 ± 0.170	0.0670 ± 0.0270	1.190 ± 0.180	0.778 ± 0.191

Notes:

1) "nr" no result reported by laboratory"

2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 1 Summary Data Table of Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical

		Analytical Method →	3.							ORISE AP11 ORISE AP5
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Technetium-99
Matrix	Sample ID	Units ↓	Result	Result	Result	Result	Result	Result	Result	Result
SJ28-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.340 ± 0.200	0.0630 ± 0.0280	1.290 ± 0.200	~Blank
SJ28-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	1.840 ± 0.270	0.0790 ± 0.0300	1.850 ± 0.270	1.534 ± 0.199
SJ28-SO-J-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.420 ± 0.220	0.0520 ± 0.0240	1.390 ± 0.210	0.646 ± 0.177
SJ28-SO-J-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.180	0.0660 ± 0.0270	1.410 ± 0.210	0.921 ± 0.206
SJ29-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.180 ± 0.180	0.0640 ± 0.0270	1.290 ± 0.200	0.308 ± 0.177
SJ29-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.130 ± 0.170	0.0600 ± 0.0250	1.200 ± 0.180	<0.289 (0.222 ± 0.173)
SJ29-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.090 ± 0.170	0.0250 ± 0.0160	1.250 ± 0.190	~Blank
SJ29-SO-J-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.160 ± 0.180	0.0660 ± 0.0260	1.310 ± 0.200	~Blank
SJ29-SO-J-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.650 ± 0.110	0.0510 ± 0.0220	0.710 ± 0.120	~Blank
SJ30-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	0.023 ± 0.014	1.380 ± 0.210	0.0410 ± 0.0200	1.410 ± 0.210	0.881 ± 0.180
SJ30-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.130 ± 0.170	0.0670 ± 0.0270	1.120 ± 0.170	0.429 ± 0.177
SJ30-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	1.320 ± 0.200	0.0870 ± 0.0310	1.410 ± 0.210	0.313 ± 0.156
SJ30-SO-J-04-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.011	1.420 ± 0.210	0.0560 ± 0.0250	1.300 ± 0.200	~Blank
SJ31-SO-J-01-A		pCi/g	~Blank	~Blank	<0.019 (0.010 ± 0.010)	~Blank	1.690 ± 0.250	0.0770 ± 0.0300	1.620 ± 0.240	~Blank
SJ31-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.440 ± 0.220	0.0620 ± 0.0260	1.520 ± 0.230	~Blank
SJ31-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	2.010 ± 0.290	0.0960 ± 0.0330	2.070 ± 0.300	~Blank
SR01-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.009	1.280 ± 0.190	0.0530 ± 0.0230	1.180 ± 0.180	~Blank
SR01-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.980 ± 0.160	0.0440 ± 0.0220	1.020 ± 0.160	~Blank
SR01-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.030 ± 0.160	0.0480 ± 0.0220	1.120 ± 0.170	~Blank
SR01-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.990 ± 0.160	0.0530 ± 0.0250	1.080 ± 0.170	~Blank
SR01-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.060 ± 0.160	0.0320 ± 0.0170	0.990 ± 0.150	~Blank
SR01-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	0.026 ± 0.014	1.110 ± 0.170	0.0420 ± 0.0210	1.090 ± 0.170	0.339 ± 0.173
SR01-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.070 ± 0.170	0.0510 ± 0.0240	1.110 ± 0.170	<0.287 (0.214 ± 0.172)
SR01-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	0.016 ± 0.011	1.060 ± 0.170	0.0490 ± 0.0240	1.080 ± 0.170	~Blank
SR01-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.011	1.150 ± 0.180	0.0640 ± 0.0270	1.080 ± 0.170	<0.290 (0.272 ± 0.174)
SR01-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.200 ± 0.180	0.0490 ± 0.0230	1.190 ± 0.180	0.408 ± 0.179
SR01-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.230 ± 0.190	0.0820 ± 0.0300	1.250 ± 0.190	0.645 ± 0.182
SR01-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	<0.022 (0.018 ± 0.014)	0.990 ± 0.160	0.0470 ± 0.0250	1.080 ± 0.170	0.392 ± 0.175
SR02-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.030 ± 0.130	0.0650 ± 0.0250	1.200 ± 0.140	<0.322 (0.121 ± 0.192)
SR02-SO-R-02-A		pCi/g	0.20 ± 0.012	~Blank	~Blank	0.025 ± 0.014	1.170 ± 0.140	0.0330 ± 0.0180	1.080 ± 0.130	~Blank
SR02-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	1.100 ± 0.130	0.0570 ± 0.0230	1.070 ± 0.130	~Blank
SR02-SO-R-04-A		pCi/g	<0.035 (0.009 ± 0.015)	<0.018 (0.013 ± 0.011)	~Blank	<0.018 (0.017 ± 0.013)	1.150 ± 0.140	0.0590 ± 0.0250	1.160 ± 0.140	0.386 ± 0.197
SR02-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	0.030 ± 0.015	1.140 ± 0.140	0.0640 ± 0.0260	1.140 ± 0.140	0.433 ± 0.198
SR02-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.050 ± 0.130	0.0600 ± 0.0240	1.180 ± 0.140	~Blank
SR02-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.230 ± 0.160	0.0570 ± 0.0250	1.270 ± 0.160	0.819 ± 0.204
SR02-SO-R-08-A		pCi/g	0.025 ± 0.014	~Blank	~Blank	0.036 ± 0.017	1.040 ± 0.140	0.0760 ± 0.0300	1.060 ± 0.140	<0.328 (0.255 ± 0.197)
SR02-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	0.009 ± 0.008	1.150 ± 0.140	0.0580 ± 0.0240	1.180 ± 0.140	<0.322 (0.170 ± 0.192)
SR02-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	0.018 ± 0.012	1.080 ± 0.130	0.0530 ± 0.0240	1.070 ± 0.130	<0.323 (0.143 ± 0.192)
SR02-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	<0.018 (0.007 ± 0.009)	1.110 ± 0.140	0.0380 ± 0.0200	1.180 ± 0.140	~Blank
SR03-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	1.300 ± 0.150	0.0810 ± 0.0270	1.390 ± 0.160	~Blank
SR03-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	~Blank	0.0430 ± 0.0210	1.030 ± 0.120	~Blank
SR03-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.140	0.0430 ± 0.0200	1.170 ± 0.140	~Blank
SR03-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.990 ± 0.120	0.0280 ± 0.0160	1.020 ± 0.120	~Blank
SR03-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	0.026 ± 0.014	0.950 ± 0.110	0.0430 ± 0.0180	1.010 ± 0.120	~Blank
SR03-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.000 ± 0.120	0.0490 ± 0.0210	1.000 ± 0.120	~Blank
SR03-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.100 ± 0.130	0.0470 ± 0.0210	1.140 ± 0.130	~Blank
SR03-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.060 ± 0.130	0.0520 ± 0.0210	1.080 ± 0.130	~Blank
SR03-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.120 ± 0.140	0.0420 ± 0.0200	1.090 ± 0.130	~Blank
SR03-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	<0.023 (0.009 ± 0.011)	1.210 ± 0.140	0.0740 ± 0.0260	1.300 ± 0.150	~Blank
SR03-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.150 ± 0.140	0.0630 ± 0.0230	1.070 ± 0.130	~Blank
SR03-SO-R-12-A		pCi/g	~Blank	~Blank	~Blank	0.025 ± 0.014	1.490 ± 0.200	0.0720 ± 0.0300	1.530 ± 0.210	~Blank
SR04-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	0.027 ± 0.017	1.090 ± 0.130	0.0490 ± 0.0220	1.090 ± 0.130	~Blank
SR04-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	0.018 ± 0.012	1.050 ± 0.130	0.0620 ± 0.0250	1.160 ± 0.140	<0.322 (0.126 ± 0.191)
SR04-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	0.023 ± 0.013	1.200 ± 0.150	0.0660 ± 0.0260	1.180 ± 0.140	~Blank
SR04-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.011	1.060 ± 0.130	0.0450 ± 0.0210	1.130 ± 0.140	~Blank
SR04-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.990 ± 0.120	0.0430 ± 0.0200	0.970 ± 0.120	~Blank
SR04-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.770 ± 0.100	0.0290 ± 0.0170	0.750 ± 0.100	~Blank
SR04-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.010	1.020 ± 0.130	0.0280 ± 0.0180	1.080 ± 0.130	~Blank
SR04-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.070 ± 0.130	0.0550 ± 0.0230	1.120 ± 0.140	~Blank
SR04-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	0.012 ± 0.010	1.060 ± 0.130	0.0540 ± 0.0230	1.040 ± 0.130	~Blank
SR04-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.140 ± 0.140	0.0520 ± 0.0220	1.150 ± 0.140	~Blank
SR04-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.000 ± 0.120	<0.0220 (0.0200 ± 0.0150)	1.090 ± 0.130	~Blank
SR04-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	<0.018 (0.015 ± 0.012)	0.980 ± 0.120	0.0500 ± 0.0220	0.960 ± 0.120	~Blank
SR05-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	0.011 ± 0.008	0.890 ± 0.120	0.0380 ± 0.0210	0.910 ± 0.120	0.294 ± 0.175
SR05-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.050 ± 0.130	0.0530 ± 0.0230	1.020 ± 0.130	~Blank
SR05-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.010 ± 0.130	0.0480 ± 0.0220	1.050 ± 0.130	~Blank
SR05-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.310 ± 0.150	0.0730 ± 0.0260	1.390 ± 0.160	~Blank
SR05-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.990 ± 0.120	0.0550 ± 0.0230	0.950 ± 0.120	0.315 ± 0.182

Notes:

1) "nr" no result reported by laboratory"

2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 1 Summary Data Table of Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical

		Analytical Method →	4.							ORISE AP11 ORISE AP5
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Technetium-99
Matrix	Sample ID	Units ↓	Result	Result	Result	Result	Result	Result	Result	Result
SR05-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.010 ± 0.130	0.0480 ± 0.0230	1.110 ± 0.140	~Blank
SR05-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.060 ± 0.140	0.0540 ± 0.0240	1.100 ± 0.140	~Blank
SR05-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.011	1.110 ± 0.140	0.0360 ± 0.0190	1.150 ± 0.140	~Blank
SR05-SO-R-09-A		pCi/g	~Blank	<0.031 (0.000 ± 0.011)	~Blank	<0.028 (0.005 ± 0.011)	0.950 ± 0.120	0.0470 ± 0.0220	0.990 ± 0.120	~Blank
SR05-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.070 ± 0.130	0.0380 ± 0.0220	1.010 ± 0.130	<0.285 (0.253 ± 0.171)
SR05-SO-R-11-A		pCi/g	<0.032 (0.003 ± 0.012)	~Blank	~Blank	~Blank	1.230 ± 0.150	0.0590 ± 0.0240	1.250 ± 0.150	<0.285 (0.254 ± 0.171)
SR06-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	<0.022 (0.007 ± 0.010)	1.120 ± 0.140	0.0580 ± 0.0240	1.240 ± 0.150	~Blank
SR06-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.030 ± 0.130	0.0700 ± 0.0260	1.080 ± 0.130	0.576 ± 0.179
SR06-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.011 ± 0.009	1.260 ± 0.160	0.0490 ± 0.0240	1.350 ± 0.160	~Blank
SR06-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.260 ± 0.150	0.0580 ± 0.0240	1.350 ± 0.160	~Blank
SR06-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.011	1.150 ± 0.140	0.0690 ± 0.0280	1.230 ± 0.150	<0.354 (0.286 ± 0.212)
SR06-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.350 ± 0.160	0.0540 ± 0.0240	1.380 ± 0.160	<0.361 (0.217 ± 0.216)
SR06-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.011	1.300 ± 0.160	0.0580 ± 0.0250	1.300 ± 0.160	~Blank
SR06-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	1.180 ± 0.140	0.0510 ± 0.0240	1.230 ± 0.150	~Blank
SR06-SO-R-09-A		pCi/g	0.017 ± 0.011	~Blank	~Blank	~Blank	1.420 ± 0.170	0.0370 ± 0.0200	1.480 ± 0.170	~Blank
SR06-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.190 ± 0.140	0.0510 ± 0.0220	1.200 ± 0.140	<0.293 (0.242 ± 0.176)
SR06-SO-R-11-A		pCi/g	<0.019 (0.012 ± 0.011)	~Blank	~Blank	0.015 ± 0.010	1.350 ± 0.160	0.0440 ± 0.0210	1.370 ± 0.160	0.561 ± 0.179
SR07-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.170 ± 0.140	0.0570 ± 0.0230	1.260 ± 0.150	<0.302 (0.133 ± 0.179)
SR07-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.050 ± 0.130	0.0640 ± 0.0240	1.130 ± 0.130	~Blank
SR07-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.380 ± 0.160	0.0580 ± 0.0220	1.350 ± 0.150	~Blank
SR07-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	<0.016 (0.010 ± 0.009)	1.540 ± 0.180	0.0560 ± 0.0240	1.510 ± 0.180	0.407 ± 0.182
SR07-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.270 ± 0.150	0.0410 ± 0.0200	1.210 ± 0.140	0.893 ± 0.189
SR07-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.280 ± 0.150	0.0460 ± 0.0220	1.420 ± 0.160	1.069 ± 0.191
SR07-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.300 ± 0.150	0.0720 ± 0.0260	1.390 ± 0.160	0.405 ± 0.181
SR07-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.280 ± 0.150	0.0900 ± 0.0290	1.330 ± 0.160	0.355 ± 0.182
SR07-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.170 ± 0.140	0.0460 ± 0.0210	1.310 ± 0.150	0.383 ± 0.181
SR07-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.260 ± 0.150	0.0530 ± 0.0220	1.350 ± 0.160	~Blank
SR07-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.310 ± 0.150	0.0530 ± 0.0220	1.310 ± 0.150	~Blank
SR08-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.070 ± 0.130	0.0470 ± 0.0220	1.080 ± 0.140	<0.352 (0.172 ± 0.210)
SR08-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	<0.022 (0.007 ± 0.010)	1.020 ± 0.130	0.0540 ± 0.0240	1.060 ± 0.130	<0.357 (0.311 ± 0.215)
SR08-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.110 ± 0.140	0.0420 ± 0.0210	1.080 ± 0.140	<0.364 (0.200 ± 0.217)
SR08-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.270 ± 0.150	0.0650 ± 0.0270	1.330 ± 0.160	~Blank
SR08-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.070 ± 0.130	0.0420 ± 0.0210	1.090 ± 0.130	~Blank
SR08-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	<0.026 (0.010 ± 0.012)	1.280 ± 0.160	0.0410 ± 0.0210	1.180 ± 0.150	~Blank
SR08-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.130 ± 0.140	0.0320 ± 0.0200	1.110 ± 0.140	~Blank
SR08-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	<0.020 (0.010 ± 0.011)	1.210 ± 0.150	0.0560 ± 0.0250	1.210 ± 0.150	~Blank
SR08-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.050 ± 0.130	0.0460 ± 0.0220	1.050 ± 0.130	~Blank
SR08-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.011	1.130 ± 0.140	0.0570 ± 0.0240	1.190 ± 0.150	~Blank
SR08-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.587 ± 0.087	0.0360 ± 0.0190	0.609 ± 0.089	~Blank
SR09-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.120 ± 0.120	0.0420 ± 0.0190	1.140 ± 0.120	~Blank
SR09-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.170 ± 0.120	0.0770 ± 0.0260	1.010 ± 0.110	~Blank
SR09-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.010 ± 0.110	0.0420 ± 0.0190	1.040 ± 0.110	~Blank
SR09-SO-R-04-A		pCi/g	<0.032 (0.006 ± 0.013)	~Blank	~Blank	~Blank	1.260 ± 0.130	0.0600 ± 0.0230	1.220 ± 0.130	~Blank
SR09-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.000 ± 0.110	0.0510 ± 0.0200	1.050 ± 0.110	~Blank
SR09-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.160 ± 0.120	0.0470 ± 0.0200	1.040 ± 0.110	~Blank
SR09-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	1.150 ± 0.120	0.0460 ± 0.0190	1.190 ± 0.120	~Blank
SR09-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.250 ± 0.130	0.0490 ± 0.0200	1.140 ± 0.120	~Blank
SR09-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	<0.011 (0.008 ± 0.007)	1.120 ± 0.120	0.0450 ± 0.0190	1.130 ± 0.120	<0.277 (0.196 ± 0.165)
SR09-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.030 ± 0.160	0.0310 ± 0.0170	1.070 ± 0.170	~Blank
SR09-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	0.950 ± 0.150	0.0440 ± 0.0210	1.060 ± 0.160	~Blank
SR11-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	0.960 ± 0.120	0.0570 ± 0.0240	0.980 ± 0.130	2.922 ± 0.213
SR11-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.860 ± 0.110	0.0490 ± 0.0240	0.910 ± 0.120	0.491 ± 0.180
SR11-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.026 ± 0.015	1.200 ± 0.150	0.0830 ± 0.0310	1.210 ± 0.150	~Blank
SR11-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.012	1.140 ± 0.140	0.0590 ± 0.0260	1.160 ± 0.140	~Blank
SR11-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.180 ± 0.140	0.0450 ± 0.0210	1.200 ± 0.150	~Blank
SR11-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	<0.017 (0.016 ± 0.012)	0.980 ± 0.120	0.0470 ± 0.0210	1.050 ± 0.130	~Blank
SR11-SO-R-07-A		pCi/g	0.014 ± 0.011	~Blank	~Blank	<0.017 (0.016 ± 0.012)	1.120 ± 0.140	0.0690 ± 0.0270	1.120 ± 0.140	~Blank
SR11-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	1.030 ± 0.130	0.0510 ± 0.0230	1.110 ± 0.140	~Blank
SR11-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.150 ± 0.140	0.0530 ± 0.0230	1.210 ± 0.150	~Blank
SR11-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	<0.026 (0.019 ± 0.015)	1.120 ± 0.140	0.0640 ± 0.0260	1.220 ± 0.150	~Blank
SR11-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.150	0.0700 ± 0.0280	1.330 ± 0.160	~Blank
SR12-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.200 ± 0.150	0.0540 ± 0.0230	1.260 ± 0.150	~Blank
SR12-SO-R-02-A		pCi/g	<0.020 (0.017 ± 0.013)	~Blank	~Blank	0.015 ± 0.011	1.680 ± 0.190	0.0910 ± 0.0320	1.580 ± 0.180	~Blank
SR12-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.011 ± 0.009	1.180 ± 0.140	0.0430 ± 0.0200	1.280 ± 0.150	~Blank
SR12-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	0.018 ± 0.012	1.280 ± 0.150	0.0660 ± 0.0260	1.360 ± 0.160	~Blank
SR12-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.300 ± 0.160	0.0700 ± 0.0280	1.310 ± 0.160	~Blank
SR12-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.011	1.880 ± 0.210	0.0950 ± 0.0320	1.850 ± 0.210	~Blank
SR12-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	0.021 ± 0.014	1.300 ± 0.150	0.0500 ± 0.0220	1.410 ± 0.160	~Blank

Notes:

1) "nr" no result reported by laboratory"

2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 1 Summary Data Table of Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical

		Analytical Method →	5.							ORISE AP11 ORISE AP5
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Technetium-99
Matrix	Sample ID	Units ↓	Result	Result	Result	Result	Result	Result	Result	Result
SR12-SO-R-08-A		pCi/g	<0.030 (0.012 ± 0.014)	~Blank	~Blank	<0.018 (0.011 ± 0.011)	1.390 ± 0.160	0.0580 ± 0.0240	1.290 ± 0.150	~Blank
SR12-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.080 ± 0.130	0.0450 ± 0.0210	1.090 ± 0.130	~Blank
SR12-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.130 ± 0.140	0.0470 ± 0.0220	1.290 ± 0.150	~Blank
SR12-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	0.030 ± 0.016	1.490 ± 0.170	<0.0310 (0.0300 ± 0.0200)	1.390 ± 0.160	~Blank
SR14-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.729 ± 0.099	0.0380 ± 0.0190	0.820 ± 0.110	<0.327 (0.118 ± 0.194)
SR14-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.010	1.150 ± 0.140	0.0330 ± 0.0190	1.170 ± 0.140	~Blank
SR14-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	<0.017 (0.011 ± 0.010)	1.160 ± 0.140	0.0500 ± 0.0220	1.190 ± 0.140	~Blank
SR14-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.700 ± 0.096	0.0360 ± 0.0190	0.790 ± 0.110	<0.329 (0.100 ± 0.195)
SR14-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	0.012 ± 0.010	1.070 ± 0.130	0.0530 ± 0.0230	1.250 ± 0.150	~Blank
SR14-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.850 ± 0.110	0.0380 ± 0.0200	0.840 ± 0.110	<0.331 (0.097 ± 0.196)
SR14-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.920 ± 0.120	0.0470 ± 0.0240	0.940 ± 0.130	~Blank
SR14-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.250 ± 0.150	0.0740 ± 0.0290	1.440 ± 0.170	<0.330 (0.133 ± 0.196)
SR14-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	<0.019 (0.015 ± 0.012)	1.100 ± 0.130	0.0570 ± 0.0250	1.210 ± 0.140	<0.327 (0.139 ± 0.195)
SR14-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.010	1.320 ± 0.160	0.0600 ± 0.0260	1.260 ± 0.150	~Blank
SR14-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	0.019 ± 0.012	1.050 ± 0.130	0.0770 ± 0.0280	1.090 ± 0.130	~Blank
SR15-SO-J-01-A		pCi/g	0.020 ± 0.013	~Blank	~Blank	~Blank	4.960 ± 0.670	0.2270 ± 0.0540	5.080 ± 0.680	2.113 ± 0.205
SR15-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	4.410 ± 0.520	0.2000 ± 0.0500	4.620 ± 0.540	3.637 ± 0.229
SR15-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.920 ± 0.150	0.0530 ± 0.0240	0.920 ± 0.150	~Blank
SR15-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.990 ± 0.160	0.0460 ± 0.0220	1.120 ± 0.170	~Blank
SR15-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.023 ± 0.014	1.020 ± 0.160	0.0640 ± 0.0260	1.160 ± 0.180	<0.294 (0.258 ± 0.177)
SR15-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.870 ± 0.140	0.0470 ± 0.0220	1.070 ± 0.170	~Blank
SR15-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.080 ± 0.170	0.0690 ± 0.0270	1.110 ± 0.170	~Blank
SR15-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.012	1.270 ± 0.200	0.0460 ± 0.0240	1.310 ± 0.200	~Blank
SR15-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.100 ± 0.170	0.0530 ± 0.0230	1.180 ± 0.180	~Blank
SR15-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.830 ± 0.130	0.0370 ± 0.0200	0.810 ± 0.130	~Blank
SR15-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.690 ± 0.110	0.0130 ± 0.0110	0.710 ± 0.120	~Blank
SR15-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.130 ± 0.180	0.0520 ± 0.0240	1.290 ± 0.200	~Blank
SR15-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.240 ± 0.190	0.0620 ± 0.0250	1.260 ± 0.190	~Blank
SR18-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	0.016 ± 0.011	1.130 ± 0.140	0.0620 ± 0.0260	1.160 ± 0.140	~Blank
SR18-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.040 ± 0.130	0.0460 ± 0.0210	1.080 ± 0.130	~Blank
SR18-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.040 ± 0.130	0.0450 ± 0.0210	1.120 ± 0.140	~Blank
SR18-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.011	1.100 ± 0.130	0.0290 ± 0.0170	1.120 ± 0.140	<0.297 (0.292 ± 0.179)
SR18-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	0.011 ± 0.009	1.130 ± 0.140	0.0440 ± 0.0210	1.170 ± 0.140	~Blank
SR18-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.200 ± 0.150	0.0620 ± 0.0250	1.220 ± 0.150	~Blank
SR18-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	<0.023 (0.009 ± 0.011)	1.120 ± 0.140	0.0460 ± 0.0210	1.240 ± 0.150	~Blank
SR18-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.150	0.0630 ± 0.0260	1.240 ± 0.150	~Blank
SR18-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.140	0.0700 ± 0.0280	1.210 ± 0.140	~Blank
SR18-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.160 ± 0.140	0.0490 ± 0.0220	1.230 ± 0.150	~Blank
SR18-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.980 ± 0.120	0.0620 ± 0.0240	0.970 ± 0.120	~Blank
SR19-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	1.310 ± 0.160	0.0460 ± 0.0210	1.320 ± 0.160	~Blank
SR19-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	0.021 ± 0.012	1.730 ± 0.190	0.0650 ± 0.0240	1.770 ± 0.190	~Blank
SR19-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.120 ± 0.130	0.0600 ± 0.0240	1.170 ± 0.140	~Blank
SR19-SO-R-04-A		pCi/g	<0.020 (0.013 ± 0.012)	~Blank	~Blank	<0.020 (0.015 ± 0.012)	1.430 ± 0.170	0.0730 ± 0.0270	1.580 ± 0.180	~Blank
SR19-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.290 ± 0.150	0.0470 ± 0.0230	1.290 ± 0.150	~Blank
SR19-SO-R-06-A		pCi/g	<0.017 (0.013 ± 0.011)	~Blank	~Blank	0.012 ± 0.009	1.330 ± 0.150	0.0680 ± 0.0240	1.330 ± 0.150	~Blank
SR19-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	0.031 ± 0.016	1.650 ± 0.190	0.0810 ± 0.0280	1.650 ± 0.190	~Blank
SR19-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.260 ± 0.150	0.0650 ± 0.0250	1.310 ± 0.150	~Blank
SR19-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.220 ± 0.140	0.0560 ± 0.0230	1.160 ± 0.140	~Blank
SR19-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.030 ± 0.120	0.0510 ± 0.0200	1.010 ± 0.120	~Blank
SR19-SO-R-11-A		pCi/g	<0.020 (0.019 ± 0.014)	~Blank	~Blank	<0.019 (0.011 ± 0.010)	1.170 ± 0.140	0.0580 ± 0.0230	1.160 ± 0.140	~Blank
SR20-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.010	1.160 ± 0.180	0.0390 ± 0.0230	1.310 ± 0.200	0.412 ± 0.174
SR20-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.250 ± 0.190	0.0620 ± 0.0250	1.310 ± 0.200	~Blank
SR20-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.300 ± 0.190	0.0520 ± 0.0230	1.280 ± 0.190	~Blank
SR20-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	<0.022 (0.016 ± 0.014)	1.170 ± 0.180	0.0680 ± 0.0280	1.290 ± 0.200	~Blank
SR20-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.110 ± 0.170	0.0660 ± 0.0270	1.250 ± 0.190	~Blank
SR20-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.190	0.0370 ± 0.0200	1.170 ± 0.180	~Blank
SR20-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.160 ± 0.180	0.0830 ± 0.0300	1.290 ± 0.190	~Blank
SR20-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.220 ± 0.190	0.0460 ± 0.0220	1.270 ± 0.190	~Blank
SR20-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.150 ± 0.180	0.0690 ± 0.0300	1.200 ± 0.190	~Blank
SR20-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	<0.018 (0.017 ± 0.013)	1.240 ± 0.190	0.0580 ± 0.0270	1.380 ± 0.210	~Blank
SR20-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.190	0.0320 ± 0.0180	1.170 ± 0.180	<0.282 (0.177 ± 0.168)
SR21-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.010	1.140 ± 0.140	0.0440 ± 0.0220	1.110 ± 0.140	~Blank
SR21-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	<0.021 (0.012 ± 0.011)	1.220 ± 0.150	0.0560 ± 0.0240	1.440 ± 0.170	~Blank
SR21-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.012 ± 0.009	1.170 ± 0.140	0.0720 ± 0.0270	1.250 ± 0.150	~Blank
SR21-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.070 ± 0.130	0.0620 ± 0.0250	1.110 ± 0.140	~Blank
SR21-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.020 ± 0.130	0.0450 ± 0.0210	1.250 ± 0.150	~Blank
SR21-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.240 ± 0.150	0.0550 ± 0.0250	1.170 ± 0.140	~Blank
SR21-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.120 ± 0.140	0.0450 ± 0.0210	1.310 ± 0.150	~Blank

Notes:

1) "nr" no result reported by laboratory"

2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 1 Summary Data Table of Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical

		Analytical Method →	6.							ORISE AP11 ORISE AP5
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Technetium-99
Matrix	Sample ID	Units ↓	Result	Result	Result	Result	Result	Result	Result	Result
SR21-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.220 ± 0.150	0.0310 ± 0.0200	1.300 ± 0.160	~Blank
SR21-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.950 ± 0.120	0.0250 ± 0.0160	1.150 ± 0.140	<0.301 (0.153 ± 0.180)
SR21-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.190 ± 0.150	0.0370 ± 0.0200	1.250 ± 0.160	~Blank
SR21-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	<0.020 (0.013 ± 0.012)	1.090 ± 0.140	0.0600 ± 0.0250	1.320 ± 0.160	~Blank
SR22-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.100 ± 0.170	0.0380 ± 0.0200	1.050 ± 0.170	0.387 ± 0.175
SR22-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.980 ± 0.150	0.0480 ± 0.0210	1.060 ± 0.160	<0.297 (0.275 ± 0.179)
SR22-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.016 ± 0.011	1.010 ± 0.160	0.0520 ± 0.0230	0.980 ± 0.150	<0.299 (0.253 ± 0.179)
SR22-SO-R-04-A		pCi/g	<0.032 (0.010 ± 0.014)	~Blank	~Blank	<0.020 (0.014 ± 0.012)	1.120 ± 0.170	0.0360 ± 0.0190	1.170 ± 0.180	0.344 ± 0.178
SR22-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.000 ± 0.150	0.0570 ± 0.0240	1.020 ± 0.160	0.517 ± 0.180
SR22-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	<0.019 (0.016 ± 0.013)	1.030 ± 0.160	0.0320 ± 0.0180	1.070 ± 0.160	0.456 ± 0.173
SR22-SO-R-07-A		pCi/g	0.015 ± 0.011	~Blank	~Blank	0.015 ± 0.010	1.030 ± 0.160	0.0570 ± 0.0260	1.000 ± 0.160	0.620 ± 0.178
SR22-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.190	0.0470 ± 0.0240	1.190 ± 0.180	0.684 ± 0.174
SR22-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.030 ± 0.160	0.0530 ± 0.0240	1.180 ± 0.180	~Blank
SR22-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.870 ± 0.140	0.0560 ± 0.0240	0.970 ± 0.150	<0.288 (0.283 ± 0.173)
SR22-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.950 ± 0.150	0.0460 ± 0.0250	1.060 ± 0.160	~Blank
SR23-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.950 ± 0.120	0.0410 ± 0.0200	1.000 ± 0.130	~Blank
SR23-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.060 ± 0.130	0.0460 ± 0.0230	1.190 ± 0.150	~Blank
SR23-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.090 ± 0.140	0.0580 ± 0.0250	1.040 ± 0.130	~Blank
SR23-SO-R-04-A		pCi/g	0.021 ± 0.015	~Blank	~Blank	~Blank	1.110 ± 0.140	0.0480 ± 0.0230	1.130 ± 0.140	~Blank
SR23-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	<0.022 (0.014 ± 0.013)	1.080 ± 0.140	0.0540 ± 0.0240	1.090 ± 0.140	~Blank
SR23-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.170 ± 0.140	0.0700 ± 0.0280	1.220 ± 0.150	~Blank
SR23-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.011	1.040 ± 0.130	0.0400 ± 0.0210	1.140 ± 0.140	<0.301 (0.210 ± 0.180)
SR23-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	<0.022 (0.018 ± 0.014)	1.190 ± 0.150	0.0710 ± 0.0280	1.200 ± 0.150	~Blank
SR23-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.960 ± 0.120	0.0450 ± 0.0230	1.090 ± 0.140	<0.301 (0.173 ± 0.180)
SR23-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.011	1.160 ± 0.140	0.0670 ± 0.0270	1.220 ± 0.150	~Blank
SR23-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.940 ± 0.120	0.0520 ± 0.0240	1.080 ± 0.140	~Blank
SR24-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.960 ± 0.120	0.0550 ± 0.0230	0.970 ± 0.120	<0.328 (0.184 ± 0.196)
SR24-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.000 ± 0.130	0.0500 ± 0.0230	1.080 ± 0.140	<0.329 (0.131 ± 0.196)
SR24-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.990 ± 0.130	0.0630 ± 0.0270	1.080 ± 0.130	<0.294 (0.281 ± 0.177)
SR24-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	0.012 ± 0.010	0.940 ± 0.120	0.0340 ± 0.0190	0.980 ± 0.130	<0.331 (0.230 ± 0.198)
SR24-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.011	1.160 ± 0.140	0.0290 ± 0.0190	1.070 ± 0.130	~Blank
SR24-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.030 ± 0.130	0.0550 ± 0.0240	1.090 ± 0.140	~Blank
SR24-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	<0.019 (0.016 ± 0.013)	1.100 ± 0.140	0.0540 ± 0.0230	1.100 ± 0.130	~Blank
SR24-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.970 ± 0.120	0.0330 ± 0.0180	1.040 ± 0.130	~Blank
SR24-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.110 ± 0.140	0.0410 ± 0.0200	1.060 ± 0.130	~Blank
SR24-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.010 ± 0.130	0.0470 ± 0.0220	1.060 ± 0.130	~Blank
SR24-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	<0.016 (0.010 ± 0.009)	1.060 ± 0.130	0.0380 ± 0.0210	1.150 ± 0.140	~Blank
SR25-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.090 ± 0.140	0.0530 ± 0.0230	1.180 ± 0.140	<0.310 (0.202 ± 0.185)
SR25-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.011	1.360 ± 0.160	0.0520 ± 0.0230	1.310 ± 0.160	~Blank
SR25-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.100 ± 0.130	0.0430 ± 0.0200	1.070 ± 0.130	~Blank
SR25-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.180 ± 0.140	0.0440 ± 0.0210	1.190 ± 0.150	~Blank
SR25-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.940 ± 0.120	0.0460 ± 0.0210	1.000 ± 0.130	~Blank
SR25-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.170 ± 0.140	0.0760 ± 0.0280	1.240 ± 0.150	~Blank
SR25-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.090 ± 0.140	0.0530 ± 0.0230	1.060 ± 0.130	~Blank
SR25-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.130 ± 0.140	0.0590 ± 0.0260	1.290 ± 0.150	~Blank
SR25-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	<0.022 (0.019 ± 0.014)	1.190 ± 0.140	0.0700 ± 0.0270	1.240 ± 0.150	~Blank
SR25-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.080 ± 0.130	0.0510 ± 0.0230	1.230 ± 0.140	~Blank
SR25-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	0.010 ± 0.008	1.220 ± 0.150	0.0600 ± 0.0240	1.280 ± 0.150	~Blank
SR26-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.250 ± 0.150	0.0650 ± 0.0260	1.340 ± 0.160	<0.342 (0.322 ± 0.205)
SR26-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	0.023 ± 0.014	1.150 ± 0.140	0.0650 ± 0.0270	1.120 ± 0.140	<0.341 (0.105 ± 0.202)
SR26-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.027 ± 0.016	1.070 ± 0.130	0.0780 ± 0.0300	1.130 ± 0.140	~Blank
SR26-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	<0.019 (0.012 ± 0.011)	1.160 ± 0.140	0.0390 ± 0.0200	1.210 ± 0.140	0.398 ± 0.206
SR26-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	0.021 ± 0.013	1.200 ± 0.150	0.0400 ± 0.0220	1.240 ± 0.150	~Blank
SR26-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.000 ± 0.120	0.0420 ± 0.0190	1.050 ± 0.130	<0.340 (0.263 ± 0.203)
SR26-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.300 ± 0.160	0.0450 ± 0.0220	1.410 ± 0.170	~Blank
SR26-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.012	1.150 ± 0.150	0.0430 ± 0.0220	1.210 ± 0.150	~Blank
SR26-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.880 ± 0.110	0.0580 ± 0.0240	1.000 ± 0.130	~Blank
SR26-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.090 ± 0.130	0.0710 ± 0.0280	1.120 ± 0.140	~Blank
SR26-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.970 ± 0.120	0.0430 ± 0.0210	1.050 ± 0.130	<0.310 (0.118 ± 0.184)
SR27-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	0.012 ± 0.010	1.050 ± 0.130	0.0430 ± 0.0200	1.170 ± 0.140	~Blank
SR27-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.250 ± 0.150	0.0610 ± 0.0250	1.270 ± 0.150	~Blank
SR27-SO-R-03-A		pCi/g	0.015 ± 0.011	~Blank	~Blank	<0.019 (0.016 ± 0.012)	0.840 ± 0.110	0.0290 ± 0.0160	0.770 ± 0.100	~Blank
SR27-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	0.011 ± 0.009	1.140 ± 0.140	0.0490 ± 0.0210	1.120 ± 0.130	~Blank
SR27-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	0.021 ± 0.014	1.030 ± 0.130	0.0360 ± 0.0190	1.090 ± 0.130	~Blank
SR27-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.009	1.160 ± 0.140	0.0700 ± 0.0280	1.120 ± 0.140	~Blank
SR27-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.080 ± 0.130	0.0630 ± 0.0250	1.050 ± 0.130	~Blank
SR27-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.011	0.850 ± 0.110	0.0350 ± 0.0190	0.970 ± 0.130	~Blank
SR27-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	<0.018 (0.011 ± 0.010)	1.180 ± 0.150	0.0780 ± 0.0290	1.270 ± 0.150	~Blank

Notes:

1) "nr" no result reported by laboratory"

2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 1 Summary Data Table of Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical

		Analytical Method →	7.							ORISE AP11 ORISE AP5
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Technetium-99
Matrix	Sample ID	Units ↓	Result	Result	Result	Result	Result	Result	Result	Result
SR27-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.010	1.130 ± 0.140	0.0760 ± 0.0280	1.130 ± 0.140	~Blank
SR27-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	0.012 ± 0.009	1.100 ± 0.140	0.0480 ± 0.0220	1.070 ± 0.130	~Blank
SR28-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.030 ± 0.130	0.0370 ± 0.0190	1.120 ± 0.130	<0.312 (0.096 ± 0.185)
SR28-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.170 ± 0.140	0.0530 ± 0.0230	1.180 ± 0.140	<0.311 (0.143 ± 0.185)
SR28-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.150	0.0400 ± 0.0200	1.160 ± 0.140	~Blank
SR28-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.019 ± 0.013	1.080 ± 0.140	0.0490 ± 0.0230	1.190 ± 0.150	<0.309 (0.211 ± 0.185)
SR28-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.000 ± 0.130	0.0570 ± 0.0240	1.040 ± 0.130	~Blank
SR28-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.910 ± 0.120	0.0410 ± 0.0200	0.960 ± 0.120	<0.310 (0.176 ± 0.185)
SR28-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.010	1.230 ± 0.150	0.0660 ± 0.0250	1.190 ± 0.140	~Blank
SR28-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.012	1.290 ± 0.160	0.0510 ± 0.0250	1.300 ± 0.160	~Blank
SR28-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	<0.019 (0.016 ± 0.013)	1.170 ± 0.140	0.0430 ± 0.0210	1.260 ± 0.150	<0.313 (0.146 ± 0.186)
SR28-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	<0.025 (0.023 ± 0.016)	0.970 ± 0.120	0.0600 ± 0.0240	1.070 ± 0.130	<0.314 (0.156 ± 0.187)
SR28-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.170 ± 0.140	0.0510 ± 0.0230	1.060 ± 0.130	~Blank
SR28-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.000 ± 0.130	0.0530 ± 0.0240	1.060 ± 0.130	~Blank
SR29-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	<0.017 (0.009 ± 0.009)	1.180 ± 0.150	0.0850 ± 0.0320	1.290 ± 0.160	~Blank
SR29-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.880 ± 0.120	0.0520 ± 0.0240	0.940 ± 0.120	~Blank
SR29-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.810 ± 0.110	0.0350 ± 0.0190	0.820 ± 0.110	~Blank
SR29-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.820 ± 0.110	0.0340 ± 0.0180	0.810 ± 0.110	~Blank
SR29-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	0.016 ± 0.011	1.110 ± 0.140	0.0600 ± 0.0250	1.180 ± 0.150	~Blank
SR29-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.070 ± 0.130	0.0660 ± 0.0270	1.070 ± 0.130	~Blank
SR29-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.900 ± 0.120	0.0530 ± 0.0230	0.950 ± 0.120	~Blank
SR29-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.110 ± 0.140	0.0570 ± 0.0240	1.170 ± 0.140	~Blank
SR29-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	<0.017 (0.011 ± 0.010)	0.840 ± 0.110	0.0390 ± 0.0210	0.920 ± 0.120	~Blank
SR29-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	0.012 ± 0.009	1.100 ± 0.140	0.0400 ± 0.0200	1.120 ± 0.140	~Blank
SR29-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	0.012 ± 0.010	1.020 ± 0.130	0.0360 ± 0.0190	1.160 ± 0.140	~Blank
SR30-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.250 ± 0.190	0.0760 ± 0.0310	1.220 ± 0.190	~Blank
SR30-SO-R-02-A		pCi/g	~Blank	~Blank	<0.034 (0.006 ± 0.014)	~Blank	1.130 ± 0.170	0.0320 ± 0.0180	1.150 ± 0.180	~Blank
SR30-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.190 ± 0.180	0.0530 ± 0.0240	1.170 ± 0.180	~Blank
SR30-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.140 ± 0.180	0.0830 ± 0.0310	1.230 ± 0.190	~Blank
SR30-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.180 ± 0.180	0.0630 ± 0.0270	1.260 ± 0.190	~Blank
SR30-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.070 ± 0.170	0.0610 ± 0.0270	1.170 ± 0.180	~Blank
SR30-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.190	0.0720 ± 0.0290	1.360 ± 0.210	~Blank
SR30-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.080 ± 0.170	0.0330 ± 0.0210	1.170 ± 0.180	~Blank
SR30-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	0.021 ± 0.014	1.260 ± 0.190	0.0460 ± 0.0230	1.160 ± 0.180	~Blank
SR30-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.140 ± 0.180	0.1000 ± 0.0370	1.160 ± 0.190	~Blank
SR30-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	<0.019 (0.012 ± 0.011)	1.050 ± 0.160	0.0580 ± 0.0240	1.090 ± 0.170	~Blank
SR31-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.140 ± 0.140	0.0610 ± 0.0240	1.170 ± 0.140	<0.294 (0.105 ± 0.175)
SR31-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.370 ± 0.160	0.0610 ± 0.0250	1.350 ± 0.160	~Blank
SR31-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.250 ± 0.150	0.0490 ± 0.0220	1.080 ± 0.130	~Blank
SR31-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.100 ± 0.130	0.0460 ± 0.0200	1.050 ± 0.130	0.381 ± 0.185
SR31-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.180 ± 0.140	0.0770 ± 0.0280	1.170 ± 0.140	~Blank
SR31-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.260 ± 0.150	0.0390 ± 0.0190	1.330 ± 0.160	<0.304 (0.127 ± 0.181)
SR31-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.040 ± 0.120	0.0540 ± 0.0210	1.130 ± 0.130	~Blank
SR31-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.300 ± 0.150	0.0490 ± 0.0210	1.250 ± 0.150	~Blank
SR31-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.150 ± 0.130	0.0510 ± 0.0220	1.140 ± 0.130	~Blank
SR31-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.250 ± 0.150	0.0440 ± 0.0220	1.340 ± 0.160	~Blank
SR31-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.300 ± 0.160	0.0450 ± 0.0210	1.360 ± 0.160	~Blank
SR32-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.260 ± 0.150	0.0500 ± 0.0240	1.240 ± 0.150	~Blank
SR32-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.290 ± 0.150	0.0500 ± 0.0210	1.290 ± 0.150	~Blank
SR32-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	<0.020 (0.010 ± 0.010)	1.350 ± 0.150	0.0620 ± 0.0240	1.250 ± 0.150	~Blank
SR32-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.090 ± 0.130	0.0390 ± 0.0190	1.150 ± 0.140	~Blank
SR32-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	<0.017 (0.011 ± 0.010)	2.130 ± 0.230	0.0850 ± 0.0290	2.120 ± 0.230	0.342 ± 0.179
SR32-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.220 ± 0.140	0.0500 ± 0.0220	1.390 ± 0.160	~Blank
SR32-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.612 ± 0.087	0.0380 ± 0.0190	0.590 ± 0.084	~Blank
SR32-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.600 ± 0.180	0.0520 ± 0.0240	1.500 ± 0.170	~Blank
SR32-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	0.034 ± 0.017	1.090 ± 0.130	0.0480 ± 0.0210	1.110 ± 0.130	~Blank
SR32-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.050 ± 0.120	0.0780 ± 0.0260	1.100 ± 0.130	<0.301 (0.120 ± 0.179)
SR32-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.380 ± 0.150	0.0750 ± 0.0260	1.390 ± 0.160	~Blank
SR34-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.100 ± 0.130	0.0700 ± 0.0260	1.120 ± 0.140	~Blank
SR34-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	0.016 ± 0.011	1.080 ± 0.140	0.0580 ± 0.0250	1.060 ± 0.130	~Blank
SR34-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	<0.017 (0.011 ± 0.010)	0.940 ± 0.120	0.0530 ± 0.0220	1.030 ± 0.120	~Blank
SR34-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.010 ± 0.130	0.0710 ± 0.0270	1.040 ± 0.130	~Blank
SR34-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.250 ± 0.150	0.0660 ± 0.0260	1.110 ± 0.130	~Blank
SR34-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	0.020 ± 0.013	1.020 ± 0.130	0.0330 ± 0.0190	1.040 ± 0.130	<0.308 (0.138 ± 0.183)
SR34-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.040 ± 0.130	0.0810 ± 0.0300	1.150 ± 0.140	<0.307 (0.207 ± 0.183)
SR34-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.180 ± 0.150	0.0770 ± 0.0290	1.250 ± 0.150	<0.310 (0.126 ± 0.184)
SR34-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.060 ± 0.140	0.0540 ± 0.0240	1.180 ± 0.150	~Blank
SR34-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	0.021 ± 0.015	1.090 ± 0.140	0.0460 ± 0.0230	1.100 ± 0.140	~Blank

Notes:

1) "nr" no result reported by laboratory"

2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 1 Summary Data Table of Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical

		Analytical Method →	8.							ORISE AP11 ORISE AP5
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Technetium-99
Matrix	Sample ID	Units ↓	Result	Result	Result	Result	Result	Result	Result	Result
SR34-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.050 ± 0.140	0.0540 ± 0.0250	1.100 ± 0.140	~Blank
SR35-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.090 ± 0.130	0.0500 ± 0.0220	1.070 ± 0.130	~Blank
SR35-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.320 ± 0.160	0.0780 ± 0.0280	1.310 ± 0.160	~Blank
SR35-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.280 ± 0.150	0.0620 ± 0.0250	1.210 ± 0.150	~Blank
SR35-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.011	1.340 ± 0.160	0.0620 ± 0.0250	1.340 ± 0.160	~Blank
SR35-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	0.012 ± 0.010	0.990 ± 0.130	0.0670 ± 0.0260	1.040 ± 0.130	~Blank
SR35-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	0.011 ± 0.009	1.260 ± 0.150	0.0600 ± 0.0240	1.330 ± 0.160	~Blank
SR35-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.050 ± 0.130	0.0540 ± 0.0230	1.110 ± 0.140	<0.310 (0.289 ± 0.186)
SR35-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.011	1.170 ± 0.140	0.0740 ± 0.0280	1.140 ± 0.140	~Blank
SR35-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	<0.024 (0.010 ± 0.012)	1.270 ± 0.150	0.0300 ± 0.0170	1.260 ± 0.150	~Blank
SR35-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.850 ± 0.110	0.0520 ± 0.0230	0.910 ± 0.120	~Blank
SR35-SO-R-11-A		pCi/g	0.14 ± 0.010	~Blank	~Blank	0.015 ± 0.010	1.360 ± 0.160	0.0740 ± 0.0290	1.370 ± 0.160	~Blank
SR36-SO-R-01-A		pCi/g	<0.018 (0.015 ± 0.011)	~Blank	~Blank	0.020 ± 0.011	1.250 ± 0.140	0.0450 ± 0.0190	1.420 ± 0.160	<0.301 (0.226 ± 0.180)
SR36-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.170 ± 0.140	0.0600 ± 0.0250	1.150 ± 0.140	~Blank
SR36-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.009	1.370 ± 0.160	0.0820 ± 0.0280	1.250 ± 0.150	<0.297 (0.259 ± 0.178)
SR36-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	<0.019 (0.012 ± 0.011)	1.280 ± 0.150	0.0870 ± 0.0290	1.290 ± 0.150	~Blank
SR36-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	<0.018 (0.013 ± 0.011)	1.100 ± 0.140	0.0320 ± 0.0180	1.140 ± 0.140	<0.296 (0.295 ± 0.178)
SR36-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.140	0.0590 ± 0.0230	1.280 ± 0.150	~Blank
SR36-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.230 ± 0.150	0.0500 ± 0.0240	1.190 ± 0.140	~Blank
SR36-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.010	0.664 ± 0.092	0.0370 ± 0.0190	0.624 ± 0.088	0.750 ± 0.184
SR36-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.340 ± 0.150	0.0530 ± 0.0220	1.370 ± 0.160	0.464 ± 0.178
SR36-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.260 ± 0.150	0.0460 ± 0.0200	1.180 ± 0.140	<0.288 (0.266 ± 0.173)
SR36-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	0.024 ± 0.013	1.330 ± 0.160	0.0670 ± 0.0270	1.220 ± 0.150	~Blank
SR37-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.130 ± 0.130	0.0610 ± 0.0230	1.270 ± 0.150	~Blank
SR37-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.140	0.0550 ± 0.0220	1.210 ± 0.140	~Blank
SR37-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.009	1.180 ± 0.140	0.0580 ± 0.0240	1.260 ± 0.150	~Blank
SR37-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.970 ± 0.120	0.0530 ± 0.0210	1.040 ± 0.130	~Blank
SR37-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.180 ± 0.140	0.0490 ± 0.0230	1.100 ± 0.140	~Blank
SR37-SO-R-06-A		pCi/g	0.15 ± 0.011	~Blank	~Blank	0.016 ± 0.011	1.220 ± 0.150	0.0690 ± 0.0250	1.280 ± 0.150	<0.312 (0.263 ± 0.187)
SR37-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.110 ± 0.120	0.0560 ± 0.0210	1.250 ± 0.130	~Blank
SR37-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	0.021 ± 0.012	1.130 ± 0.120	0.0590 ± 0.0230	1.070 ± 0.120	~Blank
SR37-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	<0.019 (0.016 ± 0.012)	1.250 ± 0.130	0.0590 ± 0.0220	1.120 ± 0.120	~Blank
SR37-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.150 ± 0.120	0.0580 ± 0.0210	1.160 ± 0.120	<0.308 (0.245 ± 0.184)
SR37-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.120 ± 0.120	0.0720 ± 0.0250	1.080 ± 0.120	~Blank
SR38-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.180 ± 0.140	0.0540 ± 0.0260	1.330 ± 0.160	~Blank
SR38-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.130 ± 0.140	0.0650 ± 0.0260	1.170 ± 0.140	<0.313 (0.140 ± 0.186)
SR38-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	1.190 ± 0.150	0.0450 ± 0.0220	1.130 ± 0.140	<0.313 (0.185 ± 0.187)
SR38-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.190 ± 0.150	0.0670 ± 0.0280	1.310 ± 0.160	~Blank
SR38-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.110 ± 0.140	0.0510 ± 0.0230	1.320 ± 0.160	~Blank
SR38-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.010 ± 0.120	0.0440 ± 0.0220	1.120 ± 0.130	~Blank
SR38-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.747 ± 0.090	0.0380 ± 0.0160	0.817 ± 0.096	~Blank
SR38-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.140 ± 0.140	0.0510 ± 0.0230	1.160 ± 0.140	~Blank
SR38-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.160 ± 0.140	0.0340 ± 0.0180	1.210 ± 0.150	~Blank
SR38-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	1.020 ± 0.130	0.0560 ± 0.0240	1.180 ± 0.140	~Blank
SR38-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.040 ± 0.130	0.0430 ± 0.0200	1.300 ± 0.150	~Blank
SR39-SO-R-01-A		pCi/g	0.16 ± 0.012	~Blank	~Blank	~Blank	1.140 ± 0.180	0.0670 ± 0.0280	1.200 ± 0.190	<0.284 (0.193 ± 0.170)
SR39-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	0.028 ± 0.017	1.130 ± 0.180	0.0580 ± 0.0250	1.100 ± 0.170	<0.281 (0.257 ± 0.169)
SR39-SO-R-03-A		pCi/g	0.019 ± 0.013	~Blank	~Blank	0.021 ± 0.013	1.370 ± 0.210	0.0600 ± 0.0270	1.520 ± 0.220	0.375 ± 0.170
SR39-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	0.030 ± 0.017	1.080 ± 0.170	0.0610 ± 0.0250	1.110 ± 0.170	~Blank
SR39-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.280 ± 0.190	0.0680 ± 0.0280	1.220 ± 0.190	~Blank
SR39-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	<0.018 (0.013 ± 0.011)	1.100 ± 0.170	0.0560 ± 0.0240	1.220 ± 0.190	~Blank
SR39-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.290 ± 0.200	0.0640 ± 0.0260	1.290 ± 0.200	0.324 ± 0.175
SR39-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.990 ± 0.160	0.0210 ± 0.0150	1.120 ± 0.170	~Blank
SR39-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.070 ± 0.170	0.0700 ± 0.0280	1.070 ± 0.170	<0.275 (0.229 ± 0.165)
SR39-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.880 ± 0.140	0.0470 ± 0.0230	1.060 ± 0.170	<0.324 (0.252 ± 0.194)
SR39-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.190 ± 0.180	0.0550 ± 0.0250	1.260 ± 0.190	~Blank
SR40-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.490 ± 0.220	0.0900 ± 0.0330	1.420 ± 0.220	0.407 ± 0.193
SR40-SO-R-02-A		pCi/g	<0.019 (0.014 ± 0.012)	~Blank	~Blank	0.021 ± 0.013	1.390 ± 0.210	0.0680 ± 0.0270	1.370 ± 0.210	0.533 ± 0.191
SR40-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.270 ± 0.190	0.0520 ± 0.0230	1.250 ± 0.190	1.466 ± 0.201
SR40-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.380 ± 0.210	0.0500 ± 0.0230	1.450 ± 0.220	~Blank
SR40-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	0.020 ± 0.013	1.240 ± 0.190	0.0460 ± 0.0230	1.190 ± 0.180	0.504 ± 0.200
SR40-SO-R-06-A		pCi/g	~Blank	~Blank	<0.031 (0.004 ± 0.012)	~Blank	1.300 ± 0.200	0.0710 ± 0.0280	1.330 ± 0.200	1.252 ± 0.209
SR40-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	<0.020 (0.013 ± 0.012)	1.610 ± 0.240	0.0660 ± 0.0290	1.560 ± 0.230	~Blank
SR40-SO-R-08-A		pCi/g	~Blank	~Blank	<0.037 (0.008 ± 0.016)	<0.020 (0.013 ± 0.012)	1.250 ± 0.190	0.0570 ± 0.0250	1.360 ± 0.210	~Blank
SR40-SO-R-09-A		pCi/g	0.21 ± 0.013	~Blank	~Blank	0.043 ± 0.020	1.400 ± 0.210	0.0900 ± 0.0320	1.450 ± 0.220	0.306 ± 0.171
SR40-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	0.018 ± 0.013	1.350 ± 0.200	0.0570 ± 0.0250	1.430 ± 0.210	0.497 ± 0.188
SR40-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.030 ± 0.160	0.0530 ± 0.0240	1.160 ± 0.180	0.340 ± 0.188
SR42-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.240 ± 0.190	0.0590 ± 0.0260	1.220 ± 0.190	<0.320 (0.210 ± 0.191)

Notes:

1) "nr" no result reported by laboratory"

2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 1 Summary Data Table of Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical

		Analytical Method →	9.							ORISE AP11 ORISE AP5
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Technetium-99
Matrix	Sample ID	Units ↓	Result	Result	Result	Result	Result	Result	Result	Result
SR42-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	<0.024 (0.012 ± 0.012)	0.800 ± 0.130	<0.0370 (0.0280 ± 0.0210)	0.820 ± 0.130	<0.316 (0.299 ± 0.190)
SR42-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.090 ± 0.170	0.0620 ± 0.0260	1.170 ± 0.180	~Blank
SR42-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	1.050 ± 0.170	0.0360 ± 0.0200	1.110 ± 0.170	~Blank
SR42-SO-R-05-A		pCi/g	<0.036 (0.007 ± 0.014)	~Blank	~Blank	0.023 ± 0.016	0.491 ± 0.089	0.0460 ± 0.0220	0.505 ± 0.091	<0.316 (0.270 ± 0.190)
SR42-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.200 ± 0.190	0.0590 ± 0.0250	1.270 ± 0.190	<0.309 (0.241 ± 0.185)
SR42-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	<0.020 (0.019 ± 0.014)	0.940 ± 0.150	0.0440 ± 0.0220	0.970 ± 0.160	0.341 ± 0.183
SR42-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.960 ± 0.150	0.0550 ± 0.0250	1.060 ± 0.170	~Blank
SR42-SO-R-09-A		pCi/g	~Blank	~Blank	<0.031 (0.004 ± 0.012)	0.025 ± 0.015	0.910 ± 0.150	0.0310 ± 0.0190	1.010 ± 0.160	~Blank
SR42-SO-R-10-A		pCi/g	0.17 ± 0.012	~Blank	~Blank	0.032 ± 0.017	0.880 ± 0.140	0.0470 ± 0.0220	0.910 ± 0.140	0.375 ± 0.195
SR42-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.012	1.190 ± 0.190	0.0400 ± 0.0220	1.160 ± 0.180	~Blank
SR45-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.230 ± 0.190	0.0700 ± 0.0290	1.210 ± 0.190	~Blank
SR45-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.270 ± 0.200	0.0540 ± 0.0250	1.160 ± 0.180	~Blank
SR45-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.080 ± 0.170	0.0620 ± 0.0260	1.190 ± 0.180	<0.303 (0.162 ± 0.180)
SR45-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	0.021 ± 0.014	1.300 ± 0.200	0.0710 ± 0.0290	1.340 ± 0.210	~Blank
SR45-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.130 ± 0.170	0.0610 ± 0.0250	1.190 ± 0.180	~Blank
SR45-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.120 ± 0.180	0.0360 ± 0.0210	0.970 ± 0.160	~Blank
SR45-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.040 ± 0.160	0.0390 ± 0.0200	1.040 ± 0.160	~Blank
SR45-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.050 ± 0.160	0.0710 ± 0.0280	1.030 ± 0.160	~Blank
SR45-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.180 ± 0.190	0.0310 ± 0.0190	1.250 ± 0.190	~Blank
SR45-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.980 ± 0.160	0.0560 ± 0.0250	0.900 ± 0.150	<0.318 (0.192 ± 0.190)
SR45-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.150 ± 0.180	0.0360 ± 0.0200	1.140 ± 0.180	~Blank
SR46-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.120 ± 0.170	0.0370 ± 0.0200	1.070 ± 0.160	~Blank
SR46-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.990 ± 0.160	0.0500 ± 0.0230	0.970 ± 0.150	~Blank
SR46-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.110 ± 0.170	0.0400 ± 0.0210	1.090 ± 0.170	~Blank
SR46-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	<0.019 (0.012 ± 0.011)	0.950 ± 0.150	0.0480 ± 0.0220	1.010 ± 0.160	~Blank
SR46-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.150 ± 0.180	0.0570 ± 0.0240	1.150 ± 0.180	<0.272 (0.247 ± 0.163)
SR46-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.020 ± 0.160	0.0340 ± 0.0180	1.020 ± 0.160	<0.251 (0.207 ± 0.151)
SR46-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.890 ± 0.140	0.0290 ± 0.0170	0.940 ± 0.150	0.716 ± 0.181
SR46-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	<0.018 (0.011 ± 0.011)	1.180 ± 0.180	0.0670 ± 0.0270	1.210 ± 0.180	0.421 ± 0.162
SR46-SO-R-09-A		pCi/g	~Blank	0.018 ± 0.014	~Blank	~Blank	1.030 ± 0.160	0.0580 ± 0.0260	1.040 ± 0.160	0.359 ± 0.161
SR46-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.000 ± 0.160	0.0390 ± 0.0200	1.060 ± 0.160	1.148 ± 0.169
SR46-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.050 ± 0.160	0.0570 ± 0.0250	1.000 ± 0.150	<0.245 (0.216 ± 0.147)
SR48-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.030 ± 0.170	0.0610 ± 0.0270	1.090 ± 0.170	~Blank
SR48-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.521 ± 0.093	0.0250 ± 0.0160	0.573 ± 0.100	~Blank
SR48-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.650 ± 0.110	0.0360 ± 0.0180	0.538 ± 0.093	0.928 ± 0.190
SR48-SO-R-04-A		pCi/g	<0.027 (0.015 ± 0.014)	~Blank	~Blank	<0.025 (0.016 ± 0.014)	1.150 ± 0.180	0.0640 ± 0.0280	1.060 ± 0.170	~Blank
SR48-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.150 ± 0.180	0.0580 ± 0.0250	1.070 ± 0.170	~Blank
SR48-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.000 ± 0.160	0.0500 ± 0.0230	1.120 ± 0.180	~Blank
SR48-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.090 ± 0.170	0.0430 ± 0.0230	1.150 ± 0.180	~Blank
SR48-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	0.023 ± 0.015	1.070 ± 0.170	0.0340 ± 0.0200	1.180 ± 0.190	~Blank
SR48-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.220 ± 0.190	0.0760 ± 0.0290	1.290 ± 0.190	~Blank
SR48-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.150 ± 0.180	0.0710 ± 0.0280	1.230 ± 0.190	~Blank
SR48-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.030 ± 0.160	0.0470 ± 0.0230	1.140 ± 0.180	~Blank
SR49-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.040 ± 0.160	0.0450 ± 0.0220	1.100 ± 0.170	~Blank
SR49-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	0.018 ± 0.012	1.200 ± 0.190	0.0630 ± 0.0270	1.030 ± 0.160	~Blank
SR49-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.180 ± 0.180	0.0600 ± 0.0260	1.170 ± 0.180	~Blank
SR49-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.860 ± 0.140	0.0370 ± 0.0210	0.830 ± 0.140	~Blank
SR49-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.100 ± 0.170	0.0520 ± 0.0240	1.240 ± 0.190	~Blank
SR49-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.050 ± 0.160	0.0620 ± 0.0260	1.250 ± 0.190	~Blank
SR49-SO-R-07-A		pCi/g	~Blank	~Blank	<0.021 (0.009 ± 0.010)	~Blank	1.110 ± 0.170	0.0480 ± 0.0230	1.190 ± 0.180	~Blank
SR49-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.040 ± 0.160	0.0560 ± 0.0250	1.120 ± 0.170	~Blank
SR49-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.050 ± 0.160	0.0400 ± 0.0200	1.030 ± 0.160	~Blank
SR49-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.080 ± 0.180	<0.0340 (0.0280 ± 0.0220)	1.160 ± 0.190	~Blank
SR49-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.280 ± 0.200	0.0550 ± 0.0250	1.200 ± 0.190	~Blank
SR51-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.760 ± 0.120	0.0310 ± 0.0170	0.820 ± 0.130	~Blank
SR51-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.011	1.210 ± 0.190	0.0440 ± 0.0220	1.250 ± 0.190	~Blank
SR51-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.120 ± 0.170	0.0380 ± 0.0210	1.130 ± 0.170	~Blank
SR51-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.010 ± 0.160	0.0410 ± 0.0200	0.970 ± 0.150	~Blank
SR51-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.011	1.160 ± 0.180	0.0740 ± 0.0280	1.290 ± 0.190	~Blank
SR51-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.200 ± 0.180	0.0630 ± 0.0250	1.260 ± 0.190	~Blank
SR51-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	0.018 ± 0.013	1.120 ± 0.180	0.0600 ± 0.0260	1.180 ± 0.180	~Blank
SR51-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.340 ± 0.200	0.0760 ± 0.0290	1.340 ± 0.200	~Blank
SR51-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	0.024 ± 0.014	1.230 ± 0.190	0.0440 ± 0.0220	1.310 ± 0.200	~Blank
SR51-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.040 ± 0.160	0.0460 ± 0.0220	1.110 ± 0.170	~Blank
SR51-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.130 ± 0.180	0.0400 ± 0.0210	1.140 ± 0.180	~Blank
SR53-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.920 ± 0.150	0.0250 ± 0.0170	0.980 ± 0.160	~Blank
SR53-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.930 ± 0.150	0.0420 ± 0.0230	1.000 ± 0.160	<0.288 (0.209 ± 0.172)
SR53-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.770 ± 0.130	0.0270 ± 0.0160	0.780 ± 0.130	~Blank

Notes:

1) "nr" no result reported by laboratory"

2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 1 Summary Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical Method

		Analytical Method →	10.							ORISE AP11 ORISE AP5
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Technetium-99
Matrix	Sample ID	Units ↓	Result	Result	Result	Result	Result	Result	Result	Result
SR53-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	<0.018 (0.011 ± 0.011)	0.730 ± 0.120	<0.0240 (0.0200 ± 0.0160)	0.640 ± 0.110	0.312 ± 0.178
SR53-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.830 ± 0.130	0.0380 ± 0.0190	0.860 ± 0.140	~Blank
SR53-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.770 ± 0.130	0.0280 ± 0.0170	0.710 ± 0.120	~Blank
SR53-SO-R-07-A		pCi/g	<0.037 (0.010 ± 0.016)	~Blank	~Blank	~Blank	0.960 ± 0.150	0.0410 ± 0.0220	0.950 ± 0.150	0.463 ± 0.174
SR53-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	<0.020 (0.012 ± 0.012)	1.010 ± 0.160	0.0470 ± 0.0230	1.000 ± 0.160	~Blank
SR53-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.890 ± 0.140	0.0250 ± 0.0160	0.970 ± 0.150	~Blank
SR53-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.980 ± 0.150	0.0590 ± 0.0260	0.910 ± 0.150	~Blank
SR53-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.960 ± 0.150	<0.0310 (0.0280 ± 0.0200)	1.070 ± 0.170	<0.294 (0.240 ± 0.176)
SR54-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.910 ± 0.150	0.0330 ± 0.0180	1.010 ± 0.160	~Blank
SR54-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.270 ± 0.190	0.0820 ± 0.0300	1.200 ± 0.180	~Blank
SR54-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	<0.018 (0.013 ± 0.011)	1.380 ± 0.210	0.0630 ± 0.0270	1.300 ± 0.200	~Blank
SR54-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.180 ± 0.180	0.0590 ± 0.0250	1.240 ± 0.190	~Blank
SR54-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.960 ± 0.150	0.0460 ± 0.0220	0.940 ± 0.150	~Blank
SR54-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.190	0.0710 ± 0.0290	1.390 ± 0.210	<0.315 (0.037 ± 0.186)
SR54-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.430 ± 0.210	0.0680 ± 0.0270	1.530 ± 0.230	~Blank
SR54-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.390 ± 0.210	0.0530 ± 0.0250	1.350 ± 0.200	~Blank
SR54-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.260 ± 0.190	0.0740 ± 0.0290	1.360 ± 0.210	~Blank
SR54-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.200 ± 0.180	0.0660 ± 0.0270	1.200 ± 0.180	<0.322 (0.070 ± 0.191)
SR54-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.190 ± 0.190	0.0580 ± 0.0260	1.410 ± 0.210	<0.328 (0.144 ± 0.195)
SR55-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	<0.019 (0.014 ± 0.012)	1.110 ± 0.150	0.0430 ± 0.0210	1.200 ± 0.160	~Blank
SR55-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.300 ± 0.170	0.0500 ± 0.0220	1.200 ± 0.160	~Blank
SR55-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.021 ± 0.012	1.130 ± 0.150	0.0560 ± 0.0230	1.080 ± 0.150	~Blank
SR55-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	0.024 ± 0.014	1.070 ± 0.150	0.0470 ± 0.0210	1.170 ± 0.160	~Blank
SR55-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.250 ± 0.170	0.0640 ± 0.0250	1.260 ± 0.170	<0.303 (0.155 ± 0.180)
SR55-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	0.019 ± 0.012	1.120 ± 0.150	0.0380 ± 0.0210	1.080 ± 0.150	~Blank
SR55-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	0.023 ± 0.014	1.250 ± 0.170	0.0510 ± 0.0230	1.190 ± 0.160	~Blank
SR55-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.230 ± 0.170	0.0650 ± 0.0260	1.260 ± 0.170	~Blank
SR55-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	0.032 ± 0.016	1.060 ± 0.150	0.0310 ± 0.0190	1.170 ± 0.160	~Blank
SR55-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.012	1.180 ± 0.160	0.0350 ± 0.0180	1.140 ± 0.150	~Blank
SR55-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	<0.019 (0.012 ± 0.011)	1.230 ± 0.170	0.0550 ± 0.0250	1.120 ± 0.150	~Blank
SR56-SO-J-01-A		pCi/g	~Blank	~Blank	0.015 ± 0.011	0.019 ± 0.013	3.030 ± 0.360	0.1220 ± 0.0370	2.900 ± 0.350	<0.286 (0.283 ± 0.172)
SR56-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.900 ± 0.250	0.0700 ± 0.0280	1.750 ± 0.230	0.370 ± 0.183
SR56-SO-J-03-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.011	3.350 ± 0.410	0.1600 ± 0.0460	3.200 ± 0.400	<0.299 (0.244 ± 0.179)
SR56-SO-J-04-A		pCi/g	~Blank	<0.026 (0.008 ± 0.012)	~Blank	~Blank	4.610 ± 0.550	0.2100 ± 0.0540	4.710 ± 0.560	0.375 ± 0.184
SR56-SO-J-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	6.030 ± 0.720	0.3090 ± 0.0680	6.110 ± 0.720	~Blank
SR56-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.400 ± 0.190	0.0640 ± 0.0260	1.380 ± 0.180	<0.291 (0.252 ± 0.175)
SR56-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.670 ± 0.220	0.0990 ± 0.0330	1.680 ± 0.220	~Blank
SR56-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.026 ± 0.015	2.610 ± 0.320	0.1250 ± 0.0370	2.670 ± 0.330	<0.307 (0.219 ± 0.183)
SR56-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.060 ± 0.150	0.0390 ± 0.0200	1.090 ± 0.150	~Blank
SR56-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	<0.027 (0.016 ± 0.015)	1.530 ± 0.200	0.0570 ± 0.0240	1.410 ± 0.190	~Blank
SR56-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.230 ± 0.170	0.0500 ± 0.0230	1.390 ± 0.180	~Blank
SR56-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	0.024 ± 0.014	1.920 ± 0.240	0.0830 ± 0.0310	1.810 ± 0.230	0.299 ± 0.174
SR56-SO-R-08-A		pCi/g	~Blank	~Blank	<0.020 (0.010 ± 0.011)	0.027 ± 0.015	1.150 ± 0.160	0.0390 ± 0.0200	1.220 ± 0.170	~Blank
SR56-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	0.034 ± 0.017	1.470 ± 0.190	0.0580 ± 0.0240	1.390 ± 0.180	~Blank
SR56-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.012	1.430 ± 0.190	0.0830 ± 0.0300	1.480 ± 0.200	~Blank
SR56-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.320 ± 0.180	0.0810 ± 0.0300	1.380 ± 0.180	~Blank
SR58-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.012	1.090 ± 0.170	0.0560 ± 0.0240	1.060 ± 0.170	~Blank
SR58-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.000 ± 0.160	0.0630 ± 0.0270	1.070 ± 0.170	~Blank
SR58-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.090 ± 0.170	0.0580 ± 0.0260	1.040 ± 0.160	~Blank
SR58-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.090 ± 0.170	0.0520 ± 0.0240	1.110 ± 0.180	~Blank
SR58-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.160 ± 0.180	0.0750 ± 0.0290	1.090 ± 0.170	~Blank
SR58-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.140 ± 0.170	0.0520 ± 0.0230	1.130 ± 0.170	~Blank
SR58-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.200 ± 0.180	0.0460 ± 0.0220	1.230 ± 0.190	~Blank
SR58-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	<0.019 (0.016 ± 0.012)	1.210 ± 0.190	0.0610 ± 0.0260	1.160 ± 0.180	~Blank
SR58-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.930 ± 0.150	0.0590 ± 0.0250	1.010 ± 0.160	~Blank
SR58-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.070 ± 0.170	0.0570 ± 0.0250	1.060 ± 0.160	~Blank
SR58-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.190	0.0590 ± 0.0250	1.230 ± 0.190	~Blank
SR59-SO-J-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	3.470 ± 0.480	0.1510 ± 0.0440	3.230 ± 0.450	~Blank
SR59-SO-J-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	2.920 ± 0.350	0.1000 ± 0.0340	2.890 ± 0.350	0.391 ± 0.187
SR59-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.012	1.130 ± 0.180	0.0540 ± 0.0250	1.210 ± 0.190	~Blank
SR59-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.190	0.0500 ± 0.0240	1.150 ± 0.180	~Blank
SR59-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.220 ± 0.190	0.0430 ± 0.0220	1.190 ± 0.190	~Blank
SR59-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.150 ± 0.180	0.0590 ± 0.0270	1.210 ± 0.190	~Blank
SR59-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.100 ± 0.180	0.0380 ± 0.0210	1.170 ± 0.180	~Blank
SR59-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.270 ± 0.200	0.0550 ± 0.0250	1.210 ± 0.190	~Blank
SR59-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	0.023 ± 0.015	1.110 ± 0.180	0.0560 ± 0.0270	1.170 ± 0.180	~Blank
SR59-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.200 ± 0.190	0.0560 ± 0.0280	1.270 ± 0.200	~Blank
SR59-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	0.025 ± 0.014	1.040 ± 0.160	0.0500 ± 0.0230	1.030 ± 0.160	~Blank

Notes:

1) "nr" no result reported by laboratory"

2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 1 Summary Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical Method

Matrix	Sample ID	Units ↓ / Analytical Method → / Radionuclide →	Americium-241 Result	Neptunium-237 Result	Plutonium-238 Result	11. Plutonium-239/240 Result	Uranium-233/234 Result	Uranium-235/236 Result	Uranium-238 Result	ORISE AP11 ORISE AP5 Technetium-99 Result
SR59-SO-R-10-A		pCi/g	<0.035 (0.013 ± 0.016)	~Blank	~Blank	0.027 ± 0.016	1.100 ± 0.170	0.0590 ± 0.0260	1.180 ± 0.190	~Blank
SR59-SO-R-11-A		pCi/g	<0.033 (0.008 ± 0.014)	~Blank	~Blank	0.036 ± 0.018	1.090 ± 0.170	0.0480 ± 0.0220	0.970 ± 0.150	~Blank
SR61-SO-R-01-A		pCi/g	<0.027 (0.015 ± 0.014)	~Blank	~Blank	~Blank	1.120 ± 0.170	0.0480 ± 0.0220	1.170 ± 0.180	~Blank
SR61-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.060 ± 0.170	0.0300 ± 0.0190	1.110 ± 0.170	~Blank
SR61-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.027 ± 0.016	1.090 ± 0.170	0.0400 ± 0.0200	1.140 ± 0.180	~Blank
SR61-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	<0.019 (0.014 ± 0.012)	0.960 ± 0.150	0.0420 ± 0.0200	0.980 ± 0.150	~Blank
SR61-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.060 ± 0.160	0.0540 ± 0.0230	0.980 ± 0.150	~Blank
SR61-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.011	1.090 ± 0.170	0.0700 ± 0.0270	1.050 ± 0.160	~Blank
SR61-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	<0.019 (0.018 ± 0.013)	0.990 ± 0.160	0.0580 ± 0.0250	1.060 ± 0.160	~Blank
SR61-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.060 ± 0.170	0.0380 ± 0.0200	0.970 ± 0.150	~Blank
SR61-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.010	1.180 ± 0.180	0.0290 ± 0.0170	1.070 ± 0.170	~Blank
SR61-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.040 ± 0.160	0.0530 ± 0.0230	1.020 ± 0.160	~Blank
SR61-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.060 ± 0.170	0.0510 ± 0.0240	1.070 ± 0.170	0.282 ± 0.165
SR65-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.011	1.500 ± 0.200	0.0580 ± 0.0260	1.430 ± 0.190	<0.283 (0.161 ± 0.169)
SR65-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	0.025 ± 0.014	1.250 ± 0.170	0.0560 ± 0.0260	1.420 ± 0.190	~Blank
SR65-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.410 ± 0.190	0.0690 ± 0.0270	1.370 ± 0.180	~Blank
SR65-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.618 ± 0.099	0.0290 ± 0.0170	0.660 ± 0.100	~Blank
SR65-SO-R-05-A		pCi/g	0.016 ± 0.011	~Blank	~Blank	0.016 ± 0.011	1.490 ± 0.200	0.0620 ± 0.0270	1.550 ± 0.210	0.312 ± 0.152
SR65-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	0.016 ± 0.011	1.240 ± 0.170	0.0670 ± 0.0260	1.410 ± 0.190	0.353 ± 0.185
SR65-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.010	1.020 ± 0.140	0.0520 ± 0.0220	1.120 ± 0.150	<0.306 (0.213 ± 0.183)
SR65-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.390 ± 0.190	0.0750 ± 0.0290	1.490 ± 0.200	<0.307 (0.300 ± 0.185)
SR65-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.010	1.310 ± 0.180	0.0570 ± 0.0250	1.330 ± 0.180	<0.300 (0.211 ± 0.179)
SR65-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.011	1.260 ± 0.170	0.0640 ± 0.0270	1.150 ± 0.160	<0.298 (0.184 ± 0.178)
SR65-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	<0.028 (0.010 ± 0.013)	1.620 ± 0.210	0.0650 ± 0.0270	1.540 ± 0.200	1.102 ± 0.192
SR66-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.300 ± 0.180	0.0570 ± 0.0260	1.250 ± 0.170	~Blank
SR66-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	0.024 ± 0.015	1.350 ± 0.180	0.0390 ± 0.0210	1.320 ± 0.180	~Blank
SR66-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.130 ± 0.160	0.0600 ± 0.0260	1.080 ± 0.160	<0.285 (0.194 ± 0.171)
SR66-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.360 ± 0.190	0.0740 ± 0.0300	1.460 ± 0.200	~Blank
SR66-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.011	1.270 ± 0.170	0.0590 ± 0.0250	1.300 ± 0.180	~Blank
SR66-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.150 ± 0.160	0.0450 ± 0.0220	1.150 ± 0.160	~Blank
SR66-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	<0.027 (0.011 ± 0.013)	1.350 ± 0.180	0.0790 ± 0.0310	1.440 ± 0.190	<0.290 (0.245 ± 0.174)
SR66-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.860 ± 0.130	0.0500 ± 0.0230	0.840 ± 0.120	<0.294 (0.244 ± 0.176)
SR66-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.890 ± 0.130	0.0480 ± 0.0220	1.010 ± 0.140	~Blank
SR66-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.520 ± 0.210	0.0410 ± 0.0220	1.490 ± 0.200	<0.304 (0.178 ± 0.181)
SR66-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.090 ± 0.150	0.0400 ± 0.0210	1.080 ± 0.150	~Blank
SR67-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.380 ± 0.190	0.0550 ± 0.0250	1.300 ± 0.180	<0.326 (0.303 ± 0.196)
SR67-SO-R-02-A		pCi/g	~Blank	~Blank	<0.031 (0.004 ± 0.012)	~Blank	1.260 ± 0.170	0.0410 ± 0.0220	1.210 ± 0.170	~Blank
SR67-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.330 ± 0.180	0.0360 ± 0.0200	1.390 ± 0.190	~Blank
SR67-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.615 ± 0.097	0.0130 ± 0.0110	0.547 ± 0.089	~Blank
SR67-SO-R-05-A		pCi/g	~Blank	~Blank	<0.026 (0.011 ± 0.012)	0.016 ± 0.011	1.350 ± 0.190	0.0530 ± 0.0260	1.310 ± 0.180	~Blank
SR67-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.160 ± 0.160	0.0570 ± 0.0240	1.230 ± 0.170	~Blank
SR67-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.130 ± 0.160	0.0580 ± 0.0250	1.250 ± 0.170	~Blank
SR67-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.150 ± 0.160	0.0450 ± 0.0220	1.310 ± 0.180	~Blank
SR67-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	<0.025 (0.010 ± 0.012)	1.100 ± 0.150	0.0260 ± 0.0180	1.050 ± 0.150	~Blank
SR67-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.110 ± 0.150	0.0340 ± 0.0190	1.190 ± 0.160	~Blank
SR67-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.230 ± 0.170	0.0460 ± 0.0230	1.240 ± 0.170	<0.322 (0.079 ± 0.191)
SR68-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.280 ± 0.180	0.0450 ± 0.0230	1.280 ± 0.180	~Blank
SR68-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.090 ± 0.150	0.0540 ± 0.0240	1.140 ± 0.160	~Blank
SR68-SO-R-03-A		pCi/g	0.019 ± 0.012	~Blank	~Blank	0.020 ± 0.012	1.200 ± 0.160	0.0230 ± 0.0160	1.220 ± 0.160	~Blank
SR68-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.170	0.0530 ± 0.0240	1.220 ± 0.170	~Blank
SR68-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.011	1.090 ± 0.150	0.0430 ± 0.0220	1.140 ± 0.160	<0.306 (0.238 ± 0.183)
SR68-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.011	1.160 ± 0.160	0.0540 ± 0.0230	1.320 ± 0.180	~Blank
SR68-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.250 ± 0.170	0.0460 ± 0.0230	1.220 ± 0.170	<0.281 (0.238 ± 0.168)
SR68-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	0.022 ± 0.013	1.070 ± 0.150	0.0350 ± 0.0190	1.170 ± 0.160	~Blank
SR68-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.110 ± 0.150	0.0650 ± 0.0280	1.190 ± 0.160	~Blank
SR68-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	<0.019 (0.014 ± 0.012)	1.100 ± 0.150	0.0640 ± 0.0260	1.140 ± 0.160	~Blank
SR68-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	0.016 ± 0.011	1.150 ± 0.160	0.0550 ± 0.0240	1.150 ± 0.160	~Blank
SR69-SO-R-01-A		pCi/g	<0.021 (0.015 ± 0.013)	~Blank	~Blank	~Blank	1.500 ± 0.210	0.0660 ± 0.0290	1.690 ± 0.230	~Blank
SR69-SO-R-02-A		pCi/g	~Blank	~Blank	<0.024 (0.008 ± 0.011)	<0.018 (0.011 ± 0.011)	1.390 ± 0.190	0.0740 ± 0.0280	1.540 ± 0.200	~Blank
SR69-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.190 ± 0.160	0.0700 ± 0.0270	1.170 ± 0.160	~Blank
SR69-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	<0.019 (0.012 ± 0.011)	2.130 ± 0.270	0.0810 ± 0.0320	2.030 ± 0.260	0.293 ± 0.161
SR69-SO-R-05-A		pCi/g	~Blank	~Blank	<0.023 (0.016 ± 0.013)	0.020 ± 0.012	1.150 ± 0.160	0.0670 ± 0.0290	1.210 ± 0.170	<0.268 (0.191 ± 0.160)
SR69-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	0.021 ± 0.013	1.800 ± 0.230	0.1010 ± 0.0330	1.910 ± 0.240	0.471 ± 0.186
SR69-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.120 ± 0.160	0.0380 ± 0.0230	1.170 ± 0.170	<0.306 (0.210 ± 0.183)
SR69-SO-R-08-A		pCi/g	~Blank	0.010 ± 0.009	~Blank	<0.019 (0.014 ± 0.012)	1.110 ± 0.160	0.0660 ± 0.0290	1.200 ± 0.170	~Blank
SR69-SO-R-09-A		pCi/g	~Blank	~Blank	<0.026 (0.009 ± 0.012)	~Blank	1.030 ± 0.150	0.0680 ± 0.0290	1.160 ± 0.160	<0.299 (0.266 ± 0.179)
SR69-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.450 ± 0.190	0.0730 ± 0.0300	1.460 ± 0.200	<0.287 (0.137 ± 0.171)
SR69-SO-R-11-A		pCi/g	<0.019 (0.014 ± 0.012)	~Blank	~Blank	0.024 ± 0.014	1.580 ± 0.210	0.0870 ± 0.0310	1.530 ± 0.200	~Blank

Notes:

1) "nr" no result reported by laboratory"

2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 1 Summary Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical Method

		Analytical Method →	12.							ORISE AP11	ORISE AP5
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Technetium-99	
Matrix	Sample ID	Units ↓	Result	Result	Result	Result	Result	Result	Result	Result	
SR70-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.440 ± 0.200	0.0790 ± 0.0310	1.390 ± 0.190	<0.297 (0.146 ± 0.177)	
SR70-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	0.024 ± 0.014	1.290 ± 0.180	0.0460 ± 0.0240	1.240 ± 0.170	~Blank	
SR70-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.350 ± 0.180	0.0540 ± 0.0260	1.280 ± 0.170	<0.262 (0.093 ± 0.156)	
SR70-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	0.025 ± 0.014	1.730 ± 0.220	0.0710 ± 0.0270	1.700 ± 0.220	<0.272 (0.197 ± 0.163)	
SR70-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	<0.027 (0.009 ± 0.012)	1.150 ± 0.160	0.0610 ± 0.0250	1.130 ± 0.150	~Blank	
SR70-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.220 ± 0.170	0.0820 ± 0.0300	1.160 ± 0.160	~Blank	
SR70-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.320 ± 0.180	0.0510 ± 0.0230	1.360 ± 0.180	<0.290 (0.286 ± 0.175)	
SR70-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.420 ± 0.190	0.0590 ± 0.0260	1.490 ± 0.200	~Blank	
SR70-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.200 ± 0.160	0.0780 ± 0.0290	1.250 ± 0.170	~Blank	
SR70-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.350 ± 0.180	0.0650 ± 0.0260	1.320 ± 0.180	<0.272 (0.231 ± 0.163)	
SR70-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	0.019 ± 0.013	1.310 ± 0.180	0.0720 ± 0.0290	1.280 ± 0.180	~Blank	
SR71-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.190 ± 0.170	0.0550 ± 0.0250	1.110 ± 0.160	<0.287 (0.260 ± 0.173)	
SR71-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.300 ± 0.180	0.0500 ± 0.0240	1.400 ± 0.190	~Blank	
SR71-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.180 ± 0.170	0.0900 ± 0.0340	1.240 ± 0.170	~Blank	
SR71-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.190 ± 0.170	0.0430 ± 0.0210	1.200 ± 0.170	~Blank	
SR71-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.950 ± 0.130	0.0220 ± 0.0150	0.990 ± 0.140	<0.302 (0.217 ± 0.181)	
SR71-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.130 ± 0.170	<0.0420 (0.0310 ± 0.0240)	1.130 ± 0.170	~Blank	
SR71-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.040 ± 0.150	0.0750 ± 0.0290	1.220 ± 0.170	~Blank	
SR71-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.170 ± 0.160	0.0470 ± 0.0230	1.170 ± 0.160	<0.285 (0.251 ± 0.171)	
SR71-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.190 ± 0.160	0.0690 ± 0.0270	1.300 ± 0.180	<0.294 (0.276 ± 0.177)	
SR71-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.011	1.170 ± 0.160	0.0560 ± 0.0250	1.240 ± 0.170	~Blank	
SR71-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.160 ± 0.160	0.0460 ± 0.0220	1.320 ± 0.180	~Blank	
SR72-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	0.016 ± 0.012	1.210 ± 0.170	0.0650 ± 0.0290	1.370 ± 0.190	~Blank	
SR72-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	0.019 ± 0.013	1.280 ± 0.170	0.0710 ± 0.0280	1.300 ± 0.180	~Blank	
SR72-SO-R-03-A		pCi/g	~Blank	<0.021 (0.013 ± 0.012)	<0.040 (0.011 ± 0.017)	<0.036 (0.016 ± 0.017)	1.180 ± 0.170	0.1020 ± 0.0350	1.190 ± 0.170	<0.292 (0.264 ± 0.175)	
SR72-SO-R-04-A		pCi/g	~Blank	<0.022 (0.011 ± 0.012)	~Blank	0.023 ± 0.014	1.130 ± 0.160	0.0670 ± 0.0280	1.210 ± 0.170	<0.307 (0.204 ± 0.184)	
SR72-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	<0.022 (0.016 ± 0.013)	1.380 ± 0.190	0.0930 ± 0.0330	1.390 ± 0.190	~Blank	
SR72-SO-R-06-A		pCi/g	~Blank	0.011 ± 0.009	<0.023 (0.013 ± 0.012)	0.030 ± 0.016	1.230 ± 0.170	0.0630 ± 0.0280	1.250 ± 0.180	<0.303 (0.165 ± 0.180)	
SR72-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.310 ± 0.180	0.0490 ± 0.0230	1.350 ± 0.180	0.952 ± 0.192	
SR72-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	0.021 ± 0.013	1.070 ± 0.150	0.0590 ± 0.0250	1.200 ± 0.160	0.324 ± 0.177	
SR72-SO-R-09-A		pCi/g	0.020 ± 0.013	~Blank	~Blank	<0.022 (0.018 ± 0.014)	1.270 ± 0.170	0.0550 ± 0.0250	1.270 ± 0.180	0.326 ± 0.174	
SR72-SO-R-10-A		pCi/g	~Blank	<0.020 (0.008 ± 0.010)	~Blank	~Blank	1.280 ± 0.180	0.0490 ± 0.0230	1.360 ± 0.190	<0.292 (0.240 ± 0.175)	
SR72-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.390 ± 0.190	0.0740 ± 0.0300	1.350 ± 0.190	0.320 ± 0.179	
SR73-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.230 ± 0.170	0.0710 ± 0.0300	1.350 ± 0.190	~Blank	
SR73-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.170 ± 0.160	0.0660 ± 0.0260	1.290 ± 0.170	0.311 ± 0.170	
SR73-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	0.017 ± 0.012	1.200 ± 0.170	0.0630 ± 0.0260	1.300 ± 0.180	~Blank	
SR73-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.160 ± 0.160	0.0680 ± 0.0260	1.260 ± 0.170	~Blank	
SR73-SO-R-05-A		pCi/g	~Blank	~Blank	<0.018 (0.011 ± 0.010)	0.017 ± 0.011	1.240 ± 0.170	0.0840 ± 0.0300	1.270 ± 0.170	~Blank	
SR73-SO-R-06-A		pCi/g	~Blank	0.010 ± 0.009	~Blank	~Blank	1.360 ± 0.190	0.0650 ± 0.0290	1.410 ± 0.190	~Blank	
SR73-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.190 ± 0.170	0.0930 ± 0.0340	1.250 ± 0.180	~Blank	
SR73-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.280 ± 0.170	0.0540 ± 0.0240	1.260 ± 0.170	~Blank	
SR73-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.360 ± 0.180	0.0680 ± 0.0280	1.260 ± 0.170	0.296 ± 0.176	
SR73-SO-R-10-A		pCi/g	~Blank	<0.019 (0.010 ± 0.010)	~Blank	~Blank	1.310 ± 0.180	0.0660 ± 0.0270	1.240 ± 0.170	~Blank	
SR73-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.200 ± 0.170	0.0880 ± 0.0320	1.390 ± 0.190	~Blank	
SR74-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.230 ± 0.190	0.0410 ± 0.0210	1.220 ± 0.190	~Blank	
SR74-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.060 ± 0.160	0.0630 ± 0.0250	1.170 ± 0.180	~Blank	
SR74-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.130 ± 0.170	0.0760 ± 0.0290	1.160 ± 0.180	~Blank	
SR74-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	0.024 ± 0.014	1.240 ± 0.190	0.0860 ± 0.0310	1.320 ± 0.200	~Blank	
SR74-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.010 ± 0.160	0.0420 ± 0.0200	1.210 ± 0.180	~Blank	
SR74-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.220 ± 0.190	0.0460 ± 0.0220	1.070 ± 0.170	~Blank	
SR74-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.180	0.0450 ± 0.0220	1.150 ± 0.180	~Blank	
SR74-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.190 ± 0.180	0.0620 ± 0.0250	1.290 ± 0.190	~Blank	
SR74-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	0.015 ± 0.011	1.210 ± 0.180	0.0710 ± 0.0270	1.210 ± 0.180	~Blank	
SR74-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	0.021 ± 0.014	1.260 ± 0.190	0.0380 ± 0.0180	1.130 ± 0.170	~Blank	
SR74-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.050 ± 0.160	0.0550 ± 0.0240	1.230 ± 0.190	~Blank	
SR75-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	0.019 ± 0.012	1.000 ± 0.140	0.0520 ± 0.0240	1.130 ± 0.160	~Blank	
SR75-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.030 ± 0.140	0.0620 ± 0.0250	0.980 ± 0.140	~Blank	
SR75-SO-R-03-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.080 ± 0.150	0.0530 ± 0.0230	1.050 ± 0.150	<0.295 (0.251 ± 0.177)	
SR75-SO-R-04-A		pCi/g	~Blank	~Blank	~Blank	0.016 ± 0.011	1.130 ± 0.160	0.0470 ± 0.0230	1.130 ± 0.160	~Blank	
SR75-SO-R-05-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.100 ± 0.160	0.0710 ± 0.0290	1.130 ± 0.160	~Blank	
SR75-SO-R-06-A		pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.011	1.220 ± 0.170	0.0650 ± 0.0270	1.280 ± 0.180	~Blank	
SR75-SO-R-07-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.800 ± 0.120	0.0540 ± 0.0240	0.890 ± 0.130	~Blank	
SR75-SO-R-08-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.920 ± 0.130	0.0520 ± 0.0250	0.940 ± 0.140	~Blank	
SR75-SO-R-09-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.020 ± 0.150	0.0550 ± 0.0240	0.960 ± 0.140	<0.300 (0.158 ± 0.179)	
SR75-SO-R-10-A		pCi/g	~Blank	~Blank	~Blank	~Blank	0.980 ± 0.140	0.0650 ± 0.0260	1.040 ± 0.150	<0.290 (0.264 ± 0.174)	
SR75-SO-R-11-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.000 ± 0.140	0.0410 ± 0.0210	1.040 ± 0.150	~Blank	
SR76-SO-R-01-A		pCi/g	~Blank	~Blank	~Blank	0.013 ± 0.010	1.180 ± 0.180	0.0590 ± 0.0260	1.280 ± 0.200	~Blank	
SR76-SO-R-02-A		pCi/g	~Blank	~Blank	~Blank	~Blank	1.290 ± 0.210	0.0670 ± 0.0320	1.260 ± 0.200	~Blank	

Notes:

1) "nr" no result reported by laboratory"

2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 1 Summary Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical Method

		Analytical Method →	13.							ORISE AP11 ORISE AP5
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Technetium-99
Matrix	Sample ID	Units ↓	Result	Result	Result	Result	Result	Result	Result	Result
	SR76-SO-R-03-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.210 ± 0.180	0.0580 ± 0.0250	1.270 ± 0.190	~Blank
	SR76-SO-R-04-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.200 ± 0.180	0.0430 ± 0.0210	1.250 ± 0.190	~Blank
	SR76-SO-R-05-A	pCi/g	~Blank	~Blank	~Blank	0.020 ± 0.013	1.080 ± 0.170	0.0800 ± 0.0300	1.180 ± 0.180	~Blank
	SR76-SO-R-06-A	pCi/g	~Blank	~Blank	~Blank	0.012 ± 0.009	0.940 ± 0.150	0.0360 ± 0.0220	0.930 ± 0.150	~Blank
	SR76-SO-R-07-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.300 ± 0.190	0.0630 ± 0.0260	1.190 ± 0.180	~Blank
	SR76-SO-R-08-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.190 ± 0.180	0.0530 ± 0.0230	1.230 ± 0.180	~Blank
	SR76-SO-R-09-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.130 ± 0.180	0.0590 ± 0.0250	1.270 ± 0.190	~Blank
	SR76-SO-R-10-A	pCi/g	~Blank	~Blank	~Blank	0.020 ± 0.013	1.090 ± 0.170	0.0400 ± 0.0200	1.240 ± 0.190	~Blank
	SR76-SO-R-11-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.260 ± 0.190	0.0450 ± 0.0220	1.370 ± 0.210	~Blank
	SR77-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	2.060 ± 0.260	0.1120 ± 0.0350	2.000 ± 0.250	<0.292 (0.261 ± 0.175)
	SR77-SO-R-02-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.980 ± 0.260	0.1240 ± 0.0400	2.130 ± 0.280	~Blank
	SR77-SO-R-03-A	pCi/g	~Blank	~Blank	~Blank	~Blank	2.130 ± 0.270	0.1090 ± 0.0360	2.130 ± 0.270	0.519 ± 0.185
	SR77-SO-R-04-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.610 ± 0.210	0.0790 ± 0.0300	1.770 ± 0.230	~Blank
	SR77-SO-R-05-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.610 ± 0.210	0.1100 ± 0.0360	1.590 ± 0.210	0.803 ± 0.190
	SR77-SO-R-06-A	pCi/g	~Blank	~Blank	~Blank	<0.020 (0.012 ± 0.011)	1.550 ± 0.210	0.0630 ± 0.0280	1.420 ± 0.190	~Blank
	SR77-SO-R-07-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.260 ± 0.170	0.0730 ± 0.0280	1.210 ± 0.170	~Blank
	SR77-SO-R-08-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.290 ± 0.170	0.0520 ± 0.0240	1.390 ± 0.190	~Blank
	SR77-SO-R-09-A	pCi/g	<0.035 (0.008 ± 0.015)	~Blank	~Blank	~Blank	1.470 ± 0.200	0.0720 ± 0.0290	1.380 ± 0.190	~Blank
	SR77-SO-R-10-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.790 ± 0.230	0.0850 ± 0.0320	1.920 ± 0.250	<0.308 (0.247 ± 0.185)
	SR77-SO-R-11-A	pCi/g	~Blank	~Blank	~Blank	0.023 ± 0.014	1.880 ± 0.240	0.0630 ± 0.0270	1.770 ± 0.230	0.306 ± 0.174
	SR80-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.020 ± 0.160	0.0400 ± 0.0220	1.040 ± 0.160	<0.297 (0.201 ± 0.178)
	SR80-SO-R-02-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.060 ± 0.160	0.0320 ± 0.0200	1.080 ± 0.170	<0.303 (0.229 ± 0.181)
	SR80-SO-R-03-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.170 ± 0.180	0.0850 ± 0.0320	1.300 ± 0.200	0.325 ± 0.179
	SR80-SO-R-04-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.100 ± 0.170	0.0460 ± 0.0220	1.150 ± 0.180	<0.295 (0.282 ± 0.177)
	SR80-SO-R-05-A	pCi/g	~Blank	~Blank	~Blank	~Blank	0.830 ± 0.130	0.0360 ± 0.0190	0.910 ± 0.140	~Blank
	SR80-SO-R-06-A	pCi/g	~Blank	~Blank	~Blank	~Blank	0.910 ± 0.140	0.0570 ± 0.0240	0.880 ± 0.140	~Blank
	SR80-SO-R-07-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.200 ± 0.190	0.0570 ± 0.0260	1.230 ± 0.190	~Blank
	SR80-SO-R-08-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.190 ± 0.180	0.0710 ± 0.0280	1.170 ± 0.180	~Blank
	SR80-SO-R-09-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.140 ± 0.180	0.0370 ± 0.0200	1.280 ± 0.190	~Blank
	SR80-SO-R-10-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.250 ± 0.190	0.0580 ± 0.0250	1.250 ± 0.190	<0.291 (0.198 ± 0.174)
	SR80-SO-R-11-A	pCi/g	~Blank	~Blank	~Blank	~Blank	0.610 ± 0.100	<0.0240 (0.0150 ± 0.0140)	0.620 ± 0.110	~Blank
	SR81-SO-R-01-A	pCi/g	~Blank	~Blank	~Blank	0.027 ± 0.015	1.020 ± 0.150	0.0480 ± 0.0240	1.100 ± 0.160	<0.310 (0.213 ± 0.185)
	SR81-SO-R-02-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.070 ± 0.150	0.0450 ± 0.0220	1.130 ± 0.160	~Blank
	SR81-SO-R-03-A	pCi/g	~Blank	~Blank	~Blank	0.021 ± 0.013	1.250 ± 0.170	0.0530 ± 0.0240	1.430 ± 0.190	~Blank
	SR81-SO-R-04-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.180 ± 0.170	0.0710 ± 0.0290	1.160 ± 0.160	~Blank
	SR81-SO-R-05-A	pCi/g	~Blank	0.010 ± 0.009	~Blank	~Blank	1.030 ± 0.150	0.0650 ± 0.0280	1.180 ± 0.170	<0.310 (0.236 ± 0.186)
	SR81-SO-R-06-A	pCi/g	~Blank	~Blank	~Blank	~Blank	0.670 ± 0.110	0.0350 ± 0.0190	0.609 ± 0.098	~Blank
	SR81-SO-R-07-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.180 ± 0.170	0.0540 ± 0.0250	1.140 ± 0.160	~Blank
	SR81-SO-R-08-A	pCi/g	<0.021 (0.015 ± 0.013)	~Blank	~Blank	0.031 ± 0.016	0.910 ± 0.140	0.0510 ± 0.0260	0.890 ± 0.140	~Blank
	SR81-SO-R-09-A	pCi/g	~Blank	~Blank	~Blank	0.021 ± 0.013	1.040 ± 0.180	0.0260 ± 0.0230	1.110 ± 0.190	~Blank
	SR81-SO-R-10-A	pCi/g	~Blank	~Blank	~Blank	~Blank	1.290 ± 0.180	0.0750 ± 0.0310	1.360 ± 0.190	<0.312 (0.185 ± 0.186)
	SR81-SO-R-11-A	pCi/g	~Blank	~Blank	~Blank	0.014 ± 0.011	1.290 ± 0.180	0.0730 ± 0.0290	1.230 ± 0.170	<0.308 (0.245 ± 0.185)
SW	BK15-SM-J-01-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0005 ± 0.0002	0.00008 ± 0.00009	0.0008 ± 0.0003	~Blank
	BK15-SM-J-02-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0040 ± 0.0007	<0.00025 (0.00008 ± 0.00011)	0.0043 ± 0.0007	<0.0117 (0.0017 ± 0.0069)
	BK52-SM-J-01-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0013 ± 0.0003	~Blank	0.0010 ± 0.0003	~Blank
	BK53-SM-J-01-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0009 ± 0.0003	~Blank	0.0011 ± 0.0003	~Blank
	BK54-SM-J-01-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
	BK54-SM-J-02-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0001 ± 0.0001)	~Blank
	BK54-SM-J-03-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0005 ± 0.0002	~Blank	0.0007 ± 0.0003	~Blank
	BK60-SM-J-01-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0005 ± 0.0002	~Blank	0.0005 ± 0.0002	~Blank
	BK60-SM-J-02-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank	0.0001 ± 0.0001	~Blank
	BK60-SM-J-03-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0004 ± 0.0002	~Blank	0.0002 ± 0.0002	~Blank
	BK61-SM-J-01-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	BK61-SM-J-02-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	0.0001 ± 0.0001	~Blank
	BK61-SM-J-03-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0001 ± 0.0001	~Blank
	BK61-SM-J-04-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank
	BK68-SM-J-01-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
	BK69-SM-J-01-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0003 ± 0.0002	~Blank
	BK70-SM-J-01-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	0.0001 ± 0.0001	~Blank
	BK70-SM-J-02-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0281 ± 0.0030	0.00091 ± 0.00033	0.0001 ± 0.0001	<0.0117 (0.0007 ± 0.0069)
	BK73-SM-J-01-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0002)	~Blank	0.0002 ± 0.0001	~Blank
	BK73-SM-J-02-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
	BK73-SM-J-03-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	BK73-SM-J-04-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	BK73-SM-J-05-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	BK73-SM-J-06-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	BK73-SM-J-07-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0003 ± 0.0002	~Blank
	BK73-SM-J-08-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank

Notes:

1) "nr" no result reported by laboratory"

2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 1 Summary Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical Method

		Analytical Method →				14.			ORISE AP11	ORISE AP5
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Technetium-99
Matrix	Sample ID	Units ↓	Result	Result	Result	Result	Result	Result	Result	Result
BK73-SM-J-09-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank
BK73-SM-J-10-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank	0.0002 ± 0.0001	~Blank
BK73-SM-J-11-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
BK73-SM-J-12-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0003 (0.0001 ± 0.0001)	~Blank
BK73-SM-J-13-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0003 (0.0002 ± 0.0002)	~Blank
BK73-SM-J-14-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0004 ± 0.0002	~Blank	0.0002 ± 0.0002	~Blank
SJ18-SM-J-01-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0002 ± 0.0001	~Blank
SJ18-SM-J-02-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	<0.0003 (0.0002 ± 0.0002)	~Blank	~Blank	~Blank
SJ18-SM-J-03-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0004 ± 0.0002	~Blank	0.0004 ± 0.0002	~Blank
SJ18-SM-J-04-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0004 ± 0.0002	~Blank	0.0004 ± 0.0002	~Blank
SJ18-SM-J-05-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0004 ± 0.0002	~Blank	0.0003 ± 0.0002	~Blank
SJ18-SM-J-06-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0002 ± 0.0002	~Blank
SJ18-SM-J-07-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ18-SM-J-08-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ18-SM-J-09-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0002 ± 0.0001	~Blank
SJ18-SM-J-10-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	0.0003 ± 0.0002	~Blank
SJ18-SM-J-11-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank
SJ18-SM-J-12-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0002 ± 0.0001	~Blank
SJ18-SM-J-13-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0004 ± 0.0002	~Blank	0.0002 ± 0.0001	~Blank
SJ18-SM-J-14-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0002)	~Blank	~Blank	~Blank
SJ18-SM-J-15-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0002)	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank
SJ18-SM-J-16-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	~Blank	~Blank
SJ18-SM-J-17-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0002	~Blank
SJ32-SM-J-01-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
SJ32-SM-J-02-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0002	~Blank	0.0002 ± 0.0001	~Blank
SJ32-SM-J-03-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ32-SM-J-04-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	~Blank	~Blank
SJ32-SM-J-05-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ32-SM-J-06-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ32-SM-J-07-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ33-SM-J-01-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0004 ± 0.0002	~Blank	0.0002 ± 0.0002	~Blank
SJ33-SM-J-02-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ33-SM-J-03-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ33-SM-J-04-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	<0.0003 (0.0002 ± 0.0001)	~Blank	0.0002 ± 0.0001	~Blank
SJ33-SM-J-05-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ34-SM-J-01-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0005 ± 0.0002	~Blank	0.0003 ± 0.0002	0.0126 ± 0.0036
SJ34-SM-J-02-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ34-SM-J-03-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
SJ34-SM-J-04-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank
SJ34-SM-J-05-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ34-SM-J-06-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ34-SM-J-07-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0243 ± 0.0030	0.00083 ± 0.00031	0.0237 ± 0.0030	~Blank
SJ34-SM-J-08-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	<0.0062 (0.0016 ± 0.0037)
SJ34-SM-J-09-A		pCi/cm2	~Blank	~Blank	<0.0003 (0.0001 ± 0.0001)	~Blank	0.0003 ± 0.0002	~Blank	~Blank	~Blank
SJ34-SM-J-10-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ34-SM-J-11-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0002 ± 0.0001	~Blank
SJ35-SM-J-01-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ35-SM-J-02-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0001)	<0.0062 (0.0037 ± 0.0037)
SJ35-SM-J-03-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank
SJ35-SM-J-04-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0062 (0.0009 ± 0.0037)
SJ35-SM-J-05-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0062 (0.0007 ± 0.0037)
SJ35-SM-J-06-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ35-SM-J-07-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0062 (0.0012 ± 0.0037)
SJ35-SM-J-08-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	~Blank	~Blank
SJ35-SM-J-09-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
SJ35-SM-J-10-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	~Blank	~Blank
SJ35-SM-J-11-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ35-SM-J-12-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0062 (0.0016 ± 0.0037)
SJ35-SM-J-13-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	<0.0059 (0.0049 ± 0.0035)
SJ35-SM-J-14-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank	0.0003 ± 0.0002	~Blank
SJ35-SM-J-15-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0002 ± 0.0001	~Blank
SJ35-SM-J-16-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	~Blank	<0.0059 (0.0055 ± 0.0035)
SJ36-SM-J-01-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ36-SM-J-02-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ36-SM-J-03-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ36-SM-J-04-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
SJ36-SM-J-05-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ36-SM-J-06-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank

Notes:

1) "nr" no result reported by laboratory"

2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 1 Summary Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical Method

		Analytical Method →				15.			ORISE AP11	ORISE AP5
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Technetium-99
Matrix	Sample ID	Units ↓	Result	Result	Result	Result	Result	Result	Result	Result
SJ36-SM-J-07-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0003 ± 0.0002	~Blank
SJ36-SM-J-08-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	0.0002 ± 0.0001	~Blank
SJ36-SM-J-09-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank
SJ36-SM-J-10-A		pCi/cm2	~Blank	<0.0002 (0.0001 ± 0.0001)	<0.0003 (0.0001 ± 0.0001)	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank
SJ36-SM-J-11-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0002	~Blank
SJ36-SM-J-12-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ36-SM-J-13-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ37-SM-J-01-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ37-SM-J-02-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	~Blank	~Blank
SJ37-SM-J-03-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ37-SM-J-04-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank	~Blank	~Blank
SJ37-SM-J-05-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0002)	~Blank	~Blank	~Blank
SJ37-SM-J-06-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0061 ± 0.0036
SJ37-SM-J-07-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0002 ± 0.0001	~Blank
SJ37-SM-J-08-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0003 ± 0.0002	~Blank
SJ37-SM-J-09-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0082 ± 0.0037
SJ37-SM-J-10-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ37-SM-J-11-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ37-SM-J-12-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ38-SM-J-01-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	~Blank	~Blank
SJ38-SM-J-02-A		pCi/cm2	~Blank	~Blank	<0.0002 (0.0001 ± 0.0001)	~Blank	0.0003 ± 0.0002	~Blank	~Blank	~Blank
SJ38-SM-J-03-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ38-SM-J-04-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0003 ± 0.0002	0.0082 ± 0.0037
SJ38-SM-J-05-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ38-SM-J-06-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0002	~Blank	0.0003 ± 0.0002	0.0063 ± 0.0036
SJ38-SM-J-07-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ38-SM-J-08-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank
SJ38-SM-J-09-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ38-SM-J-10-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0002 ± 0.0002	~Blank
SJ38-SM-J-11-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
SJ39-SM-J-01-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
SJ39-SM-J-02-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0004 ± 0.0002	~Blank
SJ39-SM-J-03-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ39-SM-J-04-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ39-SM-J-05-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ39-SM-J-06-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank
SJ39-SM-J-07-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ39-SM-J-08-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	<0.0003 (0.0002 ± 0.0002)	~Blank	~Blank	~Blank
SJ39-SM-J-09-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank
SJ39-SM-J-10-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank
SJ39-SM-J-11-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	~Blank	~Blank
SJ39-SM-J-12-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	<0.0003 (0.0002 ± 0.0002)	~Blank	0.0002 ± 0.0001	~Blank
SJ39-SM-J-13-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
SJ40-SM-J-01-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ40-SM-J-02-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank
SJ40-SM-J-03-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	~Blank	~Blank
SJ40-SM-J-04-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	0.0002 ± 0.0001	~Blank
SJ40-SM-J-05-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0004 ± 0.0002	~Blank	0.0003 ± 0.0002	~Blank
SJ40-SM-J-06-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ40-SM-J-07-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank
SJ40-SM-J-08-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank	0.0004 ± 0.0002	~Blank
SJ41-SM-J-01-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	~Blank	~Blank
SJ41-SM-J-02-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ41-SM-J-03-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	<0.0003 (0.0002 ± 0.0002)	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank
SJ41-SM-J-04-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ41-SM-J-05-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
SJ41-SM-J-06-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	~Blank	~Blank
SJ41-SM-J-07-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0002	~Blank	0.0002 ± 0.0001	~Blank
SJ42-SM-J-01-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ42-SM-J-02-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0005 ± 0.0002	<0.00027 (0.00008 ± 0.00012)	0.0007 ± 0.0003	~Blank
SJ42-SM-J-03-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
SJ42-SM-J-04-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0006 ± 0.0002	~Blank	0.0004 ± 0.0002	~Blank
SJ42-SM-J-05-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
SJ42-SM-J-06-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank	0.0003 ± 0.0002	~Blank
SJ42-SM-J-07-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
SJ42-SM-J-08-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
SJ42-SM-J-09-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	~Blank	<0.0059 (0.0010 ± 0.0035)
SJ42-SM-J-10-A		pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0004 ± 0.0002	~Blank	0.0002 ± 0.0002	<0.0059 (0.0015 ± 0.0035)

Notes:

1) "nr" no result reported by laboratory"

2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 1 Summary Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical Method

		Analytical Method →	16.							ORISE AP11
		Radionuclide →								ORISE AP5
Matrix	Sample ID	Units ↓	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Technetium-99
			Result	Result	Result	Result	Result	Result	Result	Result
	SJ42-SM-J-11-A	pCi/cm2	<0.0003 (0.0001 ± 0.0001)	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	0.0002 ± 0.0001	~Blank
	SJ42-SM-J-12-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	SJ42-SM-J-13-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	<0.0059 (0.0045 ± 0.0036)
	SJ42-SM-J-14-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	~Blank	~Blank
	SJ42-SM-J-15-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	<0.0063 (0.0037 ± 0.0038)
	SJ42-SM-J-16-A	pCi/cm2	~Blank	~Blank	<0.0003 (0.0001 ± 0.0001)	~Blank	0.0004 ± 0.0002	~Blank	0.0004 ± 0.0002	~Blank
	SJ43-SM-J-01-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0063 (0.0046 ± 0.0038)
	SJ43-SM-J-02-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0002	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank
	SJ43-SM-J-03-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0003 ± 0.0002	~Blank
	SJ43-SM-J-04-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	SJ43-SM-J-05-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
	SJ43-SM-J-06-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	~Blank	~Blank
	SJ43-SM-J-07-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	SJ43-SM-J-08-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	SJ43-SM-J-09-A	pCi/cm2	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	~Blank	~Blank	~Blank
	SJ43-SM-J-10-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0003 ± 0.0002	~Blank
	SJ43-SM-J-11-A	pCi/cm2	~Blank	~Blank	<0.0003 (0.0001 ± 0.0001)	<0.0004 (0.0000 ± 0.0001)	~Blank	~Blank	<0.0002 (0.0002 ± 0.0001)	<0.0063 (0.0018 ± 0.0037)
	SJ43-SM-J-12-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	<0.0063 (0.0021 ± 0.0037)
	SJ43-SM-J-13-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
	SJ43-SM-J-14-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	SJ43-SM-J-15-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0001)	<0.0063 (0.0010 ± 0.0037)
	SJ43-SM-J-16-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0005 ± 0.0002	~Blank	0.0004 ± 0.0002	<0.0063 (0.0018 ± 0.0037)
	SJ43-SM-J-17-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	<0.0003 (0.0003 ± 0.0002)	<0.00024 (0.00008 ± 0.00011)	0.0004 ± 0.0002	~Blank
	SJ44-SM-J-01-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	0.0002 ± 0.0001	~Blank
	SJ44-SM-J-02-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
	SJ44-SM-J-03-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0002 ± 0.0001	~Blank
	SJ44-SM-J-04-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
	SJ44-SM-J-05-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	~Blank	~Blank
	SJ44-SM-J-06-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	0.0002 ± 0.0001	~Blank
	SJ44-SM-J-07-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	0.0003 ± 0.0002	~Blank
	SJ44-SM-J-08-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0004 ± 0.0002	~Blank	~Blank	~Blank
	SJ44-SM-J-09-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0002	~Blank	0.0003 ± 0.0002	~Blank
	SJ44-SM-J-10-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	~Blank	<0.0060 (0.0018 ± 0.0036)
	SJ45-SM-J-01-A	pCi/cm2	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank	~Blank	~Blank	~Blank
	SJ45-SM-J-02-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	0.00011 ± 0.00011	0.0003 ± 0.0002	~Blank
	SJ45-SM-J-03-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	<0.0059 (0.0053 ± 0.0036)
	SJ45-SM-J-04-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0002	~Blank
	SJ45-SM-J-05-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0059 (0.0051 ± 0.0036)
	SJ45-SM-J-06-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0002 ± 0.0001	~Blank
	SJ45-SM-J-07-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	SJ45-SM-J-08-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	SJ45-SM-J-09-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	0.00011 ± 0.00011	0.0003 ± 0.0002	~Blank
	SJ45-SM-J-10-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0002 ± 0.0001	~Blank
	SJ45-SM-J-11-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	~Blank	~Blank
	SJ45-SM-J-12-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank	0.0003 ± 0.0002	~Blank
	SJ45-SM-J-13-A	pCi/cm2	~Blank	~Blank	<0.0003 (0.0001 ± 0.0001)	~Blank	~Blank	~Blank	~Blank	~Blank
	SJ45-SM-J-14-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	<0.0002 (0.0002 ± 0.0001)	~Blank	0.0002 ± 0.0001	~Blank
	SJ45-SM-J-15-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.0003 ± 0.0002	~Blank
	SJ45-SM-J-16-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	SJ45-SM-J-17-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0059 (0.0017 ± 0.0035)
	SJ45-SM-J-18-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	<0.0059 (0.0034 ± 0.0035)
	SJ45-SM-J-19-A	pCi/cm2	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
WG	SJ16-GW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.6000 ± 0.2200	~Blank	0.3600 ± 0.1700	~Blank
	SR04-GW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.3900 ± 0.1700	~Blank	0.3300 ± 0.1500	~Blank
WS	BK01-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.3400 ± 0.1600	~Blank	0.1700 ± 0.1100	~Blank
	BK02-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.8500 ± 0.2700	~Blank	0.8900 ± 0.2700	~Blank
	BK03-SW-J-01-A	pCi/L	~Blank	~Blank	0.077 ± 0.076	~Blank	0.2300 ± 0.1400	~Blank	<0.2400 (0.0800 ± 0.1100)	~Blank
	BK04-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.8800 ± 0.2700	<0.23000 (0.09000 ± 0.11000)	0.6500 ± 0.2400	~Blank
	BK04-SW-J-02-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.3300 ± 0.1600	~Blank	0.2400 ± 0.1300	~Blank
	BK05-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.4400 ± 0.1900	~Blank	0.5600 ± 0.2200	~Blank
	BK06-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	<0.1900 (0.1000 ± 0.1000)	~Blank	<0.1900 (0.1000 ± 0.1000)	<3.4647 (1.8818 ± 2.0654)
	BK07-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.5700 ± 0.2200	~Blank	0.4300 ± 0.1800	~Blank
	BK08-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	BK30-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	<0.1900 (0.1000 ± 0.1000)	~Blank	~Blank	~Blank
	BK30-SW-J-02-A	pCi/L	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	BK50-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.2500 ± 0.1400	~Blank	0.2500 ± 0.1400	~Blank
	BK51-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.7600 ± 0.2500	~Blank	0.4200 ± 0.1900	~Blank

Notes:

1) "nr" no result reported by laboratory"

2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 1 Summary Detected Concentrations Reported by REAL Laboratory and Grouped by Analytical Method

		Analytical Method →	ORISE AP11							ORISE AP5
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Technetium-99
Matrix	Sample ID	Units ↓	Result	Result	Result	Result	Result	Result	Result	Result
	SJ11-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.2600 ± 0.1400	~Blank	<0.1900 (0.1200 ± 0.1100)	~Blank
	SJ12-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.2200 ± 0.1300	~Blank	0.2200 ± 0.1300	<3.4999 (1.4442 ± 2.0805)
	SJ13-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	SJ13-SW-J-02-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.4000 ± 0.1900	~Blank	0.1600 ± 0.1100	~Blank
	SJ14-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.1800 ± 0.1200	~Blank	~Blank	~Blank
	SJ15-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	<0.2000 (0.1500 ± 0.1200)	~Blank	~Blank	~Blank
	SJ15-SW-J-02-A	pCi/L	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	SJ16-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.8700 ± 0.2600	~Blank	0.4500 ± 0.1900	~Blank
	SJ16-SW-J-02-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.1110 ± 0.0890	~Blank	0.1700 ± 0.1100	<3.4999 (1.4310 ± 2.0803)
	SJ16-SW-J-03-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.8100 ± 0.2500	~Blank	0.5100 ± 0.2000	~Blank
	SJ17-SW-J-02-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.2100 ± 0.1200	~Blank	~Blank	~Blank
	SJ18-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.4700 ± 0.1900	~Blank	0.3900 ± 0.1700	~Blank
	SJ19-SW-J-01-A	pCi/L	~Blank	~Blank	<0.235 (0.038 ± 0.092)	~Blank	<0.1840 (0.0960 ± 0.1000)	~Blank	~Blank	~Blank
	SJ20-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	<0.1900 (0.1000 ± 0.1000)	~Blank	~Blank	~Blank
	SJ22-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	0.1600 ± 0.1100	~Blank
	SJ23-SW-J-01-A	pCi/L	~Blank	~Blank	<0.243 (0.040 ± 0.095)	~Blank	0.1130 ± 0.0910	~Blank	~Blank	~Blank
	SJ23-SW-J-02-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.6100 ± 0.2200	~Blank	0.6500 ± 0.2200	<3.7754 (2.7960 ± 2.2596)
	SJ24-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.1600 ± 0.1100	~Blank	~Blank	~Blank
	SJ31-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.2000 ± 0.1200	~Blank	0.1800 ± 0.1100	~Blank
	SR02-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	<0.1700 (0.1400 ± 0.1100)	~Blank	0.1260 ± 0.0940	~Blank
	SR08-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank	~Blank
	SR12-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.1400 ± 0.1000	0.12000 ± 0.11000	~Blank	~Blank
	SR27-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.2100 ± 0.1400	~Blank	0.1340 ± 0.1000	~Blank
	SR29-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	0.1130 ± 0.0910	~Blank	~Blank	~Blank
	SR34-SW-J-01-A	pCi/L	~Blank	~Blank	~Blank	~Blank	1.1200 ± 0.3000	~Blank	0.7200 ± 0.2300	~Blank

Notes: 1) "nr" no result reported by laboratory"
2) "<" designates a sample result that is lower than the laboratory's ability to reliably quantify. Results reported as <MDA (Results ± St Dev)

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide Units ↓	Americium-241 Result	Neptunium-237 Result	Plutonium-238 Result	Plutonium-239/240 Result	Technetium-99 Result	Uranium-233/234 Result	Uranium-235/236 Result	Uranium-238 Result
SE	BK01-SD-J-01-A	pCi/g	0.0072±0.0071	<0.0055 (0.0000±0.0036)	<0.0055 (0.0037±0.0051)	<0.0176 (0.0092±0.0096)	<0.2396 (-0.0138±0.1371)	1.9700±0.2100	0.0870±0.0300	1.9300±0.2100
	BK03-SD-J-01-A	pCi/g	0.0074±0.0073	<0.0052 (0.0000±0.0034)	<0.0052 (0.0000±0.0034)	0.0069±0.0068	<0.2424 (-0.0876±0.1357)	2.1700±0.2300	0.1050±0.0330	2.0900±0.2300
	BK04-SD-J-01-A	pCi/g	<0.0171 (0.0018±0.0061)	0.0050±0.0057	<0.0206 (0.0034±0.0081)	<0.0161 (0.0034±0.0066)	<0.2643 (0.2020±0.1583)	5.2900±0.5300	0.2040±0.0490	4.9800±0.5000
	BK04-SD-J-02-A	pCi/g	<0.0071 (0.0000±0.0047)	<0.0061 (0.0041±0.0056)	<0.0194 (0.0000±0.0056)	0.0180±0.0120	<0.3019 (0.2645±0.1812)	3.8900±0.4700	0.1470±0.0430	3.9000±0.4700
	BK05-SD-J-01-A	pCi/g	<0.0052 (0.0035±0.0048)	<0.0165 (-0.0017±0.0034)	<0.0051 (0.0034±0.0048)	0.0150±0.0100	<0.2405 (-0.0521±0.1361)	1.2800±0.1500	0.0650±0.0240	1.1900±0.1400
	BK06-SD-J-01-A	pCi/g	<0.0059 (0.0039±0.0055)	<0.0183 (0.0000±0.0053)	<0.0057 (0.0019±0.0037)	<0.0274 (0.0000±0.0091)	<0.2410 (-0.1567±0.1320)	2.7100±0.2800	0.0940±0.0310	2.7200±0.2800
	BK07-SD-J-01-A	pCi/g	0.0056±0.0063	<0.0051 (0.0017±0.0033)	<0.0051 (0.0034±0.0047)	0.0051±0.0058	<0.2383 (-0.0448±0.1351)	2.3400±0.2500	0.0890±0.0290	2.3400±0.2500
	BK08-SD-J-01-A	pCi/g	0.0050±0.0057	<0.0212 (-0.0017±0.0058)	<0.0051 (0.0017±0.0034)	<0.0051 (0.0017±0.0034)	<0.2425 (-0.1331±0.1339)	2.2500±0.2400	0.0800±0.0270	2.3100±0.2400
	BK30-SD-J-01-A	pCi/g	<0.0064 (0.0000±0.0042)	<0.0168 (0.0035±0.0069)	<0.0168 (-0.0018±0.0034)	<0.0170 (0.0120±0.0100)	<0.2525 (-0.0751±0.1418)	1.1200±0.1300	0.0500±0.0220	1.1000±0.1300
	BK50-SD-J-01-A	pCi/g	0.0053±0.0060	<0.0051 (0.0000±0.0033)	<0.0209 (0.0000±0.0066)	<0.0162 (0.0000±0.0047)	<0.2545 (0.1395±0.1517)	1.2600±0.1500	0.0620±0.0230	1.2200±0.1400
	BK51-SD-J-01-A	pCi/g	<0.0057 (0.0000±0.0037)	<0.0165 (-0.0017±0.0034)	<0.0051 (0.0000±0.0034)	0.0069±0.0068	<0.2592 (0.0830±0.1537)	1.3400±0.1600	0.0410±0.0210	1.3500±0.1600
	SJ10-SD-J-01-A	pCi/g	0.0056±0.0064	<0.0053 (0.0000±0.0034)	<0.0167 (-0.0017±0.0034)	<0.0052 (0.0035±0.0048)	<0.2272 (-0.0403±0.1336)	0.9700±0.1200	0.0480±0.0210	0.9800±0.1200
	SJ12-SD-J-01-A	pCi/g	<0.0165 (0.0052±0.0076)	<0.0154 (0.0016±0.0055)	<0.0048 (0.0016±0.0031)	0.0048±0.0055	<0.2290 (-0.0785±0.1342)	1.1300±0.1300	0.0470±0.0190	1.0300±0.1200
	SJ13-SD-J-01-A	pCi/g	0.0063±0.0071	<0.0055 (0.0037±0.0051)	<0.0055 (0.0018±0.0036)	0.0074±0.0073	<0.2440 (-0.0440±0.1432)	1.0800±0.1300	0.0490±0.0220	1.1300±0.1400
	SJ13-SD-J-02-A	pCi/g	<0.0192 (0.0000±0.0056)	<0.0054 (0.0018±0.0036)	<0.0054 (0.0000±0.0035)	0.0054±0.0062	0.2957±0.1512	1.1400±0.1400	0.0550±0.0240	1.0400±0.1300
	SJ14-SD-J-01-A	pCi/g	0.0160±0.0110	0.0078±0.0077	0.0078±0.0077	<0.0187 (0.0039±0.0077)	<0.4185 (-0.2319±0.2438)	1.1900±0.1500	0.0500±0.0230	1.1500±0.1400
	SJ15-SD-J-01-A	pCi/g	0.0170±0.0110	<0.0220 (0.0000±0.0064)	<0.0069 (0.0023±0.0045)	0.0092±0.0090	<0.4106 (0.0635±0.2428)	1.1500±0.1400	0.0410±0.0210	1.0300±0.1300
	SJ15-SD-J-02-A	pCi/g	<0.0200 (0.0120±0.0110)	<0.0187 (0.0039±0.0076)	0.0170±0.0120	<0.0058 (0.0019±0.0038)	<0.4264 (-0.0643±0.2505)	1.3100±0.1500	0.0420±0.0200	1.3100±0.1500
	SJ16-SD-J-01-A	pCi/g	<0.0060 (0.0020±0.0039)	<0.0163 (0.0000±0.0047)	<0.0051 (0.0017±0.0033)	<0.0162 (0.0017±0.0058)	<0.2982 (0.0412±0.1763)	0.9200±0.1200	0.0310±0.0170	0.8500±0.1100
	SJ16-SD-J-02-A	pCi/g	<0.0219 (0.0000±0.0063)	<0.0179 (-0.0019±0.0037)	<0.0056 (0.0019±0.0037)	<0.0178 (0.0074±0.0090)	<0.2949 (-0.1398±0.1721)	0.8700±0.1100	0.0300±0.0170	0.7500±0.1000
	SJ16-SD-J-03-A	pCi/g	<0.0068 (0.0046±0.0063)	<0.0189 (0.0000±0.0055)	<0.0059 (0.0020±0.0039)	0.0079±0.0077	<0.3060 (0.0377±0.1808)	0.9200±0.1200	0.0500±0.0220	0.8200±0.1100
	SJ17-SD-J-01-A	pCi/g	0.0250±0.0160	<0.0060 (0.0000±0.0039)	<0.0059 (0.0040±0.0055)	0.0280±0.0160	<0.3092 (-0.0323±0.1818)	0.8500±0.1100	0.0420±0.0210	0.7100±0.1000
	SJ17-SD-J-02-A	pCi/g	<0.0277 (-0.0023±0.0077)	<0.0054 (0.0000±0.0035)	<0.0054 (0.0018±0.0035)	<0.0054 (0.0000±0.0035)	<0.3037 (-0.1485±0.1772)	0.9100±0.1200	0.0370±0.0190	0.8800±0.1100
	SJ18-SD-J-01-A	pCi/g	<0.0251 (-0.0020±0.0069)	<0.0056 (0.0019±0.0037)	<0.0056 (0.0000±0.0037)	0.0056±0.0064	<0.2965 (-0.1395±0.1731)	1.0800±0.1300	0.0560±0.0230	1.1400±0.1400
	SJ19-SD-J-01-A	pCi/g	<0.0064 (0.0000±0.0042)	<0.0244 (-0.0040±0.0055)	0.0079±0.0078	0.0220±0.0130	<0.3277 (-0.1235±0.1917)	0.9500±0.1200	0.0500±0.0230	0.8900±0.1200
	SJ20-SD-J-01-A	pCi/g	<0.0060 (0.0040±0.0055)	<0.0179 (0.0000±0.0052)	<0.0056 (0.0000±0.0036)	<0.0056 (0.0037±0.0052)	<0.3144 (-0.0586±0.1846)	1.3900±0.1600	0.0750±0.0280	1.1700±0.1400
	SJ23-SD-J-01-A	pCi/g	<0.0057 (0.0038±0.0053)	<0.0059 (0.0000±0.0038)	<0.0058 (0.0039±0.0054)	0.0078±0.0077	<0.2994 (-0.0708±0.1756)	0.6070±0.0900	0.0180±0.0140	0.4790±0.0760
	SJ24-SD-J-01-A	pCi/g	<0.0061 (0.0000±0.0040)	<0.0189 (0.0020±0.0067)	<0.0189 (-0.0020±0.0039)	<0.0189 (0.0020±0.0067)	<0.3007 (0.0342±0.1776)	0.8800±0.1200	0.0430±0.0210	0.9400±0.1200
	SR27-SD-J-01-A	pCi/g	0.0065±0.0074	<0.0272 (0.0000±0.0091)	<0.0231 (0.0000±0.0074)	<0.0270 (0.0040±0.0100)	<0.3113 (0.0117±0.1836)	1.5500±0.1800	0.0520±0.0220	1.2500±0.1500
	SR29-SD-J-01-A	pCi/g	<0.0302 (-0.0025±0.0083)	<0.0047 (0.0016±0.0031)	<0.0047 (0.0000±0.0031)	<0.0047 (0.0016±0.0031)	<0.3254 (0.1747±0.1940)	0.7500±0.1000	0.0550±0.0240	0.8200±0.1100
	SR34-SD-J-01-A	pCi/g	<0.0060 (0.0040±0.0056)	<0.0057 (0.0038±0.0053)	<0.0183 (0.0057±0.0084)	<0.0057 (0.0019±0.0037)	<0.2940 (0.2064±0.1758)	0.9600±0.1200	0.0390±0.0200	0.8700±0.1200
SO	BK09-SO-R-01-A	pCi/g	<0.0055 (0.0037±0.0051)	<0.0055 (0.0018±0.0036)	<0.0055 (0.0018±0.0036)	0.0160±0.0110	<0.2400 (-0.0347±0.1365)	1.4200±0.1700	0.0720±0.0270	1.4700±0.1700
	BK10-SO-R-01-A	pCi/g	0.0090±0.0080	<0.0055 (0.0000±0.0036)	<0.0054 (0.0036±0.0050)	<0.0054 (0.0018±0.0036)	2.2741±0.2163	1.3600±0.1600	0.0560±0.0240	1.4000±0.1600
	BK11-SO-R-01-A	pCi/g	<0.0177 (0.0092±0.0096)	<0.0057 (0.0038±0.0053)	<0.0181 (0.0057±0.0083)	0.0250±0.0140	<0.2402 (-0.0521±0.1359)	1.2000±0.1400	0.0770±0.0270	1.3900±0.1600
	BK12-SO-R-01-A	pCi/g	<0.0181 (0.0057±0.0083)	<0.0173 (0.0036±0.0071)	<0.0172 (-0.0018±0.0035)	<0.0221 (0.0036±0.0086)	<0.2427 (-0.0280±0.1383)	0.9600±0.1200	0.0550±0.0240	0.9400±0.1200
	BK15-SO-J-01-A	pCi/g	<0.0169 (0.0053±0.0077)	<0.0212 (-0.0034±0.0048)	<0.0165 (0.0034±0.0067)	<0.0165 (0.0052±0.0075)	<0.2425 (-0.0070±0.1390)	1.0700±0.1300	0.0290±0.0170	1.1700±0.1400
	BK16-SO-R-01-A	pCi/g	<0.0055 (0.0018±0.0036)	<0.0056 (0.0000±0.0036)	0.0055±0.0063	<0.0177 (0.0055±0.0081)	<0.2433 (-0.0070±0.1395)	2.3000±0.2500	0.1060±0.0320	1.4100±0.1600
	BK18-SO-R-01-A	pCi/g	<0.0157 (0.0000±0.0045)	<0.0052 (0.0000±0.0034)	<0.0165 (0.0034±0.0068)	0.0086±0.0076	<0.2413 (-0.0837±0.1352)	1.4100±0.1600	0.0740±0.0260	1.4900±0.1700
	BK21-SO-J-01-A	pCi/g	<0.0212 (0.0066±0.0097)	<0.0058 (0.0039±0.0054)	<0.0058 (0.0000±0.0038)	0.0058±0.0066	<0.2403 (-0.0521±0.1360)	1.3300±0.1600	0.0530±0.0230	1.4600±0.1700
	BK22-SO-R-01-A	pCi/g	<0.0254 (0.0021±0.0090)	<0.0231 (0.0000±0.0074)	<0.0180 (0.0000±0.0052)	0.0190±0.0120	<0.2349 (-0.1426±0.1291)	2.0100±0.2200	0.0880±0.0300	2.0600±0.2300
	BK23-SO-R-01-A	pCi/g	0.0092±0.0091	<0.0165 (0.0034±0.0068)	<0.0051 (0.0017±0.0034)	0.0170±0.0110	<0.2355 (-0.0918±0.1315)	1.6000±0.1800	0.0780±0.0280	1.5100±0.1700
	BK24-SO-R-01-A	pCi/g	0.0150±0.0110	<0.0053 (0.0018±0.0035)	<0.0169 (0.0000±0.0049)	0.0210±0.0120	<0.2396 (-0.0450±0.1359)	0.9900±0.1200	0.0620±0.0240	1.0700±0.1300
	BK25-SO-R-01-A	pCi/g	<0.0179 (0.0037±0.0074)	<0.0052 (0.0000±0.0034)	<0.0052 (0.0017±0.0034)	<0.0166 (0.0087±0.0090)	<0.2365 (-0.1025±0.1317)	1.3500±0.1600	0.0520±0.0220	1.4000±0.1600
	BK27-SO-R-01-A	pCi/g	<0.0065 (0.0022±0.0043)	<0.0175 (0.0000±0.0051)	<0.0225 (-0.0037±0.0051)	0.0150±0.0100	<0.2464 (-0.0586±0.1390)	0.9900±0.1200	0.0420±0.0210	1.0300±0.1300
	BK28-SO-R-01-A	pCi/g	0.0111±0.0098	<0.0056 (0.0000±0.0037)	0.0111±0.0090	0.0150±0.0100	<0.2517 (-0.0524±0.1423)	1.1800±0.1400	0.0410±0.0220	1.2800±0.1500
	BK29-SO-R-01-A	pCi/g	<0.0280 (0.0110±0.0130)	<0.0055 (0.0036±0.0051)	<0.0174 (0.0000±0.0050)	0.0240±0.0130	<0.2518 (0.0337±0.1459)	0.9400±0.1200	0.0390±0.0190	0.9800±0.1200
	BK37-SO-R-01-A	pCi/g	<0.0292 (-0.0020±0.0089)	<0.0221 (0.0000±0.0070)	0.0072±0.0070	<0.0170 (0.0130±0.0110)	<0.2507 (-0.1117±0.1392)	0.9800±0.1200	0.0340±0.0180	1.0000±0.1200
	BK38-SO-R-01-A	pCi/g	<0.0179 (0.0019±0.0064)	<0.0056 (0.0037±0.0052)	<0.0056 (0.0019±0.0036)	<0.0180 (0.0110±0.0100)	<0.2503 (-0.0558±0.1414)	0.9900±0.1200	0.0560±0.0230	1.0300±0.1300
	BK39-SO-R-01-A	pCi/g	0.0063±0.0071	<0.0176 (0.0018±0.0062)	0.0055±0.0062	0.0110±0.0088	<0.2520 (-0.0599±0.1421)	1.0200±0.1300	0.0520±0.0230	0.9400±0.1200
	BK40-SO-R-01-A	pCi/g	<0.0201 (0.0042±0.0083)	<0.0057 (0.0019±0.0037)	<0.0057 (0.0019±0.0037)	0.0076±0.0075	<0.2500 (-0.1077±0.1389)	0.8700±0.1100	0.0260±0.0150	0.9200±0.1200
	BK41-SO-R-01-A	pCi/g	<0.0182 (0.0095±0.0099)	<0.0055 (0.0018±0.0036)	<0.0176 (0.0037±0.0072)	0.0180±0.0120	<0.2517 (-0.0112±0.1440)	1.1200±0.1400	0.0480±0.0230	1.1600±0.1400
	BK42-SO-R-01-A	pCi/g	<0.0056 (0.0019±0.0036)	<0.0172 (0.0000±0.0050)	0.0054±0.0061	0.0090±0.0079	<0.2515 (0.0112±0.1448)	1.2800±0.1500	0.0300±0.0170	1.3000±0.1500
	BK43-SO-R-01-A	pCi/g	<0.0056 (0.0037±0.0052)	<0.0182 (-0.0019±0.0037)	<0.0057 (0.0000±0.0037)	0.0057±0.0065	<0.2500 (0.0632±0.1461)	1.2100±0.1500	0.0730±0.0260	1.3000±0.1500
	BK44-SO-R-01-A	pCi/g	<0.0195 (0.0061±0.0090)	<0.0178 (-0.0019±0.0036)	<0.0056 (0.0019±0.0036)	0.0111±0.0090	<0.2502 (0.0037±0.1437)	10.3000±1.1000	0.3590±0.0800	8.3700±0.9000
	BK44-SO-R-02-A	pCi/g	<0.0250 (0.0050±0.0100)	<0.0063 (0.0000±0.0041)	<0.0063 (0.0000±0.0041)	<0.0202 (0.0000±0.0058)	0.7524±0.1762	1.9400±0.2400	0.0970±0.0330	1.8700±0.2400
	BK44-SO-R-03-A	pCi/g	<0.0288 (-0.0023±0.0080)	<0.0234 (0.0038±0.0091)	<0.0273 (0.0019±0.0098)	<0.0233 (0.0019±0.0083)	<0.2856 (0.1492±0.1701)	2.0900±0.2600	0.0820±0.0310	2.1300±0.2700
	BK44-SO-R-04-A	pCi/g	<0.0334 (-0.0054±0.0076)	<0.0255 (-0.0021±0.0070)	<0.0198 (0.0000±0.0057)	0.0062±0.0070	<0.2990 (-0.0160±0.1760)	1.5500±0.2000	0.0460±0.0220	1.6100±0.2100
	BK44-SO-R-05-A	pCi/g	<0.0224 (-0.0023±0.0046)	<0.0061 (0.0000±0.0040)	<0.0060 (0.0000±0.0039)	<0.0060 (0.0020±0.0039)	<0.3049 (0.1155±0.1811)	1.4200±0.1900	0.0700±0.0270	1.4400±0.1900
	BK45-SO-R-01-A	pCi/g	<0.0058 (0.0039±0.0054)	0.0054±0.0061	0.0054±0.0061	0.0054±0.0061	<0.2517 (0.0150±0.1451)	4.9300±0.5100	0.2230±0.0530	5.2500±0.5400
	BK45-SO-R-02-A	pCi/g	0.0075±0.0085	<0.0057 (0.0019±0.0037)	<0.0057 (0.0038±0.0052)	0.0132±0.0099	0.8891±0.1807	3.7100±0.4500	0.1560±0.0450	3.5300±0.4300
	BK45-SO-R-03-A	pCi/g	<0.0340 (-0.0020±0.0100)	0.0077±0.0075	<0.0057 (0.0000±0.0038)	<0.0183 (0.0057±0.0084)	<0.2866 (0.2727±0.1723)	3.8200±0.4600	0.1110±0.0360	3.7700±0.4500
	BK45-SO-R-04-A	pCi/g	0.0067±0.0076	<0.0197 (-0.0021±0.0040)	<0.0061 (0.0041±0.0057)	<0.0196 (0.0020±0.0070)	0.5663±0.1767	4.2100±0.5100	0.1930±0.0510	4.1700±0.5000
	BK45-SO-R-05-A	pCi/g	<0.0246 (0.0000±0.0071)	<0.0201 (0.0042±0.0083)	<0.0063 (0.0000±0.0041)	0.0063±0.0071	0.5995±0.1771	4.3100±0.5200	0.2060±0.0520	4.4000±0.5300
	BK46-SO-R-01-A	pCi/g	<0.0056 (0.0037±0.0051)	<0.0051 (0.0000±0.0033)	<0.0209 (0.0034±0.0082)	<0.0051 (0.0034±0.0047)	<0.2514 (0.0000±0.1443)	2.6800±0.2800	0.1150±0.0340	2.7400±0.2900
	BK46-SO-R-02-A	pCi/g	<0.0281 (0.0023±0.0100)	<0.0059 (0.0020±0.0038)	<0.0187 (0.0000±0.0054)	<0.0187 (0.0078±0.0094)	<0.3013 (0.2398±0.1806)	2.7500±0.3400	0.1100±0.0360	2.6800±0.3300
	BK46-SO-R-03-A	pCi/g	<0.0073 (0.0049±0.0068)	<0.0059 (0.0020±0.0039)	<0.0059 (0.0020±0.0039)	<0.0188 (0.0059±0.0086)	<0.2992 (0.0675±0.1771)	2.8100±0.3500	0.1380±0.0420	2.9300±0.3600
	BK46-SO-R-04-A	pCi/g	<0.0085 (0.0000±0.0056)	<0.0249 (-0.0020±0.0069)	0.0081±0.0080	<0.0061 (0.0040±0.0056)	<0.3040 (0.0756±0.1801)	3.8600±0.4600	0.2030±0.0510	3.5700±0.4300
	BK46-SO-R-05-A	pCi/g	<0.0341 (-0.0028±0.0094)	<0.0062 (0.0042±0.0058)	<0.0198 (0.0021±0.0070)	0.0062±0.0071	<0.2999 (0.0631±0.1775)	3.7500±0.4500	0.1660±0.0450	3.7900±0.4500

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide / Units ↓	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
			Result	Result	Result	Result	Result	Result	Result	Result
BK47-SO-R-01-A		pCi/g	0.0055±0.0062	<0.0173 (0.0000±0.0050)	0.0072±0.0071	0.0108±0.0087	<0.2505 (-0.1489±0.1375)	1.8000±0.2000	0.0720±0.0260	1.8100±0.2000
BK48-SO-R-01-A		pCi/g	<0.0058 (0.0039±0.0054)	<0.0055 (0.0018±0.0036)	<0.0055 (0.0037±0.0051)	<0.0176 (0.0074±0.0089)	<0.2512 (-0.0373±0.1426)	2.2100±0.2400	0.1020±0.0330	2.0700±0.2300
BK49-SO-R-01-A		pCi/g	<0.0177 (0.0018±0.0063)	<0.0180 (-0.0019±0.0037)	0.0056±0.0064	<0.0179 (0.0094±0.0098)	0.3327±0.1787	1.8600±0.2000	0.0840±0.0290	1.5800±0.1800
BK55-SO-J-01-A		pCi/g	<0.0184 (0.0038±0.0075)	<0.0042 (0.0000±0.0027)	<0.0042 (0.0014±0.0027)	0.0056±0.0055	0.3107±0.1584	0.6670±0.0910	<0.0210 (0.0130±0.0120)	0.6530±0.0900
BK56-SO-J-01-A		pCi/g	<0.0055 (0.0018±0.0036)	<0.0050 (0.0000±0.0032)	<0.0049 (0.0033±0.0046)	<0.0202 (0.0033±0.0079)	<0.2601 (0.0080±0.1534)	1.0500±0.1300	0.0480±0.0210	1.0200±0.1300
BK57-SO-J-01-A		pCi/g	<0.0061 (0.0041±0.0056)	<0.0056 (0.0000±0.0036)	<0.0056 (0.0000±0.0036)	0.0130±0.0097	<0.2647 (0.2432±0.1590)	1.4500±0.1700	0.0580±0.0240	1.5700±0.1800
BK58-SO-J-01-A		pCi/g	0.0088±0.0077	<0.0053 (0.0018±0.0034)	<0.0167 (0.0000±0.0048)	<0.0052 (0.0035±0.0049)	<0.2593 (0.2383±0.1558)	1.5800±0.1800	0.0730±0.0260	1.4900±0.1700
BK59-SO-J-01-A		pCi/g	0.0057±0.0065	<0.0049 (0.0000±0.0032)	<0.0048 (0.0000±0.0032)	<0.0048 (0.0032±0.0045)	<0.2636 (0.1191±0.1568)	0.7380±0.0960	0.0400±0.0180	0.8000±0.1000
BK62-SO-J-01-A		pCi/g	0.0100±0.0110	<0.0055 (0.0000±0.0036)	<0.0176 (0.0018±0.0062)	0.0129±0.0096	0.2665±0.1592	0.9500±0.1200	0.0370±0.0180	1.1000±0.1300
BK63-SO-J-01-A		pCi/g	<0.0180 (0.0019±0.0064)	<0.0217 (-0.0035±0.0049)	0.0053±0.0060	0.0105±0.0085	<0.2648 (0.2586±0.1593)	0.9400±0.1200	0.0490±0.0210	1.0700±0.1300
BK64-SO-J-01-A		pCi/g	0.0076±0.0075	<0.0055 (0.0000±0.0036)	<0.0054 (0.0036±0.0050)	0.0109±0.0088	<0.2629 (0.2020±0.1575)	1.0900±0.1300	0.0450±0.0200	1.0200±0.1300
BK65-SO-J-01-A		pCi/g	<0.0173 (0.0018±0.0061)	<0.0061 (0.0000±0.0040)	<0.0194 (-0.0020±0.0040)	0.0101±0.0089	<0.2961 (0.1556±0.1764)	1.2100±0.1400	0.0550±0.0230	1.3200±0.1500
BK66-SO-J-01-A		pCi/g	0.0059±0.0067	<0.0159 (0.0017±0.0056)	<0.0050 (0.0000±0.0032)	0.0099±0.0080	0.3753±0.1786	1.1100±0.1300	0.0440±0.0210	1.2300±0.1400
BK71-SO-J-01-A		pCi/g	0.0077±0.0076	0.0055±0.0063	<0.0055 (0.0000±0.0036)	<0.0176 (0.0018±0.0062)	0.2670±0.1572	1.4500±0.1600	0.0860±0.0280	1.4600±0.1600
BK72-SO-J-01-A		pCi/g	0.0109±0.0088	<0.0171 (-0.0018±0.0035)	0.0071±0.0070	<0.0170 (0.0120±0.0110)	<0.2601 (0.2239±0.1561)	1.0800±0.1300	0.0640±0.0240	1.1200±0.1300
SJ10-SO-J-01-A		pCi/g	0.0099±0.0087	<0.0054 (0.0018±0.0036)	<0.0054 (0.0000±0.0035)	<0.0173 (0.0072±0.0087)	<0.2313 (0.0334±0.1368)	1.1200±0.1400	0.0380±0.0190	1.1700±0.1400
SJ10-SO-J-02-A		pCi/g	0.0084±0.0074	<0.0166 (0.0000±0.0048)	<0.0052 (0.0035±0.0048)	0.0160±0.0100	0.3124±0.1393	1.1000±0.1300	0.0540±0.0220	1.1000±0.1300
SJ10-SO-J-03-A		pCi/g	<0.0186 (0.0058±0.0085)	<0.0254 (-0.0021±0.0070)	<0.0253 (-0.0021±0.0070)	0.0124±0.0100	<0.2270 (0.0562±0.1345)	1.1100±0.1400	0.0870±0.0320	1.1500±0.1500
SJ10-SO-J-04-A		pCi/g	<0.0051 (0.0017±0.0033)	<0.0053 (0.0035±0.0049)	<0.0052 (0.0017±0.0034)	0.0140±0.0098	<0.2269 (0.0843±0.1348)	1.0000±0.1300	0.0300±0.0180	1.0200±0.1300
SJ11-SO-J-01-A		pCi/g	<0.0169 (0.0053±0.0078)	<0.0052 (0.0000±0.0034)	0.0069±0.0068	0.0069±0.0068	0.2518±0.1386	1.2700±0.1500	0.0540±0.0220	1.1700±0.1400
SJ11-SO-J-02-A		pCi/g	<0.0054 (0.0018±0.0036)	<0.0051 (0.0000±0.0033)	<0.0161 (0.0017±0.0057)	0.0118±0.0088	<0.2343 (0.2244±0.1408)	2.0500±0.2200	0.0730±0.0250	1.2000±0.1400
SJ11-SO-J-03-A		pCi/g	0.0086±0.0075	0.0054±0.0061	<0.0053 (0.0018±0.0035)	0.0142±0.0100	<0.2268 (0.1189±0.1352)	1.0800±0.1300	0.0670±0.0250	1.0800±0.1300
SJ12-SO-J-01-A		pCi/g	<0.0165 (-0.0017±0.0034)	0.0049±0.0055	0.0049±0.0055	<0.0049 (0.0032±0.0045)	<0.2403 (-0.0139±0.1416)	1.5000±0.1700	0.0690±0.0260	1.4400±0.1700
SJ12-SO-J-02-A		pCi/g	<0.0284 (-0.0053±0.0077)	<0.0054 (0.0018±0.0036)	<0.0222 (-0.0018±0.0061)	<0.0054 (0.0036±0.0050)	3.1068±0.2141	1.9800±0.2100	0.0910±0.0290	1.8000±0.2000
SJ12-SO-J-03-A		pCi/g	0.0138±0.0097	<0.0210 (-0.0034±0.0047)	0.0085±0.0075	0.0220±0.0130	0.9490±0.1877	1.2000±0.1400	0.0520±0.0210	1.2000±0.1400
SJ12-SO-J-04-A		pCi/g	<0.0188 (0.0000±0.0054)	<0.0173 (-0.0018±0.0035)	<0.0172 (0.0000±0.0050)	<0.0172 (-0.0018±0.0035)	<0.2308 (0.0715±0.1370)	0.5430±0.0780	0.0310±0.0170	0.7050±0.0940
SJ13-SO-J-01-A		pCi/g	<0.0210 (0.0090±0.0100)	<0.0200 (0.0000±0.0058)	<0.0400 (-0.0100±0.0110)	<0.0540 (-0.0060±0.0190)	<0.2424 (-0.0428±0.1423)	1.2300±0.1500	0.0510±0.0230	1.2100±0.1500
SJ13-SO-J-02-A		pCi/g	0.0060±0.0068	<0.0174 (0.0000±0.0050)	<0.0173 (0.0018±0.0061)	0.0090±0.0080	<0.2442 (-0.0073±0.1438)	1.2200±0.1400	0.0420±0.0200	1.1000±0.1300
SJ13-SO-J-03-A		pCi/g	<0.0180 (0.0038±0.0074)	<0.0176 (0.0018±0.0036)	<0.0176 (0.0037±0.0072)	<0.0176 (0.0092±0.0095)	<0.2396 (0.2298±0.1441)	1.8500±0.2100	0.0870±0.0300	1.4000±0.1700
SJ13-SO-R-01-A		pCi/g	<0.0340 (0.0060±0.0140)	<0.0062 (0.0041±0.0057)	<0.0062 (0.0021±0.0040)	<0.0250 (0.0080±0.0110)	<0.2237 (0.0730±0.1328)	1.1500±0.1400	0.0370±0.0200	1.2300±0.1500
SJ13-SO-R-02-A		pCi/g	<0.0060 (0.0020±0.0040)	<0.0179 (0.0019±0.0063)	<0.0178 (0.0000±0.0052)	<0.0178 (0.0037±0.0073)	<0.2516 (-0.0766±0.1473)	1.1100±0.1400	0.0440±0.0210	1.1900±0.1400
SJ13-SO-R-03-A		pCi/g	<0.0279 (-0.0045±0.0063)	<0.0191 (0.0000±0.0055)	<0.0191 (0.0040±0.0078)	<0.0245 (0.0000±0.0078)	<0.2499 (-0.0404±0.1468)	1.1800±0.1500	0.0580±0.0250	1.2500±0.1500
SJ13-SO-R-04-A		pCi/g	0.0061±0.0070	<0.0057 (0.0019±0.0037)	<0.0057 (0.0000±0.0037)	0.0132±0.0098	<0.2407 (0.0751±0.1428)	0.9600±0.1200	0.0450±0.0210	1.1600±0.1400
SJ13-SO-R-05-A		pCi/g	<0.0189 (0.0020±0.0067)	<0.0182 (0.0000±0.0053)	<0.0057 (0.0019±0.0037)	0.0057±0.0064	<0.2481 (-0.0485±0.1456)	1.0200±0.1300	0.0540±0.0260	1.1600±0.1400
SJ13-SO-R-06-A		pCi/g	<0.0198 (0.0041±0.0081)	<0.0177 (-0.0018±0.0036)	<0.0176 (-0.0018±0.0036)	0.0092±0.0081	<0.2482 (-0.0877±0.1452)	1.0100±0.1300	0.0460±0.0210	1.0200±0.1300
SJ13-SO-R-07-A		pCi/g	<0.0062 (0.0000±0.0041)	<0.0058 (0.0019±0.0038)	<0.0058 (0.0000±0.0038)	0.0160±0.0110	<0.2479 (-0.0606±0.1454)	2.4300±0.2600	0.0880±0.0300	1.1300±0.1400
SJ13-SO-R-08-A		pCi/g	0.0061±0.0069	<0.0188 (-0.0020±0.0039)	<0.0059 (0.0039±0.0054)	0.0059±0.0067	<0.2439 (-0.0092±0.1437)	1.1100±0.1400	0.0660±0.0270	1.1800±0.1400
SJ13-SO-R-09-A		pCi/g	<0.0190 (0.0040±0.0078)	<0.0059 (0.0000±0.0039)	<0.0059 (0.0020±0.0039)	0.0280±0.0150	<0.2467 (-0.0455±0.1449)	1.0500±0.1300	0.0560±0.0240	1.1800±0.1500
SJ13-SO-R-10-A		pCi/g	<0.0199 (0.0042±0.0082)	<0.0179 (0.0019±0.0064)	<0.0179 (-0.0019±0.0037)	0.0131±0.0098	<0.2470 (-0.1496±0.1438)	1.1600±0.1400	0.0680±0.0260	1.1200±0.1400
SJ13-SO-R-11-A		pCi/g	0.0064±0.0073	<0.0061 (0.0020±0.0040)	<0.0194 (0.0000±0.0056)	<0.0061 (0.0000±0.0040)	<0.2424 (0.0921±0.1440)	1.1500±0.1400	0.0460±0.0230	1.1400±0.1400
SJ13-SO-R-12-A		pCi/g	<0.0241 (0.0025±0.0086)	<0.0194 (-0.0020±0.0040)	<0.0061 (0.0020±0.0040)	0.0101±0.0089	<0.3073 (-0.0641±0.1803)	1.1200±0.1600	0.0450±0.0220	1.1800±0.1600
SJ14-SO-J-01-A		pCi/g	<0.0250 (0.0060±0.0100)	<0.0233 (-0.0038±0.0053)	<0.0057 (0.0038±0.0053)	0.0190±0.0120	<0.2961 (0.1804±0.1768)	1.1600±0.1500	0.0290±0.0180	1.0400±0.1400
SJ14-SO-J-02-A		pCi/g	0.0190±0.0120	<0.0251 (0.0000±0.0080)	<0.0061 (0.0000±0.0040)	0.0122±0.0098	<0.4287 (0.1551±0.2546)	1.3100±0.1600	0.0810±0.0300	1.2200±0.1500
SJ14-SO-J-03-A		pCi/g	<0.0200 (0.0100±0.0110)	<0.0073 (0.0024±0.0048)	<0.0073 (0.0024±0.0048)	0.0150±0.0120	<0.2935 (0.0961±0.1741)	0.7800±0.1100	0.0370±0.0200	0.7400±0.1100
SJ14-SO-J-04-A		pCi/g	<0.0240 (0.0100±0.0120)	<0.0067 (0.0022±0.0044)	<0.0067 (0.0044±0.0062)	0.0160±0.0120	<0.4138 (0.0359±0.2443)	1.0900±0.1400	0.0580±0.0250	1.2500±0.1500
SJ14-SO-J-05-A		pCi/g	<0.0360 (0.0050±0.0140)	<0.0057 (0.0000±0.0037)	<0.0183 (0.0076±0.0092)	0.0114±0.0092	<0.3045 (0.0196±0.1797)	1.1900±0.1700	0.0690±0.0290	1.1700±0.1700
SJ14-SO-J-06-A		pCi/g	0.0100±0.0098	<0.0063 (0.0021±0.0041)	<0.0063 (0.0042±0.0058)	0.0150±0.0110	<0.3055 (-0.0521±0.1794)	1.2200±0.1700	0.0820±0.0310	1.2000±0.1700
SJ14-SO-J-07-A		pCi/g	<0.0309 (0.0000±0.0098)	<0.0063 (0.0021±0.0041)	<0.0063 (0.0042±0.0059)	<0.0063 (0.0000±0.0041)	<0.3065 (-0.1546±0.1787)	1.3000±0.1800	0.0510±0.0240	1.2400±0.1700
SJ14-SO-J-08-A		pCi/g	0.0150±0.0120	<0.0060 (0.0020±0.0039)	<0.0245 (0.0020±0.0087)	<0.0190 (0.0140±0.0120)	<0.3053 (-0.1007±0.1787)	1.1600±0.1600	0.0610±0.0260	1.1500±0.1600
SJ14-SO-R-01-A		pCi/g	0.0160±0.0120	<0.0208 (-0.0022±0.0043)	<0.0065 (0.0022±0.0043)	0.0150±0.0110	<0.2472 (0.1023±0.1470)	1.2800±0.1600	0.0400±0.0210	1.2400±0.1600
SJ14-SO-R-02-A		pCi/g	0.0108±0.0095	<0.0061 (0.0020±0.0040)	<0.0061 (0.0000±0.0040)	0.0160±0.0110	<0.2510 (-0.0396±0.1475)	0.9800±0.1200	0.0430±0.0210	0.9800±0.1200
SJ14-SO-R-03-A		pCi/g	<0.0303 (-0.0021±0.0092)	<0.0166 (-0.0017±0.0034)	<0.0165 (0.0000±0.0048)	0.0138±0.0097	<0.2944 (0.1693±0.1756)	1.1200±0.1400	0.0530±0.0260	1.2000±0.1500
SJ14-SO-R-04-A		pCi/g	<0.0058 (0.0019±0.0038)	0.0094±0.0083	0.0075±0.0074	0.0210±0.0120	0.8893±0.1846	2.8000±0.2900	0.1040±0.0320	1.3100±0.1500
SJ14-SO-R-05-A		pCi/g	0.0077±0.0076	<0.0179 (0.0056±0.0082)	0.0056±0.0063	0.0112±0.0090	2.1516±0.2025	0.8000±0.1000	0.0560±0.0230	0.8500±0.1100
SJ14-SO-R-06-A		pCi/g	0.0150±0.0110	<0.0234 (-0.0019±0.0065)	0.0076±0.0075	0.0133±0.0099	0.5944±0.1824	1.1800±0.1400	0.0430±0.0210	1.2900±0.1400
SJ14-SO-R-07-A		pCi/g	<0.0209 (0.0022±0.0074)	<0.0073 (0.0024±0.0048)	<0.0073 (0.0024±0.0047)	0.0120±0.0110	0.4195±0.1807	1.2000±0.1400	0.0670±0.0260	1.1200±0.1400
SJ14-SO-R-08-A		pCi/g	<0.0064 (0.0021±0.0042)	<0.0190 (0.0000±0.0055)	<0.0059 (0.0040±0.0055)	0.0200±0.0120	0.7449±0.1823	1.0500±0.1300	0.0350±0.0180	1.0400±0.1300
SJ14-SO-R-09-A		pCi/g	<0.0340 (0.0020±0.0120)	0.0058±0.0066	<0.0058 (0.0039±0.0054)	<0.0180 (0.0130±0.0110)	<0.4259 (0.2055±0.2536)	1.3600±0.1600	0.0500±0.0220	1.5000±0.1700
SJ14-SO-R-10-A		pCi/g	0.0118±0.0095	<0.0061 (0.0041±0.0057)	0.0061±0.0069	0.0140±0.0110	<0.4212 (0.3255±0.2523)	1.2800±0.1500	0.0480±0.0220	1.3100±0.1500
SJ14-SO-R-11-A		pCi/g	<0.0169 (0.0000±0.0049)	<0.0057 (0.0019±0.0037)	<0.0057 (0.0038±0.0053)	0.0300±0.0150	0.3029±0.1787	1.0100±0.1300	0.0630±0.0250	1.0000±0.1200
SJ14-SO-R-12-A		pCi/g	<0.0403 (-0.0084±0.0095)	<0.0061 (0.0000±0.0040)	<0.0194 (0.0041±0.0080)	<0.0061 (0.0000±0.0040)	<0.3060 (0.0743±0.1813)	1.3400±0.1800	0.0420±0.0240	1.3300±0.1800
SJ14-SO-R-13-A		pCi/g	<0.0239 (0.0050±0.0098)	<0.0056 (0.0019±0.0036)	<0.0227 (0.0000±0.0072)	<0.0177 (0.0055±0.0081)	<0.2887 (0.2128±0.1728)	1.2400±0.1700	0.0420±0.0240	1.1300±0.1600
SJ14-SO-R-14-A		pCi/g	<0.0279 (0.0029±0.0099)	<0.0192 (-0.0020±0.0039)	<0.0060 (0.0020±0.0039)	<0.0060 (0.0020±0.0039)	0.2854±0.1715	1.2700±0.1700	0.0580±0.0250	1.3900±0.1900
SJ14-SO-R-15-A		pCi/g	<0.0370 (-0.0030±0.0110)	<0.0182 (-0.0019±0.0037)	<0.0233 (0.0019±0.0083)	0.0057±0.0064	0.4724±0.1732	1.2200±0.1700	0.0500±0.0230	1.3600±0.1800
SJ14-SO-R-16-A		pCi/g	<0.0510 (-0.0020±0.0180)	<0.0185 (0.0019±0.0066)	0.0077±0.0076	<0.0184 (0.0077±0.0093)	0.6481±0.1772	1.4200±0.1900	0.0540±0.0250	1.4000±0.1900
SJ14-SO-R-17-A		pCi/g	0.0108±0.0095	<0.0060 (0.0020±0.0039)	<0.0190 (-0.0020±0.0039)	0.0240±0.0160	0.7392±0.1773	1.3900±0.1800	0.0430±0.0220	1.2400±0.1700
SJ14-SO-R-18-A		pCi/g	<0.0071 (0.0047±0.0066)	<0.0058 (0.0000±0.0038)	<0.0235 (0.0019±0.0084)	<0.0057 (0.0038±0.0053)	0.4003±0.1727	1.2600±0.1700	0.0560±0.0250	1.3600±0.1800
SJ14-SO-R-19-A		pCi/g	<0.0238 (0.0050±0.0098)	<0.0249 (-0.0020±0.0069)	<0.0193 (-0.0020±0.0040)	0.0081±0.0079	<0.2862 (0.2812±0.1722)	1.2400±0.1700	0.0720±0.0280	1.3600±0.1800

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide / Units ↓	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
			Result	Result	Result	Result	Result	Result	Result	Result
SJ15-SO-J-01-A		pCi/g	<0.0193 (0.0081±0.0097)	<0.0075 (0.0000±0.0049)	<0.0239 (0.0000±0.0069)	<0.0075 (0.0050±0.0069)	<0.4105 (-0.0139±0.2418)	1.4200±0.1700	0.0680±0.0280	1.4300±0.1700
SJ15-SO-J-02-A		pCi/g	0.0062±0.0070	<0.0188 (-0.0020±0.0039)	<0.0059 (0.0039±0.0055)	0.0098±0.0086	<0.4148 (0.1298±0.2461)	1.1600±0.1400	0.0540±0.0230	1.1100±0.1400
SJ15-SO-J-03-A		pCi/g	<0.0064 (0.0043±0.0059)	<0.0074 (0.0000±0.0049)	<0.0074 (0.0049±0.0069)	0.0074±0.0084	<0.4293 (0.1974±0.2555)	1.1900±0.1500	0.0720±0.0290	1.1700±0.1500
SJ15-SO-J-04-A		pCi/g	0.0097±0.0086	<0.0213 (0.0000±0.0062)	<0.0067 (0.0022±0.0044)	0.0111±0.0098	<0.4200 (0.1235±0.2490)	0.9600±0.1200	0.0420±0.0210	0.8000±0.1100
SJ16-SO-J-01-A		pCi/g	0.0120±0.0110	<0.0198 (0.0062±0.0091)	<0.0062 (0.0021±0.0041)	<0.0250 (0.0060±0.0110)	<0.3101 (-0.1644±0.1808)	0.9800±0.1200	0.0350±0.0190	1.0200±0.1300
SJ16-SO-J-02-A		pCi/g	0.0092±0.0090	<0.0195 (0.0000±0.0057)	<0.0061 (0.0020±0.0040)	0.0220±0.0130	<0.3068 (-0.1077±0.1795)	1.1600±0.1400	0.0720±0.0280	1.1800±0.1500
SJ16-SO-J-03-A		pCi/g	0.0170±0.0130	<0.0194 (0.0020±0.0069)	0.0061±0.0069	0.0220±0.0130	<0.3099 (-0.1620±0.1807)	0.9700±0.1200	0.0460±0.0210	0.9000±0.1200
SJ16-SO-J-04-A		pCi/g	0.0074±0.0084	<0.0250 (-0.0041±0.0056)	<0.0061 (0.0040±0.0056)	<0.0250 (0.0140±0.0130)	<0.3024 (-0.0644±0.1775)	0.8400±0.1100	0.0410±0.0210	0.9700±0.1200
SJ16-SO-J-05-A		pCi/g	<0.0200 (0.0090±0.0100)	<0.0059 (0.0020±0.0039)	<0.0059 (0.0020±0.0039)	0.0098±0.0087	<0.3050 (-0.0854±0.1787)	1.9000±0.2100	0.0670±0.0270	0.9800±0.1300
SJ16-SO-J-06-A		pCi/g	<0.0340 (0.0030±0.0120)	<0.0181 (0.0000±0.0052)	0.0057±0.0064	0.0075±0.0074	0.5061±0.1876	0.8900±0.1300	0.0360±0.0200	0.8900±0.1300
SJ17-SO-J-01-A		pCi/g	<0.0065 (0.0043±0.0060)	<0.0060 (0.0000±0.0039)	<0.0059 (0.0040±0.0055)	0.0079±0.0078	<0.3085 (-0.0173±0.1816)	1.0600±0.1300	0.0580±0.0250	1.1700±0.1400
SJ17-SO-J-02-A		pCi/g	0.0076±0.0086	<0.0052 (0.0034±0.0048)	<0.0051 (0.0000±0.0034)	0.0150±0.0100	<0.3103 (-0.0498±0.1823)	1.1600±0.1400	0.0580±0.0250	1.1800±0.1500
SJ17-SO-J-03-A		pCi/g	0.0220±0.0150	<0.0184 (-0.0019±0.0038)	0.0134±0.0100	0.0570±0.0220	<0.3093 (-0.0427±0.1818)	1.1600±0.1400	0.0360±0.0190	1.1000±0.1400
SJ17-SO-J-04-A		pCi/g	<0.0064 (0.0021±0.0042)	<0.0178 (-0.0019±0.0036)	0.0056±0.0063	0.0220±0.0130	<0.3083 (-0.1151±0.1804)	1.0400±0.1300	0.0390±0.0190	1.0600±0.1300
SJ18-SO-J-01-A		pCi/g	<0.0059 (0.0020±0.0038)	<0.0059 (0.0000±0.0039)	<0.0241 (0.0039±0.0094)	<0.0059 (0.0039±0.0054)	<0.3067 (-0.1695±0.1787)	0.9800±0.1300	0.0570±0.0240	1.0800±0.1300
SJ18-SO-J-02-A		pCi/g	0.0140±0.0110	<0.0061 (0.0000±0.0040)	<0.0061 (0.0041±0.0057)	0.0122±0.0098	<0.3025 (-0.1558±0.1764)	1.1400±0.1400	0.0620±0.0260	1.2200±0.1500
SJ18-SO-J-03-A		pCi/g	<0.0248 (0.0020±0.0088)	<0.0192 (0.0000±0.0056)	<0.0060 (0.0000±0.0039)	<0.0192 (0.0040±0.0079)	<0.3041 (-0.1090±0.1779)	1.1000±0.1400	0.0600±0.0260	1.1700±0.1500
SJ19-SO-J-01-A		pCi/g	<0.0190 (0.0100±0.0100)	<0.0180 (0.0000±0.0052)	<0.0180 (-0.0019±0.0037)	<0.0230 (0.0110±0.0120)	<0.3261 (-0.0596±0.1915)	0.6510±0.0910	0.0310±0.0170	0.6420±0.0900
SJ19-SO-J-02-A		pCi/g	0.0102±0.0090	<0.0064 (0.0021±0.0042)	<0.0064 (0.0000±0.0042)	<0.0064 (0.0043±0.0060)	<0.3292 (-0.1424±0.1923)	1.0400±0.1300	0.0560±0.0250	1.0700±0.1400
SJ19-SO-J-03-A		pCi/g	<0.0191 (0.0060±0.0088)	<0.0062 (0.0042±0.0058)	0.0062±0.0071	<0.0200 (0.0100±0.0110)	<0.3246 (-0.1647±0.1894)	0.8500±0.1200	0.0410±0.0210	0.8200±0.1100
SJ20-SO-J-01-A		pCi/g	0.0074±0.0073	<0.0058 (0.0000±0.0038)	<0.0057 (0.0038±0.0053)	<0.0057 (0.0019±0.0038)	<0.3256 (-0.0814±0.1909)	0.6870±0.0970	0.0280±0.0170	0.7090±0.0990
SJ20-SO-J-02-A		pCi/g	0.0101±0.0089	<0.0064 (0.0000±0.0042)	<0.0064 (0.0000±0.0042)	0.0130±0.0100	<0.3207 (-0.1292±0.1875)	0.7300±0.1000	0.0520±0.0230	0.8000±0.1100
SJ21-SO-J-01-A		pCi/g	0.0065±0.0074	<0.0188 (0.0059±0.0086)	<0.0059 (0.0020±0.0039)	<0.0059 (0.0039±0.0055)	<0.2947 (-0.0841±0.1727)	1.1100±0.1400	0.0440±0.0210	1.1300±0.1400
SJ21-SO-J-02-A		pCi/g	<0.0187 (0.0078±0.0094)	<0.0181 (0.0038±0.0074)	<0.0181 (-0.0019±0.0037)	<0.0181 (0.0076±0.0091)	<0.3009 (-0.1073±0.1760)	1.0600±0.1300	0.0800±0.0280	1.1400±0.1400
SJ21-SO-J-03-A		pCi/g	0.0080±0.0079	<0.0056 (0.0019±0.0036)	<0.0055 (0.0018±0.0036)	0.0074±0.0073	<0.3067 (-0.0645±0.1800)	1.1400±0.1400	0.0510±0.0240	1.1100±0.1400
SJ21-SO-J-04-A		pCi/g	0.0111±0.0098	<0.0062 (0.0041±0.0057)	<0.0197 (0.0021±0.0070)	0.0103±0.0091	<0.3060 (-0.1263±0.1788)	1.1200±0.1400	0.0530±0.0240	1.1500±0.1400
SJ22-SO-J-01-A		pCi/g	<0.0203 (0.0000±0.0059)	<0.0061 (0.0020±0.0040)	<0.0195 (0.0000±0.0057)	<0.0195 (0.0020±0.0069)	<0.3042 (-0.1655±0.1773)	1.2000±0.1500	0.0440±0.0220	1.2900±0.1600
SJ22-SO-J-02-A		pCi/g	0.0119±0.0096	<0.0185 (0.0019±0.0066)	<0.0058 (0.0000±0.0038)	<0.0184 (0.0077±0.0093)	1.5128±0.1950	4.1300±0.4200	0.1800±0.0450	4.1500±0.4200
SJ22-SO-J-03-A		pCi/g	0.0078±0.0077	<0.0056 (0.0000±0.0037)	<0.0229 (-0.0037±0.0052)	0.0131±0.0097	<0.2998 (-0.2137±0.1741)	1.3500±0.1500	0.0780±0.0290	1.3300±0.1500
SJ22-SO-J-04-A		pCi/g	<0.0196 (0.0041±0.0081)	0.0055±0.0063	<0.0176 (0.0000±0.0051)	0.0170±0.0110	<0.3049 (0.2746±0.1831)	1.4700±0.1800	0.0620±0.0260	1.4500±0.1700
SJ22-SO-J-05-A		pCi/g	<0.0180 (0.0056±0.0083)	<0.0172 (-0.0018±0.0035)	<0.0172 (0.0000±0.0050)	<0.0172 (0.0036±0.0070)	3.6683±0.2233	4.9300±0.4900	0.2370±0.0540	4.7000±0.4700
SJ22-SO-J-06-A		pCi/g	<0.0197 (0.0000±0.0057)	<0.0061 (0.0020±0.0040)	<0.0195 (-0.0020±0.0040)	<0.0061 (0.0020±0.0040)	6.9240±0.2729	5.1500±0.5100	0.2020±0.0480	5.2300±0.5100
SJ22-SO-J-07-A		pCi/g	<0.0065 (0.0043±0.0060)	0.0061±0.0069	<0.0061 (0.0000±0.0040)	0.0081±0.0080	1.2190±0.1955	3.9400±0.4700	0.1850±0.0490	3.9300±0.4700
SJ22-SO-J-08-A		pCi/g	<0.0076 (0.0051±0.0070)	<0.0205 (0.0000±0.0059)	<0.0205 (0.0043±0.0084)	0.0107±0.0094	0.7942±0.1937	4.9300±0.5800	0.2330±0.0560	4.9900±0.5900
SJ22-SO-J-09-A		pCi/g	<0.0071 (0.0048±0.0066)	<0.0064 (0.0043±0.0059)	<0.0204 (0.0000±0.0059)	0.0106±0.0094	2.0458±0.2105	7.1400±0.8300	0.2990±0.0660	7.0800±0.8200
SJ22-SO-J-10-A		pCi/g	<0.0065 (0.0022±0.0042)	<0.0197 (-0.0021±0.0040)	<0.0197 (0.0000±0.0057)	<0.0062 (0.0021±0.0040)	1.2940±0.1987	6.3300±0.7300	0.3650±0.0730	6.2200±0.7200
SJ23-SO-J-01-A		pCi/g	<0.0064 (0.0021±0.0042)	<0.0181 (0.0000±0.0053)	<0.0057 (0.0038±0.0052)	<0.0181 (0.0057±0.0083)	<0.3010 (-0.2157±0.1748)	0.7600±0.1000	0.0460±0.0220	0.7400±0.1000
SJ23-SO-J-02-A		pCi/g	0.0056±0.0063	<0.0179 (-0.0019±0.0037)	<0.0056 (0.0037±0.0052)	<0.0056 (0.0019±0.0037)	<0.3014 (-0.0678±0.1768)	1.2500±0.1500	0.0580±0.0240	1.2900±0.1500
SJ24-SO-J-01-A		pCi/g	<0.0070 (0.0023±0.0046)	<0.0258 (-0.0021±0.0071)	<0.0201 (0.0000±0.0058)	0.0105±0.0093	<0.3010 (0.0731±0.1783)	1.1200±0.1400	0.0490±0.0230	1.1200±0.1400
SJ24-SO-J-02-A		pCi/g	<0.0358 (-0.0050±0.0098)	<0.0193 (-0.0020±0.0040)	<0.0060 (0.0000±0.0039)	<0.0192 (0.0080±0.0097)	<0.2994 (0.0681±0.1773)	1.0100±0.1300	0.0590±0.0250	1.1600±0.1400
SJ24-SO-J-03-A		pCi/g	<0.0199 (0.0000±0.0058)	<0.0067 (0.0045±0.0062)	<0.0213 (0.0000±0.0062)	<0.0210 (0.0110±0.0120)	<0.3017 (0.0023±0.1778)	1.0500±0.1300	0.0520±0.0240	1.1400±0.1400
SJ25-SO-R-01-A		pCi/g	0.0120±0.0110	<0.0237 (-0.0039±0.0054)	<0.0237 (-0.0038±0.0054)	<0.0184 (0.0038±0.0076)	<0.3420 (0.2327±0.2044)	0.9700±0.1200	0.0420±0.0210	1.0900±0.1400
SJ25-SO-R-02-A		pCi/g	<0.0243 (0.0051±0.0100)	<0.0068 (0.0000±0.0045)	<0.0068 (0.0023±0.0045)	<0.0217 (0.0045±0.0089)	<0.3409 (0.0166±0.2011)	0.9400±0.1200	0.0490±0.0220	0.9800±0.1200
SJ25-SO-R-03-A		pCi/g	<0.0070 (0.0047±0.0065)	<0.0055 (0.0036±0.0051)	<0.0055 (0.0000±0.0036)	0.0073±0.0072	<0.3413 (-0.0944±0.2000)	0.9800±0.1200	0.0270±0.0160	0.9700±0.1200
SJ25-SO-R-04-A		pCi/g	<0.0214 (0.0045±0.0088)	<0.0201 (-0.0021±0.0041)	<0.0063 (0.0042±0.0059)	0.0105±0.0094	<0.3381 (0.2857±0.2028)	1.5400±0.1800	0.0560±0.0250	1.6000±0.1800
SJ25-SO-R-05-A		pCi/g	0.0100±0.0100	<0.0269 (0.0000±0.0090)	<0.0178 (0.0000±0.0052)	0.0170±0.0110	0.3599±0.2056	0.8900±0.1100	0.0380±0.0200	0.8600±0.1100
SJ25-SO-R-06-A		pCi/g	0.0240±0.0160	<0.0270 (-0.0022±0.0075)	<0.0066 (0.0022±0.0043)	0.0088±0.0087	<0.3394 (-0.0355±0.1996)	1.0500±0.1300	0.0580±0.0260	1.0900±0.1300
SJ25-SO-R-07-A		pCi/g	<0.0271 (0.0022±0.0097)	<0.0196 (0.0000±0.0057)	<0.0061 (0.0000±0.0040)	0.0120±0.0100	<0.3414 (0.0536±0.2019)	1.1400±0.1400	0.0700±0.0280	1.1600±0.1500
SJ25-SO-R-08-A		pCi/g	<0.0063 (0.0042±0.0059)	<0.0057 (0.0000±0.0037)	<0.0057 (0.0000±0.0037)	0.0113±0.0093	<0.3422 (0.1356±0.2034)	0.9500±0.1200	0.0340±0.0200	1.0200±0.1300
SJ25-SO-R-09-A		pCi/g	0.0085±0.0084	<0.0181 (0.0000±0.0052)	<0.0180 (-0.0019±0.0037)	<0.0180 (0.0110±0.0110)	<0.3403 (-0.0433±0.2000)	1.0500±0.1300	0.0330±0.0190	1.0800±0.1300
SJ25-SO-R-10-A		pCi/g	<0.0248 (0.0000±0.0072)	<0.0060 (0.0000±0.0039)	<0.0060 (0.0000±0.0039)	0.0121±0.0099	0.4124±0.2064	0.8400±0.1100	0.0440±0.0220	0.9000±0.1200
SJ25-SO-R-11-A		pCi/g	0.0130±0.0110	<0.0057 (0.0019±0.0038)	<0.0057 (0.0000±0.0037)	<0.0057 (0.0038±0.0053)	<0.3410 (-0.0931±0.1999)	1.2800±0.1500	0.0690±0.0260	1.3300±0.1600
SJ26-SO-R-01-A		pCi/g	<0.0196 (0.0041±0.0080)	<0.0069 (0.0023±0.0045)	<0.0069 (0.0046±0.0064)	0.0092±0.0091	<0.3121 (0.0777±0.1849)	1.2700±0.1600	0.0610±0.0270	1.3500±0.1600
SJ26-SO-R-02-A		pCi/g	0.0113±0.0100	<0.0202 (-0.0021±0.0041)	<0.0063 (0.0000±0.0041)	0.0250±0.0150	<0.3105 (0.2354±0.1859)	1.1800±0.1400	0.0520±0.0230	1.2800±0.1500
SJ26-SO-R-03-A		pCi/g	<0.0064 (0.0043±0.0060)	<0.0180 (-0.0019±0.0037)	<0.0056 (0.0037±0.0052)	0.0170±0.0110	<0.3106 (0.1089±0.1844)	1.0500±0.1300	0.0530±0.0240	1.1900±0.1500
SJ26-SO-R-04-A		pCi/g	<0.0060 (0.0040±0.0055)	<0.0166 (-0.0017±0.0034)	<0.0052 (0.0017±0.0034)	0.0170±0.0110	<0.3116 (0.1586±0.1856)	1.2600±0.1500	0.0560±0.0230	1.1800±0.1400
SJ26-SO-R-05-A		pCi/g	0.0083±0.0081	<0.0300 (-0.0042±0.0082)	<0.0062 (0.0021±0.0041)	0.0083±0.0083	<0.3106 (0.1429±0.1848)	1.0100±0.1300	0.0840±0.0300	1.0200±0.1300
SJ26-SO-R-06-A		pCi/g	<0.0064 (0.0043±0.0059)	<0.0169 (-0.0018±0.0035)	<0.0053 (0.0000±0.0034)	0.0123±0.0093	<0.3101 (-0.0222±0.1825)	1.1000±0.1400	0.0500±0.0230	1.1100±0.1400
SJ26-SO-R-07-A		pCi/g	<0.0272 (0.0022±0.0097)	<0.0227 (-0.0037±0.0052)	<0.0177 (0.0018±0.0063)	0.0055±0.0063	<0.3121 (0.0577±0.1847)	0.9600±0.1200	0.0460±0.0220	1.0700±0.1300
SJ26-SO-R-08-A		pCi/g	<0.0190 (0.0100±0.0100)	<0.0226 (-0.0018±0.0063)	<0.0055 (0.0037±0.0051)	0.0110±0.0090	<0.3096 (0.1086±0.1838)	1.0800±0.1400	0.0480±0.0220	1.0400±0.1300
SJ26-SO-R-09-A		pCi/g	<0.0310 (0.0020±0.0110)	<0.0059 (0.0020±0.0039)	<0.0059 (0.0000±0.0038)	0.0059±0.0067	<0.3101 (0.1918±0.1851)	1.0100±0.1300	0.0380±0.0190	1.0300±0.1300
SJ26-SO-R-10-A		pCi/g	<0.0207 (0.0000±0.0060)	<0.0055 (0.0018±0.0036)	<0.0055 (0.0018±0.0036)	<0.0175 (0.0073±0.0088)	<0.3095 (0.1027±0.1837)	1.1400±0.1400	0.0500±0.0230	1.2100±0.1500
SJ26-SO-R-11-A		pCi/g	<0.0184 (0.0000±0.0053)	<0.0192 (0.0020±0.0068)	<0.0060 (0.0020±0.0039)	<0.0191 (0.0040±0.0079)	<0.3111 (0.0141±0.1835)	0.9000±0.1100	0.0320±0.0170	0.8900±0.1100
SJ27-SO-J-01-A		pCi/g	<0.0065 (0.0043±0.0060)	<0.0175 (-0.0018±0.0036)	<0.0055 (0.0018±0.0036)	<0.0224 (0.0055±0.0095)	<0.3115 (0.1683±0.1856)	0.9700±0.1200	0.0320±0.0170	0.9200±0.1200
SJ27-SO-J-02-A		pCi/g	0.0052±0.0059	<0.0162 (-0.0017±0.0033)	0.0051±0.0058	0.0118±0.0089	<0.3120 (0.1877±0.1862)	0.6500±0.0890	0.0170±0.0120	0.6770±0.0910
SJ27-SO-J-03-A		pCi/g	<0.0700 (0.0065±0.0074)	<0.0224 (-0.0018±0.0062)	<0.0054 (0.0018±0.0036)	0.0330±0.0160	<0.3116 (0.1886±0.1860)	1.0300±0.1300	0.0290±0.0180	1.0100±0.1300
SJ27-SO-J-04-A		pCi/g	0.0101±0.0089	<0.0047 (0.0016±0.0031)	<0.0148 (0.0016±0.0053)	<0.0047 (0.0031±0.0043)	<0.3100 (0.2339±0.1856)	0.9400±0.1100	0.0540±0.0210	1.0100±0.1200
SJ28-SO-J-01-A		pCi/g	<0.0299 (-0.0024±0.0083)	<0.0183 (0.0000±0.0053)	<0.0182 (0.0019±0.0065)	0.0057±0.0065	0.7779±0.1906	1.1000±0.1700	0.0670±0.0270	1.1900±0.1800

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide / Units ↓	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
			Result	Result	Result	Result	Result	Result	Result	Result
SJ28-SO-J-02-A		pCi/g	<0.0066 (0.0044±0.0061)	<0.0191 (-0.0020±0.0039)	<0.0060 (0.0020±0.0039)	<0.0060 (0.0020±0.0039)	<0.2999 (0.0287±0.1771)	1.3400±0.2000	0.0630±0.0280	1.2900±0.2000
SJ28-SO-J-03-A		pCi/g	<0.0066 (0.0022±0.0043)	<0.0055 (0.0000±0.0036)	<0.0055 (0.0000±0.0036)	0.0129±0.0098	1.5344±0.1985	1.8400±0.2700	0.0790±0.0300	1.8500±0.2700
SJ28-SO-J-04-A		pCi/g	<0.0215 (0.0022±0.0076)	<0.0062 (0.0000±0.0040)	<0.0062 (0.0021±0.0040)	<0.0062 (0.0041±0.0057)	0.6462±0.1766	1.4200±0.2200	0.0520±0.0240	1.3900±0.2100
SJ28-SO-J-05-A		pCi/g	0.0062±0.0070	<0.0178 (0.0000±0.0052)	<0.0056 (0.0000±0.0036)	0.0074±0.0074	0.9213±0.2064	1.2100±0.1800	0.0660±0.0270	1.4100±0.2100
SJ29-SO-J-01-A		pCi/g	<0.0210 (0.0110±0.0110)	<0.0062 (0.0021±0.0041)	<0.0062 (0.0021±0.0041)	0.0062±0.0071	0.3077±0.1773	1.1800±0.1800	0.0640±0.0270	1.2900±0.2000
SJ29-SO-J-02-A		pCi/g	<0.0198 (0.0021±0.0070)	<0.0181 (0.0038±0.0074)	<0.0181 (0.0057±0.0083)	0.0075±0.0075	<0.2886 (0.2216±0.1729)	1.1300±0.1700	0.0600±0.0250	1.2000±0.1800
SJ29-SO-J-03-A		pCi/g	<0.0220 (0.0070±0.0100)	<0.0053 (0.0035±0.0049)	<0.0254 (-0.0035±0.0069)	<0.0169 (0.0035±0.0069)	<0.2918 (-0.0089±0.1719)	1.0900±0.1700	0.0250±0.0160	1.2500±0.1900
SJ29-SO-J-04-A		pCi/g	0.0105±0.0093	<0.0259 (-0.0021±0.0072)	<0.0258 (0.0000±0.0082)	<0.0200 (0.0080±0.0100)	<0.2917 (0.0643±0.1727)	1.1600±0.1800	0.0660±0.0260	1.3100±0.2000
SJ29-SO-J-05-A		pCi/g	<0.0194 (0.0061±0.0089)	<0.0062 (0.0042±0.0058)	<0.0255 (0.0000±0.0081)	<0.0062 (0.0042±0.0058)	<0.2939 (-0.0134±0.1730)	0.6500±0.1100	0.0510±0.0220	0.7100±0.1200
SJ30-SO-J-01-A		pCi/g	<0.0230 (0.0120±0.0120)	<0.0241 (-0.0020±0.0067)	<0.0059 (0.0000±0.0038)	0.0230±0.0140	0.8810±0.1801	1.3800±0.2100	0.0410±0.0200	1.4100±0.2100
SJ30-SO-J-02-A		pCi/g	<0.0198 (0.0041±0.0081)	<0.0197 (-0.0021±0.0041)	<0.0253 (0.0021±0.0090)	<0.0197 (0.0062±0.0091)	0.4292±0.1765	1.1300±0.1700	0.0670±0.0270	1.1200±0.1700
SJ30-SO-J-03-A		pCi/g	0.0130±0.0100	<0.0056 (0.0000±0.0037)	<0.0056 (0.0019±0.0037)	0.0131±0.0099	0.3132±0.1565	1.3200±0.2000	0.0870±0.0310	1.4100±0.2100
SJ30-SO-J-04-A		pCi/g	<0.0262 (0.0000±0.0083)	<0.0056 (0.0000±0.0036)	<0.0055 (0.0037±0.0052)	0.0170±0.0110	<0.2975 (0.0513±0.1760)	1.4200±0.2100	0.0560±0.0250	1.3000±0.2000
SJ31-SO-J-01-A		pCi/g	0.0067±0.0076	<0.0058 (0.0039±0.0054)	<0.0190 (0.0100±0.0100)	0.0077±0.0077	<0.2748 (-0.0418±0.1614)	1.6900±0.2500	0.0770±0.0300	1.6200±0.2400
SJ31-SO-J-02-A		pCi/g	<0.0064 (0.0043±0.0059)	<0.0061 (0.0000±0.0040)	<0.0061 (0.0041±0.0057)	0.0061±0.0070	<0.3039 (0.1063±0.1804)	1.4400±0.2200	0.0620±0.0260	1.5200±0.2300
SJ31-SO-J-03-A		pCi/g	0.0120±0.0100	<0.0241 (-0.0020±0.0066)	<0.0187 (-0.0020±0.0038)	<0.0059 (0.0020±0.0038)	<0.3017 (0.0447±0.1783)	2.0100±0.2900	0.0960±0.0330	2.0700±0.3000
SR01-SO-J-01-A		pCi/g	0.0059±0.0067	<0.0050 (0.0000±0.0033)	<0.0050 (0.0000±0.0033)	0.0133±0.0094	<0.3032 (0.1337±0.1803)	1.2800±0.1900	0.0530±0.0230	1.1800±0.1800
SR01-SO-R-01-A		pCi/g	0.0140±0.0110	<0.0062 (0.0000±0.0041)	<0.0062 (0.0000±0.0041)	<0.0200 (0.0100±0.0110)	<0.2892 (0.0187±0.1706)	0.9800±0.1600	0.0440±0.0220	1.0200±0.1600
SR01-SO-R-02-A		pCi/g	0.0093±0.0091	<0.0067 (0.0022±0.0044)	<0.0067 (0.0022±0.0044)	0.0089±0.0089	<0.2805 (0.0533±0.1660)	1.0300±0.1600	0.0480±0.0220	1.1200±0.1700
SR01-SO-R-03-A		pCi/g	<0.0230 (0.0140±0.0130)	<0.0058 (0.0019±0.0038)	<0.0058 (0.0000±0.0038)	0.0096±0.0086	<0.2757 (0.1614±0.1645)	0.9900±0.1600	0.0530±0.0250	1.0800±0.1700
SR01-SO-R-04-A		pCi/g	0.0104±0.0092	<0.0056 (0.0038±0.0052)	<0.0230 (-0.0037±0.0052)	<0.0179 (0.0056±0.0083)	<0.2830 (0.1237±0.1683)	1.0600±0.1600	0.0320±0.0170	0.9900±0.1500
SR01-SO-R-05-A		pCi/g	<0.0187 (0.0039±0.0077)	<0.0053 (0.0000±0.0035)	<0.0053 (0.0000±0.0035)	0.0260±0.0140	0.3394±0.1734	1.1100±0.1700	0.0420±0.0210	1.0900±0.1700
SR01-SO-R-06-A		pCi/g	0.0063±0.0072	<0.0050 (0.0000±0.0033)	<0.0050 (0.0000±0.0033)	0.0083±0.0074	<0.2872 (0.2140±0.1719)	1.0700±0.1700	0.0510±0.0240	1.1100±0.1700
SR01-SO-R-07-A		pCi/g	<0.0066 (0.0044±0.0061)	<0.0054 (0.0000±0.0035)	<0.0172 (-0.0018±0.0035)	0.0160±0.0110	<0.2945 (-0.0045±0.1735)	1.0600±0.1700	0.0490±0.0240	1.0800±0.1700
SR01-SO-R-08-A		pCi/g	0.0083±0.0082	<0.0058 (0.0000±0.0038)	<0.0235 (0.0000±0.0075)	0.0150±0.0110	<0.2896 (0.2719±0.1740)	1.1500±0.1800	0.0640±0.0270	1.0800±0.1700
SR01-SO-R-09-A		pCi/g	<0.0065 (0.0022±0.0042)	<0.0302 (-0.0075±0.0074)	<0.0178 (-0.0019±0.0037)	<0.0178 (0.0093±0.0098)	0.4081±0.1789	1.2000±0.1800	0.0490±0.0230	1.1900±0.1800
SR01-SO-R-10-A		pCi/g	0.0115±0.0092	<0.0054 (0.0018±0.0035)	<0.0172 (0.0000±0.0050)	0.0108±0.0088	0.6451±0.1817	1.2300±0.1900	0.0820±0.0300	1.2500±0.1900
SR01-SO-R-11-A		pCi/g	0.0118±0.0095	<0.0068 (0.0000±0.0044)	<0.0277 (-0.0023±0.0077)	<0.0220 (0.0180±0.0140)	0.3918±0.1746	0.9900±0.1600	0.0470±0.0250	1.0800±0.1700
SR02-SO-R-01-A		pCi/g	<0.0210 (0.0044±0.0086)	<0.0208 (-0.0022±0.0043)	<0.0350 (-0.0087±0.0085)	0.0065±0.0074	<0.3224 (0.1215±0.1915)	1.0300±0.1300	0.0650±0.0250	1.2000±0.1400
SR02-SO-R-02-A		pCi/g	0.0200±0.0120	<0.0062 (0.0041±0.0057)	<0.0061 (0.0000±0.0040)	0.0250±0.0140	<0.3283 (-0.0282±0.1932)	1.1700±0.1400	0.0330±0.0180	1.0800±0.1300
SR02-SO-R-03-A		pCi/g	<0.0057 (0.0038±0.0053)	0.0055±0.0062	<0.0055 (0.0018±0.0036)	0.0127±0.0095	<0.3288 (-0.0846±0.1928)	1.1000±0.1300	0.0570±0.0230	1.0700±0.1300
SR02-SO-R-04-A		pCi/g	<0.0350 (0.0090±0.0150)	<0.0180 (0.0130±0.0110)	<0.0184 (-0.0019±0.0038)	<0.0180 (0.0170±0.0130)	0.3864±0.1974	1.1500±0.1400	0.0590±0.0250	1.1600±0.1400
SR02-SO-R-05-A		pCi/g	<0.0190 (0.0060±0.0087)	<0.0060 (0.0020±0.0039)	0.0100±0.0088	0.0300±0.0150	0.4330±0.1975	1.1400±0.1400	0.0640±0.0260	1.1400±0.1400
SR02-SO-R-06-A		pCi/g	0.0099±0.0087	<0.0060 (0.0020±0.0039)	<0.0059 (0.0020±0.0039)	<0.0190 (0.0059±0.0087)	<0.3289 (-0.0405±0.1934)	1.0500±0.1300	0.0600±0.0240	1.1800±0.1400
SR02-SO-R-07-A		pCi/g	<0.0310 (0.0000±0.0110)	<0.0178 (-0.0019±0.0036)	<0.0056 (0.0037±0.0051)	0.0056±0.0063	0.8192±0.2040	1.2300±0.1600	0.0570±0.0250	1.2700±0.1600
SR02-SO-R-08-A		pCi/g	0.0250±0.0140	<0.0190 (0.0000±0.0055)	<0.0059 (0.0000±0.0039)	0.0360±0.0170	<0.3283 (0.2547±0.1966)	1.0400±0.1400	0.0760±0.0300	1.0600±0.1400
SR02-SO-R-09-A		pCi/g	0.0095±0.0084	<0.0056 (0.0019±0.0037)	<0.0179 (0.0037±0.0073)	0.0093±0.0082	<0.3223 (0.1695±0.1921)	1.1500±0.1400	0.0580±0.0240	1.1800±0.1400
SR02-SO-R-10-A		pCi/g	0.0127±0.0095	<0.0055 (0.0018±0.0036)	<0.0176 (0.0000±0.0051)	0.0180±0.0120	<0.3228 (0.1433±0.1920)	1.0800±0.1300	0.0530±0.0240	1.0700±0.1300
SR02-SO-R-11-A		pCi/g	<0.0180 (0.0110±0.0100)	<0.0056 (0.0019±0.0037)	<0.0056 (0.0000±0.0036)	<0.0178 (0.0074±0.0090)	<0.3221 (-0.1778±0.1877)	1.1100±0.1400	0.0380±0.0200	1.1800±0.1400
SR03-SO-R-01-A		pCi/g	<0.0169 (0.0088±0.0092)	<0.0055 (0.0018±0.0036)	<0.0055 (0.0018±0.0036)	0.0128±0.0097	<0.2991 (-0.0808±0.1753)	1.3000±0.1500	0.0810±0.0270	1.3900±0.1600
SR03-SO-R-02-A		pCi/g	<0.0430 (0.0000±0.0160)	<0.0048 (0.0000±0.0032)	<0.0048 (0.0000±0.0031)	<0.0154 (0.0016±0.0055)	<0.3000 (-0.1552±0.1749)	<0.3400 (-0.3600±0.1400)	0.0430±0.0210	1.0300±0.1200
SR03-SO-R-03-A		pCi/g	<0.0161 (0.0067±0.0081)	<0.0052 (0.0034±0.0048)	<0.0211 (-0.0034±0.0048)	<0.0051 (0.0034±0.0048)	<0.2994 (-0.1852±0.1742)	1.2100±0.1400	0.0430±0.0200	1.1700±0.1400
SR03-SO-R-04-A		pCi/g	<0.0174 (0.0018±0.0062)	<0.0053 (0.0000±0.0035)	<0.0216 (-0.0018±0.0060)	<0.0053 (0.0018±0.0035)	<0.3016 (-0.0724±0.1769)	0.9900±0.1200	0.0280±0.0160	1.0200±0.1200
SR03-SO-R-05-A		pCi/g	0.0078±0.0077	<0.0164 (0.0017±0.0058)	<0.0051 (0.0034±0.0048)	0.0260±0.0140	<0.3005 (-0.1498±0.1753)	0.9500±0.1100	0.0430±0.0180	1.0100±0.1200
SR03-SO-R-06-A		pCi/g	<0.0053 (0.0035±0.0049)	<0.0050 (0.0017±0.0032)	<0.0049 (0.0016±0.0032)	0.0049±0.0056	<0.3012 (-0.1039±0.1763)	1.0000±0.1200	0.0490±0.0210	1.0000±0.1200
SR03-SO-R-07-A		pCi/g	<0.0274 (0.0019±0.0099)	0.0063±0.0062	<0.0047 (0.0016±0.0031)	<0.0047 (0.0031±0.0043)	<0.3010 (-0.2043±0.1749)	1.1000±0.1300	0.0470±0.0210	1.1400±0.1300
SR03-SO-R-08-A		pCi/g	0.0120±0.0089	0.0055±0.0063	<0.0055 (0.0018±0.0036)	<0.0055 (0.0037±0.0051)	<0.3012 (0.0361±0.1780)	1.0600±0.1300	0.0520±0.0210	1.0800±0.1300
SR03-SO-R-09-A		pCi/g	0.0132±0.0098	<0.0203 (-0.0033±0.0046)	<0.0158 (0.0033±0.0065)	0.0082±0.0073	<0.3124 (0.1684±0.1862)	1.1200±0.1400	0.0420±0.0200	1.0900±0.1300
SR03-SO-R-10-A		pCi/g	<0.0235 (0.0038±0.0092)	<0.0056 (0.0000±0.0036)	<0.0177 (-0.0019±0.0036)	<0.0230 (0.0090±0.0110)	<0.3127 (0.1673±0.1864)	1.2100±0.1400	0.0740±0.0260	1.3000±0.1500
SR03-SO-R-11-A		pCi/g	<0.0171 (0.0089±0.0093)	<0.0196 (-0.0016±0.0054)	<0.0153 (0.0032±0.0063)	0.0096±0.0078	<0.3125 (0.0824±0.1852)	1.1500±0.1400	0.0630±0.0230	1.0700±0.1300
SR03-SO-R-12-A		pCi/g	0.0120±0.0100	0.0063±0.0072	<0.0063 (0.0021±0.0041)	0.0250±0.0140	<0.3054 (0.1158±0.1814)	1.4900±0.2000	0.0720±0.0300	1.5300±0.2100
SR04-SO-J-01-A		pCi/g	0.0064±0.0073	<0.0255 (0.0000±0.0081)	<0.0254 (-0.0041±0.0057)	0.0270±0.0170	<0.3182 (-0.1198±0.1861)	1.0900±0.1300	0.0490±0.0220	1.0900±0.1300
SR04-SO-R-01-A		pCi/g	<0.0189 (0.0020±0.0067)	<0.0060 (0.0020±0.0039)	<0.0190 (-0.0020±0.0039)	0.0180±0.0120	<0.3216 (0.1259±0.1911)	1.0500±0.1300	0.0620±0.0250	1.1600±0.1400
SR04-SO-R-02-A		pCi/g	<0.0197 (0.0041±0.0081)	<0.0187 (0.0020±0.0066)	0.0078±0.0077	0.0230±0.0130	<0.3200 (-0.0585±0.1879)	1.2000±0.1500	0.0660±0.0260	1.1800±0.1400
SR04-SO-R-03-A		pCi/g	0.0098±0.0086	<0.0177 (0.0018±0.0063)	<0.0176 (-0.0018±0.0036)	0.0170±0.0110	<0.3189 (-0.2034±0.1855)	1.0600±0.1300	0.0450±0.0210	1.1300±0.1400
SR04-SO-R-04-A		pCi/g	<0.0160 (0.0000±0.0110)	<0.0191 (0.0040±0.0078)	<0.0060 (0.0040±0.0055)	0.0080±0.0078	<0.3185 (-0.1331±0.1862)	0.9900±0.1200	0.0430±0.0200	0.9700±0.1200
SR04-SO-R-05-A		pCi/g	<0.0059 (0.0020±0.0039)	<0.0185 (0.0000±0.0054)	<0.0185 (0.0039±0.0076)	<0.0058 (0.0019±0.0038)	<0.3226 (-0.1528±0.1883)	0.7700±0.1000	0.0290±0.0170	0.7500±0.1000
SR04-SO-R-06-A		pCi/g	<0.0248 (0.0020±0.0088)	<0.0171 (0.0000±0.0050)	<0.0171 (0.0018±0.0061)	0.0143±0.0100	<0.3188 (-0.0143±0.1878)	1.0200±0.1300	0.0280±0.0180	1.0800±0.1300
SR04-SO-R-07-A		pCi/g	0.0130±0.0100	<0.0057 (0.0038±0.0053)	0.0076±0.0075	0.0057±0.0065	<0.3225 (-0.1455±0.1883)	1.0700±0.1300	0.0550±0.0230	1.1200±0.1400
SR04-SO-R-08-A		pCi/g	<0.0072 (0.0024±0.0047)	<0.0196 (0.0000±0.0057)	<0.0061 (0.0000±0.0040)	0.0122±0.0099	<0.3221 (-0.0084±0.1897)	1.0600±0.1300	0.0540±0.0230	1.0400±0.1300
SR04-SO-R-09-A		pCi/g	<0.0064 (0.0043±0.0060)	<0.0176 (0.0037±0.0072)	<0.0176 (0.0018±0.0062)	0.0073±0.0072	<0.3216 (0.0384±0.1900)	1.1400±0.1400	0.0520±0.0220	1.1500±0.1400
SR04-SO-R-10-A		pCi/g	<0.0063 (0.0042±0.0059)	<0.0054 (0.0036±0.0050)	<0.0054 (0.0036±0.0050)	<0.0054 (0.0036±0.0050)	<0.3174 (-0.0663±0.1863)	1.0000±0.1200	<0.0220 (0.0200±0.0150)	1.0900±0.1300
SR04-SO-R-11-A		pCi/g	<0.0174 (0.0036±0.0071)	<0.0057 (0.0019±0.0037)	<0.0181 (-0.0019±0.0037)	<0.0180 (0.0150±0.0120)	<0.3181 (-0.1364±0.1859)	0.9800±0.1200	0.0500±0.0220	0.9600±0.1200
SR05-SO-R-01-A		pCi/g	0.0055±0.0062	<0.0046 (0.0000±0.0030)	<0.0046 (0.0015±0.0030)	0.0107±0.0081	0.2937±0.1751	0.8900±0.1200	0.0380±0.0210	0.9100±0.1200
SR05-SO-R-02-A		pCi/g	<0.0235 (0.0038±0.0092)	<0.0051 (0.0017±0.0033)	<0.0051 (0.0034±0.0047)	0.0051±0.0058	<0.2842 (0.1369±0.1692)	1.0500±0.1300	0.0530±0.0230	1.0200±0.1300
SR05-SO-R-03-A		pCi/g	<0.0254 (-0.0021±0.0070)	<0.0171 (0.0000±0.0050)	<0.0171 (0.0000±0.0049)	<0.0053 (0.0036±0.0050)	<0.2895 (0.1629±0.1727)	1.0100±0.1300	0.0480±0.0220	1.0500±0.1300
SR05-SO-R-04-A		pCi/g	<0.0171 (0.0036±0.0070)	<0.0053 (0.0000±0.0035)	<0.0053 (0.0018±0.0035)	0.0053±0.0061	<0.2978 (0.2124±0.1782)	1.3100±0.1500	0.0730±0.0260	1.3900±0.1600
SR05-SO-R-05-A		pCi/g	<0.0218 (0.0018±0.0078)	<0.0049 (0.0016±0.0032)	<0.0048 (0.0000±0.0032)	<0.0048 (0.0016±0.0032)	0.3148±0.1816	0.9900±0.1200	0.0550±0.0230	0.9500±0.1200

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide / Units ↓	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
			Result	Result	Result	Result	Result	Result	Result	Result
SR05-SO-R-06-A		pCi/g	0.0054±0.0061	<0.0055 (0.0018±0.0036)	<0.0176 (-0.0018±0.0036)	<0.0176 (0.0037±0.0072)	<0.3047 (0.0276±0.1799)	1.0100±0.1300	0.0480±0.0230	1.1100±0.1400
SR05-SO-R-07-A		pCi/g	<0.0063 (0.0021±0.0041)	<0.0064 (0.0000±0.0042)	<0.0203 (-0.0021±0.0042)	0.0106±0.0094	<0.2974 (0.2029±0.1778)	1.0600±0.1400	0.0540±0.0240	1.1000±0.1400
SR05-SO-R-08-A		pCi/g	0.0056±0.0064	<0.0050 (0.0000±0.0033)	<0.0160 (0.0050±0.0074)	0.0170±0.0110	<0.2967 (0.2379±0.1778)	1.1100±0.1400	0.0360±0.0190	1.1500±0.1400
SR05-SO-R-09-A		pCi/g	<0.0051 (0.0034±0.0047)	<0.0310 (0.0000±0.0110)	<0.0330 (0.0000±0.0120)	<0.0280 (0.0050±0.0110)	<0.2960 (0.1586±0.1764)	0.9500±0.1200	0.0470±0.0220	0.9900±0.1200
SR05-SO-R-10-A		pCi/g	<0.0176 (0.0000±0.0051)	<0.0178 (-0.0019±0.0037)	<0.0178 (-0.0019±0.0036)	<0.0178 (0.0037±0.0073)	<0.2845 (0.2534±0.1709)	1.0700±0.1300	0.0380±0.0220	1.0100±0.1300
SR05-SO-R-11-A		pCi/g	<0.0320 (0.0030±0.0120)	<0.0216 (0.0000±0.0069)	<0.0053 (0.0018±0.0034)	0.0070±0.0069	<0.2852 (0.2539±0.1712)	1.2300±0.1500	0.0590±0.0240	1.2500±0.1500
SR06-SO-R-01-A		pCi/g	<0.0054 (0.0018±0.0035)	<0.0053 (0.0018±0.0034)	<0.0053 (0.0018±0.0034)	<0.0216 (0.0070±0.0097)	<0.3553 (0.1294±0.2110)	1.1200±0.1400	0.0580±0.0240	1.2400±0.1500
SR06-SO-R-02-A		pCi/g	0.0058±0.0066	<0.0057 (0.0019±0.0037)	<0.0180 (0.0000±0.0052)	<0.0232 (0.0038±0.0091)	0.5761±0.1790	1.0300±0.1300	0.0700±0.0260	1.0800±0.1300
SR06-SO-R-03-A		pCi/g	0.0132±0.0099	0.0076±0.0075	<0.0057 (0.0038±0.0053)	0.0114±0.0092	<0.3651 (0.0166±0.2154)	1.2600±0.1600	0.0490±0.0240	1.3500±0.1600
SR06-SO-R-04-A		pCi/g	0.0096±0.0085	<0.0058 (0.0019±0.0038)	<0.0057 (0.0000±0.0038)	<0.0057 (0.0019±0.0038)	<0.2968 (0.0226±0.1752)	1.2600±0.1500	0.0580±0.0240	1.3500±0.1600
SR06-SO-R-05-A		pCi/g	0.0097±0.0086	<0.0057 (0.0019±0.0038)	<0.0057 (0.0038±0.0053)	0.0170±0.0110	<0.3541 (0.2862±0.2122)	1.1500±0.1400	0.0690±0.0280	1.2300±0.1500
SR06-SO-R-06-A		pCi/g	<0.0239 (-0.0019±0.0066)	<0.0181 (-0.0019±0.0037)	<0.0057 (0.0038±0.0052)	<0.0057 (0.0038±0.0052)	<0.3614 (0.2167±0.2157)	1.3500±0.1600	0.0540±0.0240	1.3800±0.1600
SR06-SO-R-07-A		pCi/g	0.0096±0.0084	<0.0260 (-0.0021±0.0072)	0.0063±0.0072	0.0150±0.0110	<0.3636 (0.0262±0.2146)	1.3000±0.1600	0.0580±0.0250	1.3000±0.1600
SR06-SO-R-08-A		pCi/g	<0.0184 (0.0039±0.0076)	<0.0183 (-0.0019±0.0038)	<0.0057 (0.0038±0.0053)	0.0134±0.0100	<0.3640 (0.0677±0.2154)	1.1800±0.1400	0.0510±0.0240	1.2300±0.1500
SR06-SO-R-09-A		pCi/g	0.0170±0.0110	0.0078±0.0077	<0.0059 (0.0020±0.0038)	0.0098±0.0086	<0.3617 (-0.0082±0.2130)	1.4200±0.1700	0.0370±0.0200	1.4800±0.1700
SR06-SO-R-10-A		pCi/g	<0.0058 (0.0019±0.0038)	<0.0054 (0.0000±0.0035)	0.0054±0.0061	0.0054±0.0061	<0.2927 (0.2419±0.1755)	1.1900±0.1400	0.0510±0.0220	1.2000±0.1400
SR06-SO-R-11-A		pCi/g	<0.0190 (0.0120±0.0110)	<0.0055 (0.0000±0.0036)	0.0055±0.0063	0.0150±0.0100	0.5610±0.1793	1.3500±0.1600	0.0440±0.0210	1.3700±0.1600
SR07-SO-R-01-A		pCi/g	<0.0177 (0.0037±0.0073)	<0.0047 (0.0016±0.0031)	<0.0047 (0.0016±0.0031)	0.0078±0.0070	<0.3016 (0.1334±0.1794)	1.1700±0.1400	0.0570±0.0230	1.2600±0.1500
SR07-SO-R-02-A		pCi/g	<0.0056 (0.0000±0.0037)	<0.0167 (0.0017±0.0059)	<0.0052 (0.0017±0.0034)	<0.0213 (0.0017±0.0076)	<0.3009 (0.0135±0.1775)	1.0500±0.1300	0.0640±0.0240	1.1300±0.1300
SR07-SO-R-03-A		pCi/g	0.0092±0.0081	<0.0049 (0.0016±0.0032)	<0.0049 (0.0016±0.0032)	0.0065±0.0065	<0.3015 (0.0373±0.1782)	1.3800±0.1600	0.0580±0.0220	1.3500±0.1500
SR07-SO-R-04-A		pCi/g	<0.0260 (0.0040±0.0100)	<0.0201 (-0.0016±0.0055)	<0.0200 (-0.0033±0.0045)	<0.0156 (0.0098±0.0092)	0.4073±0.1824	1.5400±0.1800	0.0560±0.0240	1.5100±0.1800
SR07-SO-R-05-A		pCi/g	<0.0051 (0.0034±0.0047)	<0.0052 (0.0000±0.0034)	<0.0166 (0.0017±0.0059)	0.0052±0.0059	0.8934±0.1885	1.2700±0.1500	0.0410±0.0200	1.2100±0.1400
SR07-SO-R-06-A		pCi/g	0.0089±0.0079	<0.0238 (-0.0050±0.0057)	<0.0158 (0.0000±0.0046)	0.0050±0.0057	1.0690±0.1909	1.2800±0.1500	0.0460±0.0220	1.4200±0.1600
SR07-SO-R-07-A		pCi/g	<0.0219 (0.0036±0.0085)	<0.0164 (0.0000±0.0048)	<0.0051 (0.0034±0.0048)	<0.0164 (0.0068±0.0083)	0.4047±0.1812	1.3000±0.1500	0.0720±0.0260	1.3900±0.1600
SR07-SO-R-08-A		pCi/g	<0.0175 (0.0055±0.0080)	<0.0053 (0.0018±0.0035)	<0.0053 (0.0018±0.0035)	<0.0170 (0.0089±0.0093)	0.3547±0.1820	1.2800±0.1500	0.0900±0.0290	1.3300±0.1600
SR07-SO-R-09-A		pCi/g	<0.0214 (0.0017±0.0076)	<0.0164 (-0.0017±0.0034)	<0.0163 (0.0000±0.0047)	0.0068±0.0068	0.3826±0.1811	1.1700±0.1400	0.0460±0.0210	1.3100±0.1500
SR07-SO-R-10-A		pCi/g	<0.0166 (0.0017±0.0059)	<0.0320 (-0.0020±0.0100)	<0.0450 (-0.0100±0.0140)	<0.0290 (0.0060±0.0120)	<0.2990 (-0.1222±0.1747)	1.2600±0.1500	0.0530±0.0220	1.3500±0.1600
SR07-SO-R-11-A		pCi/g	<0.0161 (0.0034±0.0066)	<0.0049 (0.0016±0.0032)	<0.0156 (-0.0016±0.0032)	0.0065±0.0065	<0.3016 (-0.0317±0.1774)	1.3100±0.1500	0.0530±0.0220	1.3100±0.1500
SR08-SO-R-01-A		pCi/g	0.0096±0.0084	<0.0055 (0.0018±0.0036)	<0.0055 (0.0000±0.0036)	<0.0177 (0.0074±0.0089)	<0.3520 (0.1723±0.2095)	1.0700±0.1300	0.0470±0.0220	1.0800±0.1400
SR08-SO-R-02-A		pCi/g	<0.0187 (0.0039±0.0077)	<0.0171 (-0.0018±0.0035)	<0.0054 (0.0000±0.0035)	<0.0220 (0.0071±0.0099)	<0.3575 (0.3107±0.2145)	1.0200±0.1300	0.0540±0.0240	1.0600±0.1300
SR08-SO-R-03-A		pCi/g	0.0077±0.0076	<0.0059 (0.0000±0.0038)	0.0059±0.0067	<0.0188 (0.0078±0.0094)	<0.3641 (0.2004±0.2170)	1.1100±0.1400	0.0420±0.0210	1.0800±0.1400
SR08-SO-R-04-A		pCi/g	<0.0196 (0.0082±0.0099)	<0.0177 (0.0000±0.0051)	<0.0055 (0.0037±0.0051)	<0.0177 (0.0037±0.0072)	<0.2913 (0.1089±0.1730)	1.2700±0.1500	0.0650±0.0270	1.3300±0.1600
SR08-SO-R-05-A		pCi/g	0.0054±0.0062	<0.0220 (-0.0036±0.0050)	<0.0054 (0.0000±0.0035)	0.0089±0.0079	<0.3033 (-0.0836±0.1777)	1.0700±0.1300	0.0420±0.0210	1.0900±0.1300
SR08-SO-R-06-A		pCi/g	0.0104±0.0092	<0.0200 (0.0042±0.0082)	0.0063±0.0071	<0.0260 (0.0100±0.0120)	<0.3011 (0.0364±0.1779)	1.2800±0.1600	0.0410±0.0210	1.1800±0.1500
SR08-SO-R-07-A		pCi/g	<0.0057 (0.0019±0.0038)	<0.0058 (0.0000±0.0038)	<0.0058 (0.0000±0.0038)	0.0058±0.0065	<0.3137 (-0.1197±0.1834)	1.1300±0.1400	0.0320±0.0200	1.1100±0.1400
SR08-SO-R-08-A		pCi/g	0.0060±0.0068	<0.0062 (0.0021±0.0040)	<0.0061 (0.0020±0.0040)	<0.0200 (0.0100±0.0110)	<0.3092 (-0.1471±0.1804)	1.2100±0.1500	0.0560±0.0250	1.2100±0.1500
SR08-SO-R-09-A		pCi/g	0.0110±0.0097	<0.0246 (0.0000±0.0078)	<0.0060 (0.0000±0.0039)	<0.0287 (-0.0060±0.0068)	<0.2997 (-0.1154±0.1752)	1.0500±0.1300	0.0460±0.0220	1.0500±0.1300
SR08-SO-R-10-A		pCi/g	<0.0190 (0.0100±0.0100)	<0.0061 (0.0020±0.0040)	<0.0193 (0.0061±0.0089)	0.0140±0.0110	<0.3092 (0.0280±0.1826)	1.1300±0.1400	0.0570±0.0240	1.1900±0.1500
SR08-SO-R-11-A		pCi/g	0.0056±0.0064	<0.0184 (-0.0019±0.0038)	<0.0057 (0.0000±0.0037)	0.0057±0.0065	<0.3065 (0.0347±0.1811)	0.5870±0.0870	0.0360±0.0190	0.6090±0.0890
SR09-SO-R-01-A		pCi/g	<0.0058 (0.0039±0.0054)	<0.0157 (0.0000±0.0046)	<0.0157 (0.0000±0.0045)	<0.0157 (0.0082±0.0086)	<0.3107 (0.0226±0.1833)	1.1200±0.1200	0.0420±0.0190	1.1400±0.1200
SR09-SO-R-02-A		pCi/g	0.0055±0.0062	<0.0054 (0.0018±0.0035)	<0.0257 (-0.0036±0.0070)	<0.0220 (0.0000±0.0070)	<0.3118 (0.0739±0.1847)	1.1700±0.1200	0.0770±0.0260	1.0100±0.1100
SR09-SO-R-03-A		pCi/g	<0.0182 (0.0095±0.0099)	<0.0240 (-0.0033±0.0066)	<0.0050 (0.0017±0.0033)	<0.0050 (0.0017±0.0033)	<0.3088 (-0.0153±0.1818)	1.0100±0.1100	0.0420±0.0190	1.0400±0.1100
SR09-SO-R-04-A		pCi/g	<0.0320 (0.0060±0.0130)	<0.0046 (0.0030±0.0042)	<0.0145 (-0.0015±0.0030)	0.0091±0.0074	<0.3080 (0.0377±0.1820)	1.2600±0.1300	0.0600±0.0230	1.2200±0.1300
SR09-SO-R-05-A		pCi/g	<0.0330 (-0.0020±0.0110)	<0.0150 (0.0000±0.0043)	<0.0192 (0.0016±0.0069)	0.0094±0.0076	<0.2872 (0.1175±0.1707)	1.0000±0.1100	0.0510±0.0200	1.0500±0.1100
SR09-SO-R-06-A		pCi/g	<0.0166 (0.0052±0.0076)	0.0052±0.0059	<0.0052 (0.0017±0.0034)	<0.0052 (0.0035±0.0048)	<0.2826 (0.0270±0.1669)	1.1600±0.1200	0.0470±0.0200	1.0400±0.1100
SR09-SO-R-07-A		pCi/g	<0.0150 (0.0031±0.0062)	<0.0161 (-0.0017±0.0033)	<0.0050 (0.0033±0.0047)	0.0134±0.0095	<0.2924 (0.0268±0.1726)	1.1500±0.1200	0.0460±0.0190	1.1900±0.1200
SR09-SO-R-08-A		pCi/g	<0.0215 (0.0035±0.0084)	<0.0050 (0.0000±0.0033)	<0.0160 (-0.0017±0.0033)	0.0084±0.0075	<0.2922 (0.0827±0.1732)	1.2500±0.1300	0.0490±0.0200	1.1400±0.1200
SR09-SO-R-09-A		pCi/g	0.0105±0.0085	<0.0035 (0.0000±0.0023)	<0.0111 (0.0012±0.0039)	<0.0111 (0.0081±0.0069)	<0.2766 (0.1956±0.1654)	1.1200±0.1200	0.0450±0.0190	1.1300±0.1200
SR09-SO-R-10-A		pCi/g	0.0063±0.0071	<0.0060 (0.0000±0.0039)	<0.0060 (0.0020±0.0039)	0.0060±0.0069	<0.2926 (0.0861±0.1735)	1.0300±0.1600	0.0310±0.0170	1.0700±0.1700
SR09-SO-R-11-A		pCi/g	<0.0280 (0.0070±0.0120)	<0.0229 (-0.0037±0.0052)	<0.0229 (0.0000±0.0073)	0.0130±0.0099	<0.2892 (0.0111±0.1705)	0.9500±0.1500	0.0440±0.0210	1.0600±0.1600
SR11-SO-R-01-A		pCi/g	<0.0218 (0.0053±0.0092)	<0.0176 (0.0055±0.0081)	<0.0175 (-0.0018±0.0036)	0.0128±0.0097	2.9219±0.2127	0.9600±0.1200	0.0570±0.0240	0.9800±0.1300
SR11-SO-R-02-A		pCi/g	<0.0065 (0.0022±0.0042)	<0.0057 (0.0000±0.0037)	<0.0057 (0.0000±0.0037)	<0.0234 (0.0057±0.0099)	0.4909±0.1805	0.8600±0.1100	0.0490±0.0240	0.9100±0.1200
SR11-SO-R-03-A		pCi/g	<0.0200 (0.0110±0.0110)	<0.0066 (0.0022±0.0043)	<0.0209 (0.0000±0.0061)	0.0260±0.0150	<0.3127 (0.0189±0.1845)	1.2000±0.1500	0.0830±0.0310	1.2100±0.1500
SR11-SO-R-04-A		pCi/g	<0.0179 (0.0056±0.0082)	<0.0058 (0.0000±0.0038)	<0.0058 (0.0019±0.0038)	0.0170±0.0120	<0.3167 (-0.0788±0.1857)	1.1400±0.1400	0.0590±0.0260	1.1600±0.1400
SR11-SO-R-05-A		pCi/g	<0.0267 (0.0000±0.0085)	<0.0063 (0.0042±0.0058)	<0.0200 (0.0000±0.0058)	<0.0200 (0.0042±0.0082)	<0.3137 (-0.0745±0.1840)	1.1800±0.1400	0.0450±0.0210	1.2000±0.1500
SR11-SO-R-06-A		pCi/g	<0.0063 (0.0042±0.0058)	<0.0171 (0.0000±0.0049)	<0.0053 (0.0000±0.0035)	<0.0170 (0.0160±0.0120)	<0.3150 (0.0344±0.1860)	0.9800±0.1200	0.0470±0.0210	1.0500±0.1300
SR11-SO-R-07-A		pCi/g	0.0140±0.0110	<0.0054 (0.0036±0.0050)	<0.0054 (0.0018±0.0035)	<0.0170 (0.0160±0.0120)	<0.2956 (0.1455±0.1760)	1.1200±0.1400	0.0690±0.0270	1.1200±0.1400
SR11-SO-R-08-A		pCi/g	0.0081±0.0080	<0.0183 (-0.0019±0.0038)	<0.0057 (0.0019±0.0037)	0.0130±0.0100	<0.3183 (-0.0888±0.1865)	1.0300±0.1300	0.0510±0.0230	1.1100±0.1400
SR11-SO-R-09-A		pCi/g	<0.0249 (-0.0020±0.0069)	<0.0062 (0.0041±0.0057)	<0.0252 (0.0021±0.0090)	<0.0062 (0.0041±0.0057)	<0.3117 (0.0200±0.1839)	1.1500±0.1400	0.0530±0.0230	1.2100±0.1500
SR11-SO-R-10-A		pCi/g	0.0083±0.0081	0.0063±0.0072	<0.0063 (0.0000±0.0041)	<0.0260 (0.0190±0.0150)	<0.3155 (0.0036±0.1860)	1.1200±0.1400	0.0640±0.0260	1.2200±0.1500
SR11-SO-R-11-A		pCi/g	<0.0055 (0.0018±0.0036)	<0.0157 (0.0033±0.0064)	<0.0049 (0.0016±0.0032)	0.0065±0.0065	<0.3176 (-0.0826±0.1862)	1.2100±0.1500	0.0700±0.0280	1.3300±0.1600
SR12-SO-R-01-A		pCi/g	<0.0185 (0.0058±0.0085)	<0.0059 (0.0000±0.0039)	0.0059±0.0067	<0.0189 (0.0079±0.0095)	<0.3168 (-0.1053±0.1854)	1.2000±0.1500	0.0540±0.0230	1.2600±0.1500
SR12-SO-R-02-A		pCi/g	<0.0200 (0.0170±0.0130)	<0.0066 (0.0044±0.0061)	<0.0209 (0.0066±0.0096)	0.0150±0.0110	<0.2946 (0.0645±0.1744)	1.6800±0.1900	0.0910±0.0320	1.5800±0.1800
SR12-SO-R-03-A		pCi/g	<0.0200 (0.0000±0.0058)	<0.0231 (0.0000±0.0074)	<0.0180 (0.0000±0.0052)	0.0112±0.0091	<0.2962 (0.0414±0.1751)	1.1800±0.1400	0.0430±0.0200	1.2800±0.1500
SR12-SO-R-04-A		pCi/g	0.0112±0.0090	<0.0059 (0.0020±0.0039)	0.0059±0.0067	0.0180±0.0120	<0.3068 (-0.0776±0.1799)	1.2800±0.1500	0.0660±0.0260	1.3600±0.1600
SR12-SO-R-05-A		pCi/g	<0.0056 (0.0019±0.0037)	<0.0183 (0.0000±0.0053)	<0.0057 (0.0038±0.0053)	<0.0183 (0.0019±0.0065)	<0.3124 (-0.0212±0.1838)	1.3000±0.1600	0.0700±0.0280	1.3100±0.1600
SR12-SO-R-06-A		pCi/g	<0.0062 (0.0021±0.0041)	<0.0052 (0.0017±0.0034)	<0.0051 (0.0017±0.0034)	0.0170±0.0110	<0.2993 (-0.0271±0.1761)	1.8800±0.2100	0.0950±0.0320	1.8500±0.2100
SR12-SO-R-07-A		pCi/g	0.0121±0.0098	<0.0059 (0.0000±0.0038)	<0.0059 (0.0039±0.0054)	0.0210±0.0140	<0.3163 (0.0072±0.1865)	1.3000±0.1500	0.0500±0.0220	1.4100±0.1600

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide / Units ↓	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
			Result	Result	Result	Result	Result	Result	Result	Result
SR12-SO-R-08-A		pCi/g	<0.0300 (0.0120±0.0140)	<0.0057 (0.0038±0.0053)	<0.0234 (0.0038±0.0092)	<0.0180 (0.0110±0.0110)	<0.3005 (-0.1112±0.1758)	1.3900±0.1600	0.0580±0.0240	1.2900±0.1500
SR12-SO-R-09-A		pCi/g	<0.0176 (0.0037±0.0072)	<0.0052 (0.0017±0.0034)	<0.0212 (0.0000±0.0068)	<0.0165 (0.0052±0.0076)	<0.2901 (-0.0614±0.1702)	1.0800±0.1300	0.0450±0.0210	1.0900±0.1300
SR12-SO-R-10-A		pCi/g	0.0129±0.0096	<0.0176 (0.0018±0.0062)	<0.0055 (0.0037±0.0051)	<0.0175 (0.0018±0.0062)	<0.3053 (-0.0252±0.1796)	1.1300±0.1400	0.0470±0.0220	1.2900±0.1500
SR12-SO-R-11-A		pCi/g	0.0078±0.0077	<0.0305 (-0.0064±0.0072)	<0.0063 (0.0000±0.0041)	0.0300±0.0160	<0.3055 (0.0069±0.1801)	1.4900±0.1700	<0.0310 (0.0300±0.0200)	1.3900±0.1600
SR14-SO-R-01-A		pCi/g	0.0081±0.0080	<0.0300 (0.0000±0.0100)	<0.0259 (-0.0021±0.0072)	0.0084±0.0083	<0.3271 (0.1183±0.1942)	0.7290±0.0990	0.0380±0.0190	0.8200±0.1100
SR14-SO-R-02-A		pCi/g	<0.0198 (0.0062±0.0091)	0.0055±0.0063	<0.0225 (-0.0018±0.0062)	0.0150±0.0100	<0.3307 (-0.2267±0.1921)	1.1500±0.1400	0.0330±0.0190	1.1700±0.1400
SR14-SO-R-03-A		pCi/g	0.0068±0.0077	<0.0054 (0.0000±0.0035)	<0.0172 (0.0018±0.0061)	<0.0170 (0.0110±0.0100)	<0.3312 (0.0424±0.1957)	1.1600±0.1400	0.0500±0.0220	1.1900±0.1400
SR14-SO-R-04-A		pCi/g	<0.0241 (0.0039±0.0094)	<0.0185 (-0.0019±0.0038)	<0.0058 (0.0000±0.0038)	<0.0240 (0.0060±0.0100)	<0.3287 (0.1003±0.1950)	0.7000±0.0960	0.0360±0.0190	0.7900±0.1100
SR14-SO-R-05-A		pCi/g	<0.0067 (0.0044±0.0062)	<0.0061 (0.0020±0.0040)	<0.0193 (-0.0020±0.0040)	0.0121±0.0098	<0.3302 (-0.0585±0.1939)	1.0700±0.1300	0.0530±0.0230	1.2500±0.1500
SR14-SO-R-06-A		pCi/g	<0.0190 (0.0020±0.0067)	0.0065±0.0074	<0.0207 (0.0000±0.0060)	<0.0266 (0.0000±0.0085)	<0.3310 (0.0972±0.1963)	0.8500±0.1100	0.0380±0.0200	0.8400±0.1100
SR14-SO-R-07-A		pCi/g	0.0063±0.0072	<0.0288 (0.0000±0.0092)	<0.0070 (0.0023±0.0046)	0.0120±0.0100	<0.3284 (-0.0495±0.1929)	0.9200±0.1200	0.0470±0.0240	0.9400±0.1300
SR14-SO-R-08-A		pCi/g	<0.0300 (0.0070±0.0130)	<0.0203 (-0.0016±0.0056)	<0.0049 (0.0016±0.0032)	<0.0157 (0.0033±0.0065)	<0.3301 (0.1330±0.1962)	1.2500±0.1500	0.0740±0.0290	1.4400±0.1700
SR14-SO-R-09-A		pCi/g	<0.0066 (0.0044±0.0061)	<0.0186 (0.0039±0.0076)	<0.0185 (0.0019±0.0066)	<0.0190 (0.0150±0.0120)	<0.3273 (0.1393±0.1946)	1.1000±0.1300	0.0570±0.0250	1.2100±0.1400
SR14-SO-R-10-A		pCi/g	<0.0202 (0.0063±0.0093)	<0.0186 (-0.0019±0.0038)	<0.0185 (0.0019±0.0066)	0.0140±0.0100	<0.3311 (-0.0437±0.1946)	1.3200±0.1600	0.0600±0.0260	1.2600±0.1500
SR14-SO-R-11-A		pCi/g	<0.0195 (0.0061±0.0089)	<0.0182 (0.0019±0.0065)	<0.0181 (0.0000±0.0053)	0.0190±0.0120	<0.2961 (0.1853±0.1768)	1.0500±0.1300	0.0770±0.0280	1.0900±0.1300
SR15-SO-J-01-A		pCi/g	0.0200±0.0130	0.0062±0.0071	<0.0062 (0.0000±0.0040)	<0.0062 (0.0041±0.0058)	2.1126±0.2053	4.9600±0.6700	0.2270±0.0540	5.0800±0.6800
SR15-SO-J-02-A		pCi/g	<0.0076 (0.0025±0.0050)	<0.0054 (0.0018±0.0035)	<0.0054 (0.0036±0.0050)	<0.0054 (0.0018±0.0035)	3.6365±0.2287	4.4100±0.5200	0.2000±0.0500	4.6200±0.5400
SR15-SO-R-01-A		pCi/g	0.0062±0.0070	<0.0064 (0.0021±0.0042)	<0.0262 (-0.0021±0.0072)	<0.0200 (0.0090±0.0100)	<0.2971 (-0.0962±0.1739)	0.9200±0.1500	0.0530±0.0240	0.9200±0.1500
SR15-SO-R-02-A		pCi/g	<0.0198 (0.0062±0.0091)	<0.0064 (0.0043±0.0060)	<0.0263 (-0.0043±0.0060)	<0.0200 (0.0110±0.0110)	<0.2840 (0.0628±0.1681)	0.9900±0.1600	0.0460±0.0220	1.1200±0.1700
SR15-SO-R-03-A		pCi/g	<0.0200 (0.0090±0.0100)	<0.0184 (0.0000±0.0053)	<0.0183 (0.0000±0.0053)	0.0230±0.0140	<0.2942 (0.2578±0.1766)	1.0200±0.1600	0.0640±0.0260	1.1600±0.1800
SR15-SO-R-04-A		pCi/g	<0.0064 (0.0021±0.0042)	<0.0191 (0.0000±0.0055)	<0.0190 (-0.0020±0.0039)	<0.0245 (0.0040±0.0096)	<0.2917 (0.0778±0.1729)	0.8700±0.1400	0.0470±0.0220	1.0700±0.1700
SR15-SO-R-05-A		pCi/g	<0.0267 (0.0022±0.0095)	<0.0058 (0.0038±0.0054)	<0.0183 (0.0000±0.0053)	<0.0057 (0.0038±0.0053)	<0.2880 (0.0735±0.1706)	1.0800±0.1700	0.0690±0.0270	1.1100±0.1700
SR15-SO-R-06-A		pCi/g	<0.0068 (0.0045±0.0062)	<0.0063 (0.0042±0.0058)	<0.0063 (0.0021±0.0041)	0.0170±0.0120	<0.2926 (0.0178±0.1727)	1.2700±0.2000	0.0460±0.0240	1.3100±0.2000
SR15-SO-R-07-A		pCi/g	<0.0195 (0.0000±0.0056)	<0.0058 (0.0019±0.0038)	<0.0236 (0.0000±0.0075)	0.0115±0.0094	<0.2907 (0.0797±0.1723)	1.1000±0.1700	0.0530±0.0230	1.1800±0.1800
SR15-SO-R-08-A		pCi/g	<0.0251 (0.0000±0.0080)	<0.0054 (0.0000±0.0035)	<0.0054 (0.0018±0.0035)	0.0054±0.0062	<0.2908 (0.0764±0.1723)	0.8300±0.1300	0.0370±0.0200	0.8100±0.1300
SR15-SO-R-09-A		pCi/g	<0.0051 (0.0034±0.0047)	<0.0049 (0.0016±0.0032)	<0.0157 (-0.0016±0.0032)	<0.0157 (-0.0016±0.0032)	<0.2904 (0.0266±0.1715)	0.6900±0.1100	0.0130±0.0110	0.7100±0.1200
SR15-SO-R-10-A		pCi/g	0.0085±0.0084	<0.0183 (0.0000±0.0053)	<0.0234 (-0.0038±0.0053)	0.0095±0.0085	<0.2945 (0.1055±0.1748)	1.1300±0.1800	0.0520±0.0240	1.2900±0.2000
SR15-SO-R-11-A		pCi/g	<0.0291 (-0.0024±0.0080)	0.0059±0.0068	<0.0059 (0.0020±0.0039)	<0.0280 (0.0020±0.0100)	<0.2832 (0.0507±0.1675)	1.2400±0.1900	0.0620±0.0250	1.2600±0.1900
SR18-SO-R-01-A		pCi/g	<0.0059 (0.0039±0.0054)	<0.0244 (-0.0040±0.0055)	<0.0059 (0.0000±0.0039)	0.0160±0.0110	<0.3005 (0.1131±0.1785)	1.1300±0.1400	0.0620±0.0260	1.1600±0.1400
SR18-SO-R-02-A		pCi/g	<0.0070 (0.0023±0.0046)	<0.0220 (-0.0036±0.0050)	<0.0054 (0.0018±0.0035)	0.0054±0.0061	<0.2998 (0.1244±0.1782)	1.0400±0.1300	0.0460±0.0210	1.0800±0.1300
SR18-SO-R-03-A		pCi/g	<0.0220 (0.0070±0.0100)	<0.0056 (0.0000±0.0036)	<0.0055 (0.0000±0.0036)	0.0092±0.0082	<0.3098 (0.1856±0.1849)	1.0400±0.1300	0.0450±0.0210	1.1200±0.1400
SR18-SO-R-04-A		pCi/g	<0.0066 (0.0044±0.0061)	<0.0061 (0.0000±0.0040)	<0.0061 (0.0020±0.0040)	0.0140±0.0110	<0.2970 (0.2923±0.1787)	1.1000±0.1300	0.0290±0.0170	1.1200±0.1400
SR18-SO-R-05-A		pCi/g	<0.0204 (0.0064±0.0094)	<0.0218 (-0.0035±0.0049)	<0.0169 (0.0000±0.0049)	0.0106±0.0086	<0.3086 (0.0735±0.1827)	1.1300±0.1400	0.0440±0.0210	1.1700±0.1400
SR18-SO-R-06-A		pCi/g	<0.0065 (0.0044±0.0061)	<0.0065 (0.0022±0.0043)	<0.0206 (0.0000±0.0060)	<0.0270 (0.0060±0.0110)	<0.3077 (0.1123±0.1827)	1.2000±0.1500	0.0620±0.0250	1.2200±0.1500
SR18-SO-R-07-A		pCi/g	<0.0063 (0.0021±0.0041)	<0.0228 (-0.0019±0.0063)	<0.0056 (0.0000±0.0036)	<0.0230 (0.0090±0.0110)	<0.3067 (-0.0130±0.1805)	1.1200±0.1400	0.0460±0.0210	1.2400±0.1500
SR18-SO-R-08-A		pCi/g	<0.0206 (0.0022±0.0073)	<0.0058 (0.0000±0.0038)	<0.0058 (0.0019±0.0038)	0.0096±0.0086	<0.3068 (-0.0907±0.1796)	1.2100±0.1500	0.0630±0.0260	1.2400±0.1500
SR18-SO-R-09-A		pCi/g	<0.0252 (0.0041±0.0098)	<0.0179 (0.0000±0.0052)	<0.0056 (0.0019±0.0037)	<0.0179 (0.0056±0.0082)	<0.3096 (-0.1558±0.1805)	1.2100±0.1400	0.0700±0.0280	1.2100±0.1400
SR18-SO-R-10-A		pCi/g	<0.0059 (0.0000±0.0039)	<0.0055 (0.0000±0.0036)	<0.0174 (0.0018±0.0062)	0.0055±0.0062	<0.3096 (-0.1748±0.1802)	1.1600±0.1400	0.0490±0.0220	1.2300±0.1500
SR18-SO-R-11-A		pCi/g	<0.0061 (0.0020±0.0040)	<0.0051 (0.0000±0.0034)	<0.0163 (-0.0017±0.0034)	0.0051±0.0059	<0.3100 (-0.0357±0.1822)	0.9800±0.1200	0.0620±0.0240	0.9700±0.1200
SR19-SO-R-01-A		pCi/g	<0.0308 (-0.0043±0.0084)	<0.0057 (0.0000±0.0037)	<0.0057 (0.0000±0.0037)	0.0130±0.0100	<0.3101 (0.1901±0.1851)	1.3100±0.1600	0.0460±0.0210	1.3200±0.1600
SR19-SO-R-02-A		pCi/g	0.0104±0.0084	<0.0053 (0.0000±0.0034)	<0.0168 (0.0000±0.0049)	0.0210±0.0120	<0.3092 (0.1895±0.1846)	1.7300±0.1900	0.0650±0.0240	1.7700±0.1900
SR19-SO-R-03-A		pCi/g	<0.0060 (0.0020±0.0039)	<0.0206 (-0.0017±0.0057)	<0.0160 (-0.0017±0.0033)	<0.0206 (0.0017±0.0073)	<0.3103 (0.1855±0.1852)	1.1200±0.1300	0.0600±0.0240	1.1700±0.1400
SR19-SO-R-04-A		pCi/g	<0.0200 (0.0130±0.0120)	<0.0199 (0.0000±0.0058)	<0.0062 (0.0041±0.0058)	<0.0200 (0.0150±0.0120)	<0.3102 (0.1331±0.1844)	1.4300±0.1700	0.0730±0.0270	1.5800±0.1800
SR19-SO-R-05-A		pCi/g	<0.0059 (0.0020±0.0039)	<0.0052 (0.0000±0.0034)	<0.0052 (0.0017±0.0034)	<0.0211 (0.0034±0.0083)	<0.3122 (0.0766±0.1849)	1.2900±0.1500	0.0470±0.0230	1.2900±0.1500
SR19-SO-R-06-A		pCi/g	<0.0170 (0.0130±0.0110)	<0.0046 (0.0015±0.0030)	<0.0145 (0.0000±0.0042)	0.0121±0.0086	<0.3130 (0.0216±0.1847)	1.3300±0.1500	0.0680±0.0240	1.3300±0.1500
SR19-SO-R-07-A		pCi/g	0.0130±0.0100	<0.0055 (0.0037±0.0051)	<0.0055 (0.0018±0.0036)	0.0310±0.0160	<0.3087 (0.1774±0.1841)	1.6500±0.1900	0.0810±0.0280	1.6500±0.1900
SR19-SO-R-08-A		pCi/g	0.0073±0.0072	<0.0163 (-0.0017±0.0034)	<0.0051 (0.0017±0.0033)	<0.0051 (0.0017±0.0033)	<0.3107 (0.0762±0.1841)	1.2600±0.1500	0.0650±0.0250	1.3100±0.1500
SR19-SO-R-09-A		pCi/g	0.0061±0.0069	<0.0281 (-0.0039±0.0077)	<0.0058 (0.0019±0.0038)	<0.0186 (0.0039±0.0076)	<0.3107 (0.2024±0.1856)	1.2200±0.1400	0.0560±0.0230	1.1600±0.1400
SR19-SO-R-10-A		pCi/g	<0.0400 (0.0110±0.0170)	<0.0140 (0.0015±0.0050)	<0.0330 (-0.0040±0.0110)	<0.0257 (0.0015±0.0095)	<0.3110 (0.0977±0.1845)	1.0300±0.1200	0.0510±0.0200	1.0100±0.1200
SR19-SO-R-11-A		pCi/g	<0.0200 (0.0190±0.0140)	<0.0048 (0.0016±0.0031)	<0.0152 (-0.0016±0.0031)	<0.0190 (0.0110±0.0100)	<0.3109 (0.2072±0.1858)	1.1700±0.1400	0.0580±0.0230	1.1600±0.1400
SR20-SO-R-01-A		pCi/g	<0.0186 (0.0078±0.0094)	<0.0169 (-0.0018±0.0035)	<0.0053 (0.0018±0.0035)	0.0140±0.0100	0.4121±0.1742	1.1600±0.1800	0.0390±0.0230	1.3100±0.2000
SR20-SO-R-02-A		pCi/g	<0.0061 (0.0040±0.0056)	<0.0168 (0.0000±0.0048)	<0.0167 (0.0000±0.0048)	0.0105±0.0085	<0.2606 (0.1189±0.1550)	1.2500±0.1900	0.0620±0.0250	1.3100±0.2000
SR20-SO-R-03-A		pCi/g	<0.0220 (0.0070±0.0100)	<0.0183 (0.0019±0.0065)	<0.0183 (0.0019±0.0065)	0.0115±0.0093	<0.2649 (0.1632±0.1582)	1.3000±0.1900	0.0520±0.0230	1.2800±0.1900
SR20-SO-R-04-A		pCi/g	<0.0340 (-0.0020±0.0100)	<0.0326 (-0.0045±0.0089)	<0.0068 (0.0023±0.0044)	<0.0220 (0.0160±0.0140)	<0.2540 (0.1062±0.1510)	1.1700±0.1800	0.0680±0.0280	1.2900±0.2000
SR20-SO-R-05-A		pCi/g	<0.0230 (0.0070±0.0100)	<0.0201 (0.0000±0.0058)	<0.0257 (0.0021±0.0092)	<0.0200 (0.0100±0.0110)	<0.2481 (0.0481±0.1468)	1.1100±0.1700	0.0660±0.0270	1.2500±0.1900
SR20-SO-R-06-A		pCi/g	<0.0273 (-0.0022±0.0075)	<0.0251 (-0.0020±0.0069)	<0.0061 (0.0041±0.0057)	<0.0195 (0.0081±0.0099)	<0.2665 (0.1135±0.1585)	1.2100±0.1900	0.0370±0.0200	1.1700±0.1800
SR20-SO-R-07-A		pCi/g	<0.0236 (-0.0025±0.0048)	<0.0058 (0.0019±0.0038)	<0.0058 (0.0019±0.0038)	<0.0058 (0.0039±0.0054)	<0.2809 (0.0417±0.1661)	1.1600±0.1800	0.0830±0.0300	1.2900±0.1900
SR20-SO-R-08-A		pCi/g	<0.0071 (0.0047±0.0066)	<0.0281 (-0.0020±0.0086)	<0.0187 (-0.0020±0.0038)	0.0059±0.0067	<0.2521 (0.0633±0.1494)	1.2200±0.1900	0.0460±0.0220	1.2700±0.1900
SR20-SO-R-09-A		pCi/g	<0.0069 (0.0000±0.0045)	<0.0193 (-0.0020±0.0040)	<0.0060 (0.0000±0.0039)	<0.0193 (0.0081±0.0098)	<0.2922 (0.0589±0.1729)	1.1500±0.1800	0.0690±0.0300	1.2000±0.1900
SR20-SO-R-10-A		pCi/g	0.0063±0.0071	<0.0271 (-0.0038±0.0074)	<0.0180 (0.0000±0.0052)	<0.0180 (0.0170±0.0130)	<0.2862 (0.1621±0.1707)	1.2400±0.1900	0.0580±0.0270	1.3800±0.2100
SR20-SO-R-11-A		pCi/g	<0.0225 (0.0024±0.0080)	<0.0067 (0.0000±0.0044)	<0.0213 (0.0067±0.0098)	0.0089±0.0088	<0.2819 (0.1768±0.1683)	1.2100±0.1900	0.0320±0.0180	1.1700±0.1800
SR21-SO-R-01-A		pCi/g	<0.0058 (0.0019±0.0038)	<0.0058 (0.0000±0.0038)	<0.0058 (0.0000±0.0038)	0.0140±0.0100	<0.3097 (-0.2558±0.1793)	1.1400±0.1400	0.0440±0.0220	1.1100±0.1400
SR21-SO-R-02-A		pCi/g	0.0090±0.0089	<0.0050 (0.0034±0.0047)	<0.0050 (0.0034±0.0047)	<0.0210 (0.0120±0.0110)	<0.3076 (-0.1607±0.1792)	1.2200±0.1500	0.0560±0.0240	1.4400±0.1700
SR21-SO-R-03-A		pCi/g	<0.0058 (0.0038±0.0053)	<0.0169 (0.0000±0.0049)	<0.0169 (0.0018±0.0060)	0.0123±0.0094	<0.3079 (-0.0331±0.1810)	1.1700±0.1400	0.0720±0.0270	1.2500±0.1500
SR21-SO-R-04-A		pCi/g	<0.0059 (0.0039±0.0054)	<0.0052 (0.0000±0.0034)	<0.0052 (0.0000±0.0034)	0.0052±0.0059	<0.3076 (-0.1843±0.1790)	1.0700±0.1300	0.0620±0.0250	1.1100±0.1400
SR21-SO-R-05-A		pCi/g	<0.0058 (0.0019±0.0038)	<0.0199 (0.0021±0.0071)	<0.0062 (0.0021±0.0041)	<0.0255 (0.0021±0.0091)	<0.3076 (-0.0402±0.1808)	1.0200±0.1300	0.0450±0.0210	1.2500±0.1500
SR21-SO-R-06-A		pCi/g	<0.0205 (0.0000±0.0059)	<0.0059 (0.0000±0.0038)	<0.0059 (0.0000±0.0038)	<0.0240 (0.0039±0.0094)	<0.3098 (-0.0857±0.1815)	1.2400±0.1500	0.0550±0.0250	1.1700±0.1400
SR21-SO-R-07-A		pCi/g	0.0110±0.0097	<0.0057 (0.0000±0.0037)	<0.0231 (-0.0019±0.0064)	0.0075±0.0075	<0.3080 (0.1018±0.1828)	1.1200±0.1400	0.0450±0.0210	1.3100±0.1500

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide Units ↓	Americium-241 Result	Neptunium-237 Result	Plutonium-238 Result	Plutonium-239/240 Result	Technetium-99 Result	Uranium-233/234 Result	Uranium-235/236 Result	Uranium-238 Result
SR21-SO-R-08-A		pCi/g	0.0100±0.0099	<0.0060 (0.0000±0.0039)	<0.0060 (0.0040±0.0056)	0.0080±0.0079	<0.3093 (0.1117±0.1836)	1.2200±0.1500	0.0310±0.0200	1.3000±0.1600
SR21-SO-R-09-A		pCi/g	0.0110±0.0100	<0.0320 (-0.0022±0.0097)	<0.0066 (0.0000±0.0043)	0.0111±0.0099	<0.3014 (0.1532±0.1795)	0.9500±0.1200	0.0250±0.0160	1.1500±0.1400
SR21-SO-R-10-A		pCi/g	0.0120±0.0110	<0.0064 (0.0021±0.0042)	<0.0064 (0.0000±0.0042)	<0.0204 (0.0043±0.0084)	<0.3029 (-0.0103±0.1784)	1.1900±0.1500	0.0370±0.0200	1.2500±0.1600
SR21-SO-R-11-A		pCi/g	0.0120±0.0100	<0.0064 (0.0021±0.0042)	<0.0204 (0.0043±0.0084)	<0.0200 (0.0130±0.0120)	<0.3023 (-0.0080±0.1781)	1.0900±0.1400	0.0600±0.0250	1.3200±0.1600
SR22-SO-R-01-A		pCi/g	0.0060±0.0068	<0.0173 (0.0000±0.0050)	<0.0054 (0.0036±0.0050)	0.0090±0.0080	0.3874±0.1755	1.1000±0.1700	0.0380±0.0200	1.0500±0.1700
SR22-SO-R-02-A		pCi/g	<0.0175 (0.0037±0.0072)	<0.0048 (0.0000±0.0031)	<0.0048 (0.0000±0.0031)	0.0064±0.0063	<0.2971 (0.2745±0.1785)	0.9800±0.1500	0.0480±0.0210	1.0600±0.1600
SR22-SO-R-03-A		pCi/g	0.0082±0.0081	<0.0055 (0.0000±0.0036)	<0.0174 (0.0000±0.0050)	0.0160±0.0110	<0.2986 (0.2532±0.1791)	1.0100±0.1600	0.0520±0.0230	0.9800±0.1500
SR22-SO-R-04-A		pCi/g	<0.0320 (0.0100±0.0140)	<0.0061 (0.0000±0.0040)	<0.0061 (0.0000±0.0040)	<0.0200 (0.0140±0.0120)	0.3443±0.1776	1.1200±0.1700	0.0360±0.0190	1.1700±0.1800
SR22-SO-R-05-A		pCi/g	<0.0178 (0.0019±0.0063)	<0.0055 (0.0000±0.0036)	<0.0264 (-0.0037±0.0072)	<0.0176 (0.0073±0.0089)	0.5174±0.1805	1.0000±0.1500	0.0570±0.0240	1.0200±0.1600
SR22-SO-R-06-A		pCi/g	0.0067±0.0076	<0.0195 (-0.0020±0.0040)	0.0061±0.0070	<0.0190 (0.0160±0.0130)	0.4557±0.1727	1.0300±0.1600	0.0320±0.0180	1.0700±0.1600
SR22-SO-R-07-A		pCi/g	0.0150±0.0110	<0.0055 (0.0000±0.0036)	0.0073±0.0072	0.0150±0.0100	0.6196±0.1778	1.0300±0.1600	0.0570±0.0260	1.0000±0.1600
SR22-SO-R-08-A		pCi/g	0.0063±0.0072	<0.0223 (-0.0023±0.0046)	<0.0070 (0.0023±0.0046)	<0.0222 (0.0023±0.0079)	0.6841±0.1738	1.2100±0.1900	0.0470±0.0240	1.1900±0.1800
SR22-SO-R-09-A		pCi/g	<0.0210 (0.0090±0.0100)	<0.0053 (0.0000±0.0034)	<0.0053 (0.0000±0.0034)	<0.0168 (0.0070±0.0085)	<0.2885 (0.1636±0.1720)	1.0300±0.1600	0.0530±0.0240	1.1800±0.1800
SR22-SO-R-10-A		pCi/g	<0.0064 (0.0043±0.0059)	<0.0223 (-0.0023±0.0046)	<0.0070 (0.0023±0.0046)	<0.0070 (0.0023±0.0046)	<0.2879 (0.2826±0.1732)	0.8700±0.1400	0.0560±0.0240	0.9700±0.1500
SR22-SO-R-11-A		pCi/g	<0.0060 (0.0000±0.0039)	<0.0061 (0.0000±0.0040)	<0.0250 (0.0020±0.0089)	0.0102±0.0091	<0.2770 (0.0453±0.1638)	0.9500±0.1500	0.0460±0.0250	1.0600±0.1600
SR23-SO-R-01-A		pCi/g	<0.0067 (0.0044±0.0062)	<0.0065 (0.0000±0.0042)	<0.0065 (0.0000±0.0042)	<0.0065 (0.0000±0.0042)	<0.3014 (0.0526±0.1783)	0.9500±0.1200	0.0410±0.0200	1.0000±0.1300
SR23-SO-R-02-A		pCi/g	<0.0073 (0.0024±0.0048)	<0.0059 (0.0000±0.0039)	<0.0059 (0.0000±0.0039)	<0.0189 (0.0059±0.0087)	<0.3007 (-0.0547±0.1766)	1.0600±0.1300	0.0460±0.0230	1.1900±0.1500
SR23-SO-R-03-A		pCi/g	<0.0234 (-0.0024±0.0048)	<0.0057 (0.0000±0.0037)	<0.0233 (-0.0019±0.0064)	<0.0270 (0.0040±0.0110)	<0.3002 (-0.0171±0.1767)	1.0900±0.1400	0.0580±0.0250	1.0400±0.1300
SR23-SO-R-04-A		pCi/g	0.0210±0.0150	<0.0061 (0.0000±0.0040)	<0.0061 (0.0000±0.0040)	0.0081±0.0080	<0.3030 (0.0919±0.1797)	1.1100±0.1400	0.0480±0.0230	1.1300±0.1400
SR23-SO-R-05-A		pCi/g	0.0100±0.0100	<0.0069 (0.0000±0.0045)	<0.0220 (-0.0023±0.0045)	<0.0220 (0.0140±0.0130)	<0.3011 (-0.0011±0.1774)	1.0800±0.1400	0.0540±0.0240	1.0900±0.1400
SR23-SO-R-06-A		pCi/g	<0.0074 (0.0000±0.0048)	<0.0190 (0.0000±0.0055)	<0.0190 (-0.0020±0.0039)	<0.0190 (0.0079±0.0096)	<0.3004 (-0.0091±0.1769)	1.1700±0.1400	0.0700±0.0280	1.2200±0.1500
SR23-SO-R-07-A		pCi/g	<0.0280 (0.0050±0.0110)	<0.0199 (0.0000±0.0058)	<0.0199 (0.0021±0.0071)	0.0150±0.0110	<0.3008 (0.2099±0.1799)	1.0400±0.1300	0.0400±0.0210	1.1400±0.1400
SR23-SO-R-08-A		pCi/g	<0.0220 (0.0000±0.0064)	<0.0174 (0.0000±0.0050)	<0.0054 (0.0018±0.0036)	<0.0220 (0.0180±0.0140)	<0.3007 (0.1061±0.1785)	1.1900±0.1500	0.0710±0.0280	1.2000±0.1500
SR23-SO-R-09-A		pCi/g	<0.0300 (0.0050±0.0120)	<0.0064 (0.0000±0.0042)	<0.0204 (0.0021±0.0072)	0.0064±0.0073	<0.3014 (0.1726±0.1798)	0.9600±0.1200	0.0450±0.0230	1.0900±0.1400
SR23-SO-R-10-A		pCi/g	<0.0218 (0.0000±0.0063)	<0.0065 (0.0000±0.0042)	<0.0064 (0.0043±0.0060)	0.0150±0.0110	<0.3032 (0.0667±0.1795)	1.1600±0.1400	0.0670±0.0270	1.2200±0.1500
SR23-SO-R-11-A		pCi/g	0.0078±0.0088	<0.0207 (-0.0022±0.0042)	<0.0065 (0.0000±0.0042)	0.0108±0.0096	<0.3030 (0.0724±0.1794)	0.9400±0.1200	0.0520±0.0240	1.0800±0.1400
SR24-SO-R-01-A		pCi/g	<0.0309 (-0.0021±0.0094)	<0.0166 (-0.0017±0.0034)	<0.0052 (0.0000±0.0034)	<0.0052 (0.0035±0.0048)	<0.3285 (0.1843±0.1959)	0.9600±0.1200	0.0550±0.0230	0.9700±0.1200
SR24-SO-R-02-A		pCi/g	<0.0066 (0.0044±0.0062)	<0.0059 (0.0000±0.0039)	<0.0188 (0.0039±0.0077)	<0.0188 (0.0059±0.0087)	<0.3291 (0.1314±0.1956)	1.0000±0.1300	0.0500±0.0230	1.0800±0.1400
SR24-SO-R-03-A		pCi/g	0.0069±0.0079	<0.0215 (-0.0022±0.0044)	0.0067±0.0077	<0.0215 (0.0067±0.0099)	<0.2939 (0.2814±0.1767)	0.9900±0.1300	0.0630±0.0270	1.0800±0.1300
SR24-SO-R-04-A		pCi/g	0.0063±0.0072	<0.0252 (-0.0041±0.0057)	<0.0061 (0.0000±0.0040)	0.0120±0.0100	<0.3312 (0.2295±0.1980)	0.9400±0.1200	0.0340±0.0190	0.9800±0.1300
SR24-SO-R-05-A		pCi/g	<0.0220 (0.0110±0.0120)	<0.0061 (0.0020±0.0040)	<0.0060 (0.0000±0.0040)	0.0140±0.0110	<0.2935 (0.0078±0.1731)	1.1600±0.1400	0.0290±0.0190	1.0700±0.1300
SR24-SO-R-06-A		pCi/g	<0.0062 (0.0042±0.0058)	<0.0198 (-0.0021±0.0041)	<0.0253 (0.0021±0.0090)	<0.0296 (-0.0021±0.0090)	<0.3271 (-0.0456±0.1922)	1.0300±0.1300	0.0550±0.0240	1.0900±0.1400
SR24-SO-R-07-A		pCi/g	0.0068±0.0078	<0.0191 (-0.0020±0.0039)	<0.0060 (0.0020±0.0039)	<0.0190 (0.0160±0.0130)	<0.3276 (-0.0234±0.1928)	1.1000±0.1400	0.0540±0.0230	1.1000±0.1300
SR24-SO-R-08-A		pCi/g	<0.0217 (0.0045±0.0089)	<0.0169 (0.0018±0.0060)	<0.0169 (0.0000±0.0049)	<0.0217 (0.0035±0.0085)	<0.3280 (-0.1211±0.1918)	0.9700±0.1200	0.0330±0.0180	1.0400±0.1300
SR24-SO-R-09-A		pCi/g	0.0082±0.0081	<0.0220 (-0.0023±0.0045)	<0.0069 (0.0023±0.0045)	<0.0220 (0.0070±0.0100)	<0.3300 (0.2383±0.1974)	1.1100±0.1400	0.0410±0.0200	1.0600±0.1300
SR24-SO-R-10-A		pCi/g	<0.0056 (0.0037±0.0052)	<0.0248 (-0.0052±0.0059)	<0.0211 (-0.0034±0.0048)	<0.0164 (0.0069±0.0083)	<0.3309 (0.0498±0.1956)	1.0100±0.1300	0.0470±0.0220	1.0600±0.1300
SR24-SO-R-11-A		pCi/g	<0.0200 (0.0110±0.0110)	<0.0050 (0.0034±0.0047)	<0.0050 (0.0034±0.0047)	<0.0161 (0.0101±0.0094)	<0.3267 (0.1552±0.1944)	1.0600±0.1300	0.0380±0.0210	1.1500±0.1400
SR25-SO-R-01-A		pCi/g	<0.0058 (0.0039±0.0054)	<0.0194 (0.0000±0.0056)	<0.0193 (0.0000±0.0056)	<0.0061 (0.0040±0.0056)	<0.3095 (0.2018±0.1849)	1.0900±0.1400	0.0530±0.0230	1.1800±0.1400
SR25-SO-R-02-A		pCi/g	<0.0061 (0.0020±0.0040)	<0.0236 (0.0000±0.0075)	<0.0057 (0.0019±0.0038)	0.0150±0.0110	<0.3097 (-0.0116±0.1824)	1.3600±0.1600	0.0520±0.0230	1.3100±0.1600
SR25-SO-R-03-A		pCi/g	<0.0263 (0.0021±0.0094)	<0.0316 (-0.0089±0.0080)	<0.0053 (0.0000±0.0035)	0.0071±0.0071	<0.3118 (-0.2301±0.1810)	1.1000±0.1300	0.0430±0.0200	1.0700±0.1300
SR25-SO-R-04-A		pCi/g	0.0063±0.0072	<0.0214 (-0.0022±0.0044)	<0.0214 (-0.0022±0.0044)	0.0067±0.0077	<0.3131 (0.0152±0.1847)	1.1800±0.1400	0.0440±0.0210	1.1900±0.1500
SR25-SO-R-05-A		pCi/g	0.0095±0.0084	<0.0064 (0.0000±0.0042)	<0.0064 (0.0000±0.0042)	0.0106±0.0095	<0.3124 (-0.0176±0.1839)	0.9400±0.1200	0.0460±0.0210	1.0000±0.1300
SR25-SO-R-06-A		pCi/g	0.0106±0.0094	<0.0208 (-0.0017±0.0057)	<0.0161 (0.0000±0.0047)	<0.0050 (0.0034±0.0047)	<0.3127 (-0.0949±0.1831)	1.1700±0.1400	0.0760±0.0280	1.2400±0.1500
SR25-SO-R-07-A		pCi/g	<0.0194 (0.0000±0.0056)	<0.0186 (0.0000±0.0054)	<0.0058 (0.0000±0.0038)	0.0077±0.0077	<0.3119 (-0.0584±0.1831)	1.0900±0.1400	0.0530±0.0230	1.0600±0.1300
SR25-SO-R-08-A		pCi/g	0.0073±0.0072	<0.0187 (0.0000±0.0054)	<0.0058 (0.0019±0.0038)	<0.0239 (0.0019±0.0085)	<0.3125 (-0.0468±0.1836)	1.1300±0.1400	0.0590±0.0260	1.2900±0.1500
SR25-SO-R-09-A		pCi/g	<0.0057 (0.0038±0.0053)	<0.0053 (0.0000±0.0035)	<0.0053 (0.0018±0.0035)	<0.0220 (0.0190±0.0140)	<0.3091 (-0.0753±0.1812)	1.1900±0.1400	0.0700±0.0270	1.2400±0.1500
SR25-SO-R-10-A		pCi/g	0.0129±0.0096	<0.0049 (0.0000±0.0032)	<0.0155 (0.0000±0.0045)	0.0081±0.0072	<0.3106 (-0.0012±0.1831)	1.0800±0.1300	0.0510±0.0230	1.2300±0.1400
SR25-SO-R-11-A		pCi/g	<0.0178 (0.0037±0.0073)	<0.0049 (0.0000±0.0032)	<0.0157 (0.0000±0.0046)	0.0099±0.0081	<0.3106 (-0.1455±0.1813)	1.2200±0.1500	0.0600±0.0240	1.2800±0.1500
SR26-SO-R-01-A		pCi/g	0.0065±0.0073	<0.0053 (0.0000±0.0035)	<0.0053 (0.0018±0.0035)	<0.0169 (0.0035±0.0069)	<0.3415 (0.3218±0.2053)	1.2500±0.1500	0.0650±0.0260	1.3400±0.1600
SR26-SO-R-02-A		pCi/g	<0.0200 (0.0120±0.0120)	<0.0319 (-0.0090±0.0080)	<0.0221 (0.0000±0.0070)	0.0230±0.0140	<0.3412 (0.1046±0.2024)	1.1500±0.1400	0.0650±0.0270	1.1200±0.1400
SR26-SO-R-03-A		pCi/g	0.0100±0.0100	<0.0058 (0.0039±0.0054)	<0.0058 (0.0019±0.0038)	0.0270±0.0160	<0.3391 (-0.0203±0.1996)	1.0700±0.1300	0.0780±0.0300	1.1300±0.1400
SR26-SO-R-04-A		pCi/g	<0.0257 (0.0021±0.0092)	<0.0189 (0.0000±0.0055)	<0.0059 (0.0020±0.0039)	<0.0190 (0.0120±0.0110)	0.3984±0.2056	1.1600±0.1400	0.0390±0.0200	1.2100±0.1400
SR26-SO-R-05-A		pCi/g	<0.0238 (0.0000±0.0076)	<0.0181 (0.0019±0.0064)	<0.0057 (0.0038±0.0053)	0.0210±0.0130	<0.3387 (-0.0355±0.1992)	1.2000±0.1500	0.0400±0.0220	1.2400±0.1500
SR26-SO-R-06-A		pCi/g	<0.0184 (0.0000±0.0053)	<0.0168 (0.0000±0.0049)	<0.0052 (0.0000±0.0034)	<0.0052 (0.0017±0.0034)	<0.3396 (0.2628±0.2034)	1.0000±0.1200	0.0420±0.0190	1.0500±0.1300
SR26-SO-R-07-A		pCi/g	<0.0062 (0.0021±0.0040)	<0.0057 (0.0019±0.0038)	<0.0057 (0.0019±0.0038)	<0.0183 (0.0019±0.0065)	<0.3383 (-0.1214±0.1979)	1.3000±0.1600	0.0450±0.0220	1.4100±0.1700
SR26-SO-R-08-A		pCi/g	<0.0240 (0.0050±0.0100)	<0.0065 (0.0000±0.0042)	<0.0065 (0.0043±0.0060)	0.0170±0.0120	<0.3396 (-0.0571±0.1995)	1.1500±0.1500	0.0430±0.0220	1.2100±0.1500
SR26-SO-R-09-A		pCi/g	0.0102±0.0090	<0.0054 (0.0018±0.0036)	<0.0054 (0.0036±0.0050)	<0.0172 (0.0090±0.0095)	<0.3111 (-0.0117±0.1832)	0.8800±0.1100	0.0580±0.0240	1.0000±0.1300
SR26-SO-R-10-A		pCi/g	0.0059±0.0067	<0.0061 (0.0020±0.0040)	<0.0060 (0.0020±0.0040)	0.0060±0.0069	<0.3115 (-0.0059±0.1835)	1.0900±0.1300	0.0710±0.0280	1.1200±0.1400
SR26-SO-R-11-A		pCi/g	<0.0210 (0.0110±0.0110)	<0.0290 (-0.0040±0.0079)	<0.0060 (0.0000±0.0039)	0.0121±0.0099	<0.3101 (0.1181±0.1842)	0.9700±0.1200	0.0430±0.0210	1.0500±0.1300
SR27-SO-R-01-A		pCi/g	0.0107±0.0094	<0.0060 (0.0040±0.0055)	<0.0243 (-0.0040±0.0055)	0.0119±0.0096	<0.3200 (-0.1122±0.1872)	1.0500±0.1300	0.0430±0.0200	1.1700±0.1400
SR27-SO-R-02-A		pCi/g	<0.0200 (0.0090±0.0100)	<0.0055 (0.0018±0.0036)	0.0055±0.0063	<0.0176 (0.0073±0.0088)	<0.3229 (-0.0831±0.1893)	1.2500±0.1500	0.0610±0.0250	1.2700±0.1500
SR27-SO-R-03-A		pCi/g	0.0150±0.0110	<0.0060 (0.0020±0.0039)	<0.0190 (0.0020±0.0067)	<0.0190 (0.0160±0.0120)	<0.3186 (-0.0440±0.1873)	0.8400±0.1100	0.0290±0.0160	0.7700±0.1000
SR27-SO-R-04-A		pCi/g	0.0083±0.0082	<0.0181 (0.0000±0.0052)	0.0075±0.0074	0.0113±0.0091	<0.3199 (-0.1778±0.1864)	1.1400±0.1400	0.0490±0.0210	1.1200±0.1300
SR27-SO-R-05-A		pCi/g	<0.0065 (0.0044±0.0061)	<0.0057 (0.0038±0.0053)	<0.0057 (0.0000±0.0037)	0.0210±0.0140	<0.3111 (-0.2069±0.1808)	1.0300±0.1300	0.0360±0.0190	1.0900±0.1300
SR27-SO-R-06-A		pCi/g	<0.0240 (0.0080±0.0110)	<0.0054 (0.0000±0.0035)	<0.0222 (0.0054±0.0094)	0.0126±0.0094	<0.3115 (-0.1334±0.1820)	1.1600±0.1400	0.0700±0.0280	1.1200±0.1400
SR27-SO-R-07-A		pCi/g	<0.0314 (-0.0022±0.0096)	<0.0057 (0.0019±0.0037)	<0.0057 (0.0038±0.0053)	<0.0234 (0.0038±0.0091)	<0.3115 (-0.1171±0.1822)	1.0800±0.1300	0.0630±0.0250	1.0500±0.1300
SR27-SO-R-08-A		pCi/g	0.0090±0.0089	<0.0182 (0.0000±0.0053)	<0.0057 (0.0038±0.0053)	0.0150±0.0110	<0.3070 (-0.0288±0.1806)	0.8500±0.1100	0.0350±0.0190	0.9700±0.1300
SR27-SO-R-09-A		pCi/g	<0.0270 (0.0090±0.0120)	<0.0056 (0.0019±0.0037)	<0.0056 (0.0019±0.0036)	<0.0180 (0.0110±0.0100)	<0.3066 (-0.0230±0.1804)	1.1800±0.1500	0.0780±0.0290	1.2700±0.1500

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide / Units ↓	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
			Result	Result	Result	Result	Result	Result	Result	Result
SR27-SO-R-10-A		pCi/g	0.0069±0.0078	<0.0239 (0.0000±0.0076)	0.0058±0.0066	0.0140±0.0100	<0.3090 (0.0743±0.1830)	1.1300±0.1400	0.0760±0.0280	1.1300±0.1400
SR27-SO-R-11-A		pCi/g	0.0090±0.0088	<0.0058 (0.0019±0.0038)	<0.0186 (0.0078±0.0093)	0.0116±0.0094	<0.3094 (0.0860±0.1834)	1.1000±0.1400	0.0480±0.0220	1.0700±0.1300
SR28-SO-J-01-A		pCi/g	0.0085±0.0084	<0.0180 (0.0000±0.0052)	<0.0056 (0.0019±0.0037)	<0.0180 (0.0094±0.0099)	<0.3118 (0.0963±0.1850)	1.0300±0.1300	0.0370±0.0190	1.1200±0.1300
SR28-SO-R-01-A		pCi/g	<0.0061 (0.0040±0.0056)	<0.0245 (-0.0040±0.0056)	<0.0060 (0.0040±0.0055)	0.0099±0.0088	<0.3112 (0.1432±0.1852)	1.1700±0.1400	0.0530±0.0230	1.1800±0.1400
SR28-SO-R-02-A		pCi/g	<0.0062 (0.0041±0.0057)	<0.0197 (-0.0021±0.0040)	<0.0061 (0.0020±0.0040)	<0.0196 (0.0020±0.0070)	<0.3105 (0.0539±0.1837)	1.2100±0.1500	0.0400±0.0200	1.1600±0.1400
SR28-SO-R-03-A		pCi/g	0.0065±0.0074	<0.0182 (-0.0019±0.0037)	<0.0182 (0.0019±0.0065)	0.0190±0.0130	<0.3090 (0.2109±0.1847)	1.0800±0.1400	0.0490±0.0230	1.1900±0.1500
SR28-SO-R-04-A		pCi/g	<0.0067 (0.0022±0.0044)	<0.0216 (-0.0018±0.0060)	<0.0168 (0.0018±0.0060)	<0.0053 (0.0035±0.0049)	<0.3101 (-0.0129±0.1826)	1.0000±0.1300	0.0570±0.0240	1.0400±0.1300
SR28-SO-R-05-A		pCi/g	<0.0209 (0.0000±0.0061)	<0.0194 (0.0000±0.0056)	<0.0061 (0.0000±0.0040)	<0.0248 (0.0040±0.0097)	<0.3105 (0.1756±0.1851)	0.9100±0.1200	0.0410±0.0200	0.9600±0.1200
SR28-SO-R-06-A		pCi/g	<0.0198 (0.0021±0.0070)	<0.0051 (0.0017±0.0034)	<0.0051 (0.0017±0.0034)	0.0150±0.0100	<0.3123 (-0.0071±0.1840)	1.2300±0.1500	0.0660±0.0250	1.1900±0.1400
SR28-SO-R-07-A		pCi/g	<0.0193 (0.0081±0.0097)	<0.0269 (-0.0044±0.0061)	<0.0065 (0.0044±0.0061)	0.0150±0.0120	<0.3138 (0.0461±0.1855)	1.2900±0.1600	0.0510±0.0250	1.3000±0.1600
SR28-SO-R-08-A		pCi/g	0.0078±0.0077	<0.0061 (0.0000±0.0040)	<0.0194 (0.0000±0.0056)	<0.0190 (0.0160±0.0130)	<0.3132 (0.1463±0.1864)	1.1700±0.1400	0.0430±0.0210	1.2600±0.1500
SR28-SO-R-09-A		pCi/g	0.0086±0.0085	<0.0062 (0.0021±0.0041)	<0.0062 (0.0021±0.0041)	<0.0250 (0.0230±0.0160)	<0.3138 (0.1560±0.1868)	0.9700±0.1200	0.0600±0.0240	1.0700±0.1300
SR28-SO-R-10-A		pCi/g	<0.0217 (0.0023±0.0077)	<0.0181 (0.0019±0.0064)	<0.0057 (0.0019±0.0037)	0.0057±0.0065	<0.3132 (-0.0212±0.1843)	1.1700±0.1400	0.0510±0.0230	1.0600±0.1300
SR28-SO-R-11-A		pCi/g	<0.0198 (0.0083±0.0100)	<0.0067 (0.0000±0.0044)	<0.0067 (0.0022±0.0044)	0.0089±0.0089	<0.2916 (0.2025±0.1744)	1.0000±0.1300	0.0530±0.0240	1.0600±0.1300
SR29-SO-R-01-A		pCi/g	0.0104±0.0092	<0.0053 (0.0018±0.0035)	<0.0170 (0.0000±0.0049)	<0.0170 (0.0089±0.0093)	<0.3296 (0.0637±0.1950)	1.1800±0.1500	0.0850±0.0320	1.2900±0.1600
SR29-SO-R-02-A		pCi/g	<0.0060 (0.0040±0.0056)	<0.0252 (-0.0041±0.0057)	<0.0196 (-0.0020±0.0040)	0.0102±0.0091	<0.2937 (0.1804±0.1753)	0.8800±0.1200	0.0520±0.0240	0.9400±0.1200
SR29-SO-R-03-A		pCi/g	0.0077±0.0076	<0.0199 (0.0021±0.0071)	<0.0299 (-0.0042±0.0082)	<0.0062 (0.0042±0.0058)	<0.3317 (0.2203±0.1982)	0.8100±0.1100	0.0350±0.0190	0.8200±0.1100
SR29-SO-R-04-A		pCi/g	<0.0236 (-0.0019±0.0065)	<0.0187 (0.0020±0.0066)	<0.0058 (0.0000±0.0038)	0.0078±0.0077	<0.3311 (0.1854±0.1975)	0.8200±0.1100	0.0340±0.0180	0.8100±0.1100
SR29-SO-R-05-A		pCi/g	0.0063±0.0071	<0.0060 (0.0020±0.0039)	<0.0059 (0.0020±0.0039)	0.0160±0.0110	<0.3286 (0.1942±0.1960)	1.1100±0.1400	0.0600±0.0250	1.1800±0.1500
SR29-SO-R-06-A		pCi/g	<0.0061 (0.0041±0.0056)	<0.0219 (-0.0036±0.0050)	<0.0170 (-0.0018±0.0035)	<0.0053 (0.0035±0.0050)	<0.3314 (0.1050±0.1966)	1.0700±0.1300	0.0660±0.0270	1.0700±0.1300
SR29-SO-R-07-A		pCi/g	<0.0200 (0.0110±0.0110)	<0.0226 (0.0000±0.0072)	<0.0055 (0.0000±0.0036)	0.0073±0.0073	<0.3318 (0.2652±0.1988)	0.9000±0.1200	0.0530±0.0230	0.9500±0.1200
SR29-SO-R-08-A		pCi/g	<0.0066 (0.0022±0.0043)	<0.0232 (-0.0038±0.0053)	<0.0056 (0.0019±0.0037)	0.0056±0.0065	<0.3319 (0.1385±0.1973)	1.1100±0.1400	0.0570±0.0240	1.1700±0.1400
SR29-SO-R-09-A		pCi/g	<0.0251 (0.0041±0.0098)	<0.0175 (0.0000±0.0051)	<0.0174 (-0.0018±0.0036)	<0.0170 (0.0110±0.0100)	<0.2945 (0.0742±0.1745)	0.8400±0.1100	0.0390±0.0210	0.9200±0.1200
SR29-SO-R-10-A		pCi/g	<0.0070 (0.0023±0.0046)	<0.0053 (0.0000±0.0034)	<0.0053 (0.0000±0.0034)	0.0123±0.0093	<0.3293 (0.0814±0.1950)	1.1000±0.1400	0.0400±0.0200	1.1200±0.1400
SR29-SO-R-11-A		pCi/g	<0.0190 (0.0040±0.0078)	<0.0245 (-0.0020±0.0068)	<0.0190 (0.0020±0.0067)	0.0119±0.0097	<0.3317 (0.0692±0.1963)	1.0200±0.1300	0.0360±0.0190	1.1600±0.1400
SR30-SO-R-01-A		pCi/g	0.0085±0.0084	<0.0064 (0.0000±0.0042)	<0.0340 (0.0000±0.0120)	0.0085±0.0084	<0.2767 (0.0042±0.1631)	1.2500±0.1900	0.0760±0.0310	1.2200±0.1900
SR30-SO-R-02-A		pCi/g	<0.0066 (0.0044±0.0061)	<0.0237 (0.0000±0.0076)	<0.0340 (0.0060±0.0140)	<0.0184 (0.0038±0.0076)	<0.2871 (-0.1284±0.1676)	1.1300±0.1700	0.0320±0.0180	1.1500±0.1800
SR30-SO-R-03-A		pCi/g	<0.0270 (0.0060±0.0110)	<0.0173 (0.0000±0.0050)	<0.0173 (-0.0018±0.0035)	0.0090±0.0080	<0.2778 (-0.0510±0.1631)	1.1900±0.1800	0.0530±0.0240	1.1700±0.1800
SR30-SO-R-04-A		pCi/g	<0.0067 (0.0022±0.0044)	<0.0194 (-0.0020±0.0040)	<0.0061 (0.0020±0.0040)	<0.0291 (0.0000±0.0097)	<0.2908 (0.0256±0.1717)	1.1400±0.1800	0.0830±0.0310	1.2300±0.1900
SR30-SO-R-05-A		pCi/g	<0.0066 (0.0044±0.0061)	<0.0066 (0.0022±0.0043)	<0.0065 (0.0022±0.0043)	0.0065±0.0075	<0.2925 (0.0369±0.1728)	1.1800±0.1800	0.0630±0.0270	1.2600±0.1900
SR30-SO-R-06-A		pCi/g	0.0066±0.0075	<0.0062 (0.0000±0.0040)	<0.0252 (-0.0041±0.0057)	0.0103±0.0091	<0.2824 (-0.0184±0.1662)	1.0700±0.1700	0.0610±0.0270	1.1700±0.1800
SR30-SO-R-07-A		pCi/g	0.0110±0.0097	<0.0159 (0.0000±0.0046)	<0.0050 (0.0033±0.0046)	<0.0159 (0.0066±0.0080)	<0.2911 (0.1246±0.1731)	1.2100±0.1900	0.0720±0.0290	1.3600±0.2100
SR30-SO-R-08-A		pCi/g	<0.0220 (0.0070±0.0100)	<0.0192 (0.0000±0.0055)	<0.0350 (-0.0020±0.0120)	<0.0191 (0.0060±0.0088)	<0.2872 (0.0714±0.1701)	1.0800±0.1700	0.0330±0.0210	1.1700±0.1800
SR30-SO-R-09-A		pCi/g	<0.0280 (0.0020±0.0100)	<0.0070 (0.0000±0.0046)	<0.0224 (-0.0023±0.0046)	0.0210±0.0140	<0.2819 (0.1175±0.1676)	1.2600±0.1900	0.0460±0.0230	1.1600±0.1800
SR30-SO-R-10-A		pCi/g	<0.0405 (-0.0084±0.0096)	<0.0216 (0.0000±0.0062)	<0.0215 (0.0000±0.0062)	<0.0067 (0.0045±0.0063)	<0.2899 (0.1341±0.1725)	1.1400±0.1800	0.1000±0.0370	1.1600±0.1900
SR30-SO-R-11-A		pCi/g	0.0062±0.0070	<0.0061 (0.0000±0.0040)	<0.0061 (0.0041±0.0057)	<0.0190 (0.0120±0.0110)	<0.2875 (0.1033±0.1707)	1.0500±0.1600	0.0580±0.0240	1.0900±0.1700
SR31-SO-R-01-A		pCi/g	<0.0196 (-0.0020±0.0040)	<0.0203 (0.0000±0.0065)	<0.0370 (-0.0080±0.0120)	<0.0291 (-0.0016±0.0097)	<0.2944 (0.1053±0.1748)	1.1400±0.1400	0.0610±0.0240	1.1700±0.1400
SR31-SO-R-02-A		pCi/g	<0.0284 (0.0000±0.0095)	<0.0061 (0.0000±0.0040)	<0.0193 (0.0000±0.0056)	<0.0250 (0.0080±0.0110)	<0.3056 (-0.1266±0.1786)	1.3700±0.1600	0.0610±0.0250	1.3500±0.1600
SR31-SO-R-03-A		pCi/g	<0.0067 (0.0022±0.0044)	<0.0188 (0.0020±0.0067)	<0.0059 (0.0020±0.0039)	<0.0240 (0.0060±0.0100)	<0.2976 (0.0022±0.1754)	1.2500±0.1500	0.0490±0.0220	1.0800±0.1300
SR31-SO-R-04-A		pCi/g	<0.0186 (0.0019±0.0066)	<0.0175 (0.0000±0.0051)	<0.0055 (0.0018±0.0036)	0.0055±0.0062	0.3808±0.1848	1.1000±0.1300	0.0460±0.0200	1.0500±0.1300
SR31-SO-R-05-A		pCi/g	<0.0061 (0.0041±0.0056)	<0.0053 (0.0000±0.0035)	<0.0053 (0.0000±0.0035)	0.0053±0.0061	<0.3055 (0.0575±0.1808)	1.1800±0.1400	0.0770±0.0280	1.1700±0.1400
SR31-SO-R-06-A		pCi/g	<0.0192 (0.0040±0.0079)	<0.0056 (0.0019±0.0037)	<0.0056 (0.0000±0.0037)	<0.0179 (0.0075±0.0091)	<0.3041 (0.1271±0.1808)	1.2600±0.1500	0.0390±0.0190	1.3300±0.1600
SR31-SO-R-07-A		pCi/g	<0.0057 (0.0019±0.0038)	<0.0048 (0.0016±0.0032)	<0.0048 (0.0000±0.0032)	0.0064±0.0064	<0.2986 (-0.0540±0.1753)	1.0400±0.1200	0.0540±0.0210	1.1300±0.1300
SR31-SO-R-08-A		pCi/g	<0.0230 (0.0037±0.0090)	<0.0050 (0.0000±0.0033)	<0.0050 (0.0017±0.0033)	<0.0205 (0.0033±0.0080)	<0.3007 (-0.1788±0.1750)	1.3000±0.1500	0.0490±0.0210	1.2500±0.1500
SR31-SO-R-09-A		pCi/g	<0.0062 (0.0041±0.0057)	<0.0184 (0.0000±0.0053)	<0.0057 (0.0019±0.0038)	0.0057±0.0066	<0.2985 (-0.0101±0.1758)	1.1500±0.1300	0.0510±0.0220	1.1400±0.1300
SR31-SO-R-10-A		pCi/g	<0.0191 (0.0020±0.0068)	<0.0261 (-0.0036±0.0071)	<0.0054 (0.0018±0.0036)	<0.0054 (0.0036±0.0050)	<0.3010 (0.0748±0.1783)	1.2500±0.1500	0.0440±0.0220	1.3400±0.1600
SR31-SO-R-11-A		pCi/g	<0.0060 (0.0040±0.0055)	<0.0277 (-0.0058±0.0066)	<0.0058 (0.0000±0.0038)	<0.0058 (0.0038±0.0054)	<0.3001 (0.0588±0.1776)	1.3000±0.1600	0.0450±0.0210	1.3600±0.1600
SR32-SO-R-01-A		pCi/g	<0.0072 (0.0048±0.0066)	<0.0057 (0.0000±0.0037)	<0.0056 (0.0000±0.0037)	0.0075±0.0075	<0.3119 (0.1458±0.1856)	1.2600±0.1500	0.0500±0.0240	1.2400±0.1500
SR32-SO-R-02-A		pCi/g	<0.0200 (0.0080±0.0100)	<0.0049 (0.0016±0.0032)	0.0049±0.0056	<0.0156 (0.0049±0.0072)	<0.3099 (0.0760±0.1835)	1.2900±0.1500	0.0500±0.0210	1.2900±0.1500
SR32-SO-R-03-A		pCi/g	0.0080±0.0078	<0.0048 (0.0016±0.0031)	<0.0048 (0.0000±0.0031)	<0.0196 (0.0095±0.0100)	<0.3119 (0.0562±0.1845)	1.3500±0.1500	0.0620±0.0240	1.2500±0.1500
SR32-SO-R-04-A		pCi/g	<0.0057 (0.0019±0.0037)	<0.0183 (0.0000±0.0053)	<0.0057 (0.0038±0.0053)	0.0076±0.0076	<0.3104 (0.1427±0.1847)	1.0900±0.1300	0.0390±0.0190	1.1500±0.1400
SR32-SO-R-05-A		pCi/g	<0.0064 (0.0000±0.0041)	<0.0169 (0.0000±0.0049)	<0.0053 (0.0000±0.0034)	<0.0168 (0.0105±0.0099)	0.3424±0.1794	2.1300±0.2300	0.0850±0.0290	2.1200±0.2300
SR32-SO-R-06-A		pCi/g	<0.0057 (0.0038±0.0052)	<0.0154 (0.0000±0.0045)	<0.0048 (0.0016±0.0032)	<0.0154 (0.0064±0.0078)	<0.3050 (-0.0230±0.1795)	1.2200±0.1400	0.0500±0.0220	1.3900±0.1600
SR32-SO-R-07-A		pCi/g	<0.0204 (0.0021±0.0072)	<0.0211 (0.0000±0.0061)	<0.0066 (0.0044±0.0061)	<0.0270 (0.0040±0.0110)	<0.3002 (-0.2113±0.1743)	0.6120±0.0870	0.0380±0.0190	0.5900±0.0840
SR32-SO-R-08-A		pCi/g	<0.0061 (0.0020±0.0040)	<0.0176 (-0.0018±0.0036)	<0.0176 (0.0000±0.0051)	0.0110±0.0090	<0.3068 (0.0577±0.1815)	1.6000±0.1800	0.0520±0.0240	1.5000±0.1700
SR32-SO-R-09-A		pCi/g	<0.0200 (0.0080±0.0100)	<0.0063 (0.0021±0.0041)	<0.0063 (0.0000±0.0041)	0.0340±0.0170	<0.3064 (-0.0623±0.1798)	1.0900±0.1300	0.0480±0.0210	1.1100±0.1300
SR32-SO-R-10-A		pCi/g	<0.0183 (-0.0019±0.0038)	<0.0241 (-0.0050±0.0057)	<0.0205 (-0.0017±0.0057)	<0.0160 (0.0033±0.0066)	<0.3014 (0.1203±0.1791)	1.0500±0.1200	0.0780±0.0260	1.1000±0.1300
SR32-SO-R-11-A		pCi/g	<0.0056 (0.0019±0.0036)	<0.0243 (-0.0034±0.0066)	<0.0050 (0.0017±0.0033)	<0.0161 (0.0050±0.0074)	<0.3017 (-0.1022±0.1765)	1.3800±0.1500	0.0750±0.0260	1.3900±0.1600
SR34-SO-R-01-A		pCi/g	<0.0205 (0.0000±0.0059)	<0.0057 (0.0000±0.0037)	<0.0057 (0.0000±0.0037)	<0.0057 (0.0038±0.0053)	<0.3105 (0.0152±0.1832)	1.1000±0.1300	0.0700±0.0260	1.1200±0.1400
SR34-SO-R-02-A		pCi/g	<0.0205 (0.0064±0.0094)	<0.0189 (0.0000±0.0055)	<0.0059 (0.0039±0.0055)	0.0160±0.0110	<0.3102 (0.0431±0.1834)	1.0800±0.1400	0.0580±0.0250	1.0600±0.1300
SR34-SO-R-03-A		pCi/g	<0.0221 (0.0046±0.0091)	<0.0217 (-0.0018±0.0060)	<0.0053 (0.0035±0.0049)	<0.0169 (0.0106±0.0098)	<0.3088 (-0.0557±0.1813)	0.9400±0.1200	0.0530±0.0220	1.0300±0.1200
SR34-SO-R-04-A		pCi/g	<0.0083 (0.0028±0.0054)	<0.0186 (-0.0019±0.0038)	<0.0058 (0.0039±0.0054)	0.0097±0.0085	<0.3096 (-0.0628±0.1817)	1.0100±0.1300	0.0710±0.0270	1.0400±0.1300
SR34-SO-R-05-A		pCi/g	<0.0071 (0.0000±0.0047)	<0.0171 (-0.0018±0.0035)	<0.0171 (0.0000±0.0049)	0.0053±0.0061	<0.2930 (0.1319±0.1743)	1.2500±0.1500	0.0660±0.0260	1.1100±0.1300
SR34-SO-R-06-A		pCi/g	0.0101±0.0099	<0.0193 (0.0000±0.0056)	<0.0193 (0.0000±0.0056)	0.0200±0.0130	<0.3084 (0.1379±0.1835)	1.0200±0.1300	0.0330±0.0190	1.0400±0.1300
SR34-SO-R-07-A		pCi/g	<0.0320 (0.0050±0.0130)	<0.0053 (0.0000±0.0035)	<0.0053 (0.0000±0.0035)	0.0070±0.0069	<0.3067 (0.2075±0.1833)	1.0400±0.1300	0.0810±0.0300	1.1500±0.1400
SR34-SO-R-08-A		pCi/g	<0.0265 (-0.0022±0.0073)	<0.0057 (0.0038±0.0053)	<0.0057 (0.0000±0.0037)	<0.0183 (0.0000±0.0053)	<0.3099 (0.1257±0.1842)	1.1800±0.1500	0.0770±0.0290	1.2500±0.1500
SR34-SO-R-09-A		pCi/g	<0.0310 (0.0050±0.0120)	<0.0063 (0.0042±0.0059)	<0.0201 (-0.0021±0.0041)	0.0084±0.0083	<0.3175 (0.0299±0.1875)	1.0600±0.1400	0.0540±0.0240	1.1800±0.1500
SR34-SO-R-10-A		pCi/g	0.0112±0.0099	<0.0064 (0.0000±0.0042)	<0.0063 (0.0042±0.0059)	0.0210±0.0150	<0.3184 (0.0276±0.1880)	1.0900±0.1400	0.0460±0.0230	1.1000±0.1400

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide / Units ↓	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
			Result	Result	Result	Result	Result	Result	Result	Result
SR34-SO-R-11-A		pCi/g	<0.0278 (-0.0023±0.0077)	<0.0063 (0.0021±0.0041)	<0.0256 (-0.0042±0.0058)	<0.0256 (0.0021±0.0091)	<0.3167 (0.0705±0.1875)	1.0500±0.1400	0.0540±0.0250	1.1000±0.1400
SR35-SO-R-01-A		pCi/g	0.0059±0.0067	<0.0239 (-0.0039±0.0054)	<0.0058 (0.0039±0.0054)	<0.0240 (0.0060±0.0100)	<0.3310 (0.1636±0.1971)	1.0900±0.1300	0.0500±0.0220	1.0700±0.1300
SR35-SO-R-02-A		pCi/g	0.0130±0.0100	<0.0055 (0.0000±0.0036)	<0.0225 (-0.0037±0.0051)	<0.0175 (0.0073±0.0089)	<0.3315 (0.0333±0.1958)	1.3200±0.1600	0.0780±0.0280	1.3100±0.1600
SR35-SO-R-03-A		pCi/g	<0.0214 (0.0000±0.0062)	<0.0054 (0.0000±0.0035)	<0.0054 (0.0000±0.0035)	0.0072±0.0071	<0.3270 (0.0202±0.1929)	1.2800±0.1500	0.0620±0.0250	1.2100±0.1500
SR35-SO-R-04-A		pCi/g	0.0097±0.0096	<0.0061 (0.0000±0.0040)	<0.0061 (0.0000±0.0040)	0.0140±0.0110	<0.3286 (0.1586±0.1956)	1.3400±0.1600	0.0620±0.0250	1.3400±0.1600
SR35-SO-R-05-A		pCi/g	<0.0063 (0.0021±0.0042)	<0.0062 (0.0000±0.0040)	<0.0196 (0.0041±0.0081)	0.0120±0.0100	<0.3108 (-0.0175±0.1830)	0.9900±0.1300	0.0670±0.0260	1.0400±0.1300
SR35-SO-R-06-A		pCi/g	<0.0070 (0.0023±0.0046)	<0.0054 (0.0018±0.0035)	<0.0054 (0.0018±0.0035)	0.0107±0.0088	<0.3113 (-0.0268±0.1831)	1.2600±0.1500	0.0600±0.0240	1.3300±0.1600
SR35-SO-R-07-A		pCi/g	<0.0218 (0.0023±0.0077)	<0.0065 (0.0022±0.0043)	<0.0065 (0.0000±0.0043)	<0.0065 (0.0044±0.0061)	<0.3103 (0.2895±0.1865)	1.0500±0.1300	0.0540±0.0230	1.1100±0.1400
SR35-SO-R-08-A		pCi/g	<0.0063 (0.0000±0.0041)	<0.0193 (-0.0020±0.0040)	<0.0192 (-0.0020±0.0039)	0.0140±0.0110	<0.3121 (-0.0982±0.1827)	1.1700±0.1400	0.0740±0.0280	1.1400±0.1400
SR35-SO-R-09-A		pCi/g	0.0104±0.0092	<0.0060 (0.0040±0.0056)	<0.0190 (0.0040±0.0078)	<0.0240 (0.0100±0.0120)	<0.3100 (-0.1324±0.1811)	1.2700±0.1500	0.0300±0.0170	1.2600±0.1500
SR35-SO-R-10-A		pCi/g	<0.0205 (0.0043±0.0084)	<0.0189 (-0.0020±0.0039)	<0.0059 (0.0039±0.0055)	<0.0189 (0.0000±0.0055)	<0.3114 (0.0128±0.1837)	0.8500±0.1100	0.0520±0.0230	0.9100±0.1200
SR35-SO-R-11-A		pCi/g	0.0140±0.0100	<0.0055 (0.0037±0.0051)	<0.0055 (0.0000±0.0036)	0.0150±0.0100	<0.3115 (-0.0082±0.1835)	1.3600±0.1600	0.0740±0.0290	1.3700±0.1600
SR36-SO-R-01-A		pCi/g	<0.0180 (0.0150±0.0110)	<0.0047 (0.0016±0.0031)	<0.0047 (0.0016±0.0030)	0.0200±0.0110	<0.3011 (0.2256±0.1803)	1.2500±0.1400	0.0450±0.0190	1.4200±0.1600
SR36-SO-R-02-A		pCi/g	<0.0204 (0.0000±0.0059)	<0.0255 (-0.0035±0.0070)	<0.0217 (-0.0018±0.0060)	<0.0217 (0.0053±0.0092)	<0.2947 (0.0743±0.1746)	1.1700±0.1400	0.0600±0.0250	1.1500±0.1400
SR36-SO-R-03-A		pCi/g	0.0130±0.0110	<0.0046 (0.0015±0.0030)	<0.0046 (0.0031±0.0043)	0.0138±0.0092	<0.2971 (0.2588±0.1783)	1.3700±0.1600	0.0820±0.0280	1.2500±0.1500
SR36-SO-R-04-A		pCi/g	<0.0192 (0.0000±0.0056)	<0.0191 (0.0000±0.0055)	<0.0060 (0.0020±0.0039)	<0.0190 (0.0120±0.0110)	<0.2904 (0.0381±0.1716)	1.2800±0.1500	0.0870±0.0290	1.2900±0.1500
SR36-SO-R-05-A		pCi/g	<0.0320 (0.0020±0.0120)	<0.0179 (-0.0019±0.0037)	<0.0056 (0.0019±0.0037)	<0.0180 (0.0130±0.0110)	<0.2964 (0.2948±0.1784)	1.1000±0.1400	0.0320±0.0180	1.1400±0.1400
SR36-SO-R-06-A		pCi/g	<0.0059 (0.0020±0.0039)	<0.0062 (0.0021±0.0041)	<0.0198 (-0.0021±0.0041)	0.0062±0.0071	<0.2937 (0.1557±0.1750)	1.2100±0.1400	0.0590±0.0230	1.2800±0.1500
SR36-SO-R-07-A		pCi/g	<0.0219 (-0.0023±0.0045)	<0.0052 (0.0000±0.0034)	<0.0052 (0.0017±0.0034)	0.0104±0.0085	<0.2908 (0.1670±0.1735)	1.2300±0.1500	0.0500±0.0240	1.1900±0.1400
SR36-SO-R-08-A		pCi/g	0.0080±0.0079	<0.0055 (0.0000±0.0036)	<0.0055 (0.0000±0.0036)	0.0150±0.0100	0.7501±0.1837	0.6640±0.0920	0.0370±0.0190	0.6240±0.0880
SR36-SO-R-09-A		pCi/g	<0.0193 (0.0081±0.0097)	<0.0259 (-0.0054±0.0062)	<0.0172 (0.0000±0.0050)	<0.0172 (0.0090±0.0094)	0.4636±0.1784	1.3400±0.1500	0.0530±0.0220	1.3700±0.1600
SR36-SO-R-10-A		pCi/g	0.0054±0.0062	<0.0049 (0.0033±0.0046)	<0.0049 (0.0016±0.0032)	<0.0157 (0.0049±0.0072)	<0.2879 (0.2663±0.1730)	1.2600±0.1500	0.0460±0.0200	1.1800±0.1400
SR36-SO-R-11-A		pCi/g	<0.0190 (0.0100±0.0110)	<0.0052 (0.0000±0.0034)	<0.0052 (0.0000±0.0034)	0.0240±0.0130	<0.2870 (0.1704±0.1712)	1.3300±0.1600	0.0670±0.0270	1.2200±0.1500
SR37-SO-R-01-A		pCi/g	<0.0219 (0.0018±0.0078)	<0.0189 (0.0015±0.0067)	<0.0248 (-0.0046±0.0068)	0.0092±0.0075	<0.3110 (-0.0202±0.1830)	1.1300±0.1300	0.0610±0.0230	1.2700±0.1500
SR37-SO-R-02-A		pCi/g	<0.0168 (0.0088±0.0091)	<0.0155 (-0.0016±0.0032)	<0.0048 (0.0016±0.0032)	<0.0154 (0.0048±0.0071)	<0.3107 (0.1164±0.1846)	1.2100±0.1400	0.0550±0.0220	1.2100±0.1400
SR37-SO-R-03-A		pCi/g	<0.0191 (0.0000±0.0055)	<0.0050 (0.0000±0.0033)	<0.0050 (0.0000±0.0032)	0.0133±0.0094	<0.3094 (0.0591±0.1831)	1.1800±0.1400	0.0580±0.0240	1.2600±0.1500
SR37-SO-R-04-A		pCi/g	<0.0180 (0.0075±0.0091)	<0.0049 (0.0016±0.0032)	<0.0202 (-0.0033±0.0046)	0.0082±0.0073	<0.3119 (0.0513±0.1844)	0.9700±0.1200	0.0530±0.0210	1.0400±0.1300
SR37-SO-R-05-A		pCi/g	<0.0430 (-0.0070±0.0140)	<0.0145 (0.0000±0.0042)	0.0045±0.0052	<0.0186 (0.0045±0.0079)	<0.3100 (0.1493±0.1845)	1.1800±0.1400	0.0490±0.0230	1.1000±0.1400
SR37-SO-R-06-A		pCi/g	0.0150±0.0110	<0.0054 (0.0000±0.0035)	<0.0054 (0.0000±0.0035)	0.0160±0.0110	<0.3117 (0.2633±0.1870)	1.2200±0.1500	0.0690±0.0250	1.2800±0.1500
SR37-SO-R-07-A		pCi/g	<0.0173 (0.0000±0.0050)	<0.0232 (-0.0032±0.0063)	<0.0198 (0.0016±0.0070)	0.0080±0.0072	<0.3079 (-0.1236±0.1799)	1.1100±0.1200	0.0560±0.0210	1.2500±0.1300
SR37-SO-R-08-A		pCi/g	<0.0256 (0.0018±0.0092)	<0.0216 (0.0018±0.0077)	<0.0052 (0.0017±0.0034)	0.0210±0.0120	<0.3111 (-0.0214±0.1830)	1.1300±0.1200	0.0590±0.0230	1.0700±0.1200
SR37-SO-R-09-A		pCi/g	<0.0052 (0.0035±0.0048)	<0.0150 (-0.0016±0.0031)	<0.0047 (0.0000±0.0031)	<0.0190 (0.0160±0.0120)	<0.3110 (0.0939±0.1844)	1.2500±0.1300	0.0590±0.0220	1.1200±0.1200
SR37-SO-R-10-A		pCi/g	<0.0159 (0.0017±0.0056)	<0.0180 (-0.0019±0.0037)	<0.0056 (0.0038±0.0052)	<0.0231 (0.0056±0.0098)	<0.3079 (0.2447±0.1845)	1.1500±0.1200	0.0580±0.0210	1.1600±0.1200
SR37-SO-R-11-A		pCi/g	<0.0201 (0.0000±0.0064)	<0.0047 (0.0000±0.0030)	<0.0148 (-0.0015±0.0030)	<0.0148 (0.0046±0.0068)	<0.3096 (-0.0805±0.1814)	1.1200±0.1200	0.0720±0.0250	1.0800±0.1200
SR38-SO-R-01-A		pCi/g	<0.0061 (0.0000±0.0040)	<0.0209 (0.0000±0.0061)	<0.0268 (-0.0044±0.0061)	<0.0209 (0.0000±0.0060)	<0.3137 (0.0674±0.1857)	1.1800±0.1400	0.0540±0.0260	1.3300±0.1600
SR38-SO-R-02-A		pCi/g	<0.0064 (0.0043±0.0060)	<0.0056 (0.0037±0.0052)	<0.0055 (0.0000±0.0036)	<0.0177 (0.0037±0.0073)	<0.3126 (0.1401±0.1859)	1.1300±0.1400	0.0650±0.0260	1.1700±0.1400
SR38-SO-R-03-A		pCi/g	0.0078±0.0076	<0.0057 (0.0000±0.0037)	0.0075±0.0075	0.0130±0.0100	<0.3135 (0.1854±0.1870)	1.1900±0.1500	0.0450±0.0220	1.1300±0.1400
SR38-SO-R-04-A		pCi/g	<0.0063 (0.0042±0.0059)	<0.0174 (0.0018±0.0062)	<0.0054 (0.0036±0.0051)	0.0109±0.0089	<0.3113 (0.0164±0.1837)	1.1900±0.1500	0.0670±0.0280	1.3100±0.1600
SR38-SO-R-05-A		pCi/g	0.0073±0.0083	<0.0176 (0.0000±0.0051)	<0.0055 (0.0037±0.0051)	<0.0176 (0.0092±0.0096)	<0.3100 (-0.0619±0.1819)	1.1100±0.1400	0.0510±0.0230	1.3200±0.1600
SR38-SO-R-06-A		pCi/g	<0.0253 (0.0041±0.0099)	<0.0193 (0.0000±0.0056)	<0.0247 (-0.0040±0.0056)	0.0080±0.0080	<0.3132 (0.0507±0.1852)	1.0100±0.1200	0.0440±0.0220	1.1200±0.1300
SR38-SO-R-07-A		pCi/g	0.0062±0.0070	<0.0180 (0.0000±0.0052)	<0.0056 (0.0019±0.0037)	<0.0180 (0.0056±0.0083)	<0.3119 (0.0482±0.1844)	0.7470±0.0900	0.0380±0.0160	0.8170±0.0960
SR38-SO-R-08-A		pCi/g	<0.0310 (0.0000±0.0100)	0.0063±0.0072	<0.0063 (0.0021±0.0041)	<0.0063 (0.0042±0.0058)	<0.3094 (0.0152±0.1825)	1.1400±0.1400	0.0510±0.0230	1.1600±0.1400
SR38-SO-R-09-A		pCi/g	<0.0062 (0.0041±0.0057)	<0.0180 (-0.0019±0.0037)	<0.0269 (0.0000±0.0090)	<0.0056 (0.0037±0.0052)	<0.3124 (-0.1612±0.1821)	1.1600±0.1400	0.0340±0.0180	1.2100±0.1500
SR38-SO-R-10-A		pCi/g	<0.0194 (0.0081±0.0098)	<0.0058 (0.0000±0.0038)	<0.0058 (0.0019±0.0038)	0.0130±0.0100	<0.3097 (-0.0968±0.1813)	1.0200±0.1300	0.0560±0.0240	1.1800±0.1400
SR38-SO-R-11-A		pCi/g	<0.0060 (0.0040±0.0055)	<0.0055 (0.0018±0.0036)	<0.0055 (0.0018±0.0036)	<0.0175 (0.0036±0.0072)	<0.3130 (0.0613±0.1852)	1.0400±0.1300	0.0430±0.0200	1.3000±0.1500
SR39-SO-R-01-A		pCi/g	0.0160±0.0120	<0.0180 (0.0000±0.0052)	<0.0056 (0.0038±0.0052)	0.0094±0.0083	<0.2838 (0.1933±0.1696)	1.1400±0.1800	0.0670±0.0280	1.2000±0.1900
SR39-SO-R-02-A		pCi/g	<0.0067 (0.0044±0.0062)	<0.0290 (-0.0020±0.0089)	<0.0193 (0.0040±0.0079)	0.0280±0.0170	<0.2814 (0.2570±0.1690)	1.1300±0.1800	0.0580±0.0250	1.1000±0.1700
SR39-SO-R-03-A		pCi/g	0.0190±0.0130	<0.0171 (0.0000±0.0050)	<0.0054 (0.0018±0.0035)	0.0210±0.0130	0.3747±0.1695	1.3700±0.2100	0.0600±0.0270	1.5200±0.2200
SR39-SO-R-04-A		pCi/g	0.0122±0.0098	<0.0314 (-0.0065±0.0075)	<0.0208 (0.0000±0.0060)	0.0300±0.0170	<0.2861 (0.0925±0.1697)	1.0800±0.1700	0.0610±0.0250	1.1100±0.1700
SR39-SO-R-05-A		pCi/g	0.0113±0.0100	<0.0054 (0.0000±0.0035)	<0.0054 (0.0000±0.0035)	0.0054±0.0061	<0.2820 (0.1127±0.1676)	1.2800±0.1900	0.0680±0.0280	1.2200±0.1900
SR39-SO-R-06-A		pCi/g	<0.0063 (0.0021±0.0041)	<0.0236 (0.0000±0.0075)	<0.0057 (0.0000±0.0038)	<0.0180 (0.0130±0.0110)	<0.2793 (0.1361±0.1663)	1.1000±0.1700	0.0560±0.0240	1.2200±0.1900
SR39-SO-R-07-A		pCi/g	<0.0201 (0.0000±0.0058)	<0.0299 (-0.0024±0.0083)	<0.0073 (0.0048±0.0068)	<0.0300 (0.0020±0.0110)	0.3238±0.1746	1.2900±0.2000	0.0640±0.0260	1.2900±0.2000
SR39-SO-R-08-A		pCi/g	<0.0360 (0.0000±0.0130)	<0.0194 (0.0020±0.0069)	<0.0060 (0.0000±0.0040)	0.0060±0.0069	<0.2747 (0.0449±0.1624)	0.9900±0.1600	0.0210±0.0150	1.1200±0.1700
SR39-SO-R-09-A		pCi/g	0.0092±0.0091	<0.0315 (-0.0066±0.0075)	<0.0209 (-0.0022±0.0043)	0.0065±0.0075	<0.2752 (0.2294±0.1650)	1.0700±0.1700	0.0700±0.0280	1.0700±0.1700
SR39-SO-R-10-A		pCi/g	0.0086±0.0084	<0.0242 (-0.0039±0.0055)	<0.0059 (0.0020±0.0039)	<0.0188 (0.0059±0.0086)	<0.3237 (0.2515±0.1939)	0.8800±0.1400	0.0470±0.0230	1.0600±0.1700
SR39-SO-R-11-A		pCi/g	0.0110±0.0100	<0.0237 (-0.0019±0.0066)	<0.0058 (0.0019±0.0038)	<0.0240 (0.0060±0.0100)	<0.2626 (0.0577±0.1555)	1.1900±0.1800	0.0550±0.0250	1.2600±0.1900
SR40-SO-R-01-A		pCi/g	<0.0190 (0.0000±0.0055)	<0.0058 (0.0000±0.0038)	<0.0185 (0.0000±0.0054)	<0.0185 (0.0000±0.0054)	0.4066±0.1926	1.4900±0.2200	0.0900±0.0330	1.4200±0.2200
SR40-SO-R-02-A		pCi/g	<0.0190 (0.0140±0.0120)	0.0063±0.0072	<0.0200 (-0.0021±0.0041)	0.0210±0.0130	0.5331±0.1908	1.3900±0.2100	0.0680±0.0270	1.3700±0.2100
SR40-SO-R-03-A		pCi/g	0.0067±0.0076	<0.0202 (-0.0016±0.0056)	<0.0049 (0.0016±0.0032)	0.0065±0.0065	1.4663±0.2014	1.2700±0.1900	0.0520±0.0230	1.2500±0.1900
SR40-SO-R-04-A		pCi/g	<0.0059 (0.0020±0.0038)	<0.0058 (0.0019±0.0038)	<0.0058 (0.0000±0.0038)	0.0116±0.0094	<0.3271 (0.2240±0.1955)	1.3800±0.2100	0.0500±0.0230	1.4500±0.2200
SR40-SO-R-05-A		pCi/g	<0.0185 (0.0019±0.0066)	<0.0241 (0.0000±0.0077)	<0.0240 (0.0020±0.0086)	0.0200±0.0130	0.5039±0.2004	1.2400±0.1900	0.0460±0.0230	1.1900±0.1800
SR40-SO-R-06-A		pCi/g	<0.0182 (0.0057±0.0083)	<0.0185 (0.0058±0.0085)	<0.0310 (0.0040±0.0120)	0.0058±0.0066	1.2516±0.2088	1.3000±0.2000	0.0710±0.0280	1.3300±0.2000
SR40-SO-R-07-A		pCi/g	0.0110±0.0097	<0.0203 (0.0021±0.0072)	<0.0259 (0.0021±0.0092)	<0.0200 (0.0130±0.0120)	<0.3211 (0.2335±0.1922)	1.6100±0.2400	0.0660±0.0290	1.5600±0.2300
SR40-SO-R-08-A		pCi/g	<0.0262 (0.0000±0.0083)	<0.0341 (-0.0084±0.0084)	<0.0370 (0.0080±0.0160)	<0.0200 (0.0130±0.0120)	<0.3162 (0.1464±0.1882)	1.2500±0.1900	0.0570±0.0250	1.3600±0.2100
SR40-SO-R-09-A		pCi/g	0.0210±0.0130	<0.0062 (0.0021±0.0041)	0.0062±0.0071	0.0430±0.0200	0.3063±0.1711	1.4000±0.2100	0.0900±0.0320	1.4500±0.2200
SR40-SO-R-10-A		pCi/g	0.0087±0.0086	<0.0309 (0.0000±0.0099)	<0.0075 (0.0050±0.0070)	0.0180±0.0130	0.4971±0.1881	1.3500±0.2000	0.0570±0.0250	1.4300±0.2100
SR40-SO-R-11-A		pCi/g	<0.0202 (0.0063±0.0092)	<0.0061 (0.0020±0.0040)	<0.0196 (0.0000±0.0057)	0.0120±0.0100	0.3397±0.1885	1.0300±0.1600	0.0530±0.0240	1.1600±0.1800
SR42-SO-R-01-A		pCi/g	<0.0062 (0.0041±0.0057)	<0.0193 (0.0000±0.0056)	<0.0060 (0.0020±0.0039)	0.0120±0.0098	<0.3204 (0.2101±0.1915)	1.2400±0.1900	0.0590±0.0260	1.2200±0.1900

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide / Units ↓	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
			Result	Result	Result	Result	Result	Result	Result	Result
SR42-SO-R-02-A		pCi/g	<0.0220 (0.0000±0.0064)	<0.0238 (-0.0019±0.0066)	<0.0058 (0.0000±0.0038)	<0.0240 (0.0120±0.0120)	<0.3163 (0.2985±0.1901)	0.8000±0.1300	<0.0370 (0.0280±0.0210)	0.8200±0.1300
SR42-SO-R-03-A		pCi/g	0.0160±0.0120	<0.0059 (0.0000±0.0039)	<0.0059 (0.0000±0.0039)	0.0118±0.0096	<0.3137 (0.1332±0.1865)	1.0900±0.1700	0.0620±0.0260	1.1700±0.1800
SR42-SO-R-04-A		pCi/g	<0.0270 (0.0090±0.0120)	<0.0058 (0.0000±0.0038)	<0.0058 (0.0000±0.0038)	0.0130±0.0100	<0.3046 (0.0208±0.1798)	1.0500±0.1700	0.0360±0.0200	1.1100±0.1700
SR42-SO-R-05-A		pCi/g	<0.0360 (0.0070±0.0140)	<0.0064 (0.0021±0.0042)	<0.0064 (0.0000±0.0042)	0.0230±0.0160	<0.3163 (0.2698±0.1898)	0.4910±0.0890	0.0460±0.0220	0.5050±0.0910
SR42-SO-R-06-A		pCi/g	<0.0206 (0.0065±0.0095)	<0.0062 (0.0000±0.0041)	<0.0198 (-0.0021±0.0041)	0.0062±0.0071	<0.3086 (0.2410±0.1849)	1.2000±0.1900	0.0590±0.0250	1.2700±0.1900
SR42-SO-R-07-A		pCi/g	<0.0208 (0.0065±0.0095)	<0.0205 (-0.0021±0.0042)	0.0064±0.0073	<0.0200 (0.0190±0.0140)	0.3413±0.1829	0.9400±0.1500	0.0440±0.0220	0.9700±0.1600
SR42-SO-R-08-A		pCi/g	<0.0065 (0.0043±0.0060)	<0.0060 (0.0000±0.0039)	<0.0290 (0.0040±0.0110)	<0.0320 (-0.0020±0.0100)	<0.2999 (0.1592±0.1787)	0.9600±0.1500	0.0550±0.0250	1.0600±0.1700
SR42-SO-R-09-A		pCi/g	<0.0300 (0.0040±0.0110)	<0.0273 (-0.0038±0.0075)	<0.0310 (0.0040±0.0120)	0.0250±0.0150	<0.3134 (-0.0178±0.1845)	0.9100±0.1500	0.0310±0.0190	1.0100±0.1600
SR42-SO-R-10-A		pCi/g	0.0170±0.0120	<0.0061 (0.0000±0.0040)	<0.0194 (0.0000±0.0056)	0.0320±0.0170	0.3755±0.1955	0.8800±0.1400	0.0470±0.0220	0.9100±0.1400
SR42-SO-R-11-A		pCi/g	<0.0320 (0.0000±0.0110)	<0.0184 (-0.0019±0.0038)	<0.0184 (0.0038±0.0075)	0.0170±0.0120	<0.3248 (0.0123±0.1916)	1.1900±0.1900	0.0400±0.0220	1.1600±0.1800
SR45-SO-R-01-A		pCi/g	<0.0063 (0.0021±0.0041)	0.0062±0.0070	<0.0197 (0.0000±0.0057)	0.0062±0.0070	<0.3184 (0.0639±0.1884)	1.2300±0.1900	0.0700±0.0290	1.2100±0.1900
SR45-SO-R-02-A		pCi/g	<0.0217 (0.0000±0.0063)	<0.0064 (0.0021±0.0042)	<0.0063 (0.0021±0.0042)	0.0085±0.0084	<0.3109 (-0.0341±0.1828)	1.2700±0.2000	0.0540±0.0250	1.1600±0.1800
SR45-SO-R-03-A		pCi/g	<0.0210 (0.0066±0.0096)	<0.0061 (0.0000±0.0040)	0.0061±0.0070	0.0061±0.0070	<0.3028 (0.1616±0.1804)	1.0800±0.1700	0.0620±0.0260	1.1900±0.1800
SR45-SO-R-04-A		pCi/g	<0.0200 (0.0042±0.0082)	<0.0064 (0.0043±0.0060)	<0.0205 (0.0000±0.0059)	0.0210±0.0140	<0.2973 (0.0169±0.1754)	1.3000±0.2000	0.0710±0.0290	1.3400±0.2100
SR45-SO-R-05-A		pCi/g	<0.0190 (0.0100±0.0100)	<0.0062 (0.0000±0.0040)	<0.0061 (0.0000±0.0040)	0.0061±0.0070	<0.2966 (-0.0921±0.1737)	1.1300±0.1700	0.0610±0.0250	1.1900±0.1800
SR45-SO-R-06-A		pCi/g	<0.0068 (0.0023±0.0045)	<0.0188 (0.0000±0.0054)	<0.0059 (0.0020±0.0038)	0.0059±0.0067	<0.3053 (-0.0948±0.1788)	1.1200±0.1800	0.0360±0.0210	0.9700±0.1600
SR45-SO-R-07-A		pCi/g	<0.0277 (-0.0045±0.0063)	0.0063±0.0072	<0.0063 (0.0000±0.0041)	<0.0200 (0.0100±0.0110)	<0.3059 (0.0232±0.1806)	1.0400±0.1600	0.0390±0.0200	1.0400±0.1600
SR45-SO-R-08-A		pCi/g	<0.0200 (0.0080±0.0100)	<0.0064 (0.0021±0.0042)	<0.0343 (-0.0085±0.0084)	0.0064±0.0073	<0.3143 (0.0119±0.1854)	1.0500±0.1600	0.0710±0.0280	1.0300±0.1600
SR45-SO-R-09-A		pCi/g	<0.0067 (0.0000±0.0044)	<0.0061 (0.0041±0.0057)	<0.0061 (0.0020±0.0040)	0.0102±0.0090	<0.3189 (-0.0157±0.1877)	1.1800±0.1900	0.0310±0.0190	1.2500±0.1900
SR45-SO-R-10-A		pCi/g	<0.0239 (0.0000±0.0069)	<0.0195 (0.0000±0.0056)	<0.0061 (0.0000±0.0040)	<0.0061 (0.0041±0.0057)	<0.3175 (0.1923±0.1895)	0.9800±0.1600	0.0560±0.0250	0.9000±0.1500
SR45-SO-R-11-A		pCi/g	<0.0064 (0.0021±0.0042)	<0.0064 (0.0000±0.0042)	<0.0064 (0.0043±0.0059)	0.0064±0.0073	<0.3155 (-0.1003±0.1847)	1.1500±0.1800	0.0360±0.0200	1.1400±0.1800
SR46-SO-R-01-A		pCi/g	<0.0056 (0.0019±0.0037)	<0.0061 (0.0020±0.0040)	<0.0248 (-0.0020±0.0069)	<0.0061 (0.0020±0.0040)	<0.2971 (0.1331±0.1767)	1.1200±0.1700	0.0370±0.0200	1.0700±0.1600
SR46-SO-R-02-A		pCi/g	<0.0198 (0.0083±0.0100)	<0.0064 (0.0043±0.0060)	<0.0064 (0.0021±0.0042)	0.0130±0.0100	<0.2821 (0.1512±0.1681)	0.9900±0.1600	0.0500±0.0230	0.9700±0.1500
SR46-SO-R-03-A		pCi/g	<0.0330 (-0.0020±0.0100)	<0.0061 (0.0020±0.0040)	<0.0061 (0.0040±0.0056)	0.0061±0.0069	<0.2865 (0.1569±0.1708)	1.1100±0.1700	0.0400±0.0210	1.0900±0.1700
SR46-SO-R-04-A		pCi/g	<0.0293 (0.0000±0.0093)	<0.0061 (0.0020±0.0040)	<0.0061 (0.0041±0.0057)	<0.0190 (0.0120±0.0110)	<0.2531 (0.1560±0.1511)	0.9500±0.1500	0.0480±0.0220	1.0100±0.1600
SR46-SO-R-05-A		pCi/g	<0.0340 (-0.0020±0.0100)	<0.0058 (0.0000±0.0038)	<0.0058 (0.0000±0.0038)	<0.0058 (0.0039±0.0054)	<0.2719 (0.2468±0.1633)	1.1500±0.1800	0.0570±0.0240	1.1500±0.1800
SR46-SO-R-06-A		pCi/g	<0.0068 (0.0046±0.0063)	<0.0180 (-0.0019±0.0037)	<0.0230 (0.0019±0.0082)	<0.0230 (0.0019±0.0082)	<0.2512 (0.2069±0.1506)	1.0200±0.1600	0.0340±0.0180	1.0200±0.1600
SR46-SO-R-07-A		pCi/g	<0.0200 (0.0042±0.0082)	<0.0063 (0.0000±0.0041)	<0.0200 (0.0000±0.0058)	0.0105±0.0093	0.7157±0.1814	0.8900±0.1400	0.0290±0.0170	0.9400±0.1500
SR46-SO-R-08-A		pCi/g	<0.0066 (0.0044±0.0062)	<0.0270 (-0.0037±0.0074)	<0.0179 (-0.0019±0.0037)	<0.0180 (0.0110±0.0110)	0.4214±0.1623	1.1800±0.1800	0.0670±0.0270	1.2100±0.1800
SR46-SO-R-09-A		pCi/g	<0.0210 (0.0090±0.0110)	0.0180±0.0140	<0.0249 (0.0026±0.0088)	<0.0078 (0.0052±0.0073)	0.3588±0.1614	1.0300±0.1600	0.0580±0.0260	1.0400±0.1600
SR46-SO-R-10-A		pCi/g	<0.0063 (0.0000±0.0041)	<0.0056 (0.0000±0.0037)	<0.0231 (-0.0019±0.0064)	<0.0056 (0.0038±0.0052)	1.1478±0.1695	1.0000±0.1600	0.0390±0.0200	1.0600±0.1600
SR46-SO-R-11-A		pCi/g	0.0066±0.0075	<0.0052 (0.0017±0.0034)	<0.0052 (0.0000±0.0034)	<0.0052 (0.0035±0.0049)	<0.2448 (0.2156±0.1469)	1.0500±0.1600	0.0570±0.0250	1.0000±0.1500
SR48-SO-R-01-A		pCi/g	<0.0066 (0.0000±0.0043)	<0.0198 (-0.0021±0.0041)	<0.0062 (0.0000±0.0040)	<0.0062 (0.0041±0.0057)	<0.2983 (0.1543±0.1777)	1.0300±0.1700	0.0610±0.0270	1.0900±0.1700
SR48-SO-R-02-A		pCi/g	0.0061±0.0070	<0.0060 (0.0020±0.0039)	<0.0060 (0.0000±0.0039)	0.0080±0.0079	<0.3012 (0.0057±0.1775)	0.5210±0.0930	0.0250±0.0160	0.5730±0.1000
SR48-SO-R-03-A		pCi/g	<0.0061 (0.0041±0.0056)	<0.0058 (0.0019±0.0038)	<0.0057 (0.0019±0.0038)	<0.0184 (0.0019±0.0065)	0.9281±0.1897	0.6500±0.1100	0.0360±0.0180	0.5380±0.0930
SR48-SO-R-04-A		pCi/g	<0.0270 (0.0150±0.0140)	<0.0061 (0.0000±0.0040)	<0.0250 (-0.0020±0.0069)	<0.0250 (0.0160±0.0140)	<0.3033 (0.1188±0.1802)	1.1500±0.1800	0.0640±0.0280	1.0600±0.1700
SR48-SO-R-05-A		pCi/g	<0.0196 (0.0020±0.0070)	<0.0064 (0.0021±0.0042)	<0.0064 (0.0000±0.0042)	0.0085±0.0085	<0.2940 (0.0659±0.1741)	1.1500±0.1800	0.0580±0.0250	1.0700±0.1700
SR48-SO-R-06-A		pCi/g	<0.0183 (0.0038±0.0075)	<0.0176 (0.0000±0.0051)	<0.0176 (0.0000±0.0051)	0.0092±0.0082	<0.2949 (0.1513±0.1757)	1.0000±0.1600	0.0500±0.0230	1.1200±0.1800
SR48-SO-R-07-A		pCi/g	<0.0068 (0.0023±0.0045)	<0.0199 (0.0000±0.0058)	<0.0062 (0.0000±0.0041)	0.0083±0.0082	<0.2959 (0.0113±0.1745)	1.0900±0.1700	0.0430±0.0230	1.1500±0.1800
SR48-SO-R-08-A		pCi/g	0.0061±0.0069	<0.0219 (-0.0023±0.0045)	<0.0069 (0.0000±0.0045)	0.0230±0.0150	<0.3013 (0.0951±0.1787)	1.0700±0.1700	0.0340±0.0200	1.1800±0.1900
SR48-SO-R-09-A		pCi/g	0.0115±0.0093	<0.0060 (0.0020±0.0040)	<0.0060 (0.0000±0.0039)	<0.0060 (0.0020±0.0039)	<0.2987 (-0.0216±0.1758)	1.2200±0.1900	0.0760±0.0290	1.2900±0.1900
SR48-SO-R-10-A		pCi/g	<0.0178 (0.0037±0.0073)	<0.0058 (0.0000±0.0038)	<0.0184 (0.0038±0.0076)	0.0058±0.0066	<0.2880 (0.0372±0.1702)	1.1500±0.1800	0.0710±0.0280	1.2300±0.1900
SR48-SO-R-11-A		pCi/g	<0.0062 (0.0041±0.0057)	<0.0067 (0.0000±0.0044)	<0.0067 (0.0000±0.0044)	0.0067±0.0077	<0.3050 (-0.0406±0.1792)	1.0300±0.1600	0.0470±0.0230	1.1400±0.1800
SR49-SO-R-01-A		pCi/g	<0.0200 (0.0130±0.0120)	<0.0176 (0.0000±0.0051)	<0.0055 (0.0037±0.0051)	0.0092±0.0081	<0.2986 (0.1011±0.1772)	1.0400±0.1600	0.0450±0.0220	1.1000±0.1700
SR49-SO-R-02-A		pCi/g	<0.0230 (0.0100±0.0120)	<0.0061 (0.0000±0.0040)	<0.0061 (0.0041±0.0057)	0.0180±0.0120	<0.3004 (0.2601±0.1803)	1.2000±0.1900	0.0630±0.0270	1.0300±0.1600
SR49-SO-R-03-A		pCi/g	<0.0203 (0.0021±0.0072)	<0.0063 (0.0042±0.0058)	<0.0301 (-0.0063±0.0071)	<0.0200 (0.0080±0.0100)	<0.3005 (0.1272±0.1786)	1.1800±0.1800	0.0600±0.0260	1.1700±0.1800
SR49-SO-R-04-A		pCi/g	<0.0193 (0.0000±0.0056)	<0.0061 (0.0000±0.0040)	<0.0194 (0.0061±0.0089)	<0.0061 (0.0040±0.0056)	<0.2846 (0.1939±0.1701)	0.8600±0.1400	0.0370±0.0210	0.8300±0.1400
SR49-SO-R-05-A		pCi/g	<0.0268 (0.0022±0.0096)	<0.0201 (0.0000±0.0058)	<0.0063 (0.0042±0.0058)	<0.0201 (0.0063±0.0092)	<0.2941 (0.1381±0.1750)	1.1000±0.1700	0.0520±0.0240	1.2400±0.1900
SR49-SO-R-06-A		pCi/g	<0.0190 (0.0100±0.0110)	<0.0056 (0.0038±0.0052)	<0.0056 (0.0019±0.0037)	<0.0270 (0.0019±0.0097)	<0.3008 (0.1586±0.1792)	1.0500±0.1600	0.0620±0.0260	1.2500±0.1900
SR49-SO-R-07-A		pCi/g	<0.0064 (0.0043±0.0060)	<0.0206 (-0.0021±0.0042)	<0.0210 (0.0090±0.0100)	0.0107±0.0094	<0.2966 (0.2306±0.1777)	1.1100±0.1700	0.0480±0.0230	1.1900±0.1800
SR49-SO-R-08-A		pCi/g	0.0062±0.0071	<0.0058 (0.0019±0.0038)	<0.0183 (-0.0019±0.0038)	0.0057±0.0065	<0.3006 (0.2175±0.1799)	1.0400±0.1600	0.0560±0.0250	1.1200±0.1700
SR49-SO-R-09-A		pCi/g	<0.0400 (-0.0020±0.0130)	<0.0187 (-0.0020±0.0038)	<0.0058 (0.0039±0.0054)	0.0078±0.0077	<0.3001 (0.2449±0.1799)	1.0500±0.1600	0.0400±0.0200	1.0300±0.1600
SR49-SO-R-10-A		pCi/g	<0.0370 (-0.0060±0.0110)	<0.0058 (0.0019±0.0038)	<0.0186 (0.0019±0.0066)	<0.0190 (0.0100±0.0100)	<0.2970 (-0.0297±0.1747)	1.0800±0.1800	<0.0340 (0.0280±0.0220)	1.1600±0.1900
SR49-SO-R-11-A		pCi/g	<0.0220 (0.0070±0.0100)	<0.0062 (0.0021±0.0041)	<0.0198 (0.0021±0.0070)	0.0103±0.0091	<0.2872 (0.1260±0.1708)	1.2800±0.2000	0.0550±0.0250	1.2000±0.1900
SR51-SO-R-01-A		pCi/g	0.0064±0.0072	<0.0226 (-0.0037±0.0051)	<0.0055 (0.0000±0.0036)	<0.0175 (0.0037±0.0072)	<0.2743 (0.0984±0.1629)	0.7600±0.1200	0.0310±0.0170	0.8200±0.1300
SR51-SO-R-02-A		pCi/g	<0.0220 (0.0120±0.0120)	<0.0061 (0.0000±0.0040)	<0.0061 (0.0020±0.0040)	0.0140±0.0110	<0.2762 (-0.0601±0.1620)	1.2100±0.1900	0.0440±0.0220	1.2500±0.1900
SR51-SO-R-03-A		pCi/g	0.0064±0.0073	<0.0063 (0.0000±0.0041)	<0.0202 (0.0021±0.0072)	0.0084±0.0084	<0.2793 (0.0320±0.1650)	1.1200±0.1700	0.0380±0.0210	1.1300±0.1700
SR51-SO-R-04-A		pCi/g	0.0109±0.0096	<0.0180 (0.0000±0.0052)	<0.0056 (0.0000±0.0037)	0.0056±0.0064	<0.2796 (-0.0149±0.1646)	1.0100±0.1600	0.0410±0.0200	0.9700±0.1500
SR51-SO-R-05-A		pCi/g	<0.0067 (0.0022±0.0044)	<0.0065 (0.0043±0.0060)	<0.0065 (0.0022±0.0042)	0.0150±0.0110	<0.2879 (0.0648±0.1704)	1.1600±0.1800	0.0740±0.0280	1.2900±0.1900
SR51-SO-R-06-A		pCi/g	<0.0184 (0.0058±0.0084)	<0.0170 (0.0000±0.0049)	<0.0053 (0.0018±0.0035)	<0.0053 (0.0035±0.0049)	<0.2751 (0.0651±0.1629)	1.2000±0.1800	0.0630±0.0250	1.2600±0.1900
SR51-SO-R-07-A		pCi/g	<0.0225 (0.0047±0.0092)	<0.0067 (0.0000±0.0044)	<0.0214 (0.0000±0.0062)	0.0180±0.0130	<0.2821 (0.0065±0.1663)	1.1200±0.1800	0.0600±0.0260	1.1800±0.1800
SR51-SO-R-08-A		pCi/g	<0.0064 (0.0021±0.0042)	<0.0059 (0.0020±0.0039)	<0.0188 (-0.0020±0.0039)	<0.0059 (0.0039±0.0055)	<0.2642 (0.0988±0.1569)	1.3400±0.2000	0.0760±0.0290	1.3400±0.2000
SR51-SO-R-09-A		pCi/g	0.0083±0.0081	<0.0181 (-0.0019±0.0037)	<0.0057 (0.0000±0.0037)	0.0240±0.0140	<0.2706 (0.0568±0.1602)	1.2300±0.1900	0.0440±0.0220	1.3100±0.2000
SR51-SO-R-10-A		pCi/g	0.0068±0.0077	<0.0176 (0.0000±0.0051)	<0.0055 (0.0000±0.0036)	0.0073±0.0073	<0.2861 (0.0753±0.1695)	1.0400±0.1600	0.0460±0.0220	1.1100±0.1700
SR51-SO-R-11-A		pCi/g	0.0093±0.0092	<0.0074 (0.0025±0.0048)	<0.0074 (0.0000±0.0048)	<0.0074 (0.0025±0.0048)	<0.2720 (0.0166±0.1605)	1.1300±0.1800	0.0400±0.0210	1.1400±0.1800
SR53-SO-R-01-A		pCi/g	<0.0064 (0.0042±0.0059)	<0.0062 (0.0021±0.0040)	<0.0197 (-0.0021±0.0040)	0.0082±0.0082	<0.2915 (-0.0011±0.1718)	0.9200±0.1500	0.0250±0.0170	0.9800±0.1600
SR53-SO-R-02-A		pCi/g	<0.0214 (0.0022±0.0076)	<0.0067 (0.0000±0.0044)	<0.0067 (0.0000±0.0044)	<0.0213 (0.0022±0.0076)	<0.2876 (0.2088±0.1721)	0.9300±0.1500	0.0420±0.0230	1.0000±0.1600
SR53-SO-R-03-A		pCi/g	0.0059±0.0066	<0.0204 (0.0000±0.0059)	<0.0064 (0.0021±0.0042)	0.0064±0.0073	<0.2910 (0.0608±0.1723)	0.7700±0.1300	0.0270±0.0160	0.7800±0.1300

Notes:

1) "nr" no result reported by laboratory"

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide / Units ↓	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
			Result	Result	Result	Result	Result	Result	Result	Result
SR53-SO-R-04-A		pCi/g	<0.0228 (0.0024±0.0081)	<0.0057 (0.0019±0.0037)	<0.0057 (0.0000±0.0037)	<0.0180 (0.0110±0.0110)	0.3116±0.1776	0.7300±0.1200	<0.0240 (0.0200±0.0160)	0.6400±0.1100
SR53-SO-R-05-A		pCi/g	0.0060±0.0068	<0.0183 (0.0038±0.0075)	<0.0057 (0.0019±0.0037)	0.0057±0.0065	<0.2953 (0.1111±0.1754)	0.8300±0.1300	0.0380±0.0190	0.8600±0.1400
SR53-SO-R-06-A		pCi/g	<0.0330 (-0.0020±0.0100)	<0.0063 (0.0000±0.0041)	<0.0260 (0.0040±0.0100)	0.0063±0.0072	<0.2902 (0.0408±0.1715)	0.7700±0.1300	0.0280±0.0170	0.7100±0.1200
SR53-SO-R-07-A		pCi/g	<0.0370 (0.0100±0.0160)	0.0063±0.0072	<0.0200 (0.0000±0.0058)	0.0105±0.0093	0.4632±0.1736	0.9600±0.1500	0.0410±0.0220	0.9500±0.1500
SR53-SO-R-08-A		pCi/g	<0.0350 (0.0040±0.0140)	<0.0198 (-0.0021±0.0041)	0.0062±0.0071	<0.0200 (0.0120±0.0120)	<0.2857 (-0.0076±0.1683)	1.0100±0.1600	0.0470±0.0230	1.0000±0.1600
SR53-SO-R-09-A		pCi/g	0.0065±0.0074	<0.0185 (0.0039±0.0076)	<0.0058 (0.0039±0.0054)	<0.0058 (0.0039±0.0054)	<0.2941 (0.1498±0.1752)	0.8900±0.1400	0.0250±0.0160	0.9700±0.1500
SR53-SO-R-10-A		pCi/g	0.0130±0.0110	<0.0184 (0.0000±0.0053)	<0.0184 (-0.0019±0.0038)	0.0096±0.0085	<0.2951 (0.0561±0.1746)	0.9800±0.1500	0.0590±0.0260	0.9100±0.1500
SR53-SO-R-11-A		pCi/g	<0.0210 (0.0110±0.0120)	<0.0057 (0.0000±0.0037)	<0.0182 (0.0019±0.0065)	<0.0182 (0.0095±0.0100)	<0.2940 (0.2403±0.1763)	0.9600±0.1500	<0.0310 (0.0280±0.0200)	1.0700±0.1700
SR54-SO-R-01-A		pCi/g	<0.0071 (0.0024±0.0047)	<0.0247 (-0.0020±0.0068)	<0.0060 (0.0000±0.0039)	0.0120±0.0098	<0.2792 (0.0181±0.1648)	0.9100±0.1500	0.0330±0.0180	1.0100±0.1600
SR54-SO-R-02-A		pCi/g	<0.0249 (0.0000±0.0079)	<0.0177 (0.0018±0.0063)	<0.0055 (0.0000±0.0036)	<0.0055 (0.0018±0.0036)	<0.2722 (0.1288±0.1620)	1.2700±0.1900	0.0820±0.0300	1.2000±0.1800
SR54-SO-R-03-A		pCi/g	0.0150±0.0110	<0.0058 (0.0000±0.0038)	<0.0236 (-0.0019±0.0065)	<0.0180 (0.0130±0.0110)	<0.2681 (0.0604±0.1587)	1.3800±0.2100	0.0630±0.0270	1.3000±0.2000
SR54-SO-R-04-A		pCi/g	<0.0197 (0.0021±0.0070)	<0.0064 (0.0043±0.0060)	<0.0064 (0.0000±0.0042)	<0.0064 (0.0043±0.0059)	<0.2852 (0.0958±0.1692)	1.1800±0.1800	0.0590±0.0250	1.2400±0.1900
SR54-SO-R-05-A		pCi/g	<0.0200 (0.0000±0.0058)	<0.0197 (0.0000±0.0057)	<0.0062 (0.0041±0.0057)	0.0061±0.0070	<0.2759 (0.0895±0.1637)	0.9600±0.1500	0.0460±0.0220	0.9400±0.1500
SR54-SO-R-06-A		pCi/g	0.0085±0.0084	<0.0060 (0.0000±0.0039)	<0.0060 (0.0020±0.0039)	<0.0246 (0.0040±0.0096)	<0.3151 (0.0365±0.1862)	1.2100±0.1900	0.0710±0.0290	1.3900±0.2100
SR54-SO-R-07-A		pCi/g	<0.0245 (0.0020±0.0087)	<0.0059 (0.0000±0.0038)	<0.0240 (0.0020±0.0086)	0.0078±0.0078	<0.3232 (-0.0117±0.1904)	1.4300±0.2100	0.0680±0.0270	1.5300±0.2300
SR54-SO-R-08-A		pCi/g	<0.0241 (0.0039±0.0094)	<0.0059 (0.0000±0.0039)	<0.0189 (-0.0020±0.0039)	0.0079±0.0078	<0.3231 (-0.1065±0.1893)	1.3900±0.2100	0.0530±0.0250	1.3500±0.2000
SR54-SO-R-09-A		pCi/g	0.0098±0.0086	<0.0056 (0.0000±0.0037)	<0.0229 (-0.0037±0.0052)	<0.0056 (0.0037±0.0052)	<0.3210 (-0.0418±0.1888)	1.2600±0.1900	0.0740±0.0290	1.3600±0.2100
SR54-SO-R-10-A		pCi/g	0.0108±0.0095	<0.0059 (0.0000±0.0038)	<0.0059 (0.0039±0.0055)	<0.0187 (0.0020±0.0066)	<0.3220 (0.0700±0.1907)	1.2000±0.1800	0.0660±0.0270	1.2000±0.1800
SR54-SO-R-11-A		pCi/g	<0.0065 (0.0044±0.0061)	<0.0235 (-0.0019±0.0065)	<0.0057 (0.0019±0.0037)	<0.0182 (0.0038±0.0075)	<0.3277 (0.1436±0.1949)	1.1900±0.1900	0.0580±0.0260	1.4100±0.2100
SR55-SO-R-01-A		pCi/g	<0.0230 (0.0070±0.0100)	<0.0246 (-0.0020±0.0068)	<0.0246 (0.0020±0.0088)	<0.0190 (0.0140±0.0120)	<0.3027 (-0.0775±0.1774)	1.1100±0.1500	0.0430±0.0210	1.2000±0.1600
SR55-SO-R-02-A		pCi/g	<0.0217 (0.0023±0.0077)	<0.0182 (-0.0019±0.0037)	<0.0273 (0.0000±0.0091)	0.0057±0.0065	<0.3011 (-0.1009±0.1762)	1.3000±0.1700	0.0500±0.0220	1.2000±0.1600
SR55-SO-R-03-A		pCi/g	<0.0225 (0.0024±0.0080)	<0.0170 (0.0018±0.0060)	0.0053±0.0060	0.0210±0.0120	<0.3037 (-0.0126±0.1788)	1.1300±0.1500	0.0560±0.0230	1.0800±0.1500
SR55-SO-R-04-A		pCi/g	<0.0220 (0.0070±0.0100)	<0.0061 (0.0020±0.0040)	<0.0194 (-0.0020±0.0040)	0.0240±0.0140	<0.3050 (-0.0792±0.1788)	1.0700±0.1500	0.0470±0.0210	1.1700±0.1600
SR55-SO-R-05-A		pCi/g	<0.0227 (0.0047±0.0093)	<0.0059 (0.0020±0.0039)	<0.0059 (0.0039±0.0055)	0.0099±0.0087	<0.3030 (0.1551±0.1805)	1.2500±0.1700	0.0640±0.0250	1.2600±0.1700
SR55-SO-R-06-A		pCi/g	0.0130±0.0110	<0.0198 (0.0021±0.0070)	<0.0197 (0.0000±0.0057)	0.0190±0.0120	<0.2969 (0.0056±0.1750)	1.1200±0.1500	0.0380±0.0210	1.0800±0.1500
SR55-SO-R-07-A		pCi/g	<0.0260 (0.0100±0.0120)	<0.0064 (0.0021±0.0042)	<0.0204 (0.0021±0.0072)	0.0230±0.0140	<0.2917 (-0.1460±0.1701)	1.2500±0.1700	0.0510±0.0230	1.1900±0.1600
SR55-SO-R-08-A		pCi/g	<0.0212 (0.0022±0.0075)	<0.0064 (0.0000±0.0042)	0.0064±0.0072	0.0085±0.0083	<0.2935 (-0.0044±0.1729)	1.2300±0.1700	0.0650±0.0260	1.2600±0.1700
SR55-SO-R-09-A		pCi/g	0.0140±0.0120	<0.0202 (0.0000±0.0059)	<0.0063 (0.0042±0.0058)	0.0320±0.0160	<0.2990 (-0.0146±0.1760)	1.0600±0.1500	0.0310±0.0190	1.1700±0.1600
SR55-SO-R-10-A		pCi/g	<0.0400 (0.0000±0.0140)	<0.0201 (0.0000±0.0058)	<0.0063 (0.0042±0.0058)	0.0170±0.0120	<0.3007 (-0.0385±0.1767)	1.1800±0.1600	0.0350±0.0180	1.1400±0.1500
SR55-SO-R-11-A		pCi/g	0.0083±0.0081	<0.0060 (0.0040±0.0056)	<0.0246 (-0.0020±0.0068)	<0.0190 (0.0120±0.0110)	<0.3014 (-0.0647±0.1768)	1.2300±0.1700	0.0550±0.0250	1.1200±0.1500
SR56-SO-J-01-A		pCi/g	<0.0400 (0.0020±0.0150)	<0.0204 (0.0021±0.0072)	0.0150±0.0110	0.0190±0.0130	<0.2859 (0.2831±0.1720)	3.0300±0.3600	0.1220±0.0370	2.9000±0.3500
SR56-SO-J-02-A		pCi/g	0.0070±0.0079	0.0057±0.0065	<0.0181 (0.0057±0.0083)	0.0076±0.0074	0.3702±0.1834	1.9000±0.2500	0.0700±0.0280	1.7500±0.2300
SR56-SO-J-03-A		pCi/g	0.0067±0.0076	<0.0057 (0.0019±0.0038)	<0.0183 (0.0057±0.0084)	0.0170±0.0110	<0.2986 (0.2445±0.1790)	3.3500±0.4100	0.1600±0.0460	3.2000±0.4000
SR56-SO-J-04-A		pCi/g	<0.0293 (-0.0024±0.0081)	<0.0260 (0.0080±0.0120)	<0.0300 (0.0040±0.0120)	<0.0200 (0.0100±0.0110)	0.3749±0.1840	4.6100±0.5500	0.2100±0.0540	4.7100±0.5600
SR56-SO-J-05-A		pCi/g	<0.0280 (0.0020±0.0100)	<0.0062 (0.0021±0.0041)	<0.0198 (0.0000±0.0057)	<0.0198 (0.0000±0.0057)	<0.2986 (0.2217±0.1787)	6.0300±0.7200	0.3090±0.0680	6.1100±0.7200
SR56-SO-R-01-A		pCi/g	0.0068±0.0077	<0.0057 (0.0019±0.0037)	<0.0057 (0.0019±0.0037)	0.0076±0.0075	<0.2910 (0.2524±0.1747)	1.4000±0.1900	0.0640±0.0260	1.3800±0.1800
SR56-SO-R-02-A		pCi/g	<0.0244 (0.0025±0.0086)	<0.0206 (0.0000±0.0060)	<0.0206 (0.0021±0.0073)	0.0107±0.0095	<0.2873 (0.1268±0.1709)	1.6700±0.2200	0.0990±0.0330	1.6800±0.2200
SR56-SO-R-03-A		pCi/g	0.0091±0.0089	<0.0065 (0.0000±0.0042)	<0.0065 (0.0043±0.0060)	0.0260±0.0150	<0.3066 (0.2190±0.1834)	2.6100±0.3200	0.1250±0.0370	2.6700±0.3300
SR56-SO-R-04-A		pCi/g	<0.0240 (0.0025±0.0085)	<0.0215 (-0.0022±0.0044)	<0.0214 (0.0000±0.0062)	0.0130±0.0110	<0.2858 (0.0823±0.1694)	1.0600±0.1500	0.0390±0.0200	1.0900±0.1500
SR56-SO-R-05-A		pCi/g	<0.0219 (0.0046±0.0090)	<0.0067 (0.0000±0.0044)	<0.0274 (-0.0022±0.0076)	<0.0270 (0.0160±0.0150)	<0.2890 (0.0954±0.1715)	1.5300±0.2000	0.0570±0.0240	1.4100±0.1900
SR56-SO-R-06-A		pCi/g	<0.0219 (0.0023±0.0078)	<0.0213 (0.0022±0.0076)	0.0067±0.0076	0.0111±0.0098	<0.2928 (0.1394±0.1743)	1.2300±0.1700	0.0500±0.0230	1.3900±0.1800
SR56-SO-R-07-A		pCi/g	<0.0230 (0.0140±0.0130)	<0.0064 (0.0021±0.0042)	<0.0205 (0.0021±0.0073)	0.0240±0.0140	0.2990±0.1744	1.9200±0.2400	0.0830±0.0310	1.8100±0.2300
SR56-SO-R-08-A		pCi/g	<0.0201 (0.0021±0.0071)	<0.0062 (0.0000±0.0041)	<0.0200 (0.0100±0.0110)	0.0270±0.0150	<0.2914 (0.1040±0.1730)	1.1500±0.1600	0.0390±0.0200	1.2200±0.1700
SR56-SO-R-09-A		pCi/g	<0.0270 (0.0060±0.0110)	<0.0182 (-0.0019±0.0037)	0.0057±0.0065	0.0340±0.0170	<0.3062 (-0.1423±0.1787)	1.4700±0.1900	0.0580±0.0240	1.3900±0.1800
SR56-SO-R-10-A		pCi/g	<0.0210 (0.0090±0.0110)	<0.0066 (0.0000±0.0043)	<0.0211 (0.0066±0.0097)	0.0150±0.0120	<0.2884 (0.0830±0.1710)	1.4300±0.1900	0.0830±0.0300	1.4800±0.2000
SR56-SO-R-11-A		pCi/g	0.0067±0.0076	<0.0243 (0.0000±0.0077)	<0.0059 (0.0000±0.0039)	<0.0059 (0.0039±0.0055)	<0.2936 (0.1803±0.1752)	1.3200±0.1800	0.0810±0.0300	1.3800±0.1800
SR58-SO-R-01-A		pCi/g	<0.0252 (0.0000±0.0080)	<0.0259 (-0.0021±0.0072)	<0.0201 (-0.0021±0.0041)	0.0170±0.0120	<0.3247 (-0.1916±0.1892)	1.0900±0.1700	0.0560±0.0240	1.0600±0.1700
SR58-SO-R-02-A		pCi/g	<0.0290 (0.0050±0.0110)	<0.0065 (0.0000±0.0043)	<0.0065 (0.0044±0.0061)	<0.0208 (0.0044±0.0086)	<0.3030 (-0.0055±0.1786)	1.0000±0.1600	0.0630±0.0270	1.0700±0.1700
SR58-SO-R-03-A		pCi/g	<0.0270 (0.0040±0.0110)	<0.0238 (0.0000±0.0076)	<0.0185 (-0.0019±0.0038)	<0.0058 (0.0039±0.0054)	<0.3001 (-0.1108±0.1756)	1.0900±0.1700	0.0580±0.0260	1.0400±0.1600
SR58-SO-R-04-A		pCi/g	0.0061±0.0069	<0.0206 (-0.0022±0.0042)	<0.0206 (0.0000±0.0060)	0.0086±0.0085	<0.3174 (-0.2609±0.1841)	1.0900±0.1700	0.0520±0.0240	1.1100±0.1800
SR58-SO-R-05-A		pCi/g	0.0086±0.0084	<0.0209 (-0.0022±0.0043)	<0.0209 (0.0022±0.0074)	0.0130±0.0110	<0.3184 (0.0127±0.1879)	1.1600±0.1800	0.0750±0.0290	1.0900±0.1700
SR58-SO-R-06-A		pCi/g	<0.0200 (0.0063±0.0092)	<0.0060 (0.0000±0.0039)	0.0080±0.0079	0.0060±0.0068	<0.3197 (-0.0752±0.1876)	1.1400±0.1700	0.0520±0.0230	1.1300±0.1700
SR58-SO-R-07-A		pCi/g	<0.0199 (0.0000±0.0058)	<0.0061 (0.0020±0.0040)	<0.0290 (0.0020±0.0100)	<0.0248 (0.0040±0.0097)	<0.3291 (-0.0298±0.1937)	1.2000±0.1800	0.0460±0.0220	1.2300±0.1900
SR58-SO-R-08-A		pCi/g	<0.0210 (0.0022±0.0074)	0.0059±0.0068	<0.0420 (-0.0100±0.0130)	<0.0190 (0.0160±0.0120)	<0.3152 (-0.1164±0.1845)	1.2100±0.1900	0.0610±0.0260	1.1600±0.1800
SR58-SO-R-09-A		pCi/g	<0.0219 (0.0023±0.0078)	<0.0061 (0.0000±0.0040)	<0.0060 (0.0040±0.0056)	0.0121±0.0099	<0.3040 (-0.1200±0.1778)	0.9300±0.1500	0.0590±0.0250	1.0100±0.1600
SR58-SO-R-10-A		pCi/g	<0.0290 (0.0040±0.0110)	<0.0056 (0.0000±0.0037)	<0.0056 (0.0019±0.0037)	0.0094±0.0083	<0.3143 (-0.1104±0.1840)	1.0700±0.1700	0.0570±0.0250	1.0600±0.1600
SR58-SO-R-11-A		pCi/g	<0.0480 (-0.0040±0.0160)	<0.0304 (-0.0063±0.0072)	<0.0202 (-0.0021±0.0041)	<0.0202 (0.0063±0.0093)	<0.2834 (-0.0280±0.1667)	1.2100±0.1900	0.0590±0.0250	1.2300±0.1900
SR59-SO-J-01-A		pCi/g	<0.0063 (0.0042±0.0058)	<0.0196 (-0.0020±0.0040)	<0.0196 (-0.0020±0.0040)	<0.0061 (0.0000±0.0040)	<0.2895 (0.0826±0.1716)	3.4700±0.4800	0.1510±0.0440	3.2300±0.4500
SR59-SO-J-02-A		pCi/g	<0.0218 (0.0000±0.0063)	<0.0235 (0.0019±0.0084)	<0.0182 (0.0057±0.0084)	<0.0234 (0.0000±0.0075)	0.3906±0.1872	2.9200±0.3500	0.1000±0.0340	2.8900±0.3500
SR59-SO-R-01-A		pCi/g	<0.0230 (0.0120±0.0130)	<0.0064 (0.0021±0.0042)	<0.0205 (0.0043±0.0084)	0.0170±0.0120	<0.3023 (-0.1634±0.1762)	1.1300±0.1800	0.0540±0.0250	1.2100±0.1900
SR59-SO-R-02-A		pCi/g	<0.0066 (0.0022±0.0043)	<0.0069 (0.0000±0.0045)	<0.0069 (0.0023±0.0045)	0.0110±0.0100	<0.2939 (-0.0257±0.1729)	1.2100±0.1900	0.0500±0.0240	1.1500±0.1800
SR59-SO-R-03-A		pCi/g	<0.0213 (0.0022±0.0075)	<0.0067 (0.0022±0.0044)	<0.0215 (0.0067±0.0099)	0.0090±0.0089	<0.2953 (0.0719±0.1749)	1.2200±0.1900	0.0430±0.0220	1.1900±0.1900
SR59-SO-R-04-A		pCi/g	<0.0200 (0.0090±0.0100)	<0.0074 (0.0049±0.0069)	<0.0074 (0.0049±0.0069)	<0.0074 (0.0049±0.0069)	<0.2982 (0.1475±0.1776)	1.1500±0.1800	0.0590±0.0270	1.2100±0.1900
SR59-SO-R-05-A		pCi/g	<0.0067 (0.0022±0.0044)	<0.0075 (0.0025±0.0049)	<0.0306 (0.0000±0.0098)	<0.0075 (0.0050±0.0069)	<0.2978 (0.1326±0.1772)	1.1000±0.1800	0.0380±0.0210	1.1700±0.1800
SR59-SO-R-06-A		pCi/g	<0.0225 (0.0024±0.0080)	<0.0233 (-0.0024±0.0048)	<0.0232 (-0.0024±0.0048)	<0.0230 (0.0070±0.0110)	<0.2777 (0.0740±0.1646)	1.2700±0.2000	0.0550±0.0250	1.2100±0.1900
SR59-SO-R-07-A		pCi/g	<0.0219 (0.0023±0.0078)	0.0077±0.0087	<0.0244 (0.0051±0.0100)	0.0230±0.0150	<0.2918 (0.1277±0.1735)	1.1100±0.1800	0.0560±0.0270	1.1700±0.1800
SR59-SO-R-08-A		pCi/g	<0.0062 (0.0021±0.0040)	<0.0069 (0.0023±0.0045)	<0.0330 (-0.0020±0.0100)	0.0069±0.0078	<0.2895 (-0.0419±0.1701)	1.2000±0.1900	0.0560±0.0280	1.2700±0.2000
SR59-SO-R-09-A		pCi/g	<0.0196 (0.0082±0.0099)	<0.0198 (0.0000±0.0057)	<0.0254 (0.0041±0.0099)	0.0250±0.0140	<0.2932 (0.0759±0.1737)	1.0400±0.1600	0.0500±0.0230	1.0300±0.1600

Notes:

1) "nr" no result reported by laboratory"

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide / Units ↓	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
			Result	Result	Result	Result	Result	Result	Result	Result
SR59-SO-R-10-A		pCi/g	<0.0350 (0.0130±0.0160)	<0.0240 (0.0070±0.0110)	<0.0074 (0.0025±0.0049)	0.0270±0.0160	<0.2949 (0.0314±0.1742)	1.1000±0.1700	0.0590±0.0260	1.1800±0.1900
SR59-SO-R-11-A		pCi/g	<0.0330 (0.0080±0.0140)	<0.0068 (0.0000±0.0044)	<0.0215 (0.0022±0.0076)	0.0360±0.0180	<0.2966 (0.0598±0.1755)	1.0900±0.1700	0.0480±0.0220	0.9700±0.1500
SR61-SO-R-01-A		pCi/g	<0.0270 (0.0150±0.0140)	<0.0059 (0.0020±0.0039)	<0.0283 (-0.0059±0.0068)	<0.0283 (0.0000±0.0095)	<0.2768 (0.1111±0.1645)	1.1200±0.1700	0.0480±0.0220	1.1700±0.1800
SR61-SO-R-02-A		pCi/g	<0.0260 (0.0040±0.0100)	<0.0183 (-0.0019±0.0038)	<0.0182 (-0.0019±0.0037)	0.0057±0.0065	<0.2905 (0.1346±0.1729)	1.0600±0.1700	0.0300±0.0190	1.1100±0.1700
SR61-SO-R-03-A		pCi/g	<0.0060 (0.0000±0.0039)	<0.0063 (0.0021±0.0042)	<0.0063 (0.0000±0.0041)	0.0270±0.0160	<0.2962 (0.2379±0.1775)	1.0900±0.1700	0.0400±0.0200	1.1400±0.1800
SR61-SO-R-04-A		pCi/g	<0.0216 (0.0023±0.0076)	<0.0190 (-0.0020±0.0039)	<0.0189 (-0.0020±0.0039)	<0.0190 (0.0140±0.0120)	<0.2828 (0.2391±0.1696)	0.9600±0.1500	0.0420±0.0200	0.9800±0.1500
SR61-SO-R-05-A		pCi/g	<0.0182 (0.0038±0.0074)	<0.0058 (0.0000±0.0038)	<0.0058 (0.0019±0.0038)	0.0096±0.0085	<0.2885 (0.1136±0.1714)	1.0600±0.1600	0.0540±0.0230	0.9800±0.1500
SR61-SO-R-06-A		pCi/g	<0.0221 (0.0000±0.0064)	<0.0185 (-0.0019±0.0038)	<0.0184 (0.0019±0.0065)	0.0150±0.0110	<0.2816 (0.1936±0.1684)	1.0900±0.1700	0.0700±0.0270	1.0500±0.1600
SR61-SO-R-07-A		pCi/g	<0.0067 (0.0022±0.0044)	<0.0060 (0.0000±0.0039)	<0.0246 (-0.0020±0.0068)	<0.0190 (0.0180±0.0130)	<0.2939 (0.1067±0.1745)	0.9900±0.1600	0.0580±0.0250	1.0600±0.1600
SR61-SO-R-08-A		pCi/g	<0.0300 (0.0020±0.0110)	<0.0187 (0.0000±0.0054)	<0.0186 (0.0000±0.0054)	0.0058±0.0067	<0.2947 (0.2868±0.1773)	1.0600±0.1700	0.0380±0.0200	0.9700±0.1500
SR61-SO-R-09-A		pCi/g	<0.0065 (0.0044±0.0061)	<0.0188 (0.0020±0.0067)	<0.0059 (0.0039±0.0055)	0.0140±0.0100	<0.2641 (0.1815±0.1579)	1.1800±0.1800	0.0290±0.0170	1.0700±0.1700
SR61-SO-R-10-A		pCi/g	<0.0186 (0.0000±0.0054)	<0.0179 (-0.0019±0.0037)	<0.0056 (0.0019±0.0037)	0.0056±0.0064	<0.2758 (0.1331±0.1642)	1.0400±0.1600	0.0530±0.0230	1.0200±0.1600
SR61-SO-R-11-A		pCi/g	<0.0280 (0.0070±0.0120)	<0.0061 (0.0041±0.0057)	<0.0061 (0.0000±0.0040)	0.0061±0.0069	0.2821±0.1654	1.0600±0.1700	0.0510±0.0240	1.0700±0.1700
SR65-SO-R-01-A		pCi/g	0.0092±0.0091	<0.0064 (0.0043±0.0060)	<0.0264 (0.0021±0.0094)	0.0150±0.0110	<0.2832 (0.1605±0.1689)	1.5000±0.2000	0.0580±0.0260	1.4300±0.1900
SR65-SO-R-02-A		pCi/g	<0.0192 (0.0080±0.0097)	<0.0059 (0.0039±0.0055)	0.0059±0.0067	0.0250±0.0140	<0.7730 (0.2080±0.4581)	1.2500±0.1700	0.0560±0.0260	1.4200±0.1900
SR65-SO-R-03-A		pCi/g	0.0084±0.0082	<0.0058 (0.0019±0.0038)	<0.0058 (0.0019±0.0038)	<0.0058 (0.0019±0.0038)	<0.2561 (0.1181±0.1524)	1.4100±0.1900	0.0690±0.0270	1.3700±0.1800
SR65-SO-R-04-A		pCi/g	<0.0530 (-0.0070±0.0180)	<0.0184 (0.0058±0.0085)	<0.0058 (0.0019±0.0038)	<0.0058 (0.0019±0.0038)	<0.2820 (0.0149±0.1664)	0.6180±0.0990	0.0290±0.0170	0.6600±0.1000
SR65-SO-R-05-A		pCi/g	0.0160±0.0110	<0.0059 (0.0000±0.0039)	<0.0188 (0.0020±0.0067)	0.0160±0.0110	0.3120±0.1518	1.4900±0.2000	0.0620±0.0270	1.5500±0.2100
SR65-SO-R-06-A		pCi/g	0.0106±0.0093	<0.0194 (-0.0020±0.0040)	<0.0194 (0.0000±0.0056)	0.0160±0.0110	0.3529±0.1849	1.2400±0.1700	0.0670±0.0260	1.4100±0.1900
SR65-SO-R-07-A		pCi/g	<0.0063 (0.0042±0.0058)	<0.0054 (0.0000±0.0036)	<0.0173 (0.0000±0.0050)	0.0140±0.0100	<0.3057 (0.2132±0.1828)	1.0200±0.1400	0.0520±0.0220	1.1200±0.1500
SR65-SO-R-08-A		pCi/g	<0.0071 (0.0024±0.0046)	<0.0192 (0.0000±0.0056)	<0.0060 (0.0020±0.0039)	0.0100±0.0088	<0.3072 (0.3004±0.1848)	1.3900±0.1900	0.0750±0.0290	1.4900±0.2000
SR65-SO-R-09-A		pCi/g	<0.0069 (0.0046±0.0064)	<0.0060 (0.0020±0.0039)	<0.0060 (0.0040±0.0055)	0.0140±0.0100	<0.3001 (0.2109±0.1795)	1.3100±0.1800	0.0570±0.0250	1.3300±0.1800
SR65-SO-R-10-A		pCi/g	<0.0250 (0.0000±0.0072)	<0.0204 (0.0021±0.0073)	<0.0064 (0.0021±0.0042)	0.0150±0.0110	<0.2984 (0.1838±0.1781)	1.2600±0.1700	0.0640±0.0270	1.1500±0.1600
SR65-SO-R-11-A		pCi/g	<0.0248 (0.0000±0.0072)	<0.0241 (0.0039±0.0094)	<0.0440 (-0.0140±0.0130)	<0.0280 (0.0100±0.0130)	1.1016±0.1919	1.6200±0.2100	0.0650±0.0270	1.5400±0.2000
SR66-SO-R-01-A		pCi/g	<0.0067 (0.0022±0.0044)	<0.0260 (0.0000±0.0083)	<0.0340 (0.0000±0.0120)	<0.0200 (0.0110±0.0110)	<0.2884 (-0.0066±0.1699)	1.3000±0.1800	0.0570±0.0260	1.2500±0.1700
SR66-SO-R-02-A		pCi/g	0.0074±0.0084	<0.0067 (0.0000±0.0044)	0.0067±0.0076	0.0240±0.0150	<0.3031 (-0.0962±0.1774)	1.3500±0.1800	0.0390±0.0210	1.3200±0.1800
SR66-SO-R-03-A		pCi/g	<0.0069 (0.0023±0.0045)	<0.0059 (0.0000±0.0039)	<0.0280 (0.0040±0.0110)	0.0079±0.0078	<0.2854 (0.1941±0.1706)	1.1300±0.1600	0.0600±0.0260	1.0800±0.1600
SR66-SO-R-04-A		pCi/g	0.0160±0.0120	<0.0258 (0.0000±0.0082)	<0.0201 (0.0021±0.0071)	0.0105±0.0092	<0.3011 (0.0125±0.1776)	1.3600±0.1900	0.0740±0.0300	1.4600±0.2000
SR66-SO-R-05-A		pCi/g	<0.0210 (0.0000±0.0061)	<0.0259 (-0.0021±0.0072)	<0.0260 (0.0060±0.0110)	0.0150±0.0110	<0.2987 (0.1612±0.1780)	1.2700±0.1700	0.0590±0.0250	1.3000±0.1800
SR66-SO-R-06-A		pCi/g	<0.0228 (0.0048±0.0093)	<0.0066 (0.0022±0.0043)	<0.0209 (0.0000±0.0060)	<0.0065 (0.0022±0.0043)	<0.3001 (0.1174±0.1783)	1.1500±0.1600	0.0450±0.0220	1.1500±0.1600
SR66-SO-R-07-A		pCi/g	0.0089±0.0088	<0.0269 (-0.0022±0.0074)	<0.0269 (0.0022±0.0096)	<0.0270 (0.0110±0.0130)	<0.2897 (0.2455±0.1738)	1.3500±0.1800	0.0790±0.0310	1.4400±0.1900
SR66-SO-R-08-A		pCi/g	<0.0065 (0.0044±0.0060)	<0.0056 (0.0019±0.0036)	<0.0266 (0.0000±0.0089)	0.0055±0.0063	<0.2941 (0.2436±0.1763)	0.8600±0.1300	0.0500±0.0230	0.8400±0.1200
SR66-SO-R-09-A		pCi/g	0.0112±0.0099	<0.0063 (0.0021±0.0041)	<0.0063 (0.0000±0.0041)	0.0063±0.0072	<0.3022 (0.1034±0.1794)	0.8900±0.1300	0.0480±0.0220	1.0100±0.1400
SR66-SO-R-10-A		pCi/g	<0.0210 (0.0066±0.0096)	<0.0063 (0.0000±0.0041)	<0.0200 (-0.0021±0.0041)	0.0084±0.0083	<0.3035 (0.1778±0.1811)	1.5200±0.2100	0.0410±0.0220	1.4900±0.2000
SR66-SO-R-11-A		pCi/g	<0.0220 (0.0023±0.0078)	<0.0063 (0.0021±0.0041)	<0.0256 (0.0000±0.0082)	0.0120±0.0100	<0.3031 (0.1054±0.1800)	1.0900±0.1500	0.0400±0.0210	1.0800±0.1500
SR67-SO-R-01-A		pCi/g	0.0083±0.0082	<0.0063 (0.0000±0.0041)	0.0063±0.0072	0.0063±0.0072	<0.3263 (0.3026±0.1960)	1.3800±0.1900	0.0550±0.0250	1.3000±0.1800
SR67-SO-R-02-A		pCi/g	0.0085±0.0083	<0.0235 (0.0019±0.0084)	<0.0310 (0.0040±0.0120)	<0.0182 (0.0076±0.0092)	<0.3225 (-0.0217±0.1898)	1.2600±0.1700	0.0410±0.0220	1.2100±0.1700
SR67-SO-R-03-A		pCi/g	<0.0210 (0.0022±0.0075)	<0.0210 (0.0000±0.0061)	<0.0066 (0.0022±0.0043)	<0.0209 (0.0066±0.0096)	<0.3227 (0.0664±0.1910)	1.3300±0.1800	0.0360±0.0200	1.3900±0.1900
SR67-SO-R-04-A		pCi/g	<0.0191 (0.0000±0.0055)	<0.0058 (0.0019±0.0038)	<0.0057 (0.0019±0.0038)	<0.0057 (0.0038±0.0053)	<0.3237 (0.0206±0.1910)	0.6150±0.0970	0.0130±0.0110	0.5470±0.0890
SR67-SO-R-05-A		pCi/g	<0.0069 (0.0046±0.0064)	<0.0055 (0.0018±0.0036)	<0.0260 (0.0110±0.0120)	0.0160±0.0110	<0.3156 (-0.1274±0.1845)	1.3500±0.1900	0.0530±0.0260	1.3100±0.1800
SR67-SO-R-06-A		pCi/g	0.0089±0.0088	<0.0254 (-0.0021±0.0070)	<0.0197 (0.0021±0.0070)	0.0082±0.0081	<0.3256 (-0.1010±0.1907)	1.1600±0.1600	0.0570±0.0240	1.2300±0.1700
SR67-SO-R-07-A		pCi/g	0.0113±0.0100	<0.0251 (-0.0020±0.0069)	<0.0250 (0.0000±0.0080)	<0.0061 (0.0041±0.0056)	<0.3086 (-0.0958±0.1807)	1.1300±0.1600	0.0580±0.0250	1.2500±0.1700
SR67-SO-R-08-A		pCi/g	0.0060±0.0068	<0.0064 (0.0000±0.0042)	<0.0204 (0.0021±0.0072)	0.0064±0.0073	<0.3261 (-0.0707±0.1914)	1.1500±0.1600	0.0450±0.0220	1.3100±0.1800
SR67-SO-R-09-A		pCi/g	<0.0350 (0.0020±0.0130)	<0.0249 (-0.0040±0.0056)	<0.0248 (-0.0020±0.0069)	<0.0250 (0.0100±0.0120)	<0.3229 (-0.0398±0.1899)	1.1000±0.1500	0.0260±0.0180	1.0500±0.1500
SR67-SO-R-10-A		pCi/g	<0.0060 (0.0040±0.0055)	<0.0056 (0.0037±0.0052)	<0.0056 (0.0037±0.0052)	0.0111±0.0090	<0.3251 (-0.0462±0.1910)	1.1100±0.1500	0.0340±0.0190	1.1900±0.1600
SR67-SO-R-11-A		pCi/g	<0.0290 (0.0050±0.0110)	<0.0066 (0.0000±0.0043)	<0.0209 (0.0022±0.0074)	<0.0065 (0.0044±0.0061)	<0.3219 (0.0794±0.1907)	1.2300±0.1700	0.0460±0.0230	1.2400±0.1700
SR68-SO-R-01-A		pCi/g	0.0067±0.0076	<0.0259 (0.0021±0.0092)	<0.0258 (-0.0021±0.0071)	<0.0201 (0.0000±0.0058)	<0.2908 (0.1171±0.1728)	1.2800±0.1800	0.0450±0.0230	1.2800±0.1800
SR68-SO-R-02-A		pCi/g	<0.0211 (0.0066±0.0097)	<0.0184 (0.0000±0.0053)	<0.0058 (0.0019±0.0038)	<0.0058 (0.0019±0.0038)	<0.2881 (0.0525±0.1704)	1.0900±0.1500	0.0540±0.0240	1.1400±0.1600
SR68-SO-R-03-A		pCi/g	0.0190±0.0120	0.0059±0.0067	<0.0059 (0.0039±0.0054)	0.0200±0.0120	<0.3042 (0.0081±0.1794)	1.2000±0.1600	0.0230±0.0160	1.2200±0.1600
SR68-SO-R-04-A		pCi/g	<0.0062 (0.0042±0.0058)	<0.0055 (0.0000±0.0036)	0.0073±0.0072	0.0073±0.0072	<0.2630 (0.0589±0.1557)	1.2100±0.1700	0.0530±0.0240	1.2200±0.1700
SR68-SO-R-05-A		pCi/g	<0.0198 (0.0000±0.0057)	<0.0198 (-0.0021±0.0041)	<0.0062 (0.0000±0.0040)	0.0140±0.0110	<0.3062 (0.2379±0.1834)	1.0900±0.1500	0.0430±0.0220	1.1400±0.1600
SR68-SO-R-06-A		pCi/g	0.0086±0.0085	<0.0058 (0.0019±0.0038)	<0.0237 (0.0039±0.0093)	0.0170±0.0110	<0.2955 (0.0943±0.1753)	1.1600±0.1600	0.0540±0.0230	1.3200±0.1800
SR68-SO-R-07-A		pCi/g	0.0069±0.0078	<0.0189 (-0.0020±0.0039)	<0.0189 (-0.0020±0.0039)	<0.0190 (0.0100±0.0100)	<0.2809 (0.2379±0.1685)	1.2500±0.1700	0.0460±0.0230	1.2200±0.1700
SR68-SO-R-08-A		pCi/g	0.0065±0.0073	<0.0196 (0.0000±0.0057)	<0.0061 (0.0020±0.0040)	0.0220±0.0130	<0.2932 (0.1615±0.1748)	1.0700±0.1500	0.0350±0.0190	1.1700±0.1600
SR68-SO-R-09-A		pCi/g	<0.0064 (0.0043±0.0059)	<0.0064 (0.0021±0.0042)	<0.0064 (0.0043±0.0059)	<0.0064 (0.0043±0.0059)	<0.2622 (-0.0129±0.1544)	1.1100±0.1500	0.0650±0.0280	1.1900±0.1600
SR68-SO-R-10-A		pCi/g	<0.0204 (-0.0021±0.0042)	<0.0059 (0.0039±0.0054)	0.0078±0.0077	<0.0190 (0.0140±0.0120)	<0.2855 (0.0922±0.1694)	1.1000±0.1500	0.0640±0.0260	1.1400±0.1600
SR68-SO-R-11-A		pCi/g	<0.0190 (0.0059±0.0087)	<0.0060 (0.0020±0.0039)	<0.0060 (0.0040±0.0056)	0.0160±0.0110	<0.2913 (0.0409±0.1722)	1.1500±0.1600	0.0550±0.0240	1.1500±0.1600
SR69-SO-R-01-A		pCi/g	<0.0210 (0.0150±0.0130)	<0.0264 (-0.0021±0.0073)	<0.0205 (0.0000±0.0059)	0.0107±0.0094	<0.3013 (-0.0068±0.1775)	1.5000±0.2100	0.0660±0.0290	1.6900±0.2300
SR69-SO-R-02-A		pCi/g	<0.0240 (0.0100±0.0110)	<0.0058 (0.0038±0.0053)	<0.0240 (0.0080±0.0110)	<0.0180 (0.0110±0.0110)	<0.3012 (0.0011±0.1775)	1.3900±0.1900	0.0740±0.0280	1.5400±0.2000
SR69-SO-R-03-A		pCi/g	<0.0066 (0.0044±0.0061)	<0.0060 (0.0020±0.0039)	<0.0060 (0.0000±0.0039)	<0.0060 (0.0020±0.0039)	<0.3017 (0.0760±0.1787)	1.1900±0.1600	0.0700±0.0270	1.1700±0.1600
SR69-SO-R-04-A		pCi/g	<0.0290 (0.0070±0.0120)	<0.0194 (0.0061±0.0089)	<0.0061 (0.0040±0.0056)	<0.0190 (0.0120±0.0110)	0.2929±0.1608	2.1300±0.2700	0.0810±0.0320	2.0300±0.2600
SR69-SO-R-05-A		pCi/g	<0.0216 (0.0000±0.0062)	<0.0055 (0.0018±0.0036)	<0.0230 (0.0160±0.0130)	0.0200±0.0120	<0.2675 (0.1912±0.1600)	1.1500±0.1600	0.0670±0.0290	1.2100±0.1700
SR69-SO-R-06-A		pCi/g	0.0110±0.0100	<0.0063 (0.0000±0.0041)	<0.0063 (0.0021±0.0041)	0.0210±0.0130	0.4715±0.1861	1.8000±0.2300	0.1010±0.0330	1.9100±0.2400
SR69-SO-R-07-A		pCi/g	<0.0198 (0.0000±0.0057)	<0.0196 (-0.0020±0.0040)	<0.0294 (-0.0041±0.0080)	0.0102±0.0090	<0.3055 (0.2101±0.1827)	1.1200±0.1600	0.0380±0.0230	1.1700±0.1700
SR69-SO-R-08-A		pCi/g	<0.0191 (0.0080±0.0096)	0.0100±0.0088	<0.0245 (0.0020±0.0087)	<0.0190 (0.0140±0.0120)	<0.3022 (0.1393±0.1798)	1.1100±0.1600	0.0660±0.0290	1.2000±0.1700
SR69-SO-R-09-A		pCi/g	<0.0059 (0.0020±0.0039)	<0.0260 (0.0040±0.0100)	<0.0260 (0.0090±0.0120)	0.0130±0.0100	<0.2987 (0.2663±0.1793)	1.0300±0.1500	0.0680±0.0290	1.1600±0.1600
SR69-SO-R-10-A		pCi/g	<0.0320 (-0.0026±0.0088)	<0.0187 (0.0000±0.0054)	<0.0280 (-0.0019±0.0085)	<0.0187 (0.0058±0.0086)	<0.2869 (0.1370±0.1708)	1.4500±0.1900	0.0730±0.0300	1.4600±0.2000
SR69-SO-R-11-A		pCi/g	<0.0190 (0.0140±0.0120)	<0.0059 (0.0000±0.0039)	<0.0059 (0.0039±0.0055)	0.0240±0.0140	<0.2947 (0.0033±0.1737)	1.5800±0.2100	0.0870±0.0310	1.5300±0.2000

Notes:

1) "nr" no result reported by laboratory"

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide / Units ↓	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
			Result	Result	Result	Result	Result	Result	Result	Result
SR70-SO-R-01-A		pCi/g	<0.0252 (0.0021±0.0090)	<0.0057 (0.0000±0.0037)	<0.0232 (-0.0038±0.0052)	<0.0180 (0.0075±0.0091)	<0.2973 (0.1462±0.1770)	1.4400±0.2000	0.0790±0.0310	1.3900±0.1900
SR70-SO-R-02-A		pCi/g	0.0062±0.0071	<0.0065 (0.0000±0.0042)	<0.0065 (0.0022±0.0042)	0.0240±0.0140	<0.2921 (-0.0132±0.1720)	1.2900±0.1800	0.0460±0.0240	1.2400±0.1700
SR70-SO-R-03-A		pCi/g	0.0090±0.0089	<0.0062 (0.0021±0.0041)	<0.0062 (0.0000±0.0040)	0.0103±0.0091	<0.2624 (0.0926±0.1558)	1.3500±0.1800	0.0540±0.0260	1.2800±0.1700
SR70-SO-R-04-A		pCi/g	0.0130±0.0110	<0.0183 (0.0000±0.0053)	<0.0057 (0.0000±0.0037)	0.0250±0.0140	<0.2721 (0.1972±0.1628)	1.7300±0.2200	0.0710±0.0270	1.7000±0.2200
SR70-SO-R-05-A		pCi/g	<0.0204 (0.0064±0.0094)	<0.0057 (0.0019±0.0037)	<0.0180 (0.0000±0.0052)	<0.0270 (0.0090±0.0120)	<0.2510 (0.0038±0.1480)	1.1500±0.1600	0.0610±0.0250	1.1300±0.1500
SR70-SO-R-06-A		pCi/g	<0.0067 (0.0044±0.0062)	<0.0063 (0.0000±0.0041)	0.0063±0.0072	0.0105±0.0093	<0.2827 (0.0191±0.1669)	1.2200±0.1700	0.0820±0.0300	1.1600±0.1600
SR70-SO-R-07-A		pCi/g	<0.0065 (0.0022±0.0043)	<0.0057 (0.0000±0.0037)	<0.0057 (0.0019±0.0037)	<0.0057 (0.0038±0.0053)	<0.2903 (0.2856±0.1746)	1.3200±0.1800	0.0510±0.0230	1.3600±0.1800
SR70-SO-R-08-A		pCi/g	<0.0263 (0.0021±0.0094)	<0.0193 (0.0000±0.0056)	<0.0192 (0.0000±0.0056)	0.0060±0.0068	<0.2788 (-0.0094±0.1642)	1.4200±0.1900	0.0590±0.0260	1.4900±0.2000
SR70-SO-R-09-A		pCi/g	<0.0214 (0.0000±0.0062)	<0.0061 (0.0020±0.0040)	<0.0193 (0.0040±0.0079)	0.0060±0.0069	<0.2933 (0.0573±0.1736)	1.2000±0.1600	0.0780±0.0290	1.2500±0.1700
SR70-SO-R-10-A		pCi/g	<0.0211 (0.0000±0.0061)	<0.0208 (0.0043±0.0085)	<0.0207 (0.0022±0.0073)	0.0065±0.0074	<0.2718 (0.2306±0.1630)	1.3500±0.1800	0.0650±0.0260	1.3200±0.1800
SR70-SO-R-11-A		pCi/g	<0.0068 (0.0045±0.0063)	<0.0227 (0.0024±0.0081)	0.0120±0.0100	0.0190±0.0130	<0.2923 (0.0571±0.1729)	1.3100±0.1800	0.0720±0.0290	1.2800±0.1800
SR71-SO-R-01-A		pCi/g	<0.0205 (0.0043±0.0084)	<0.0202 (0.0021±0.0072)	<0.0202 (0.0000±0.0058)	<0.0202 (0.0021±0.0072)	<0.2873 (0.2600±0.1725)	1.1900±0.1700	0.0550±0.0250	1.1100±0.1600
SR71-SO-R-02-A		pCi/g	<0.0240 (0.0080±0.0110)	<0.0062 (0.0000±0.0040)	<0.0062 (0.0000±0.0040)	<0.0200 (0.0100±0.0110)	<0.2920 (0.1349±0.1737)	1.3000±0.1800	0.0500±0.0240	1.4000±0.1900
SR71-SO-R-03-A		pCi/g	<0.0076 (0.0051±0.0071)	<0.0064 (0.0021±0.0042)	<0.0263 (-0.0043±0.0060)	0.0086±0.0084	<0.2888 (0.1136±0.1716)	1.1800±0.1700	0.0900±0.0340	1.2400±0.1700
SR71-SO-R-04-A		pCi/g	<0.0091 (0.0030±0.0059)	<0.0060 (0.0020±0.0039)	<0.0192 (0.0040±0.0079)	0.0060±0.0068	<0.2870 (0.0811±0.1701)	1.1900±0.1700	0.0430±0.0210	1.2000±0.1700
SR71-SO-R-05-A		pCi/g	0.0092±0.0091	<0.0260 (-0.0042±0.0059)	0.0063±0.0072	0.0106±0.0093	<0.3020 (0.2169±0.1807)	0.9500±0.1300	0.0220±0.0150	0.9900±0.1400
SR71-SO-R-06-A		pCi/g	0.0084±0.0096	<0.0216 (-0.0023±0.0044)	<0.0068 (0.0000±0.0044)	<0.0068 (0.0045±0.0063)	<0.2806 (0.1447±0.1671)	1.1300±0.1700	<0.0420 (0.0310±0.0240)	1.1300±0.1700
SR71-SO-R-07-A		pCi/g	<0.0074 (0.0025±0.0048)	<0.0202 (0.0000±0.0058)	0.0063±0.0072	0.0105±0.0093	<0.2818 (0.1184±0.1676)	1.0400±0.1500	0.0750±0.0290	1.2200±0.1700
SR71-SO-R-08-A		pCi/g	<0.0290 (0.0070±0.0120)	<0.0063 (0.0021±0.0041)	<0.0302 (-0.0042±0.0082)	0.0105±0.0093	<0.2849 (0.2513±0.1710)	1.1700±0.1600	0.0470±0.0230	1.1700±0.1600
SR71-SO-R-09-A		pCi/g	<0.0238 (0.0025±0.0085)	<0.0206 (-0.0022±0.0042)	<0.0206 (-0.0022±0.0042)	<0.0206 (0.0065±0.0094)	<0.2937 (0.2759±0.1766)	1.1900±0.1600	0.0690±0.0270	1.3000±0.1800
SR71-SO-R-10-A		pCi/g	0.0130±0.0110	<0.0061 (0.0041±0.0057)	<0.0251 (-0.0020±0.0069)	0.0140±0.0110	<0.2921 (0.1628±0.1741)	1.1700±0.1600	0.0560±0.0250	1.2400±0.1700
SR71-SO-R-11-A		pCi/g	0.0068±0.0077	<0.0198 (0.0021±0.0070)	<0.0062 (0.0021±0.0041)	<0.0254 (0.0041±0.0099)	<0.2894 (0.1680±0.1726)	1.1600±0.1600	0.0460±0.0220	1.3200±0.1800
SR72-SO-R-01-A		pCi/g	<0.0274 (0.0022±0.0098)	<0.0067 (0.0045±0.0062)	<0.0067 (0.0000±0.0044)	0.0160±0.0120	<0.2914 (0.1358±0.1734)	1.2100±0.1700	0.0650±0.0290	1.3700±0.1900
SR72-SO-R-02-A		pCi/g	<0.0065 (0.0022±0.0042)	<0.0263 (0.0000±0.0084)	<0.0260 (0.0060±0.0110)	0.0190±0.0130	<0.2878 (0.1000±0.1709)	1.2800±0.1700	0.0710±0.0280	1.3000±0.1800
SR72-SO-R-03-A		pCi/g	0.0113±0.0100	<0.0210 (0.0130±0.0120)	<0.0400 (0.0110±0.0170)	<0.0360 (0.0160±0.0170)	<0.2921 (0.2644±0.1754)	1.1800±0.1700	0.1020±0.0350	1.1900±0.1700
SR72-SO-R-04-A		pCi/g	<0.0260 (0.0110±0.0130)	<0.0220 (0.0110±0.0120)	<0.0328 (-0.0046±0.0089)	0.0230±0.0140	<0.3074 (0.2039±0.1837)	1.1300±0.1600	0.0670±0.0280	1.2100±0.1700
SR72-SO-R-05-A		pCi/g	0.0120±0.0100	<0.0217 (0.0000±0.0063)	<0.0216 (0.0023±0.0077)	<0.0220 (0.0160±0.0130)	<0.2927 (0.0693±0.1734)	1.3800±0.1900	0.0930±0.0330	1.3900±0.1900
SR72-SO-R-06-A		pCi/g	<0.0068 (0.0023±0.0045)	0.0114±0.0092	<0.0230 (0.0130±0.0120)	0.0300±0.0160	<0.3026 (0.1652±0.1804)	1.2300±0.1700	0.0630±0.0280	1.2500±0.1800
SR72-SO-R-07-A		pCi/g	<0.0209 (0.0022±0.0074)	<0.0265 (-0.0043±0.0060)	0.0107±0.0095	<0.0260 (0.0090±0.0120)	0.9521±0.1915	1.3100±0.1800	0.0490±0.0230	1.3500±0.1800
SR72-SO-R-08-A		pCi/g	<0.0200 (0.0080±0.0100)	<0.0205 (0.0021±0.0073)	<0.0310 (0.0000±0.0100)	0.0210±0.0130	0.3236±0.1774	1.0700±0.1500	0.0590±0.0250	1.2000±0.1600
SR72-SO-R-09-A		pCi/g	0.0200±0.0130	<0.0068 (0.0000±0.0045)	<0.0280 (0.0050±0.0110)	<0.0220 (0.0180±0.0140)	0.3258±0.1745	1.2700±0.1700	0.0550±0.0250	1.2700±0.1800
SR72-SO-R-10-A		pCi/g	<0.0189 (0.0000±0.0055)	<0.0200 (0.0080±0.0100)	<0.0300 (0.0020±0.0110)	<0.0200 (0.0021±0.0071)	<0.2918 (0.2397±0.1750)	1.2800±0.1800	0.0490±0.0230	1.3600±0.1900
SR72-SO-R-11-A		pCi/g	0.0079±0.0078	<0.0182 (0.0019±0.0065)	<0.0233 (-0.0038±0.0053)	<0.0182 (0.0076±0.0091)	0.3195±0.1788	1.3900±0.1900	0.0740±0.0300	1.3500±0.1900
SR73-SO-R-01-A		pCi/g	<0.0064 (0.0042±0.0059)	<0.0209 (0.0022±0.0074)	<0.0268 (-0.0022±0.0074)	<0.0209 (0.0044±0.0086)	<0.3036 (-0.0493±0.1783)	1.2300±0.1700	0.0710±0.0300	1.3500±0.1900
SR73-SO-R-02-A		pCi/g	<0.0220 (0.0070±0.0100)	0.0063±0.0071	0.0063±0.0071	0.0063±0.0071	0.3107±0.1698	1.1700±0.1600	0.0660±0.0260	1.2900±0.1700
SR73-SO-R-03-A		pCi/g	<0.0063 (0.0042±0.0059)	0.0083±0.0082	0.0062±0.0071	0.0170±0.0120	<0.2936 (0.1186±0.1745)	1.2000±0.1700	0.0630±0.0260	1.3000±0.1800
SR73-SO-R-04-A		pCi/g	<0.0195 (0.0000±0.0056)	<0.0058 (0.0019±0.0038)	0.0058±0.0066	<0.0058 (0.0039±0.0054)	<0.2845 (0.1553±0.1696)	1.1600±0.1600	0.0680±0.0260	1.2600±0.1700
SR73-SO-R-05-A		pCi/g	0.0065±0.0073	0.0074±0.0073	<0.0180 (0.0110±0.0100)	0.0170±0.0110	<0.2941 (0.1289±0.1749)	1.2400±0.1700	0.0840±0.0300	1.2700±0.1700
SR73-SO-R-06-A		pCi/g	<0.0203 (0.0042±0.0083)	0.0099±0.0087	<0.0059 (0.0000±0.0039)	0.0059±0.0067	<0.2862 (0.2190±0.1714)	1.3600±0.1900	0.0650±0.0290	1.4100±0.1900
SR73-SO-R-07-A		pCi/g	<0.0280 (0.0020±0.0100)	<0.0070 (0.0000±0.0046)	<0.0223 (0.0000±0.0065)	0.0070±0.0080	<0.2902 (0.2411±0.1741)	1.1900±0.1700	0.0930±0.0340	1.2500±0.1800
SR73-SO-R-08-A		pCi/g	<0.0209 (0.0044±0.0085)	<0.0061 (0.0020±0.0040)	<0.0061 (0.0000±0.0040)	<0.0251 (0.0020±0.0089)	<0.3013 (-0.0194±0.1774)	1.2800±0.1700	0.0540±0.0240	1.2600±0.1700
SR73-SO-R-09-A		pCi/g	0.0087±0.0086	<0.0195 (0.0000±0.0057)	<0.0195 (0.0020±0.0069)	0.0061±0.0069	0.2956±0.1760	1.3600±0.1800	0.0680±0.0280	1.2600±0.1700
SR73-SO-R-10-A		pCi/g	<0.0067 (0.0045±0.0062)	<0.0190 (0.0100±0.0100)	<0.0190 (0.0020±0.0067)	0.0060±0.0068	<0.2856 (0.1384±0.1700)	1.3100±0.1800	0.0660±0.0270	1.2400±0.1700
SR73-SO-R-11-A		pCi/g	<0.0290 (0.0020±0.0100)	<0.0191 (0.0040±0.0078)	<0.0060 (0.0000±0.0039)	0.0060±0.0068	<0.2955 (0.0591±0.1748)	1.2000±0.1700	0.0880±0.0320	1.3900±0.1900
SR74-SO-R-01-A		pCi/g	0.0070±0.0080	<0.0222 (-0.0036±0.0050)	<0.0054 (0.0036±0.0050)	<0.0172 (0.0054±0.0079)	<0.2975 (0.1578±0.1773)	1.2300±0.1900	0.0410±0.0210	1.2200±0.1900
SR74-SO-R-02-A		pCi/g	<0.0272 (0.0000±0.0087)	<0.0055 (0.0000±0.0036)	<0.0174 (-0.0018±0.0036)	0.0109±0.0089	<0.2827 (0.0626±0.1674)	1.0600±0.1600	0.0630±0.0250	1.1700±0.1800
SR74-SO-R-03-A		pCi/g	<0.0232 (0.0019±0.0083)	<0.0201 (-0.0021±0.0041)	<0.0063 (0.0000±0.0041)	0.0105±0.0093	<0.2868 (0.0241±0.1693)	1.1300±0.1700	0.0760±0.0290	1.1600±0.1800
SR74-SO-R-04-A		pCi/g	0.0110±0.0100	<0.0189 (0.0000±0.0055)	<0.0059 (0.0000±0.0039)	0.0240±0.0140	<0.2770 (0.1364±0.1650)	1.2400±0.1900	0.0860±0.0310	1.3200±0.2000
SR74-SO-R-05-A		pCi/g	<0.0059 (0.0040±0.0055)	<0.0181 (-0.0019±0.0037)	<0.0057 (0.0038±0.0053)	0.0113±0.0092	<0.2882 (0.1452±0.1716)	1.0100±0.1600	0.0420±0.0200	1.2100±0.1800
SR74-SO-R-06-A		pCi/g	<0.0340 (0.0070±0.0140)	<0.0070 (0.0047±0.0065)	<0.0287 (-0.0023±0.0079)	<0.0220 (0.0120±0.0120)	<0.2830 (0.0994±0.1680)	1.2200±0.1900	0.0460±0.0220	1.0700±0.1700
SR74-SO-R-07-A		pCi/g	<0.0064 (0.0000±0.0042)	<0.0236 (0.0025±0.0084)	<0.0235 (-0.0025±0.0048)	<0.0074 (0.0049±0.0069)	<0.2969 (0.2040±0.1775)	1.2100±0.1800	0.0450±0.0220	1.1500±0.1800
SR74-SO-R-08-A		pCi/g	0.0127±0.0095	<0.0155 (0.0000±0.0045)	<0.0199 (-0.0016±0.0055)	0.0081±0.0072	<0.2892 (0.1810±0.1727)	1.1900±0.1800	0.0620±0.0250	1.2900±0.1900
SR74-SO-R-09-A		pCi/g	<0.0176 (0.0018±0.0062)	<0.0056 (0.0037±0.0052)	<0.0056 (0.0019±0.0037)	0.0150±0.0110	<0.2954 (0.0011±0.1741)	1.2100±0.1800	0.0710±0.0270	1.2100±0.1800
SR74-SO-R-10-A		pCi/g	<0.0055 (0.0037±0.0051)	<0.0264 (-0.0021±0.0073)	0.0086±0.0085	0.0210±0.0140	<0.2819 (0.0065±0.1662)	1.2600±0.1900	0.0380±0.0180	1.1300±0.1700
SR74-SO-R-11-A		pCi/g	<0.0216 (0.0045±0.0088)	<0.0065 (0.0043±0.0060)	<0.0065 (0.0000±0.0042)	<0.0310 (-0.0022±0.0095)	<0.2859 (0.0927±0.1696)	1.0500±0.1600	0.0550±0.0240	1.2300±0.1900
SR75-SO-R-01-A		pCi/g	0.0090±0.0089	<0.0200 (0.0000±0.0058)	<0.0062 (0.0000±0.0041)	0.0190±0.0120	<0.2726 (0.1569±0.1626)	1.0000±0.1400	0.0520±0.0240	1.1300±0.1600
SR75-SO-R-02-A		pCi/g	<0.0194 (0.0041±0.0080)	<0.0060 (0.0000±0.0039)	<0.0060 (0.0020±0.0039)	<0.0060 (0.0000±0.0039)	<0.2941 (0.0970±0.1745)	1.0300±0.1400	0.0620±0.0250	0.9800±0.1400
SR75-SO-R-03-A		pCi/g	<0.0272 (0.0000±0.0087)	<0.0059 (0.0020±0.0039)	<0.0059 (0.0000±0.0039)	<0.0280 (0.0060±0.0120)	<0.2955 (0.2505±0.1773)	1.0800±0.1500	0.0530±0.0230	1.0500±0.1500
SR75-SO-R-04-A		pCi/g	<0.0067 (0.0044±0.0062)	<0.0239 (-0.0039±0.0054)	<0.0058 (0.0000±0.0038)	0.0160±0.0110	<0.2764 (0.1696±0.1650)	1.1300±0.1600	0.0470±0.0230	1.1300±0.1600
SR75-SO-R-05-A		pCi/g	0.0087±0.0085	<0.0063 (0.0042±0.0058)	<0.0062 (0.0021±0.0041)	0.0120±0.0100	<0.2795 (0.1544±0.1666)	1.1000±0.1600	0.0710±0.0290	1.1300±0.1600
SR75-SO-R-06-A		pCi/g	<0.0066 (0.0000±0.0043)	<0.0062 (0.0021±0.0041)	<0.0062 (0.0021±0.0041)	0.0140±0.0110	<0.3046 (-0.0518±0.1789)	1.2200±0.1700	0.0650±0.0270	1.2800±0.1800
SR75-SO-R-07-A		pCi/g	0.0064±0.0073	<0.0210 (0.0000±0.0061)	<0.0315 (-0.0066±0.0075)	0.0087±0.0086	<0.2892 (0.0854±0.1715)	0.8000±0.1200	0.0540±0.0240	0.8900±0.1300
SR75-SO-R-08-A		pCi/g	<0.0069 (0.0023±0.0045)	<0.0062 (0.0042±0.0058)	<0.0198 (0.0000±0.0057)	0.0083±0.0082	<0.2685 (0.0845±0.1593)	0.9200±0.1300	0.0520±0.0250	0.9400±0.1400
SR75-SO-R-09-A		pCi/g	<0.0320 (0.0020±0.0120)	<0.0059 (0.0020±0.0039)	<0.0189 (-0.0020±0.0039)	0.0059±0.0067	<0.3000 (0.1576±0.1788)	1.0200±0.1500	0.0550±0.0240	0.9600±0.1400
SR75-SO-R-10-A		pCi/g	<0.0194 (0.0081±0.0097)	<0.0183 (0.0000±0.0053)	<0.0182 (0.0000±0.0053)	<0.0234 (-0.0019±0.0065)	<0.2900 (0.2636±0.1742)	0.9800±0.1400	0.0650±0.0260	1.0400±0.1500
SR75-SO-R-11-A		pCi/g	<0.0236 (0.0025±0.0084)	<0.0247 (-0.0020±0.0068)	0.0060±0.0068	0.0120±0.0097	<0.2958 (0.0295±0.1747)	1.0000±0.1400	0.0410±0.0210	1.0400±0.1500
SR76-SO-R-01-A		pCi/g	<0.0200 (0.0080±0.0100)	<0.0181 (-0.0019±0.0037)	<0.0181 (0.0000±0.0052)	0.0132±0.0100	<0.2965 (0.1483±0.1766)	1.1800±0.1800	0.0590±0.0260	1.2800±0.2000
SR76-SO-R-02-A		pCi/g	0.0065±0.0074	<0.0054 (0.0000±0.0035)	<0.0054 (0.0036±0.0050)	<0.0171 (0.0089±0.0094)	<0.2934 (0.0291±0.1732)	1.2900±0.2100	0.0670±0.0320	1.2600±0.2000

Notes:

1) "nr" no result reported by laboratory"

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide / Units ↓	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
			Result	Result	Result	Result	Result	Result	Result	Result
SR76-SO-R-03-A		pCi/g	0.0130±0.0100	0.0065±0.0075	<0.0065 (0.0022±0.0043)	0.0109±0.0097	<0.2850 (0.1436±0.1697)	1.2100±0.1800	0.0580±0.0250	1.2700±0.1900
SR76-SO-R-04-A		pCi/g	<0.0202 (0.0042±0.0083)	<0.0062 (0.0041±0.0058)	<0.0198 (0.0021±0.0070)	<0.0197 (0.0082±0.0100)	<0.2889 (0.0595±0.1710)	1.2000±0.1800	0.0430±0.0210	1.2500±0.1900
SR76-SO-R-05-A		pCi/g	<0.0300 (0.0070±0.0120)	<0.0286 (-0.0040±0.0078)	<0.0190 (0.0000±0.0055)	0.0200±0.0130	<0.2974 (-0.0511±0.1746)	1.0800±0.1700	0.0800±0.0300	1.1800±0.1800
SR76-SO-R-06-A		pCi/g	<0.0060 (0.0040±0.0056)	<0.0053 (0.0036±0.0050)	<0.0053 (0.0036±0.0050)	0.0124±0.0094	<0.2860 (0.0415±0.1691)	0.9400±0.1500	0.0360±0.0220	0.9300±0.1500
SR76-SO-R-07-A		pCi/g	0.0079±0.0078	<0.0210 (0.0000±0.0061)	<0.0066 (0.0044±0.0061)	0.0087±0.0087	<0.2756 (0.0989±0.1636)	1.3000±0.1900	0.0630±0.0260	1.1900±0.1800
SR76-SO-R-08-A		pCi/g	<0.0064 (0.0021±0.0042)	<0.0049 (0.0000±0.0032)	0.0049±0.0056	<0.0049 (0.0032±0.0045)	<0.2882 (0.2058±0.1724)	1.1900±0.1800	0.0530±0.0230	1.2300±0.1800
SR76-SO-R-09-A		pCi/g	<0.0066 (0.0000±0.0043)	<0.0201 (0.0000±0.0058)	<0.0063 (0.0021±0.0041)	0.0130±0.0100	<0.2961 (0.1729±0.1766)	1.1300±0.1800	0.0590±0.0250	1.2700±0.1900
SR76-SO-R-10-A		pCi/g	<0.0062 (0.0021±0.0041)	<0.0190 (0.0000±0.0055)	<0.0284 (-0.0039±0.0078)	0.0200±0.0130	<0.2863 (-0.0186±0.1685)	1.0900±0.1700	0.0400±0.0200	1.2400±0.1900
SR76-SO-R-11-A		pCi/g	<0.0310 (0.0020±0.0110)	<0.0056 (0.0000±0.0037)	<0.0056 (0.0000±0.0036)	0.0093±0.0083	<0.2988 (0.0958±0.1773)	1.2600±0.1900	0.0450±0.0220	1.3700±0.2100
SR77-SO-R-01-A		pCi/g	<0.0195 (0.0041±0.0080)	<0.0058 (0.0038±0.0053)	<0.0183 (0.0038±0.0075)	0.0115±0.0093	<0.2921 (0.2612±0.1754)	2.0600±0.2600	0.1120±0.0350	2.0000±0.2500
SR77-SO-R-02-A		pCi/g	<0.0066 (0.0022±0.0043)	<0.0257 (0.0021±0.0092)	<0.0200 (-0.0021±0.0041)	0.0104±0.0092	<0.2891 (0.1546±0.1723)	1.9800±0.2600	0.1240±0.0400	2.1300±0.2800
SR77-SO-R-03-A		pCi/g	<0.0191 (0.0000±0.0055)	<0.0066 (0.0044±0.0061)	<0.0066 (0.0022±0.0043)	0.0109±0.0096	0.5192±0.1847	2.1300±0.2700	0.1090±0.0360	2.1300±0.2700
SR77-SO-R-04-A		pCi/g	0.0130±0.0100	<0.0064 (0.0043±0.0059)	0.0106±0.0094	0.0106±0.0094	<0.2929 (0.0313±0.1730)	1.6100±0.2100	0.0790±0.0300	1.7700±0.2300
SR77-SO-R-05-A		pCi/g	0.0067±0.0077	<0.0352 (-0.0099±0.0088)	0.0099±0.0087	<0.0190 (0.0100±0.0100)	0.8035±0.1899	1.6100±0.2100	0.1100±0.0360	1.5900±0.2100
SR77-SO-R-06-A		pCi/g	<0.0197 (0.0000±0.0057)	<0.0252 (0.0000±0.0080)	<0.0196 (0.0041±0.0080)	<0.0200 (0.0120±0.0110)	<0.2910 (0.0345±0.1719)	1.5500±0.2100	0.0630±0.0280	1.4200±0.1900
SR77-SO-R-07-A		pCi/g	<0.0200 (0.0021±0.0071)	<0.0192 (0.0040±0.0079)	0.0100±0.0088	0.0080±0.0079	<0.2820 (0.1131±0.1676)	1.2600±0.1700	0.0730±0.0280	1.2100±0.1700
SR77-SO-R-08-A		pCi/g	<0.0284 (-0.0023±0.0079)	<0.0063 (0.0021±0.0041)	0.0063±0.0071	0.0084±0.0083	<0.2908 (0.0200±0.1716)	1.2900±0.1700	0.0520±0.0240	1.3900±0.1900
SR77-SO-R-09-A		pCi/g	<0.0350 (0.0080±0.0150)	0.0083±0.0082	<0.0062 (0.0021±0.0041)	<0.0062 (0.0000±0.0040)	<0.2892 (-0.0563±0.1697)	1.4700±0.2000	0.0720±0.0290	1.3800±0.1900
SR77-SO-R-10-A		pCi/g	<0.0330 (-0.0020±0.0100)	<0.0201 (0.0021±0.0071)	<0.0063 (0.0000±0.0041)	0.0105±0.0093	<0.3079 (0.2474±0.1845)	1.7900±0.2300	0.0850±0.0320	1.9200±0.2500
SR77-SO-R-11-A		pCi/g	<0.0196 (0.0020±0.0069)	0.0062±0.0070	<0.0252 (-0.0021±0.0070)	0.0230±0.0140	0.3064±0.1745	1.8800±0.2400	0.0630±0.0270	1.7700±0.2300
SR80-SO-R-01-A		pCi/g	<0.0290 (0.0100±0.0130)	<0.0188 (0.0020±0.0067)	<0.0059 (0.0039±0.0055)	<0.0059 (0.0020±0.0039)	<0.2973 (0.2013±0.1777)	1.0200±0.1600	0.0400±0.0220	1.0400±0.1600
SR80-SO-R-02-A		pCi/g	0.0062±0.0071	<0.0210 (0.0022±0.0075)	<0.0500 (-0.0070±0.0170)	<0.0269 (0.0000±0.0086)	<0.3031 (0.2286±0.1814)	1.0600±0.1600	0.0320±0.0200	1.0800±0.1700
SR80-SO-R-03-A		pCi/g	0.0106±0.0093	<0.0064 (0.0000±0.0042)	<0.0203 (0.0000±0.0059)	0.0064±0.0073	0.3246±0.1792	1.1700±0.1800	0.0850±0.0320	1.3000±0.2000
SR80-SO-R-04-A		pCi/g	<0.0208 (0.0022±0.0074)	<0.0218 (0.0000±0.0063)	<0.0068 (0.0000±0.0045)	<0.0217 (0.0000±0.0063)	<0.2948 (0.2815±0.1772)	1.1000±0.1700	0.0460±0.0220	1.1500±0.1800
SR80-SO-R-05-A		pCi/g	<0.0190 (0.0059±0.0087)	<0.0240 (-0.0039±0.0055)	<0.0187 (0.0000±0.0054)	<0.0058 (0.0000±0.0038)	<0.2989 (-0.0262±0.1758)	0.8300±0.1300	0.0360±0.0190	0.9100±0.1400
SR80-SO-R-06-A		pCi/g	<0.0214 (0.0045±0.0088)	<0.0233 (-0.0019±0.0064)	<0.0181 (0.0019±0.0064)	0.0057±0.0065	<0.2951 (0.0371±0.1744)	0.9100±0.1400	0.0570±0.0240	0.8800±0.1400
SR80-SO-R-07-A		pCi/g	<0.0190 (0.0100±0.0100)	<0.0232 (-0.0019±0.0064)	<0.0180 (0.0038±0.0074)	0.0094±0.0084	<0.2955 (0.0686±0.1750)	1.2000±0.1900	0.0570±0.0260	1.2300±0.1900
SR80-SO-R-08-A		pCi/g	<0.0370 (-0.0070±0.0100)	<0.0235 (-0.0038±0.0053)	<0.0057 (0.0038±0.0053)	0.0057±0.0065	<0.2968 (0.0779±0.1759)	1.1900±0.1800	0.0710±0.0280	1.1700±0.1800
SR80-SO-R-09-A		pCi/g	<0.0069 (0.0046±0.0064)	<0.0068 (0.0000±0.0045)	<0.0217 (0.0023±0.0077)	<0.0068 (0.0045±0.0063)	<0.2959 (0.0090±0.1745)	1.1400±0.1800	0.0370±0.0200	1.2800±0.1900
SR80-SO-R-10-A		pCi/g	<0.0215 (0.0067±0.0098)	<0.0067 (0.0000±0.0044)	<0.0067 (0.0045±0.0062)	0.0089±0.0088	<0.2913 (0.1984±0.1742)	1.2500±0.1900	0.0580±0.0250	1.2500±0.1900
SR80-SO-R-11-A		pCi/g	<0.0063 (0.0042±0.0058)	<0.0059 (0.0039±0.0055)	<0.0059 (0.0000±0.0039)	0.0098±0.0088	<0.2881 (0.1590±0.1718)	0.6100±0.1000	<0.0240 (0.0150±0.0140)	0.6200±0.1100
SR81-SO-R-01-A		pCi/g	<0.0260 (0.0080±0.0120)	0.0063±0.0071	<0.0257 (-0.0042±0.0058)	0.0270±0.0150	<0.3098 (0.2135±0.1853)	1.0200±0.1500	0.0480±0.0240	1.1000±0.1600
SR81-SO-R-02-A		pCi/g	<0.0062 (0.0021±0.0041)	<0.0195 (-0.0020±0.0040)	<0.0250 (0.0000±0.0080)	0.0081±0.0080	<0.3090 (0.0900±0.1832)	1.0700±0.1500	0.0450±0.0220	1.1300±0.1600
SR81-SO-R-03-A		pCi/g	0.0104±0.0092	<0.0062 (0.0041±0.0057)	<0.0062 (0.0021±0.0040)	0.0210±0.0130	<0.3086 (0.1076±0.1832)	1.2500±0.1700	0.0530±0.0240	1.4300±0.1900
SR81-SO-R-04-A		pCi/g	<0.0220 (0.0110±0.0120)	<0.0061 (0.0041±0.0056)	<0.0194 (0.0000±0.0056)	0.0101±0.0089	<0.3107 (0.0635±0.1839)	1.1800±0.1700	0.0710±0.0290	1.1600±0.1600
SR81-SO-R-05-A		pCi/g	<0.0061 (0.0040±0.0056)	0.0100±0.0088	0.0060±0.0068	<0.0060 (0.0040±0.0056)	<0.3101 (0.2360±0.1857)	1.0300±0.1500	0.0650±0.0280	1.1800±0.1700
SR81-SO-R-06-A		pCi/g	<0.0198 (0.0021±0.0070)	0.0087±0.0086	<0.0208 (0.0065±0.0095)	0.0065±0.0074	<0.3101 (0.0458±0.1833)	0.6700±0.1100	0.0350±0.0190	0.6090±0.0980
SR81-SO-R-07-A		pCi/g	0.0066±0.0075	<0.0068 (0.0023±0.0045)	<0.0068 (0.0045±0.0063)	<0.0280 (0.0070±0.0120)	<0.3080 (0.1469±0.1833)	1.1800±0.1700	0.0540±0.0250	1.1400±0.1600
SR81-SO-R-08-A		pCi/g	<0.0210 (0.0150±0.0130)	<0.0200 (-0.0021±0.0041)	<0.0200 (0.0000±0.0058)	0.0310±0.0160	<0.3065 (0.1266±0.1822)	0.9100±0.1400	0.0510±0.0260	0.8900±0.1400
SR81-SO-R-09-A		pCi/g	<0.0265 (0.0000±0.0084)	<0.0064 (0.0021±0.0042)	<0.0205 (-0.0021±0.0042)	0.0210±0.0130	<0.3065 (0.0395±0.1811)	1.0400±0.1800	0.0260±0.0230	1.1100±0.1900
SR81-SO-R-10-A		pCi/g	0.0060±0.0068	<0.0191 (0.0020±0.0068)	<0.0060 (0.0000±0.0039)	0.0119±0.0096	<0.3119 (0.1854±0.1861)	1.2900±0.1800	0.0750±0.0310	1.3600±0.1900
SR81-SO-R-11-A		pCi/g	0.0060±0.0068	0.0083±0.0082	<0.0062 (0.0021±0.0041)	0.0140±0.0110	<0.3079 (0.2451±0.1845)	1.2900±0.1800	0.0730±0.0290	1.2300±0.1700
SW	BK15-SM-J-01-A	pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	0.0001±0.0001	<0.0117 (-0.0061±0.0068)	0.0005±0.0002	0.0001±0.0001	0.0008±0.0003
BK15-SM-J-02-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0117 (0.0017±0.0069)	0.0040±0.0007	<0.0003 (0.0001±0.0001)	0.0043±0.0007
BK52-SM-J-01-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0117 (-0.0036±0.0068)	0.0013±0.0003	<0.0001 (0.0001±0.0001)	0.0010±0.0003
BK53-SM-J-01-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)	<0.0117 (-0.0055±0.0068)	0.0009±0.0003	<0.0001 (0.0001±0.0001)	0.0011±0.0003
BK54-SM-J-01-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	0.0001±0.0001	<0.0117 (-0.0055±0.0068)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0001±0.0001)	0.0002±0.0001
BK54-SM-J-02-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)	<0.0117 (-0.0079±0.0068)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)
BK54-SM-J-03-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	0.0001±0.0001	<0.0117 (-0.0041±0.0068)	0.0005±0.0002	<0.0001 (0.0001±0.0001)	0.0007±0.0003
BK60-SM-J-01-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0117 (-0.0057±0.0068)	0.0005±0.0002	<0.0001 (0.0000±0.0001)	0.0005±0.0002
BK60-SM-J-02-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	0.0001±0.0001	<0.0117 (-0.0081±0.0068)	<0.0002 (0.0002±0.0001)	<0.0001 (0.0000±0.0001)	0.0001±0.0001
BK60-SM-J-03-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0117 (-0.0026±0.0069)	0.0004±0.0002	<0.0001 (0.0000±0.0001)	0.0002±0.0002
BK61-SM-J-01-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0117 (-0.0052±0.0068)	0.0001±0.0001	<0.0003 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)
BK61-SM-J-02-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0117 (-0.0061±0.0068)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
BK61-SM-J-03-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0117 (0.0002±0.0069)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
BK61-SM-J-04-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0117 (-0.0075±0.0068)	<0.0002 (0.0001±0.0001)	<0.0003 (0.0000±0.0001)	<0.0002 (0.0002±0.0001)
BK68-SM-J-01-A		pCi/cm2	<0.0003 (0.0000±0.0001)	0.0001±0.0001	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0117 (-0.0016±0.0069)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
BK69-SM-J-01-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)	0.0001±0.0001	<0.0002 (0.0000±0.0001)	<0.0117 (-0.0017±0.0069)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	0.0003±0.0002
BK70-SM-J-01-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0117 (-0.0067±0.0068)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
BK70-SM-J-02-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0117 (0.0007±0.0069)	0.0281±0.0030	0.0009±0.0003	0.0001±0.0001
BK73-SM-J-01-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	0.0001±0.0001	<0.0060 (-0.0006±0.0036)	<0.0002 (0.0002±0.0002)	<0.0001 (0.0000±0.0001)	0.0002±0.0001
BK73-SM-J-02-A		pCi/cm2	0.0001±0.0001	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0060 (-0.0008±0.0036)	0.0002±0.0001	<0.0001 (0.0001±0.0001)	0.0002±0.0001
BK73-SM-J-03-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0060 (-0.0047±0.0035)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)
BK73-SM-J-04-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0004 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	<0.0060 (0.0005±0.0036)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	0.0002±0.0001
BK73-SM-J-05-A		pCi/cm2	<0.0002 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0060 (-0.0010±0.0036)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)
BK73-SM-J-06-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0060 (-0.0017±0.0035)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0001±0.0001)	<0.0002 (0.0000±0.0001)
BK73-SM-J-07-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	0.0001±0.0001	<0.0060 (-0.0012±0.0035)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	0.0003±0.0002
BK73-SM-J-08-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0060 (0.0015±0.0036)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001

Notes:

1) "nr" no result reported by laboratory"

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide / Units ↓	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
			Result	Result	Result	Result	Result	Result	Result	Result
BK73-SM-J-09-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0060 (-0.0006±0.0036)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	<0.0002 (0.0002±0.0001)
BK73-SM-J-10-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0003 (-0.0001±0.0001)	0.0001±0.0001	<0.0060 (-0.0013±0.0035)	<0.0002 (0.0002±0.0001)	<0.0001 (0.0000±0.0001)	0.0002±0.0001
BK73-SM-J-11-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	0.0001±0.0001	<0.0060 (-0.0036±0.0035)	0.0002±0.0001	<0.0001 (0.0001±0.0001)	0.0002±0.0001
BK73-SM-J-12-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	<0.0003 (0.0000±0.0001)	0.0001±0.0001	<0.0060 (-0.0024±0.0035)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	<0.0003 (0.0001±0.0001)
BK73-SM-J-13-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0060 (0.0006±0.0036)	0.0002±0.0001	<0.0003 (0.0000±0.0001)	<0.0003 (0.0002±0.0002)
BK73-SM-J-14-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0060 (0.0021±0.0036)	0.0004±0.0002	<0.0003 (0.0000±0.0001)	0.0002±0.0002
SJ18-SM-J-01-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0060 (-0.0032±0.0035)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ18-SM-J-02-A		pCi/cm2	0.0001±0.0001	<0.0002 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)	0.0001±0.0001	<0.0060 (-0.0044±0.0035)	<0.0003 (0.0002±0.0002)	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ18-SM-J-03-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0060 (-0.0020±0.0035)	0.0004±0.0002	<0.0001 (0.0000±0.0001)	0.0004±0.0002
SJ18-SM-J-04-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0060 (0.0000±0.0035)	0.0004±0.0002	<0.0001 (0.0000±0.0001)	0.0004±0.0002
SJ18-SM-J-05-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0060 (-0.0002±0.0035)	0.0004±0.0002	<0.0001 (0.0000±0.0001)	0.0003±0.0002
SJ18-SM-J-06-A		pCi/cm2	<0.0004 (0.0001±0.0002)	<0.0001 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)	<0.0001 (0.0001±0.0001)	<0.0060 (-0.0038±0.0035)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	0.0002±0.0002
SJ18-SM-J-07-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	0.0001±0.0001	<0.0060 (-0.0025±0.0035)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)
SJ18-SM-J-08-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0060 (-0.0025±0.0035)	0.0001±0.0001	<0.0003 (0.0000±0.0001)	0.0001±0.0001
SJ18-SM-J-09-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0060 (-0.0030±0.0035)	0.0003±0.0002	<0.0003 (0.0001±0.0001)	0.0002±0.0001
SJ18-SM-J-10-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0060 (-0.0011±0.0035)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0003±0.0002
SJ18-SM-J-11-A		pCi/cm2	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0003 (0.0000±0.0001)	0.0001±0.0001	<0.0060 (0.0001±0.0035)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	<0.0002 (0.0002±0.0001)
SJ18-SM-J-12-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0060 (0.0003±0.0035)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ18-SM-J-13-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0003 (0.0000±0.0001)	<0.0060 (-0.0034±0.0035)	0.0004±0.0002	<0.0003 (0.0000±0.0001)	0.0002±0.0001
SJ18-SM-J-14-A		pCi/cm2	<0.0004 (-0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	<0.0060 (-0.0021±0.0035)	<0.0002 (0.0002±0.0002)	<0.0003 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)
SJ18-SM-J-15-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0060 (-0.0041±0.0035)	<0.0002 (0.0002±0.0002)	<0.0003 (0.0000±0.0001)	<0.0002 (0.0002±0.0001)
SJ18-SM-J-16-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0060 (-0.0049±0.0035)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ18-SM-J-17-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0060 (-0.0036±0.0035)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0002
SJ32-SM-J-01-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0059 (0.0000±0.0034)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ32-SM-J-02-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)	<0.0003 (-0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0059 (-0.0006±0.0034)	0.0002±0.0002	<0.0001 (0.0001±0.0001)	0.0002±0.0001
SJ32-SM-J-03-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0059 (-0.0006±0.0034)	0.0002±0.0001	<0.0001 (0.0001±0.0001)	0.0001±0.0001
SJ32-SM-J-04-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0059 (0.0013±0.0035)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ32-SM-J-05-A		pCi/cm2	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0059 (0.0028±0.0035)	0.0001±0.0001	<0.0001 (0.0001±0.0001)	0.0001±0.0001
SJ32-SM-J-06-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	0.0001±0.0001	<0.0059 (0.0005±0.0035)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ32-SM-J-07-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0059 (0.0009±0.0035)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ33-SM-J-01-A		pCi/cm2	<0.0001 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0000±0.0034)	0.0004±0.0002	<0.0003 (0.0000±0.0001)	0.0002±0.0002
SJ33-SM-J-02-A		pCi/cm2	<0.0003 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0003 (0.0001±0.0001)	<0.0059 (0.0013±0.0035)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0001±0.0001)	<0.0003 (0.0002±0.0002)
SJ33-SM-J-03-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0059 (-0.0013±0.0034)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ33-SM-J-04-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0059 (0.0011±0.0035)	<0.0003 (0.0002±0.0001)	<0.0002 (0.0000±0.0001)	0.0002±0.0001
SJ33-SM-J-05-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0059 (0.0027±0.0035)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ34-SM-J-01-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	0.0126±0.0036	0.0005±0.0002	<0.0001 (0.0000±0.0001)	0.0003±0.0002
SJ34-SM-J-02-A		pCi/cm2	<0.0001 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	0.0001±0.0001	<0.0059 (0.0017±0.0035)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ34-SM-J-03-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	0.0001±0.0001	<0.0059 (-0.0003±0.0034)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ34-SM-J-04-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0059 (-0.0031±0.0034)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	<0.0002 (0.0002±0.0001)
SJ34-SM-J-05-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001	0.0001±0.0001	<0.0059 (0.0001±0.0034)	<0.0003 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)	0.0001±0.0001
SJ34-SM-J-06-A		pCi/cm2	<0.0002 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0000±0.0034)	0.0002±0.0001	<0.0002 (0.0000±0.0001)	0.0001±0.0001
SJ34-SM-J-07-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	0.0001±0.0001	<0.0062 (-0.0049±0.0036)	0.0243±0.0030	0.0008±0.0003	0.0237±0.0030
SJ34-SM-J-08-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	0.0001±0.0001	<0.0062 (0.0016±0.0037)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ34-SM-J-09-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0003 (0.0001±0.0001)	0.0001±0.0001	<0.0062 (-0.0050±0.0036)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ34-SM-J-10-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0062 (-0.0017±0.0036)	0.0001±0.0001	<0.0003 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)
SJ34-SM-J-11-A		pCi/cm2	<0.0001 (0.0000±0.0001)	0.0001±0.0001	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0062 (-0.0010±0.0036)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ35-SM-J-01-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	<0.0062 (-0.0004±0.0036)	0.0001±0.0001	<0.0003 (0.0000±0.0001)	<0.0001 (0.0001±0.0001)
SJ35-SM-J-02-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0003 (0.0000±0.0001)	0.0001±0.0001	<0.0062 (0.0037±0.0037)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0002±0.0001)
SJ35-SM-J-03-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0062 (0.0000±0.0036)	0.0002±0.0001	<0.0003 (0.0000±0.0001)	0.0003±0.0002
SJ35-SM-J-04-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)	<0.0062 (0.0009±0.0037)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ35-SM-J-05-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0062 (0.0007±0.0037)	<0.0001 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ35-SM-J-06-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0062 (-0.0001±0.0036)	0.0002±0.0001	<0.0001 (0.0001±0.0001)	<0.0002 (0.0001±0.0001)
SJ35-SM-J-07-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	<0.0003 (0.0000±0.0001)	0.0001±0.0001	<0.0062 (0.0012±0.0037)	<0.0003 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	<0.0003 (0.0001±0.0001)
SJ35-SM-J-08-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	0.0001±0.0001	<0.0062 (-0.0018±0.0036)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ35-SM-J-09-A		pCi/cm2	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0062 (-0.0008±0.0036)	<0.0002 (0.0002±0.0001)	<0.0001 (0.0001±0.0001)	0.0002±0.0001
SJ35-SM-J-10-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0062 (-0.0031±0.0036)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ35-SM-J-11-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0062 (-0.0015±0.0036)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ35-SM-J-12-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0062 (0.0016±0.0037)	0.0001±0.0001	<0.0001 (0.0001±0.0001)	0.0001±0.0001
SJ35-SM-J-13-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0049±0.0035)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ35-SM-J-14-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0003 (0.0000±0.0001)	0.0001±0.0001	0.0001±0.0001	<0.0059 (0.0023±0.0035)	<0.0002 (0.0002±0.0001)	<0.0003 (0.0000±0.0001)	0.0003±0.0002
SJ35-SM-J-15-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	<0.0059 (0.0033±0.0035)	0.0003±0.0002	0.0001±0.0001	0.0002±0.0001
SJ35-SM-J-16-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0055±0.0035)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ36-SM-J-01-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0059 (0.0018±0.0035)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ36-SM-J-02-A		pCi/cm2	0.0001±0.0001	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0059 (0.0001±0.0035)	0.0001±0.0001	<0.0003 (0.0000±0.0001)	0.0002±0.0001
SJ36-SM-J-03-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0059 (0.0023±0.0035)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ36-SM-J-04-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	0.0001±0.0001	<0.0059 (0.0006±0.0035)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ36-SM-J-05-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0059 (-0.0016±0.0034)	<0.0002 (0.0002±0.0001)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)
SJ36-SM-J-06-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0003 (-0.0001±0.0001)	<0.0001 (0.0000±0.0001)	0.0001±0.0001	<0.0059 (-0.0008±0.0035)	0.0001±0.0001	<0.0003 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)

Notes:

1) "nr" no result reported by laboratory"

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide Units ↓	Americium-241 Result	Neptunium-237 Result	Plutonium-238 Result	Plutonium-239/240 Result	Technetium-99 Result	Uranium-233/234 Result	Uranium-235/236 Result	Uranium-238 Result
SJ36-SM-J-07-A		pCi/cm2	<0.0001 (0.0001±0.0001)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0009±0.0035)	0.0003±0.0002	<0.0001 (0.0001±0.0001)	0.0003±0.0002
SJ36-SM-J-08-A		pCi/cm2	<0.0003 (-0.0001±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0034±0.0035)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ36-SM-J-09-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0059 (0.0009±0.0035)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0002±0.0001)
SJ36-SM-J-10-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0002 (0.0001±0.0001)	<0.0003 (0.0001±0.0001)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0019±0.0035)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	<0.0002 (0.0002±0.0001)
SJ36-SM-J-11-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)	<0.0059 (-0.0002±0.0035)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	0.0002±0.0002
SJ36-SM-J-12-A		pCi/cm2	<0.0002 (0.0000±0.0000)	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0012±0.0035)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)
SJ36-SM-J-13-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0005±0.0035)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)
SJ37-SM-J-01-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	<0.0060 (0.0020±0.0036)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)
SJ37-SM-J-02-A		pCi/cm2	<0.0002 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0060 (0.0055±0.0036)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ37-SM-J-03-A		pCi/cm2	0.0001±0.0001	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0060 (0.0030±0.0036)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ37-SM-J-04-A		pCi/cm2	<0.0003 (0.0001±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	0.0001±0.0001	<0.0060 (0.0026±0.0036)	<0.0002 (0.0002±0.0001)	<0.0001 (0.0001±0.0001)	0.0002±0.0001
SJ37-SM-J-05-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0002 (0.0001±0.0001)	<0.0060 (0.0034±0.0036)	<0.0002 (0.0002±0.0002)	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ37-SM-J-06-A		pCi/cm2	<0.0001 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	0.0061±0.0036	0.0001±0.0001	0.0001±0.0001	0.0001±0.0001
SJ37-SM-J-07-A		pCi/cm2	<0.0003 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0060 (0.0048±0.0036)	0.0003±0.0002	<0.0003 (0.0000±0.0001)	0.0002±0.0001
SJ37-SM-J-08-A		pCi/cm2	0.0001±0.0001	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0060 (0.0056±0.0036)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	0.0003±0.0002
SJ37-SM-J-09-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	0.0082±0.0037	0.0002±0.0001	<0.0001 (0.0001±0.0001)	0.0001±0.0001
SJ37-SM-J-10-A		pCi/cm2	<0.0005 (-0.0001±0.0002)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	0.0001±0.0001	<0.0060 (0.0031±0.0036)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ37-SM-J-11-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0060 (0.0058±0.0036)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0001±0.0001)	0.0001±0.0001
SJ37-SM-J-12-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)	0.0001±0.0001	<0.0060 (0.0012±0.0036)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ38-SM-J-01-A		pCi/cm2	<0.0001 (0.0000±0.0001)	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0002 (0.0001±0.0001)	<0.0060 (0.0032±0.0036)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ38-SM-J-02-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)	<0.0003 (0.0000±0.0001)	<0.0060 (0.0043±0.0036)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ38-SM-J-03-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0060 (0.0031±0.0036)	0.0001±0.0001	<0.0003 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)
SJ38-SM-J-04-A		pCi/cm2	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	0.0082±0.0037	0.0003±0.0002	<0.0001 (0.0000±0.0001)	0.0003±0.0002
SJ38-SM-J-05-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	0.0001±0.0001	<0.0060 (0.0036±0.0036)	0.0001±0.0001	<0.0001 (0.0001±0.0001)	0.0001±0.0001
SJ38-SM-J-06-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)	0.0063±0.0036	0.0002±0.0002	<0.0001 (0.0000±0.0001)	0.0003±0.0002
SJ38-SM-J-07-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)	<0.0060 (0.0040±0.0036)	<0.0002 (0.0001±0.0001)	<0.0003 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)
SJ38-SM-J-08-A		pCi/cm2	<0.0003 (-0.0001±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0060 (0.0021±0.0036)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0003±0.0002
SJ38-SM-J-09-A		pCi/cm2	<0.0003 (0.0001±0.0001)	<0.0002 (0.0000±0.0000)	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0060 (0.0028±0.0036)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ38-SM-J-10-A		pCi/cm2	<0.0003 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0060 (0.0033±0.0036)	0.0003±0.0002	<0.0001 (0.0001±0.0001)	0.0002±0.0002
SJ38-SM-J-11-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0060 (0.0050±0.0036)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ39-SM-J-01-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0060 (0.0018±0.0036)	<0.0003 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ39-SM-J-02-A		pCi/cm2	0.0001±0.0001	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0060 (0.0020±0.0036)	0.0003±0.0002	<0.0002 (0.0000±0.0001)	0.0004±0.0002
SJ39-SM-J-03-A		pCi/cm2	<0.0002 (0.0001±0.0001)	<0.0002 (0.0000±0.0000)	0.0001±0.0001	0.0001±0.0001	<0.0060 (0.0012±0.0036)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ39-SM-J-04-A		pCi/cm2	0.0001±0.0001	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	0.0001±0.0001	<0.0060 (0.0021±0.0036)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ39-SM-J-05-A		pCi/cm2	<0.0001 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0060 (0.0024±0.0036)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ39-SM-J-06-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0060 (0.0006±0.0035)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0002±0.0001)
SJ39-SM-J-07-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0060 (0.0002±0.0035)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ39-SM-J-08-A		pCi/cm2	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0002 (0.0001±0.0001)	<0.0002 (0.0000±0.0001)	<0.0060 (0.0023±0.0036)	<0.0003 (0.0002±0.0002)	<0.0001 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)
SJ39-SM-J-09-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0060 (0.0017±0.0036)	0.0002±0.0001	<0.0003 (0.0000±0.0001)	<0.0002 (0.0002±0.0001)
SJ39-SM-J-10-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0060 (0.0039±0.0036)	<0.0002 (0.0001±0.0001)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0002±0.0001)
SJ39-SM-J-11-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	0.0001±0.0001	0.0001±0.0001	<0.0060 (0.0022±0.0036)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ39-SM-J-12-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0060 (0.0009±0.0036)	<0.0003 (0.0002±0.0002)	<0.0003 (0.0000±0.0001)	0.0002±0.0001
SJ39-SM-J-13-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0060 (0.0039±0.0036)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ40-SM-J-01-A		pCi/cm2	<0.0003 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	0.0001±0.0001	<0.0060 (0.0001±0.0036)	0.0001±0.0001	<0.0004 (-0.0001±0.0001)	0.0002±0.0001
SJ40-SM-J-02-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	0.0001±0.0001	<0.0060 (0.0013±0.0036)	0.0002±0.0001	<0.0003 (0.0000±0.0001)	0.0003±0.0002
SJ40-SM-J-03-A		pCi/cm2	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	0.0001±0.0001	<0.0060 (-0.0028±0.0035)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)
SJ40-SM-J-04-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0060 (-0.0023±0.0035)	0.0002±0.0001	<0.0001 (0.0000±0.0000)	0.0002±0.0001
SJ40-SM-J-05-A		pCi/cm2	<0.0001 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0001±0.0001)	<0.0060 (-0.0003±0.0036)	0.0004±0.0002	<0.0001 (0.0001±0.0001)	0.0003±0.0002
SJ40-SM-J-06-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	<0.0060 (0.0002±0.0036)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ40-SM-J-07-A		pCi/cm2	<0.0003 (0.0000±0.0001)	0.0001±0.0001	<0.0003 (0.0000±0.0001)	0.0001±0.0001	<0.0060 (-0.0010±0.0036)	0.0002±0.0001	<0.0003 (0.0000±0.0001)	<0.0002 (0.0002±0.0001)
SJ40-SM-J-08-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0060 (-0.0030±0.0035)	<0.0002 (0.0002±0.0001)	<0.0001 (0.0000±0.0001)	0.0004±0.0002
SJ41-SM-J-01-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0024±0.0035)	0.0002±0.0001	<0.0003 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)
SJ41-SM-J-02-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0059 (0.0010±0.0035)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ41-SM-J-03-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0059 (0.0016±0.0035)	<0.0003 (0.0002±0.0002)	<0.0003 (0.0000±0.0001)	<0.0002 (0.0002±0.0001)
SJ41-SM-J-04-A		pCi/cm2	<0.0003 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0018±0.0035)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ41-SM-J-05-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	0.0001±0.0001	<0.0059 (0.0000±0.0035)	0.0002±0.0001	<0.0002 (0.0000±0.0001)	0.0002±0.0001
SJ41-SM-J-06-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0059 (0.0019±0.0035)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ41-SM-J-07-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0012±0.0035)	0.0002±0.0002	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ42-SM-J-01-A		pCi/cm2	<0.0003 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0004±0.0035)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)
SJ42-SM-J-02-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0059 (-0.0006±0.0035)	0.0005±0.0002	<0.0003 (0.0001±0.0001)	0.0007±0.0003
SJ42-SM-J-03-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	0.0001±0.0001	<0.0002 (0.0000±0.0001)	<0.0059 (0.0032±0.0035)	<0.0003 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	0.0002±0.0001
SJ42-SM-J-04-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0001±0.0001)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0009±0.0035)	0.0006±0.0002	<0.0001 (0.0000±0.0000)	0.0004±0.0002
SJ42-SM-J-05-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0059 (0.0019±0.0035)	0.0001±0.0001	<0.0003 (0.0000±0.0001)	0.0002±0.0001
SJ42-SM-J-06-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0008±0.0035)	<0.0002 (0.0002±0.0001)	<0.0001 (0.0000±0.0001)	0.0003±0.0002
SJ42-SM-J-07-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0002 (0.0000±0.0001)	<0.0059 (0.0010±0.0035)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ42-SM-J-08-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	0.0001±0.0001	<0.0059 (0.0028±0.0035)	<0.0002 (0.0001±0.0001)	<0.0001 (0.0001±0.0001)	<0.0002 (0.0001±0.0001)
SJ42-SM-J-09-A		pCi/cm2	0.0001±0.0001	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0059 (0.0010±0.0035)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ42-SM-J-10-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0059 (0.0015±0.0035)	0.0004±0.0002	<0.0001 (0.0001±0.0001)	0.0002±0.0002

Notes:

1) "nr" no result reported by laboratory"

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide Units ↓	Americium-241 Result	Neptunium-237 Result	Plutonium-238 Result	Plutonium-239/240 Result	Technetium-99 Result	Uranium-233/234 Result	Uranium-235/236 Result	Uranium-238 Result
SJ42-SM-J-11-A		pCi/cm2	<0.0003 (0.0001±0.0001)	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0059 (0.0006±0.0035)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ42-SM-J-12-A		pCi/cm2	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0059 (0.0009±0.0035)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ42-SM-J-13-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0059 (0.0045±0.0036)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ42-SM-J-14-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0063 (0.0012±0.0037)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ42-SM-J-15-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0063 (0.0037±0.0038)	0.0002±0.0001	<0.0003 (0.0000±0.0001)	0.0002±0.0001
SJ42-SM-J-16-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	<0.0003 (0.0001±0.0001)	0.0001±0.0001	<0.0063 (0.0013±0.0037)	0.0004±0.0002	<0.0001 (0.0000±0.0001)	0.0004±0.0002
SJ43-SM-J-01-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0063 (0.0046±0.0038)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ43-SM-J-02-A		pCi/cm2	<0.0002 (0.0001±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0063 (0.0001±0.0037)	0.0002±0.0002	<0.0001 (0.0001±0.0001)	<0.0002 (0.0002±0.0001)
SJ43-SM-J-03-A		pCi/cm2	<0.0003 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0063 (0.0009±0.0037)	0.0003±0.0002	<0.0001 (0.0001±0.0001)	0.0003±0.0002
SJ43-SM-J-04-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0003 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0063 (-0.0028±0.0037)	<0.0003 (0.0001±0.0001)	<0.0001 (0.0001±0.0001)	<0.0002 (0.0001±0.0001)
SJ43-SM-J-05-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0063 (-0.0002±0.0037)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ43-SM-J-06-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0063 (0.0007±0.0037)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ43-SM-J-07-A		pCi/cm2	<0.0004 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	<0.0063 (0.0000±0.0037)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ43-SM-J-08-A		pCi/cm2	<0.0001 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0063 (-0.0017±0.0037)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ43-SM-J-09-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	0.0002±0.0001	<0.0063 (0.0017±0.0037)	0.0001±0.0001	<0.0003 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)
SJ43-SM-J-10-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0001±0.0001)	<0.0063 (0.0013±0.0037)	0.0003±0.0002	<0.0001 (0.0000±0.0001)	0.0003±0.0002
SJ43-SM-J-11-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)	<0.0003 (0.0001±0.0001)	<0.0004 (0.0000±0.0001)	<0.0063 (0.0018±0.0037)	<0.0003 (0.0001±0.0001)	<0.0003 (0.0000±0.0001)	<0.0002 (0.0002±0.0001)
SJ43-SM-J-12-A		pCi/cm2	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	0.0001±0.0001	<0.0063 (0.0021±0.0037)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ43-SM-J-13-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0063 (0.0002±0.0037)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ43-SM-J-14-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0063 (-0.0011±0.0037)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ43-SM-J-15-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)	<0.0063 (0.0010±0.0037)	0.0001±0.0001	<0.0001 (0.0001±0.0001)	<0.0002 (0.0002±0.0001)
SJ43-SM-J-16-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)	0.0001±0.0001	<0.0063 (0.0018±0.0037)	0.0005±0.0002	<0.0003 (0.0000±0.0001)	0.0004±0.0002
SJ43-SM-J-17-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0003 (-0.0001±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0063 (0.0012±0.0037)	<0.0003 (0.0003±0.0002)	<0.0002 (0.0001±0.0001)	0.0004±0.0002
SJ44-SM-J-01-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0003 (0.0000±0.0001)	<0.0060 (-0.0014±0.0035)	0.0002±0.0001	<0.0003 (0.0000±0.0001)	0.0002±0.0001
SJ44-SM-J-02-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0060 (-0.0006±0.0036)	<0.0002 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)	0.0002±0.0001
SJ44-SM-J-03-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0060 (-0.0024±0.0035)	0.0003±0.0002	<0.0003 (0.0000±0.0001)	0.0002±0.0001
SJ44-SM-J-04-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)	<0.0002 (0.0000±0.0001)	<0.0060 (-0.0001±0.0036)	<0.0003 (0.0001±0.0001)	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ44-SM-J-05-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0003 (0.0001±0.0001)	<0.0002 (0.0001±0.0001)	<0.0060 (-0.0023±0.0035)	0.0002±0.0001	<0.0001 (0.0000±0.0000)	<0.0002 (0.0001±0.0001)
SJ44-SM-J-06-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0060 (-0.0026±0.0035)	0.0002±0.0001	<0.0003 (0.0000±0.0001)	0.0002±0.0001
SJ44-SM-J-07-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0060 (-0.0034±0.0035)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0003±0.0002
SJ44-SM-J-08-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	0.0001±0.0001	<0.0060 (-0.0007±0.0036)	0.0004±0.0002	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ44-SM-J-09-A		pCi/cm2	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0060 (-0.0008±0.0036)	0.0002±0.0002	<0.0001 (0.0000±0.0001)	0.0003±0.0002
SJ44-SM-J-10-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0060 (0.0018±0.0036)	0.0002±0.0001	<0.0001 (0.0001±0.0001)	0.0001±0.0001
SJ45-SM-J-01-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	0.0001±0.0001	0.0002±0.0001	<0.0059 (0.0038±0.0036)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ45-SM-J-02-A		pCi/cm2	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0059 (0.0027±0.0035)	0.0003±0.0002	0.0001±0.0001	0.0003±0.0002
SJ45-SM-J-03-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0001±0.0001)	0.0001±0.0001	<0.0059 (0.0053±0.0036)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ45-SM-J-04-A		pCi/cm2	<0.0001 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0059 (0.0027±0.0035)	0.0001±0.0001	<0.0003 (0.0000±0.0001)	0.0002±0.0002
SJ45-SM-J-05-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0059 (0.0051±0.0036)	0.0001±0.0001	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)
SJ45-SM-J-06-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	0.0001±0.0001	<0.0059 (0.0039±0.0036)	0.0003±0.0002	<0.0003 (0.0000±0.0001)	0.0002±0.0001
SJ45-SM-J-07-A		pCi/cm2	<0.0004 (-0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0000)	0.0001±0.0001	<0.0059 (-0.0002±0.0035)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)
SJ45-SM-J-08-A		pCi/cm2	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0003 (0.0000±0.0001)	0.0001±0.0001	<0.0059 (-0.0001±0.0035)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	0.0001±0.0001
SJ45-SM-J-09-A		pCi/cm2	<0.0001 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0001)	<0.0059 (0.0004±0.0035)	0.0003±0.0002	0.0001±0.0001	0.0003±0.0002
SJ45-SM-J-10-A		pCi/cm2	<0.0001 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0059 (0.0024±0.0035)	0.0002±0.0001	<0.0001 (0.0000±0.0001)	0.0002±0.0001
SJ45-SM-J-11-A		pCi/cm2	<0.0002 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0001±0.0001)	<0.0059 (0.0018±0.0035)	0.0003±0.0002	<0.0002 (0.0000±0.0001)	<0.0003 (0.0000±0.0001)
SJ45-SM-J-12-A		pCi/cm2	<0.0001 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0025±0.0035)	0.0003±0.0002	<0.0001 (0.0001±0.0001)	0.0003±0.0002
SJ45-SM-J-13-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0001)	<0.0003 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0059 (0.0017±0.0035)	0.0001±0.0001	<0.0003 (-0.0001±0.0001)	0.0001±0.0001
SJ45-SM-J-14-A		pCi/cm2	<0.0004 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	0.0001±0.0001	<0.0059 (0.0019±0.0035)	<0.0002 (0.0002±0.0001)	<0.0002 (0.0000±0.0001)	0.0002±0.0001
SJ45-SM-J-15-A		pCi/cm2	<0.0002 (0.0001±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0007±0.0035)	0.0001±0.0001	<0.0003 (0.0000±0.0001)	0.0003±0.0002
SJ45-SM-J-16-A		pCi/cm2	0.0001±0.0001	<0.0002 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	0.0001±0.0001	<0.0059 (0.0013±0.0035)	0.0001±0.0001	<0.0001 (0.0000±0.0001)	<0.0002 (0.0001±0.0001)
SJ45-SM-J-17-A		pCi/cm2	<0.0003 (0.0000±0.0001)	<0.0001 (0.0000±0.0000)	<0.0001 (0.0000±0.0000)	0.0001±0.0001	<0.0059 (0.0017±0.0035)	0.0002±0.0001	<0.0003 (0.0000±0.0001)	0.0001±0.0001
SJ45-SM-J-18-A		pCi/cm2	<0.0002 (0.0001±0.0001)	<0.0002 (0.0000±0.0000)	<0.0002 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0034±0.0035)	0.0002±0.0001	<0.0001 (0.0001±0.0001)	0.0002±0.0001
SJ45-SM-J-19-A		pCi/cm2	0.0001±0.0001	<0.0001 (0.0000±0.0000)	<0.0003 (0.0000±0.0001)	<0.0002 (0.0000±0.0001)	<0.0059 (0.0030±0.0035)	0.0001±0.0001	<0.0001 (0.0001±0.0001)	0.0001±0.0001
WG	SJ16-GW-J-01-A	pCi/L	<0.1790 (0.0560±0.0820)	<0.1740 (-0.0180±0.0360)	<0.0540 (0.0360±0.0500)	<0.0540 (0.0180±0.0360)	<3.4999 (0.3047±2.0664)	0.6000±0.2200	<0.0700 (0.0230±0.0460)	0.3600±0.1700
	SR04-GW-J-01-A	pCi/L	<0.1970 (0.0410±0.0810)	<0.0550 (0.0000±0.0360)	0.0550±0.0620	<0.1750 (0.0550±0.0800)	<3.7754 (0.3832±2.2298)	0.3900±0.1700	<0.0680 (0.0450±0.0630)	0.3300±0.1500
WS	BK01-SW-J-01-A	pCi/L	<0.0560 (0.0370±0.0520)	<0.1710 (-0.0180±0.0350)	0.0540±0.0610	<0.0540 (0.0360±0.0500)	<3.4647 (-0.8138±1.9560)	0.3400±0.1600	<0.0690 (0.0000±0.0450)	0.1700±0.1100
BK02-SW-J-01-A		pCi/L	<0.0630 (0.0000±0.0410)	<0.0610 (0.0200±0.0400)	<0.0610 (0.0410±0.0570)	<0.0610 (0.0410±0.0570)	<3.4647 (-3.0516±1.8612)	0.8500±0.2700	<0.2240 (0.0470±0.0920)	0.8900±0.2700
BK03-SW-J-01-A		pCi/L	0.0600±0.0680	<0.0580 (0.0390±0.0540)	0.0770±0.0760	<0.0580 (0.0000±0.0380)	<3.4647 (-1.4241±1.9305)	0.2300±0.1400	<0.0710 (0.0240±0.0460)	<0.2400 (0.0800±0.1100)
BK04-SW-J-01-A		pCi/L	0.1000±0.0880	<0.1850 (0.0190±0.0660)	<0.0580 (0.0190±0.0380)	0.0580±0.0660	<3.4647 (-0.5086±1.9686)	0.8800±0.2700	<0.2300 (0.0900±0.1100)	0.6500±0.2400
BK04-SW-J-02-A		pCi/L	<0.3080 (-0.0210±0.0940)	<0.0530 (0.0000±0.0340)	<0.0530 (0.0350±0.0490)	<0.0530 (0.0350±0.0490)	<3.4834 (0.4509±2.0583)	0.3300±0.1600	0.0680±0.0770	0.2400±0.1300
BK05-SW-J-01-A		pCi/L	0.0570±0.0650	<0.2740 (-0.0190±0.0830)	<0.0570 (0.0380±0.0530)	0.0950±0.0840	<3.4647 (-0.2543±1.9791)	0.4400±0.1900	<0.0710 (0.0480±0.0660)	0.5600±0.2200
BK06-SW-J-01-A		pCi/L	0.0950±0.0840	<0.2200 (-0.0180±0.0610)	<0.0540 (0.0180±0.0350)	0.0540±0.0610	<3.4647 (1.8818±2.0654)	<0.1900 (0.1000±0.1000)	<0.0720 (0.0240±0.0470)	<0.1900 (0.1000±0.1000)
BK07-SW-J-01-A		pCi/L	0.0590±0.0670	<0.0580 (0.0000±0.0380)	<0.0570 (0.0000±0.0370)	0.0570±0.0650	<3.4647 (-0.4069±1.9728)	0.5700±0.2200	<0.0720 (0.0000±0.0470)	0.4300±0.1800
BK08-SW-J-01-A		pCi/L	<0.2450 (0.0000±0.0780)	<0.1780 (-0.0190±0.0370)	<0.0560 (0.0190±0.0360)	<0.1780 (0.0370±0.0730)	<3.4647 (-4.6282±1.7920)	<0.0570 (0.0380±0.0530)	<0.0700 (0.0000±0.0460)	0.1130±0.0910
BK30-SW-J-01-A		pCi/L	0.0760±0.0750	<0.1810 (-0.0190±0.0370)	<0.2320 (-0.0190±0.0640)	<0.1800 (0.0190±0.0640)	<3.4647 (0.9155±2.0267)	<0.1900 (0.1000±0.1000)	<0.0730 (0.0240±0.0480)	0.0980±0.0860
BK30-SW-J-02-A		pCi/L	<0.2020 (0.0630±0.0930)	<0.0530 (0.0180±0.0350)	<0.1700 (0.0180±0.0600)	<0.0530 (0.0350±0.0490)	<3.4834 (0.3183±2.0567)	<0.2730 (0.0190±0.0980)	<0.0700 (0.0470±0.0650)	0.0570±0.0640
BK50-SW-J-01-A		pCi/L	<0.0560 (0.0370±0.0520)	<0.2460 (-0.0200±0.0680)	<0.0600 (0.0000±0.0390)	<0.0600 (0.0200±0.0390)	<3.4647 (-1.7292±1.9177)	0.2500±0.1400	<0.0720 (0.0480±0.0660)	0.2500±0.1400
BK51-SW-J-01-A		pCi/L	<0.1750 (0.0000±0.0510)	<0.0540 (0.0000±0.0350)	<0.0540 (0.0360±0.0500)	0.0720±0.0710	<3.4647 (-0.4069±1.9728)	0.7600±0.2500	<0.0740 (0.0000±0.0490)	0.4200±0.1900
SJ10-SW-J-01-A		pCi/L	<0.0550 (0.0000±0.0360)	<0.1830 (-0.0190±0.0380)	0.0570±0.0650	<0.2350 (0.0570±0.0990)	<3.4999 (0.3047±2.0664)	0.1900±0.1200	<0.0710 (0.0000±0.0460)	0.1330±0.1000

Notes:

1) "nr" no result reported by laboratory"

Table A. 2 Summary Data Table of All Results Reported by REAL Laboratory

Matrix	Sample ID	Radionuclide Units ↓	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
			Result	Result	Result	Result	Result	Result	Result	Result
SJ11-SW-J-01-A		pCi/L	0.0540±0.0610	<0.1800 (0.0000±0.0520)	<0.0560 (0.0190±0.0370)	<0.0560 (0.0380±0.0520)	<3.4999 (-1.3912±2.0455)	0.2600±0.1400	<0.0730 (0.0240±0.0470)	<0.1900 (0.1200±0.1100)
SJ12-SW-J-01-A		pCi/L	0.0780±0.0760	<0.2260 (-0.0180±0.0620)	<0.0550 (0.0370±0.0510)	<0.2250 (0.0000±0.0720)	<3.4999 (1.4442±2.0805)	0.2200±0.1300	<0.2200 (0.0000±0.0640)	0.2200±0.1300
SJ13-SW-J-01-A		pCi/L	<0.0750 (0.0500±0.0690)	<0.2960 (-0.0410±0.0810)	<0.1960 (0.0000±0.0570)	<0.1960 (0.0200±0.0700)	<3.4999 (-0.3445±2.0583)	<0.0640 (0.0000±0.0420)	<0.0790 (0.0260±0.0520)	<0.2600 (0.0600±0.1100)
SJ13-SW-J-02-A		pCi/L	<0.0550 (0.0180±0.0360)	<0.0560 (0.0370±0.0520)	<0.0560 (0.0190±0.0370)	<0.0560 (0.0190±0.0370)	<3.4999 (-0.7022±2.0539)	0.4000±0.1900	<0.0740 (0.0250±0.0480)	0.1600±0.1100
SJ14-SW-J-01-A		pCi/L	<0.2400 (0.0390±0.0940)	<0.0580 (0.0000±0.0380)	<0.0580 (0.0190±0.0380)	<0.0580 (0.0190±0.0380)	<3.4999 (-1.2057±2.0478)	0.1800±0.1200	<0.0740 (0.0250±0.0480)	0.0590±0.0670
SJ15-SW-J-01-A		pCi/L	<0.0570 (0.0000±0.0370)	<0.0540 (0.0000±0.0360)	<0.0540 (0.0360±0.0500)	<0.0540 (0.0180±0.0360)	<3.4999 (-0.5697±2.0556)	<0.2000 (0.1500±0.1200)	<0.0780 (0.0520±0.0720)	0.0630±0.0710
SJ15-SW-J-02-A		pCi/L	<0.1830 (-0.0190±0.0380)	<0.1800 (0.0000±0.0520)	0.0560±0.0640	<0.0560 (0.0380±0.0520)	<3.4999 (-1.8152±2.0403)	<0.1930 (0.0200±0.0680)	<0.2380 (0.0000±0.0690)	0.1200±0.0970
SJ16-SW-J-01-A		pCi/L	<0.2830 (-0.0200±0.0860)	<0.1830 (-0.0190±0.0370)	<0.0570 (0.0190±0.0370)	0.0760±0.0750	<3.4999 (0.5035±2.0688)	0.8700±0.2600	<0.0670 (0.0220±0.0440)	0.4500±0.1900
SJ16-SW-J-02-A		pCi/L	<0.0570 (0.0380±0.0530)	<0.0550 (0.0180±0.0360)	<0.0550 (0.0370±0.0510)	0.0740±0.0730	<3.4999 (1.4310±2.0803)	0.1110±0.0890	<0.0680 (0.0460±0.0630)	0.1700±0.1100
SJ16-SW-J-03-A		pCi/L	<0.0560 (0.0190±0.0370)	<0.0560 (0.0190±0.0360)	<0.0560 (0.0000±0.0360)	<0.1770 (0.0000±0.0510)	<3.4999 (0.9407±2.0742)	0.8100±0.2500	<0.0700 (0.0470±0.0650)	0.5100±0.2000
SJ17-SW-J-02-A		pCi/L	<0.0580 (0.0190±0.0380)	<0.0530 (0.0000±0.0350)	<0.0530 (0.0000±0.0350)	<0.0530 (0.0180±0.0350)	<3.4999 (0.0662±2.0634)	0.2100±0.1200	<0.0700 (0.0460±0.0650)	<0.0560 (0.0370±0.0520)
SJ18-SW-J-01-A		pCi/L	<0.0560 (0.0370±0.0520)	<0.1750 (0.0000±0.0510)	<0.0550 (0.0180±0.0360)	<0.1740 (0.0180±0.0620)	<3.4999 (-0.4770±2.0567)	0.4700±0.1900	<0.0700 (0.0230±0.0460)	0.3900±0.1700
SJ19-SW-J-01-A		pCi/L	0.1050±0.0850	<0.0570 (0.0000±0.0370)	<0.2350 (0.0380±0.0920)	0.0570±0.0650	<3.4999 (-0.1325±2.0610)	<0.1840 (0.0960±0.1000)	<0.0710 (0.0000±0.0460)	0.0960±0.0840
SJ20-SW-J-01-A		pCi/L	0.0560±0.0640	<0.0580 (0.0000±0.0380)	<0.0580 (0.0390±0.0530)	<0.1840 (-0.0190±0.0380)	<3.4999 (0.2385±2.0655)	<0.1900 (0.1000±0.1000)	<0.0720 (0.0000±0.0470)	0.0980±0.0860
SJ22-SW-J-01-A		pCi/L	0.0720±0.0710	<0.1920 (-0.0200±0.0390)	0.0600±0.0680	<0.1920 (0.0200±0.0680)	<3.7754 (-1.6038±2.2055)	<0.0590 (0.0400±0.0550)	<0.0730 (0.0000±0.0480)	0.1600±0.1100
SJ23-SW-J-01-A		pCi/L	<0.0570 (0.0380±0.0530)	<0.0590 (0.0000±0.0390)	<0.2430 (0.0400±0.0950)	<0.0590 (0.0400±0.0550)	<3.7754 (-1.3199±2.2090)	0.1130±0.0910	<0.2230 (0.0230±0.0790)	0.1130±0.0910
SJ23-SW-J-02-A		pCi/L	<0.0540 (0.0180±0.0350)	<0.1680 (-0.0180±0.0340)	0.0530±0.0600	<0.1680 (0.0000±0.0490)	<3.7754 (2.7960±2.2596)	0.6100±0.2200	<0.0710 (0.0240±0.0460)	0.6500±0.2200
SJ24-SW-J-01-A		pCi/L	<0.2110 (0.0220±0.0750)	<0.0520 (0.0170±0.0340)	<0.0510 (0.0340±0.0480)	<0.0510 (0.0170±0.0340)	<3.7754 (0.0852±2.2262)	0.1600±0.1100	<0.0740 (0.0000±0.0480)	0.0600±0.0680
SJ31-SW-J-01-A		pCi/L	<0.0520 (0.0000±0.0340)	<0.0510 (0.0000±0.0330)	0.0510±0.0580	0.0680±0.0670	<3.3296 (0.6305±1.9700)	0.2000±0.1200	<0.0660 (0.0440±0.0610)	0.1800±0.1100
SR02-SW-J-01-A		pCi/L	<0.0540 (0.0180±0.0360)	<0.0530 (0.0180±0.0350)	<0.0530 (0.0000±0.0350)	0.0530±0.0600	<3.4999 (0.2252±2.0654)	<0.1700 (0.1400±0.1100)	<0.0670 (0.0220±0.0440)	0.1260±0.0940
SR08-SW-J-01-A		pCi/L	<0.0570 (0.0190±0.0370)	<0.1780 (0.0000±0.0520)	<0.0560 (0.0190±0.0360)	<0.1780 (0.0000±0.0510)	<3.7754 (1.2490±2.2405)	<0.1900 (0.0800±0.0960)	<0.0740 (0.0250±0.0480)	<0.1900 (0.0200±0.0670)
SR12-SW-J-01-A		pCi/L	<0.0570 (0.0000±0.0370)	<0.0530 (0.0000±0.0340)	<0.1680 (-0.0180±0.0340)	<0.1680 (-0.0180±0.0340)	<3.7754 (0.3974±2.2300)	0.1400±0.1000	0.1200±0.1100	<0.0600 (0.0400±0.0550)
SR27-SW-J-01-A		pCi/L	<0.1880 (0.0000±0.0540)	<0.1660 (0.0000±0.0480)	<0.0520 (0.0350±0.0480)	0.0520±0.0590	<3.7754 (1.4477±2.2429)	0.2100±0.1400	<0.0710 (0.0240±0.0470)	0.1340±0.1000
SR29-SW-J-01-A		pCi/L	0.1090±0.0880	<0.0540 (0.0000±0.0360)	<0.0540 (0.0180±0.0360)	<0.0540 (0.0180±0.0360)	<3.7754 (-0.1419±2.2234)	0.1130±0.0910	<0.0700 (0.0230±0.0460)	<0.0560 (0.0370±0.0520)
SR34-SW-J-01-A		pCi/L	<0.2190 (0.0000±0.0630)	<0.2140 (-0.0350±0.0480)	<0.1660 (0.0000±0.0480)	<0.0520 (0.0350±0.0480)	<3.7754 (0.5961±2.2324)	1.1200±0.3000	<0.2750 (0.0220±0.0980)	0.7200±0.2300

Notes:

1) "nr" no result reported by laboratory"

Table A-3 Summary Data Table of ICP/MS Results for Radionuclides Reported at Quantifiable Levels

		Analytical Method →	ICP/MS						
		Radionuclide →	Neptunium-237	Plutonium-239	Plutonium-240	Uranium-234	Uranium-235	Uranium-236	Uranium-238
Matrix	Sample ID	Units ↓	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA
SD	BK01-SD-J-01-B	ug/Kg	-	-	-	0.317	39.5	-	5710
SD	BK03-SD-J-01-B	ug/Kg	-	-	-	0.404	49.8	-	7040
SD	BK04-SD-J-01-B	ug/Kg	-	-	-	0.66	83.1	-	11600
SD	BK05-SD-J-01-B	ug/Kg	-	-	-	0.165	19.7	-	2830
SD	BK06-SD-J-01-B	ug/Kg	0.367	-	-	0.407	51.2	-	7180
SD	BK07-SD-J-01-B	ug/Kg	-	-	-	0.375	49.4	-	6980
SD	BK08-SD-J-01-B	ug/Kg	-	-	-	0.362	47.6	-	6700
SD	BK30-SD-J-01-B	ug/Kg	-	-	-	0.15	20	-	2840
SD	BK50-SD-J-01-B	ug/Kg	-	-	-	0.23	28.4	-	4120
SD	BK51-SD-J-01-B	ug/Kg	-	-	-	0.215	28.8	-	4120
SD	PB20M15SD1	ug/Kg	nr	-	-	-	-	-	-
SD	PB20M15SD3	ug/Kg	-	nr	nr	nr	nr	nr	nr
SD	PB20M31VH4	ug/Kg	nr	-	-	nr	nr	nr	nr
SM	BK15-SM-J-01-B	ug/sample	-	-	-	-	0.00164	-	0.163
SM	BK15-SM-J-02-B	ug/sample	-	-	-	-	0.00452	-	0.619
SM	BK52-SM-J-01-B	ug/sample	-	-	-	-	0.0015	-	0.196
SM	BK53-SM-J-01-B	ug/sample	-	-	-	-	0.00156	-	0.2
SM	BK54-SM-J-01-B	ug/sample	-	-	-	-	-	-	0.0225
SM	BK54-SM-J-02-B	ug/sample	-	-	-	-	-	-	0.0266
SM	BK54-SM-J-03-B	ug/sample	-	-	-	-	-	-	0.0567
SM	BK60-SM-J-01-B	ug/sample	-	-	-	-	-	-	0.0832
SM	BK60-SM-J-02-B	ug/sample	-	-	-	-	-	-	0.0282
SM	BK60-SM-J-03-B	ug/sample	-	-	-	-	0.00112	-	0.14
SM	BK61-SM-J-01-B	ug/sample	-	-	-	-	-	-	0.0261
SM	BK61-SM-J-02-B	ug/sample	-	-	-	-	-	-	0.0256
SM	BK61-SM-J-03-B	ug/sample	-	-	-	-	-	-	0.0232
SM	BK61-SM-J-04-B	ug/sample	-	-	-	-	-	-	0.0303
SM	BK68-SM-J-01-B	ug/sample	-	-	-	-	-	-	0.0524
SM	BK69-SM-J-01-B	ug/sample	-	-	-	-	-	-	0.136
SM	BK70-SM-J-01-B	ug/sample	-	-	-	-	-	-	0.0211
SM	BK70-SM-J-02-B	ug/sample	-	-	-	-	-	-	0.0234
SM	BK73-SM-J-04-B	ug/smear	-	-	-	-	0.000592	-	0.0924
SM	BK73-SM-J-14-B	ug/smear	-	-	-	-	0.000875	-	0.13
SM	PB20M21KE1	ug/sample	-	-	-	-	-	-	0.00795
SM	PB20M21KE3	ug/sample	-	-	-	-	-	-	-
SM	SJ18-SM-J-02-B	ug/smear	-	-	-	-	0.000689	-	0.0981
SM	SJ33-SM-J-02-B	ug/smear	-	-	-	-	0.000655	-	0.1
SM	SJ34-SM-J-02-B	ug/smear	-	-	-	-	0.000528	-	0.0835
SM	SJ35-SM-J-10-B	ug/smear	-	-	-	-	0.000594	-	0.082
SM	SJ36-SM-J-03-B	ug/smear	-	-	-	-	0.000364	-	0.0581
SM	SJ37-SM-J-02-B	ug/smear	-	-	-	-	0.000432	-	0.0683

Table A-3 Summary Data Table of ICP/MS Results for Radionuclides Reported at Quantifiable Levels

		Analytical Method →	ICP/MS						
		Radionuclide →	Neptunium-237	Plutonium-239	Plutonium-240	Uranium-234	Uranium-235	Uranium-236	Uranium-238
Matrix	Sample ID	Units ↓	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA
SM	SJ37-SM-J-12-B	ug/smear	-	-	-	-	0.000456	-	0.0729
SM	SJ38-SM-J-04-B	ug/smear	-	-	-	-	0.000791	-	0.126
SM	SJ39-SM-J-01-B	ug/smear	-	-	-	-	0.000788	-	0.155
SM	SJ39-SM-J-11-B	ug/smear	-	-	-	-	-	-	0.12
SM	SJ40-SM-J-02-B	ug/smear	-	-	-	-	0.00063	-	0.104
SM	SJ41-SM-J-05-B	ug/smear	-	-	-	-	0.00101	-	0.185
SM	SJ42-SM-J-02-B	ug/smear	-	-	-	-	0.00175	-	0.243
SM	SJ43-SM-J-07-B	ug/smear	-	-	-	-	0.000559	-	0.0966
SM	SJ43-SM-J-16-B	ug/smear	-	-	-	-	0.00109	-	0.177
SM	SJ44-SM-J-04-B	ug/smear	-	-	-	-	0.0021	-	0.143
SM	SJ45-SM-J-06-B	ug/smear	-	-	-	-	0.000628	-	0.0966
SM	SJ45-SM-J-18-B	ug/smear	-	-	-	-	0.000586	-	0.0918
SO	5343S0001	ug/Kg	-	-	-	0.17	21.6	-	3090
SO	5343S0003	ug/Kg	-	-	-	0.157	20.1	-	2920
SO	5343S0009	ug/Kg	-	-	-	0.149	17.1	-	2550
SO	5343S0011	ug/Kg	-	-	-	0.223	27.1	-	3910
SO	5343S0013	ug/Kg	-	-	-	0.103	13.8	-	1940
SO	5343S0015	ug/Kg	-	-	-	0.37	46.8	-	6630
SO	5343S0016	ug/Kg	-	-	-	0.182	22.6	-	3150
SO	5343S0019	ug/Kg	-	-	-	0.176	22.9	-	3130
SO	5343S0021	ug/Kg	-	-	-	0.174	23.4	-	3360
SO	5343S0024	ug/Kg	-	-	-	0.212	28.1	-	4000
SO	5343S0027	ug/Kg	-	-	-	0.174	22.8	-	3270
SO	5343S0028	ug/Kg	-	-	-	0.123	16	-	2250
SO	5343S0033	ug/Kg	-	-	-	0.14	18.9	-	2640
SO	5343S0035	ug/Kg	-	-	-	0.242	31.4	-	4520
SO	5343S0039	ug/Kg	-	-	-	0.192	23	-	3250
SO	5343S0042	ug/Kg	-	-	-	0.166	20.2	-	2870
SO	5343S0044	ug/Kg	-	-	-	0.123	17.2	-	2390
SO	5343S0046	ug/Kg	-	-	-	0.154	18.8	-	2710
SO	BK09-SO-R-01-B	ug/Kg	-	-	-	0.183	23.9	-	3350
SO	BK10-SO-R-01-B	ug/Kg	-	-	-	0.227	29.9	-	4370
SO	BK11-SO-R-01-B	ug/Kg	-	-	-	0.195	25.6	-	3660
SO	BK12-SO-R-01-B	ug/Kg	-	-	-	0.162	21.5	-	3060
SO	BK15-SO-J-01-B	ug/Kg	-	-	-	0.147	21	-	2950
SO	BK16-SO-R-01-B	ug/Kg	-	-	-	0.25	30.2	-	4340
SO	BK18-SO-R-01-B	ug/Kg	-	-	-	0.276	35.6	-	5030
SO	BK21-SO-J-01-B	ug/Kg	-	-	-	0.259	33.6	-	4740
SO	BK22-SO-R-01-B	ug/Kg	-	-	-	0.347	44	-	6190
SO	BK23-SO-R-01-B	ug/Kg	-	-	-	0.238	30.3	-	4220
SO	BK24-SO-R-01-B	ug/Kg	-	-	-	0.164	21.4	-	3030

Table A-3 Summary Data Table of ICP/MS Results for Radionuclides Reported at Quantifiable Levels

		Analytical Method →	ICP/MS						
		Radionuclide →	Neptunium-237	Plutonium-239	Plutonium-240	Uranium-234	Uranium-235	Uranium-236	Uranium-238
Matrix	Sample ID	Units ↓	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA
SO	BK25-SO-R-01-B	ug/Kg	-	-	-	0.245	28.8	-	4140
SO	BK27-SO-R-01-B	ug/Kg	-	-	-	0.161	20.5	-	2880
SO	BK28-SO-R-01-B	ug/Kg	-	-	-	0.192	24.1	-	3420
SO	BK29-SO-R-01-B	ug/Kg	-	-	-	0.164	19.9	-	2810
SO	BK37-SO-R-01-B	ug/Kg	-	-	-	0.171	22	-	3150
SO	BK38-SO-R-01-B	ug/Kg	-	-	-	0.172	22.9	-	3230
SO	BK39-SO-R-01-B	ug/Kg	-	-	-	0.177	23.1	-	3240
SO	BK40-SO-R-01-B	ug/Kg	-	-	-	0.142	19.4	-	2720
SO	BK41-SO-R-01-B	ug/Kg	-	-	-	0.159	21.6	-	3090
SO	BK42-SO-R-01-B	ug/Kg	-	-	-	0.215	30.1	-	4290
SO	BK43-SO-R-01-B	ug/Kg	-	-	-	0.174	24.3	-	3510
SO	BK44-SO-R-01-B	ug/Kg	-	-	-	0.841	105	-	14500
SO	BK45-SO-R-01-B	ug/Kg	-	-	-	0.823	108	-	15100
SO	BK46-SO-R-01-B	ug/Kg	-	-	-	0.496	63	-	8800
SO	BK47-SO-R-01-B	ug/Kg	-	-	-	0.302	39.3	-	5510
SO	BK48-SO-R-01-B	ug/Kg	-	-	-	0.342	44.7	-	6300
SO	BK49-SO-R-01-B	ug/Kg	-	-	-	0.272	36	-	5030
SO	BK55-SO-J-01-B	ug/Kg	-	-	-	0.105	14.6	-	2070
SO	BK56-SO-J-01-B	ug/Kg	-	-	-	0.156	19.6	-	2830
SO	BK57-SO-J-01-B	ug/Kg	-	-	-	0.279	36.6	-	5180
SO	BK58-SO-J-01-B	ug/Kg	-	-	-	0.26	33.4	-	4730
SO	BK59-SO-J-01-B	ug/Kg	-	-	-	0.106	14.7	-	2070
SO	BK62-SO-J-01-B	ug/Kg	-	-	-	0.163	23.2	-	3350
SO	BK63-SO-J-01-B	ug/Kg	-	-	-	0.132	18.5	-	2690
SO	BK64-SO-J-01-B	ug/Kg	-	-	-	0.151	21.1	-	3030
SO	BK65-SO-J-01-B	ug/Kg	-	-	-	0.204	27	-	3910
SO	BK66-SO-J-01-B	ug/Kg	-	-	-	0.164	22.6	-	3180
SO	BK71-SO-J-01-B	ug/Kg	-	-	-	0.214	30.4	-	4370
SO	BK72-SO-J-01-B	ug/Kg	-	-	-	0.172	23.1	-	3370
SO	SJ11-SO-J-02-B	ug/Kg	-	-	-	0.217	26.8	-	4030
SO	SJ12-SO-J-02-B	ug/Kg	-	-	-	0.308	37.3	-	5300
SO	SJ13-SO-J-03-B	ug/Kg	-	-	-	0.247	30.5	-	3680
SO	SJ13-SO-R-07-B	ug/Kg	-	-	-	0.18	23.7	-	3580
SO	SJ14-SO-J-01-B	ug/Kg	-	-	-	0.196	24.4	-	3570
SO	SJ14-SO-J-03-B	ug/Kg	-	-	-	0.109	12.3	-	1820
SO	SJ14-SO-R-04-B	ug/Kg	-	-	-	0.176	23	-	3370
SO	SJ14-SO-R-05-B	ug/Kg	-	-	-	0.14	17.4	-	2570
SO	SJ14-SO-R-06-B	ug/Kg	-	-	-	0.192	24	-	3420
SO	SJ14-SO-R-07-B	ug/Kg	-	-	-	0.159	19.5	-	2930
SO	SJ14-SO-R-08-B	ug/Kg	-	-	-	0.163	19.6	-	2810
SO	SJ14-SO-R-11-B	ug/Kg	-	-	-	0.163	21.3	-	3120

Table A-3 Summary Data Table of ICP/MS Results for Radionuclides Reported at Quantifiable Levels

		Analytical Method →	ICP/MS						
		Radionuclide →	Neptunium-237	Plutonium-239	Plutonium-240	Uranium-234	Uranium-235	Uranium-236	Uranium-238
Matrix	Sample ID	Units ↓	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA
SO	SJ16-SO-J-05-B	ug/Kg	-	-	-	0.149	19.1	-	2840
SO	SJ22-SO-J-02-B	ug/Kg	-	-	-	0.706	87	-	12200
SO	SJ22-SO-J-05-B	ug/Kg	-	-	-	0.917	110	-	15300
SO	SJ22-SO-J-06-B	ug/Kg	-	-	-	1.07	129	-	18300
SO	SJ25-SO-R-04-B	ug/Kg	-	-	-	0.263	32.1	-	4540
SO	SR02-SO-R-07-B	ug/Kg	-	-	-	0.17	21.5	-	3180
SO	SR12-SO-R-02-B	ug/Kg	-	-	-	0.268	33.4	-	4790
SO	SR12-SO-R-06-B	ug/Kg	-	-	-	0.236	28.9	-	4070
SO	SR18-SO-R-07-B	ug/Kg	-	-	-	0.122	16	-	2020
SO	SR18-SO-R-08-B	ug/Kg	-	-	-	0.132	17.4	-	2370
SO	SR18-SO-R-09-B	ug/Kg	-	-	-	0.136	17.3	-	2240
SO	SR18-SO-R-10-B	ug/Kg	-	-	-	0.123	17	-	2210
SO	SR18-SO-R-11-B	ug/Kg	-	-	-	0.114	15.8	-	2060
SO	SR21-SO-R-01-B	ug/Kg	-	-	-	0.148	20.6	-	2810
SO	SR21-SO-R-02-B	ug/Kg	-	-	-	0.163	22	-	2920
SO	SR21-SO-R-03-B	ug/Kg	-	-	-	0.167	21.3	-	2950
SO	SR21-SO-R-04-B	ug/Kg	-	-	-	0.153	20.8	-	2700
SO	SR21-SO-R-05-B	ug/Kg	-	-	-	0.161	21.2	-	2790
SO	SR21-SO-R-06-B	ug/Kg	-	-	-	0.133	18.4	-	2560
SO	SR21-SO-R-07-B	ug/Kg	-	-	-	0.15	20	-	2570
SO	SR21-SO-R-08-B	ug/Kg	-	-	-	0.152	20.9	-	2880
SO	SR21-SO-R-09-B	ug/Kg	-	-	-	0.162	22.5	-	3060
SO	SR21-SO-R-10-B	ug/Kg	-	-	-	0.156	20.9	-	2720
SO	SR21-SO-R-11-B	ug/Kg	-	-	-	0.0736	9.59	-	1270
SO	SR22-SO-R-10-B	ug/Kg	-	-	-	0.129	19.2	-	2640
SW	5343R0004	ug/sample	-	-	-	0.000501	0.00613	-	0.844
SW	5343R0006	ug/sample	-	-	-	-	0.00186	-	0.174

Notes:

1) "-"identifies a reported concentration that is less than the laboratory's ability to reliably measure using the selected sample size and analytical method.

2) "nr" no result reported by the laboratory.

Table A-4 Summary of Alpha Spectroscopy and Liquid Scintillation Results for Radionuclides Reported at Quantifiable Levels (≥MDA)

		Analytical Methods →	Alpha Spectroscopy and Liquid Scintillation							
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
Matrix	Sample ID	Units ↓	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA
SD	BK51-SD-J-01-B	pCi/g	-	-	-	-	-	1.3	0.0459	1.26
SM	BK52-SM-J-01-B	pCi/smear	-	-	-	-	-	0.168	-	0.109
SM	BK60-SM-J-03-B	pCi/smear	-	-	-	-	-	-	-	-
SM	BK73-SM-J-04-B	pCi/smear	-	-	-	-	-	-	-	-
SM	BK73-SM-J-14-B	pCi/smear	-	-	-	-	-	-	-	0.14
SM	SJ18-SM-J-02-B	pCi/smear	-	-	0.397	-	-	0.111	-	-
SM	SJ33-SM-J-02-B	pCi/smear	-	-	-	-	-	-	-	-
SM	SJ34-SM-J-02-B	pCi/smear	-	-	-	-	-	0.112	-	-
SM	SJ35-SM-J-10-B	pCi/smear	-	-	-	-	-	0.129	-	-
SM	SJ36-SM-J-03-B	pCi/smear	-	-	-	-	-	-	-	-
SM	SJ37-SM-J-02-B	pCi/smear	-	-	-	-	-	-	-	-
SM	SJ37-SM-J-12-B	pCi/smear	-	-	-	-	-	-	-	-
SM	SJ38-SM-J-04-B	pCi/smear	-	-	-	-	-	-	-	-
SM	SJ39-SM-J-01-B	pCi/smear	-	-	-	-	-	-	-	-
SM	SJ39-SM-J-11-B	pCi/smear	-	-	-	-	-	0.111	-	-
SM	SJ40-SM-J-02-B	pCi/smear	-	-	-	-	-	-	-	nr
SM	SJ41-SM-J-05-B	pCi/smear	-	-	-	-	-	-	-	-
SM	SJ42-SM-J-02-B	pCi/smear	-	-	-	-	-	0.164	-	0.141
SM	SJ43-SM-J-07-B	pCi/smear	-	-	-	-	-	-	-	-
SM	SJ43-SM-J-16-B	pCi/smear	-	-	-	-	-	-	-	-
SM	SJ44-SM-J-04-B	pCi/smear	-	-	-	-	-	-	-	-
SM	SJ45-SM-J-06-B	pCi/smear	-	-	-	-	-	-	-	-
SM	SJ45-SM-J-18-B	pCi/smear	-	-	-	-	-	-	-	-
SO	5343S0001	pCi/g	-	-	-	-	-	1.13	0.06	1.09
SO	5343S0003	pCi/g	-	-	-	-	-	1.14	0.07	1.14
SO	5343S0009	pCi/g	-	-	-	-	-	0.69	0.06	0.79
SO	5343S0011	pCi/g	0.02	-	-	0.03	-	1.44	0.08	1.39
SO	5343S0013	pCi/g	-	-	-	-	-	0.55	0.06	0.6
SO	5343S0015	pCi/g	-	-	-	0.04	-	2.28	0.11	2.28
SO	5343S0016	pCi/g	-	-	-	-	-	1.1	0.07	1.14
SO	5343S0019	pCi/g	-	-	-	-	-	1.11	0.06	1.05
SO	5343S0021	pCi/g	-	-	-	-	-	1.03	0.04	0.95
SO	5343S0024	pCi/g	-	-	-	-	-	1.23	0.07	1.22
SO	5343S0027	pCi/g	0.02	-	-	-	-	0.85	0.04	0.95
SO	5343S0028	pCi/g	-	-	-	-	-	0.91	0.04	0.88
SO	5343S0033	pCi/g	-	-	-	-	-	1.04	0.06	1.04
SO	5343S0035	pCi/g	-	-	-	-	-	1.45	0.08	1.52
SO	5343S0039	pCi/g	-	-	-	-	-	1.1	0.08	1.15
SO	5343S0042	pCi/g	-	-	-	-	-	0.86	0.04	0.85
SO	5343S0044	pCi/g	-	-	-	-	-	0.69	0.04	0.71
SO	5343S0046	pCi/g	-	-	0.03	-	-	1.06	0.07	1.01

Table A-4 Summary of Alpha Spectroscopy and Liquid Scintillation Results for Radionuclides Reported at Quantifiable Levels (≥MDA)

		Analytical Methods →	Alpha Spectroscopy and Liquid Scintillation							
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
Matrix	Sample ID	Units ↓	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA
SO	BK09-SO-R-01-B	pCi/g	-	-	-	-	-	1.42	0.0562	1.37
SO	BK37-SO-R-01-B	pCi/g	-	-	-	-	-	0.901	0.0297	0.927
SO	BK55-SO-J-01-B	pCi/g	-	-	-	0.013	-	0.601	0.0232	0.637
SO	BK65-SO-J-01-B	pCi/g	-	-	-	0.0179	-	1.13	0.0449	1.17
SO	SR18-SO-R-07-B	pCi/g	-	-	-	0.0142	-	1.19	0.0589	1.34
SO	SR18-SO-R-08-B	pCi/g	-	-	-	0.0192	-	1.03	0.0492	1.09
SO	SR18-SO-R-09-B	pCi/g	-	-	-	-	-	1.01	0.0649	1.03
SO	SR18-SO-R-10-B	pCi/g	0.179	-	-	0.128	-	0.935	0.0461	1
SO	SR18-SO-R-11-B	pCi/g	-	-	-	-	-	0.916	0.0369	1.01
SO	SR21-SO-R-01-B	pCi/g	-	-	-	-	-	1.14	0.0636	1.18
SO	SR21-SO-R-02-B	pCi/g	-	-	-	0.0238	-	1.08	0.056	1.05
SO	SR21-SO-R-03-B	pCi/g	-	-	-	0.0232	-	1.28	0.0571	1.32
SO	SR21-SO-R-04-B	pCi/g	-	-	-	-	-	1.01	0.0432	0.979
SO	SR21-SO-R-05-B	pCi/g	0.0623	-	-	0.0864	-	1.15	0.0313	1.27
SO	SR21-SO-R-06-B	pCi/g	-	-	-	-	-	1.07	0.0492	1.13
SO	SR21-SO-R-07-B	pCi/g	-	-	-	0.0275	-	1.26	0.0694	1.26
SO	SR21-SO-R-08-B	pCi/g	-	-	-	-	-	1.16	0.074	1.15
SO	SR21-SO-R-09-B	pCi/g	-	-	-	-	-	1.07	0.0578	1.09
SO	SR21-SO-R-10-B	pCi/g	-	-	-	-	-	1.03	0.0595	1.14
SO	SR21-SO-R-11-B	pCi/g	-	-	-	-	-	0.998	0.054	1.02
SO	SR22-SO-R-10-B	pCi/g	-	-	-	-	-	0.887	0.0645	1.01
SO	SR23-SO-R-02-B	pCi/g	-	-	-	-	-	1.05	0.0708	1.09
SO	SR23-SO-R-03-B	pCi/g	-	-	-	-	-	1.04	0.0599	0.92
SO	SR23-SO-R-04-B	pCi/g	-	-	-	-	-	0.953	0.0377	0.856
SO	SR23-SO-R-05-B	pCi/g	0.0172	-	-	-	-	0.813	0.046	0.854
SO	SR23-SO-R-06-B	pCi/g	-	-	-	-	-	1.11	0.0467	1.06
SO	SR23-SO-R-07-B	pCi/g	-	-	-	-	-	0.981	0.0506	0.971
SO	SR23-SO-R-08-B	pCi/g	-	-	-	0.0173	-	1.14	0.0648	1.18
SO	SR23-SO-R-09-B	pCi/g	-	-	-	-	-	1.12	0.0436	1.16
SO	SR23-SO-R-10-B	pCi/g	-	-	-	0.0166	-	0.999	0.0434	0.981
SO	SR32-SO-R-05-B	pCi/g	-	-	-	-	-	2.42	0.152	2.39
SO	SR34-SO-R-05-B	pCi/g	-	-	-	-	0.373	1.14	0.0657	1.03
SO	SR39-SO-R-03-B	pCi/g	-	-	-	-	-	1.38	0.0687	1.45
SO	SR46-SO-R-07-B	pCi/g	-	-	-	-	-	0.866	0.0689	0.951
SO	SR56-SO-J-01-B	pCi/g	-	-	-	-	-	2.28	0.15	2.12
SO	SR56-SO-R-03-B	pCi/g	-	-	-	0.0432	-	3.47	0.177	3.26
SO	SR56-SO-R-07-B	pCi/g	-	-	-	0.0291	-	1.75	0.0981	1.85
SO	SR56-SO-R-09-B	pCi/g	-	-	-	0.0206	-	1.26	0.0618	1.18
SO	SR59-SO-J-01-B	pCi/g	-	-	-	-	-	2.62	0.132	2.68
SO	SR66-SO-R-10-B	pCi/g	-	-	-	-	-	1.55	0.102	1.51
SO	SR69-SO-R-01-B	pCi/g	-	-	-	0.017	-	1.17	0.0722	1.3

Table A-4 Summary of Alpha Spectroscopy and Liquid Scintillation Results for Radionuclides Reported at Quantifiable Levels (≥MDA)

		Analytical Methods →	Alpha Spectroscopy and Liquid Scintillation							
		Radionuclide →	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
Matrix	Sample ID	Units ↓	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA	Result ≥ MDA
SO	SR69-SO-R-02-B	pCi/g	-	-	-	-	-	1.03	0.0674	1.17
SO	SR69-SO-R-04-B	pCi/g	-	-	-	0.0176	-	1.63	0.0944	1.53
SO	SR69-SO-R-06-B	pCi/g	-	-	-	0.0179	-	1.94	0.107	1.91
SO	SR75-SO-R-09-B	pCi/g	-	-	-	-	-	0.877	0.0478	0.857
SO	SR77-SO-R-01-B	pCi/g	-	-	-	-	-	1.6	0.0761	1.62
SO	SR77-SO-R-02-B	pCi/g	-	-	-	-	-	1.86	0.0964	1.64
SO	SR77-SO-R-03-B	pCi/g	-	-	-	-	-	1.88	0.0871	1.82
SO	SR77-SO-R-05-B	pCi/g	-	-	-	-	-	1.41	0.0824	1.52
SO	SR77-SO-R-10-B	pCi/g	-	-	-	-	-	1.71	0.11	1.66
SO	SR77-SO-R-11-B	pCi/g	-	-	-	0.0164	-	1.65	0.08	1.64
SW	5343R0004	pCi/sample	-	-	-	-	-	0.23	-	0.23
SW	5343R0006	pCi/sample	-	-	-	-	-	0.1	-	-

Notes:

1) "-"identifies a reported concentration that is less than the laboratory's ability to reliably measure using the selected sample size and analytical method.

Table A-5 is also included as a separate pdf.

Table A-5 Summary Data Table of SWRI Results

Table A-5 Summary of SWRI Results

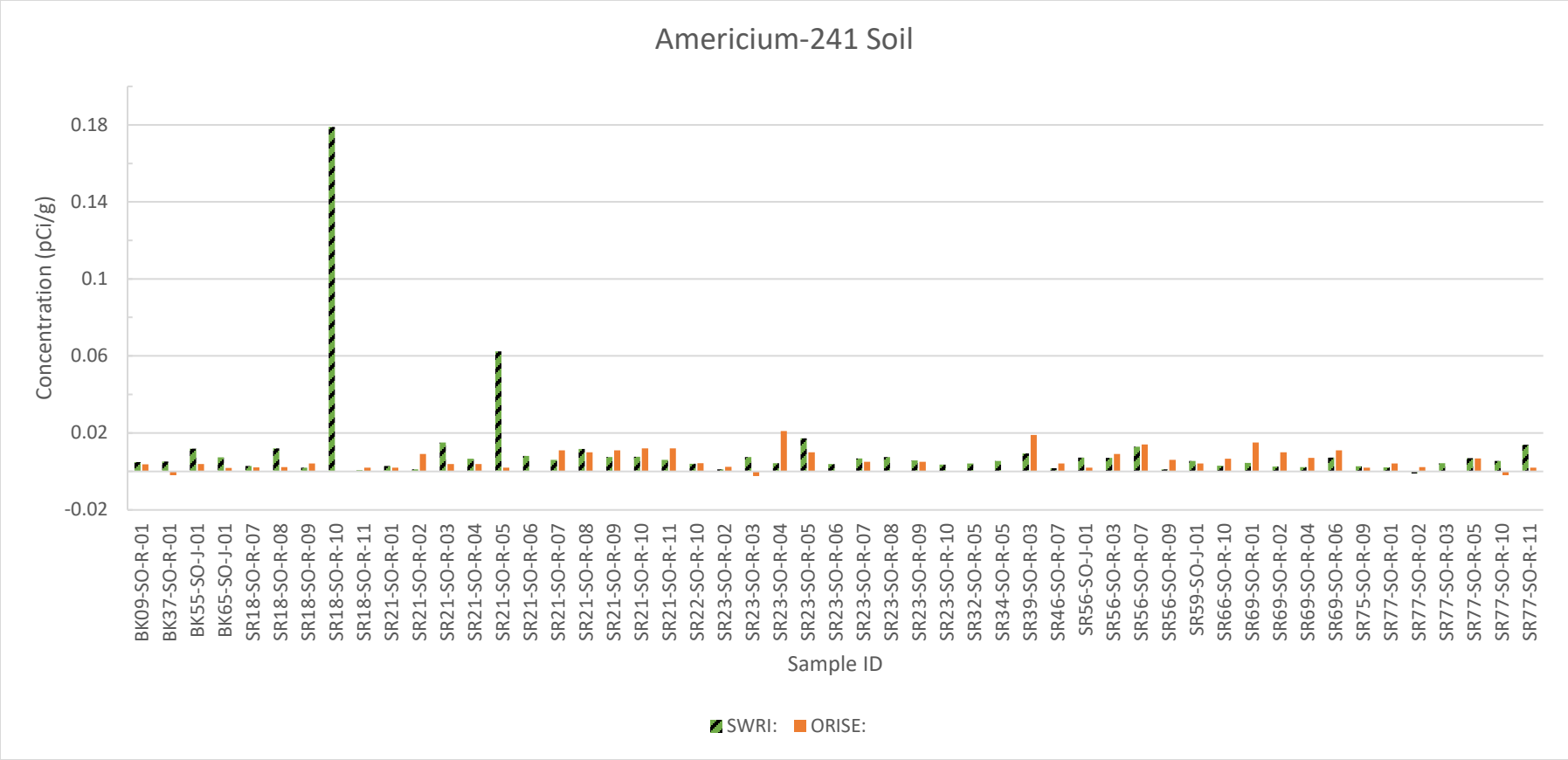
		Analysis ä				Alpha							DRC II				LSC	NextION	
		Isotope ä	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Neptunium-237	Plutonium-239	Plutonium-240	Uranium-234	Uranium-235	Uranium-236	Uranium-238	Technetium-99	Uranium-234	Uranium-235	Uranium-238
Matrix	Sample ID	Units ä	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
SD	BK31-SD-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.3889 (-0.1270 ± 0.4600)	<0.4150 (-0.0141 ± 0.4790)	<0.4150 (-0.0599 ± 0.4790)	nr	nr	<0.2770 (-0.0847 ± 0.3200)	nr	nr	0.3170 ± 0.0821	39.5000 ± 6.5900	5710.0000 ± 523.0000
SD	BK33-SD-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2150 (-0.0623 ± 0.2480)	<0.6710 (-0.0843 ± 0.7750)	<0.6710 (-0.0878 ± 0.7750)	nr	nr	<0.2570 (-0.0660 ± 0.2970)	nr	nr	0.4040 ± 0.0883	49.8000 ± 8.1900	7040.0000 ± 1140.0000
SD	BK34-SD-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2810 (-0.0838 ± 0.3250)	<0.4410 (-0.0148 ± 0.5090)	<0.4410 (-0.0052 ± 0.5090)	nr	nr	<0.2700 (-0.0754 ± 0.3120)	nr	nr	0.6600 ± 0.1240	83.1000 ± 13.5000	11600.0000 ± 1880.0000
SD	BK35-SD-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2900 (-0.0883 ± 0.3350)	<1.2200 (-0.1580 ± 1.4100)	<1.2200 (-0.1680 ± 1.4100)	nr	nr	<0.4760 (-0.1360 ± 0.5500)	nr	nr	0.1650 ± 0.1130	19.7000 ± 4.2100	2830.0000 ± 458.0000
SD	BK36-SD-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	0.3670 ± 0.4280	<0.7850 (-0.1350 ± 0.9070)	<0.7850 (-0.1100 ± 0.9070)	nr	nr	<0.2610 (-0.0768 ± 0.3020)	nr	nr	0.4070 ± 0.0852	51.2000 ± 8.4100	7180.0000 ± 1160.0000
SD	BK37-SD-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2930 (-0.0742 ± 0.3390)	<0.8370 (-0.1440 ± 0.9670)	<0.8370 (-0.1040 ± 0.9670)	nr	nr	<0.3130 (-0.0799 ± 0.3620)	nr	nr	0.3750 ± 0.0844	49.4000 ± 8.1900	6980.0000 ± 1130.0000
SD	BK38-SD-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2290 (-0.0620 ± 0.2650)	<0.3390 (-0.0167 ± 0.3910)	<0.3390 (-0.0066 ± 0.3910)	nr	nr	<0.2680 (-0.0628 ± 0.3100)	nr	nr	0.3620 ± 0.0852	47.6000 ± 7.8500	6700.0000 ± 1080.0000
SD	BK30-SD-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1960 (-0.0621 ± 0.2270)	<0.8460 (-0.1170 ± 0.9770)	<0.8460 (-0.1090 ± 0.9770)	nr	nr	<0.2170 (-0.0586 ± 0.2510)	nr	nr	0.1500 ± 0.0958	20.0000 ± 3.4700	2840.0000 ± 459.0000
SD	BK30-SD-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2490 (-0.0761 ± 0.2880)	<0.3660 (-0.0078 ± 0.4230)	<0.3660 (-0.0071 ± 0.4230)	nr	nr	<0.3320 (-0.0944 ± 0.3840)	nr	nr	0.2300 ± 0.0852	28.4000 ± 4.9800	4120.0000 ± 666.0000
SD	BK31-SD-J-01-8	pCi/smear	<0.0210 (0.0026 ± 0.0041)	<0.0096 (0.0010 ± 0.0017)	<0.0246 (-0.0061 ± 0.0034)	<0.0146 (0.0106 ± 0.0046)	1.3000 ± 0.0529	0.0459 ± 0.0087	1.2600 ± 0.0809	nr	nr	nr	nr	nr	nr	nr	<0.3820 (-0.1160 ± 0.1120)	nr	nr	nr
SD	BK31-SD-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2520 (-0.0738 ± 0.2910)	<0.9540 (-0.1690 ± 1.1000)	<0.9540 (-0.1760 ± 1.1000)	nr	nr	<0.3100 (-0.0771 ± 0.3580)	nr	nr	0.2150 ± 0.0797	28.8000 ± 4.9900	4120.0000 ± 666.0000
SD	PB20M15SD1	ug/Kg	nr	nr	nr	nr	nr	nr	nr	nr	<0.2060 (0.0124 ± 0.2380)	<0.2060 (0.0129 ± 0.2380)	nr	nr	<0.2280 (-0.0654 ± 0.2630)	nr	nr	<0.0456 (0.0005 ± 0.0527)	<1.1400 (-0.0016 ± 1.3200)	<9.1200 (0.7600 ± 10.5000)
SD	PB20M15SD3	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1690 (-0.0549 ± 0.1950)	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr
SD	PB20M31VH4	ug/Kg	nr	nr	nr	nr	nr	nr	nr	nr	<0.2550 (-0.0047 ± 0.2940)	<0.2550 (-0.0100 ± 0.2940)	nr	nr	nr	nr	nr	nr	nr	nr
SM	BK15-SM-J-01-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0032 (-0.0004 ± 0.0037)	<0.0020 (-0.0004 ± 0.0024)	<0.0020 (-0.0005 ± 0.0024)	nr	nr	<0.0036 (-0.0010 ± 0.0041)	nr	nr	<0.0004 (0.0000 ± 0.0004)	0.0016 ± 0.0011	0.1630 ± 0.0276
SM	BK15-SM-J-02-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0032 (-0.0004 ± 0.0037)	<0.0020 (-0.0004 ± 0.0023)	<0.0020 (-0.0004 ± 0.0023)	nr	nr	<0.0034 (-0.0009 ± 0.0039)	nr	nr	<0.0003 (0.0001 ± 0.0004)	0.0045 ± 0.0012	0.6190 ± 0.1000
SM	BK32-SM-J-01-8	pCi/smear	<0.1280 (0.0418 ± 0.0297)	<0.1130 (-0.0183 ± 0.0159)	<0.1440 (-0.0117 ± 0.0202)	<0.1120 (0.0467 ± 0.0287)	0.1680 ± 0.0434	<0.0942 (0.0123 ± 0.0174)	0.1090 ± 0.0350	nr	nr	nr	nr	nr	nr	nr	<0.9240 (0.1290 ± 0.2750)	nr	nr	nr
SM	BK32-SM-J-01-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0032 (-0.0003 ± 0.0037)	<0.0036 (-0.0002 ± 0.0041)	<0.0036 (-0.0002 ± 0.0041)	nr	nr	<0.0037 (-0.0007 ± 0.0043)	nr	nr	<0.0004 (0.0001 ± 0.0004)	0.0015 ± 0.0011	0.1960 ± 0.0328
SM	BK33-SM-J-01-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0032 (-0.0003 ± 0.0037)	<0.0018 (-0.0004 ± 0.0021)	<0.0018 (-0.0004 ± 0.0021)	nr	nr	<0.0039 (-0.0012 ± 0.0045)	nr	nr	<0.0004 (0.0001 ± 0.0004)	0.0016 ± 0.0012	0.2000 ± 0.0336
SM	BK34-SM-J-01-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0032 (-0.0003 ± 0.0037)	<0.0019 (-0.0004 ± 0.0022)	<0.0019 (-0.0004 ± 0.0022)	nr	nr	<0.0037 (-0.0011 ± 0.0042)	nr	nr	<0.0004 (0.0001 ± 0.0004)	<0.0009 (0.0003 ± 0.0011)	0.0225 ± 0.0092
SM	BK34-SM-J-02-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0032 (-0.0002 ± 0.0037)	<0.0019 (-0.0004 ± 0.0022)	<0.0019 (-0.0004 ± 0.0022)	nr	nr	<0.0035 (-0.0011 ± 0.0040)	nr	nr	<0.0003 (0.0000 ± 0.0004)	<0.0009 (0.0003 ± 0.0010)	0.0266 ± 0.0092
SM	BK34-SM-J-03-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0032 (-0.0004 ± 0.0037)	<0.0021 (-0.0005 ± 0.0024)	<0.0021 (-0.0004 ± 0.0024)	nr	nr	<0.0035 (-0.0010 ± 0.0040)	nr	nr	<0.0004 (0.0001 ± 0.0004)	<0.0009 (0.0005 ± 0.0010)	0.0567 ± 0.0122
SM	BK00-SM-J-01-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0032 (-0.0005 ± 0.0037)	<0.0018 (-0.0002 ± 0.0021)	<0.0018 (-0.0002 ± 0.0021)	nr	nr	<0.0038 (-0.0012 ± 0.0044)	nr	nr	<0.0004 (0.0000 ± 0.0004)	<0.0009 (0.0007 ± 0.0011)	0.0832 ± 0.0160
SM	BK00-SM-J-02-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0032 (-0.0002 ± 0.0037)	<0.0020 (-0.0002 ± 0.0023)	<0.0020 (-0.0001 ± 0.0023)	nr	nr	<0.0035 (-0.0011 ± 0.0041)	nr	nr	<0.0004 (0.0000 ± 0.0004)	<0.0009 (0.0003 ± 0.0010)	0.0282 ± 0.0093
SM	BK00-SM-J-03-8	pCi/smear	<0.1250 (0.0509 ± 0.0308)	<0.0820 (-0.0086 ± 0.0121)	<0.1330 (-0.0108 ± 0.0187)	<0.0826 (0.0124 ± 0.0217)	<0.0939 (0.0400 ± 0.0261)	<0.0933 (0.0124 ± 0.0212)	<0.0939 (0.0400 ± 0.0261)	nr	nr	nr	nr	nr	nr	nr	<0.9190 (-0.1770 ± 0.2700)	nr	nr	nr
SM	BK00-SM-J-03-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0032 (-0.0005 ± 0.0037)	<0.0037 (-0.0002 ± 0.0042)	<0.0037 (-0.0003 ± 0.0042)	nr	nr	<0.0036 (-0.0007 ± 0.0041)	nr	nr	<0.0004 (0.0000 ± 0.0004)	0.0011 ± 0.0011	0.1400 ± 0.0241
SM	BK01-SM-J-01-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0032 (-0.0004 ± 0.0037)	<0.0019 (-0.0002 ± 0.0022)	<0.0019 (-0.0001 ± 0.0022)	nr	nr	<0.0039 (-0.0010 ± 0.0046)	nr	nr	<0.0004 (0.0000 ± 0.0009)	<0.0010 (0.0003 ± 0.0011)	0.0261 ± 0.0100
SM	BK01-SM-J-02-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0033 (-0.0004 ± 0.0038)	<0.0020 (-0.0001 ± 0.0023)	<0.0020 (-0.0002 ± 0.0023)	nr	nr	<0.0034 (-0.0010 ± 0.0039)	nr	nr	<0.0003 (0.0001 ± 0.0004)	<0.0009 (0.0003 ± 0.0010)	0.0256 ± 0.0089
SM	BK01-SM-J-03-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0032 (-0.0005 ± 0.0037)	<0.0019 (-0.0002 ± 0.0022)	<0.0019 (-0.0002 ± 0.0022)	nr	nr	<0.0035 (-0.0010 ± 0.0040)	nr	nr	<0.0004 (0.0000 ± 0.0004)	<0.0009 (0.0003 ± 0.0010)	0.0232 ± 0.0089
SM	BK01-SM-J-04-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0032 (-0.0003 ± 0.0037)	<0.0020 (-0.0002 ± 0.0023)	<0.0020 (-0.0001 ± 0.0023)	nr	nr	<0.0036 (-0.0011 ± 0.0041)	nr	nr	<0.0004 (0.0001 ± 0.0004)	<0.0009 (0.0003 ± 0.0010)	0.0303 ± 0.0096
SM	BK08-SM-J-01-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0032 (-0.0004 ± 0.0037)	<0.0019 (-0.0004 ± 0.0022)	<0.0019 (-0.0004 ± 0.0022)	nr	nr	<0.0034 (-0.0010 ± 0.0039)	nr	nr	<0.0003 (0.0000 ± 0.0004)	<0.0008 (0.0005 ± 0.0010)	0.0524 ± 0.0115
SM	BK09-SM-J-01-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0032 (-0.0002 ± 0.0037)	<0.0036 (-0.0001 ± 0.0042)	<0.0036 (-0.0002 ± 0.0042)	nr	nr	<0.0035 (-0.0011 ± 0.0041)	nr	nr	<0.0004 (0.0000 ± 0.0004)	<0.0009 (0.0009 ± 0.0010)	0.1360 ± 0.0234
SM	BK70-SM-J-01-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0032 (-0.0004 ± 0.0037)	<0.0038 (-0.0003 ± 0.0044)	<0.0038 (-0.0003 ± 0.0044)	nr	nr	<0.0035 (-0.0010 ± 0.0040)	nr	nr	<0.0003 (0.0000 ± 0.0004)	<0.0009 (0.0002 ± 0.0010)	0.0211 ± 0.0087
SM	BK70-SM-J-02-8	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0033 (-0.0003 ± 0.0038)	<0.0018 (-0.0001 ± 0.0021)	<0.0018 (-0.0002 ± 0.0021)	nr	nr	<0.0039 (-0.0012 ± 0.0045)	nr	nr	<0.0004 (0.0000 ± 0.0004)	<0.0010 (0.0003 ± 0.0011)	0.0234 ± 0.0097
SM	BK73-SM-J-04-8	pCi/smear	<0.1890 (0.0000 ± 0.0311)	<0.1110 (0.0000 ± 0.0206)	<0.1920 (-0.0096 ± 0.0255)	<0.1350 (-0.0096 ± 0.0216)	<0.1040 (0.0221 ± 0.0222)	<0.1400 (0.0000 ± 0.0260)	<0.1130 (0.0295 ± 0.0256)	nr	nr	nr	nr	nr	nr	nr	<0.9120 (-0.3570 ± 0.2660)	nr	nr	nr
SM	BK73-SM-J-04-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0014 (-0.0001 ± 0.0016)	<0.0014 (0.0000 ± 0.0016)	<0.0014 (0.0000 ± 0.0016)	nr	0.0006 ± 0.0004	<0.0013 (-0.0009 ± 0.0015)	0.0524 ± 0.0152	nr	<0.0001 (0.0000 ± 0.0002)	nr	nr
SM	BK73-SM-J-14-8	pCi/smear	<0.1390 (0.0488 ± 0.0337)	<0.0992 (-0.0071 ± 0.0158)	<0.1890 (-0.0237 ± 0.0237)	<0.1110 (-0.0079 ± 0.0176)	<0.1070 (0.0702 ± 0.0347)	<0.1340 (0.0000 ± 0.0247)	0.1400 ± 0.0476	nr	nr	nr	nr	nr	nr	nr	<0.9110 (-0.7220 ± 0.2630)	nr	nr	nr
SM	BK73-SM-J-14-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0014 (0.0000 ± 0.0017)	<0.0012 (0.0000 ± 0.0014)	<0.0012 (0.0000 ± 0.0014)	nr	0.0009 ± 0.0004	<0.0014 (-0.0010 ± 0.0017)	0.1300 ± 0.0213	nr	<0.0001 (0.0000 ± 0.0002)	nr	nr
SM	PB20M21KE1	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0036 (-0.0005 ± 0.0041)	<0.0040 (-0.0004 ± 0.0046)	<0.0040 (-0.0005 ± 0.0046)	nr	nr	<0.0039 (-0.0012 ± 0.0045)	nr	nr	<0.0004 (0.0000 ± 0.0004)	<0.0010 (0.0002 ± 0.0011)	0.0080 ± 0.0091
SM	PB20M21KE3	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0033 (-0.0005 ± 0.0038)	<0.0019 (-0.0005 ± 0.0022)	<0.0019 (-0.0004 ± 0.0022)	nr	nr	<0.0038 (-0.0010 ± 0.0044)	nr	nr	<0.0004 (0.0001 ± 0.0004)	<0.0010 (0.0004 ± 0.0011)	<0.0076 (0.0069 ± 0.0089)
SM	SJ18-SM-J-02-8	pCi/smear	<0.1530 (-0.0077 ± 0.0203)	<0.1420 (-0.0071 ± 0.0188)	0.3970 ± 0.0871	<0.1160 (0.0083 ± 0.0185)	0.1110 ± 0.0423	<0.1720 (0.0086 ± 0.0286)	<0.0974 (0.0069 ± 0.0155)	nr	nr	nr	nr	nr	nr	nr	<0.9160 (-0.5020 ± 0.2660)	nr	nr	nr
SM	SJ18-SM-J-02-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0014 (0.0000 ± 0.0016)	<0.0014 (0.0000 ± 0.0016)	<0.0014 (0.0000 ± 0.0016)	nr	0.0007 ± 0.0004	<0.0014 (-0.0009 ± 0.0016)	0.0981 ± 0.0162	nr	<0.0001 (0.0000 ± 0.0002)	nr	nr
SM	SJ33-SM-J-02-8	pCi/smear	<0.1500 (0.0528 ± 0.0364)	<0.1050 (0.0137 ± 0.0194)	<0.2250 (-0.0077 ± 0.0277)	<0.1260 (0.0000 ± 0.0233)	<0.1150 (0.0000 ± 0.0213)	<0.1310 (-0.0094 ± 0.0209)	<0.1150 (0.0301 ± 0.0261)	nr	nr	nr	nr	nr	nr	nr	<0.9160 (-0.5450 ± 0.2660)	nr	nr	nr
SM	SJ33-SM-J-02-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0014 (0.0000 ± 0.0016)	<0.0013 (0.0000 ± 0.0016)	<0.0013 (0.0000 ± 0.0016)	nr	0.0007 ± 0.0004	<0.0013 (-0.0009 ± 0.0016)	0.1000 ± 0.0165	nr	<0.0001 (0.0000 ± 0.0002)	nr	nr
SM	SJ34-SM-J-02-8	pCi/smear	<0.1580 (-0.0143 ± 0.0202)	<0.1690 (0.0000 ± 0.0264)	<0.1160 (-0.0082 ± 0.0184)	<0.1430 (0.0000 ± 0.0202)	0.1120 ± 0.0426	<0.1330 (0.0174 ± 0.0246)	<0.1070 (0.0140 ± 0.0198)	nr	nr	nr	nr	nr	nr	nr	<0.9140 (-0.0543 ± 0.2700)	nr	nr	nr
SM	SJ34-SM-J-02-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0015 (-0.0001 ± 0.0017)	<0.0014 (0.0000 ± 0.0016)	<0.0014 (0.0000 ± 0.0016)	nr	0.0005 ± 0.0004	<0.0014 (-0.0010 ± 0.0017)	0.0835 ± 0.0139	nr	<0.0001 (0.0000 ± 0.0002)	nr	nr
SM	SJ35-SM-J-10-8	pCi/smear	<0.1260 (0.0145 ± 0.0229)	<0.1240 (-0.0142 ± 0.0174)	<0.1740 (-0.0158 ± 0.0223)	<0.1110 (0.0236 ± 0.0237)	0.1290 ± 0.0464	<0.1260 (0.0268 ± 0.0269)	<0.1010 (0.0547 ± 0.0333)	nr	nr	nr	nr	nr	nr	nr	<0.9150 (-0.1980 ± 0.2690)	nr	nr	nr
SM	SJ35-SM-J-10-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0014 (0.0000 ± 0.0016)	<0.0014 (0.0000 ± 0.0016)	<0.0014 (0.0000 ± 0.0016)	nr	0.0008 ± 0.0004	<0.0014 (-0.0009 ± 0.0016)	0.0820 ± 0.0137	nr	<0.0001 (0.0000 ± 0.0002)	nr	nr
SM	SJ36-SM-J-03-8	pCi/smear	<0.1180 (0.0154 ± 0.0218)	<0.1050 (0.0138 ± 0.0195)	<0.1550 (-0.0078 ± 0.0206)	<0.1090 (0.0078 ± 0.0174)	<0.0969 (0.0483 ± 0.0286)	<0.1310 (0.0343 ± 0.0298)	<0.1060 (0.0276 ± 0.0240)	nr	nr	nr	nr	nr	nr	nr	<0.9200 (-0.1670 ± 0.2700)	nr	nr	nr
SM	SJ36-SM-J-03-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0015 (-0.0001 ± 0.0018)	<0.0014 (0.0000 ± 0.0016)	<0.0014 (0.0000 ± 0.0016)	nr	0.0004 ± 0.0004	<0.0014 (-0.0009 ± 0.0017)	0.0581 ± 0.0100	nr	<0.0001 (0.0000 ± 0.0002)	nr	nr
SM	SJ37-SM-J-02-8	pCi/smear	<0.1830 (-0.0076 ± 0.0275)	<0.1170 (0.0000 ± 0.0193)	<0.2050 (-0.0159 ± 0.0268)	<0.1120 (0.0239 ± 0.0239)	<0.1150 (0.0151 ± 0.0213)	<0.1430 (0.0188 ± 0.0266)	<0.1060 (0.0075 ± 0.0169)	nr	nr	nr	nr	nr	nr	nr	<0.9210 (-0.1630 ± 0.2710)	nr	nr	nr
SM	SJ37-SM-J-02-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0014 (0.0000 ± 0.0016)	<0.0014 (0.0000 ± 0.0016)	<0.0014 (0.0000 ± 0.0016)	nr	0.0004 ± 0.0004	<0.0013 (-0.0009 ± 0.0015)	0.0683 ± 0.0114	nr	<0.0001 (0.0000 ± 0.0001)	nr	nr
SM	SJ37-SM-J-12-8	pCi/smear	<0.1590 (-0.0144 ± 0.0203)	<0.1090 (-0.0078 ± 0.0174)	<0.1390 (0.0000 ± 0.0196)	<0.1220 (0.0202 ± 0.0278)	<0.1100 (0.0374 ± 0.0323)	<0.1370 (0.0178 ± 0.0253)	<0.1010 (0.0359 ± 0.0260)	nr	nr	nr	nr	nr	nr	nr	<0.9200 (-0.1860 ± 0.2700)	nr	nr	nr
SM	SJ37-SM-J-12-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0014 (0.0000 ± 0.0017)	<0.0013 (0.0000 ± 0.0015)	<0.0013 (0.0000 ± 0.0015)	nr	0.0005 ± 0.0004	<0.0013 (-0.0009 ± 0.0016)	0.0729 ± 0.0122	nr	<0.0001 (0.0000 ± 0.0002)	nr	nr
SM	SJ38-SM-J-04-8	pCi/smear	<0.1880 (0.0146 ± 0.0344)	<0.1080 (0.0000 ± 0.0200)	<0.1200 (0.0256 ± 0.0256)	<0.1200 (0.0085 ± 0.0191)	<0.1130 (0.0740 ± 0.0366)	<0.1410 (0.0000 ± 0.0261)	<0.1130 (0.0592 ± 0.0334)	nr	nr	nr	nr	nr	nr	nr	<0.9150 (-0.2260 ± 0.2690)	nr	nr	nr
SM	SJ38-SM-J-04-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0015 (-0.0001 ± 0.0017)	<0.0015 (0.0000 ± 0.0017)	<0.0015 (0.0000 ± 0.0017)	nr	0.0008 ± 0.0004	<0.0014 (-0.0010 ± 0.0017)	0.1260 ± 0.0206	nr	<0.0001 (0.0000 ± 0.0002)	nr	nr
SM	SJ39-SM-J-01-8	pCi/smear	<0.1130 (0.0148 ± 0.0209)	<0.1090 (0.0285 ± 0.0248)	<0.1600 (-0.0241 ± 0.0213)	<0.1230 (0.0481 ± 0.0322)	<0.1090 (0.0223 ± 0.0234)	<0.1480 (0.0000 ± 0.0274)	<0.1190 (0.1060 ± 0.0446)	nr	nr	nr	nr	nr	nr	nr	<0.9140 (-0.2920 ± 0.2680)	nr	nr	nr
SM	SJ39-SM-J-01-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0015 (0.0000 ± 0.0017)	<0.0014 (0.0000 ± 0.0017)	<0.0014 (0.0000 ± 0.0017)	nr	0.0008 ± 0.0004	<0.0014 (-0.0009 ± 0.0016)	0.1550 ± 0.0253	nr	<0.0001 (0.0000 ± 0.0002)	nr	nr
SM	SJ39-SM-J-11-8	pCi/smear	<0.1240 (0.0572 ± 0.0339)	<0.1380 (-0.0069 ± 0.0183)	<0.1430 (-0.0164 ± 0.0201)	<0.1260 (0.0856 ± 0.0370)	0.1110 ± 0.0432	<0.1290 (-0.0092 ± 0.0206)	<0.1130 (0.0740 ± 0.0366)	nr	nr	nr	nr	nr	nr	nr	<0.9110 (0.1320 ± 0.2720)	nr	nr	nr
SM	SJ39-SM-J-11-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0015 (0.0000 ± 0.0017)	<0.0014 (0.0000 ± 0.0017)	<0.0014 (0.0000 ± 0.0017)	nr	<0.0013 (-0.0001 ± 0.0015)	<0.0013 (-0.0009 ± 0.0015)	0.1200 ± 0.0195	nr	<0.0001 (0.0000 ± 0.0002)	nr	nr
SM	SJ40-SM-J-02-8	pCi/smear	<0.1540 (0.0139 ± 0.0279)	<0.1130 (0.0000 ± 0.0209)	<0.1220 (0.0000 ± 0.0225)	<0.1120 (0.0079 ± 0.0178)	<0.1060 (0.0678 ± 0.0349)	<0.1320 (-0.0094 ± 0.0210)	<0.1150 (0.0000 ± 0.0213)	nr	nr	nr	nr	nr	nr	nr	<0.9140 (-0.6200 ± 0.2650)	nr	nr	nr
SM	SJ40-SM-J-02-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0014 (0.0000 ± 0.0016)	<0.0014 (0.0000 ± 0.0017)	<0.0014 (0.0000 ± 0.0017)	nr	0.0008 ± 0.0004	<0.0013 (-0.0009 ± 0.0015)	0.1040 ± 0.0171	nr	<0.0001 (0.0000 ± 0.0002)	nr	nr
SM	SJ41-SM-J-05-8	pCi/smear	<0.1440 (0.0360 ± 0.0316)	<0.1130 (0.0000 ± 0.0209)	<0.1880 (-0.0078 ± 0.0263)	<0.1200 (0.0627 ± 0.0353)	<0.1060 (0.0415 ± 0.0278)	<0.1320 (0.0172 ± 0.0243)	<0.1060 (0.0276 ± 0.0240)	nr	nr	nr	nr	nr	nr	nr	<0.9130 (-0.1590 ± 0.2690)	nr	nr	nr
SM	SJ41-SM-J-05-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0014 (-0.0001 ± 0.0016)	<0.0014 (0.0000 ± 0.0017)	<0.0014 (0.0000 ± 0.0017)	nr	0.0010 ± 0.0005	<0.0016 (-0.0010 ± 0.0018)	0.1850 ± 0.0301	nr	<0.0002 (0.0000 ± 0.0002)	nr	nr
SM	SJ42-SM-J-02-8	pCi/smear	<0.2030 (0.0000 ± 0.0334)	<0.1710 (-0.0310 ± 0.0220)	<0.1700 (0.0085 ± 0.0262)	<0.1200 (0.0255 ± 0.0256)	0.1640 ± 0.0536	<0.1490 (0.0194 ± 0.0275)	0.1410 ± 0.0504	nr	nr	nr	nr	nr	nr	nr	<0.9140 (-0.6370 ± 0.2650)	nr	nr	nr
SM	SJ42-SM-J-02-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0014 (0.0000 ± 0.0016)	<0.0013 (0.0000 ± 0.0016)	<0.0013 (0.0000 ± 0.0016)	nr	0.0018 ± 0.0005	<0.0015 (-0.0010 ± 0.0017)	0.2430 ± 0.0394	nr	<0.0001 (0.0000 ± 0.0002)	nr	nr
SM	SJ43-SM-J-07-8	pCi/smear	<0.1500 (0.0375 ± 0.0329)	<0.1270 (0.0000 ± 0.0179)	<0.1880 (-0.0235 ± 0.0235)	<0.1100 (0.0235 ± 0.0235)	<0.1110 (0.0745 ± 0.0205)	<0.1380 (0.0180 ± 0.0255)	<0.1110 (0.0434 ± 0.0291)	nr	nr	nr	nr	nr	nr	nr	<0.9180 (-0.0653 ± 0.2710)	nr	nr	nr
SM	SJ43-SM-J-07-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0016 (0.0000 ± 0.0018)	<0.0014 (-0.0001 ± 0.0016)	<0.0014 (0.0000 ± 0.0016)	nr	0.0006 ± 0.0004	<0.0013 (-0.0009 ± 0.0015)	0.0966 ± 0.0159	nr	<0.0001 (0.0000 ± 0.0002)	nr	nr
SM	SJ43-SM-J-16-8	pCi/smear	<0.1480 (0.0669 ± 0.0390)	<0.1090 (0.0000 ± 0.0202)	<0.1210 (0.0475 ± 0.0318)	<0.1110 (0.0554 ± 0.0329)	<0.1090 (0.0709 ± 0.0351)	<0.1760 (-0.0088 ± 0.0234)	<0.0997 (0.0638 ± 0.0328)	nr	nr	nr	nr	nr	nr	nr	<0.9140 (-0.3990 ± 0.2670)	nr	nr	nr
SM	SJ43-SM-J-16-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0016 (0.0000 ± 0.0019)	<0.0014 (0.0000 ± 0.0016)	<0.0014 (0.0000 ± 0.0016)	nr	0.0011 ± 0.0004	<0.0014 (-0.0010 ± 0.0016)	0.1770 ± 0.0288	nr	<0.0001 (0.0000 ± 0.0002)	nr	nr
SM	SJ44-SM-J-04-8	pCi/smear	<0.1550 (-0.0078 ± 0.0206)	<0.1270 (0.0000 ± 0.0178)	<0.2130 (-0.0389 ± 0.0260)	<0.1190 (0.0000 ± 0.0220)	<0.1110 (0.0082 ± 0.0329)	<0.1270 (-0.0091 ± 0.0203)	<0.1110 (0.0251 ± 0.0253)	nr	nr	nr	nr	nr	nr	nr	<0.9110 (-0.5460 ± 0.2650)	nr	nr	nr
SM	SJ44-SM-J-04-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0015 (0.0000 ± 0.0018)	<0.0015 (0.0000 ± 0.0017)	<0.0015 (0.0000 ± 0.0017)	nr	0.0021 ± 0.0005	<0.0014 (-0.0009 ± 0.0016)	0.1430 ± 0.0233	nr	<0.0001 (0.0001 ± 0.0002)	nr	nr
SM	SJ45-SM-J-06-8	pCi/smear	<0.1650 (0.0299 ± 0.0335)	<0.1180 (-0.0064 ± 0.0187)	<0.1090 (0.0541 ± 0.0321)	<0.1340 (0.0464 ± 0.0329)	<0.1140 (0.0894 ± 0.0399)	<0.1420 (0.0000 ± 0.0262)	<0.1140 (0.0149 ± 0.0211)	nr	nr	nr	nr	nr	nr	nr	<0.9130 (-0.0134 ± 0.2710)	nr	nr	nr
SM	SJ45-SM-J-06-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0015 (-0.0001 ± 0.0017)	<0.0016 (0.0000 ± 0.0018)	<0.0016 (0.0000 ± 0.0018)	nr	0.0006 ± 0.0004	<0.0013 (-0.0008 ± 0.0015)	0.0966 ± 0.0159	nr	<0.0001 (0.0000 ± 0.0001)	nr	nr
SM	SJ45-SM-J-18-8	pCi/smear	<0.1250 (0.0000 ± 0.0177)	<0.1270 (0.0000 ± 0.0239)	<0.1720 (0.0776 ± 0.0442)	<0.1090 (0.0388 ± 0.0281)	<0.1040 (0.0546 ± 0.0307)	<0.1190 (-0.0085 ± 0.0190)	<0.0958 (0.0341 ± 0.0247)	nr	nr	nr	nr	nr	nr	nr	<0.9110 (-0.7280 ± 0.2630)	nr	nr	nr
SM	SJ45-SM-J-18-8	ug/smear	nr	nr	nr	nr	nr	nr	nr	<0.0016 (0.0000 ± 0.0018)	<0.0015 (0.0000 ± 0.0017)	<0.0015 (0.0000 ± 0.0017)	nr	0.0008 ± 0.0004	<0.0014 (-0.0009 ± 0.0016)	0.0918 ± 0.0152	nr	<0.0001 (0.0000 ± 0.0002)	nr	nr
SO	S34350001	pCi/g	<0.0287 (0.0100 ± 0.0149)	<0.0182 (0.0000 ± 0.0067)	<0.0220 (0.0000 ± 0.0094)	<0.0313 (0.0000 ± 0.0083)	1.1300 ± 0.1520	0.0600 ± 0.0304	1.0900 ± 0.1860	nr	nr	nr	nr	nr	nr	nr	<0.4040 (0.1800 ± 0.2450)	nr

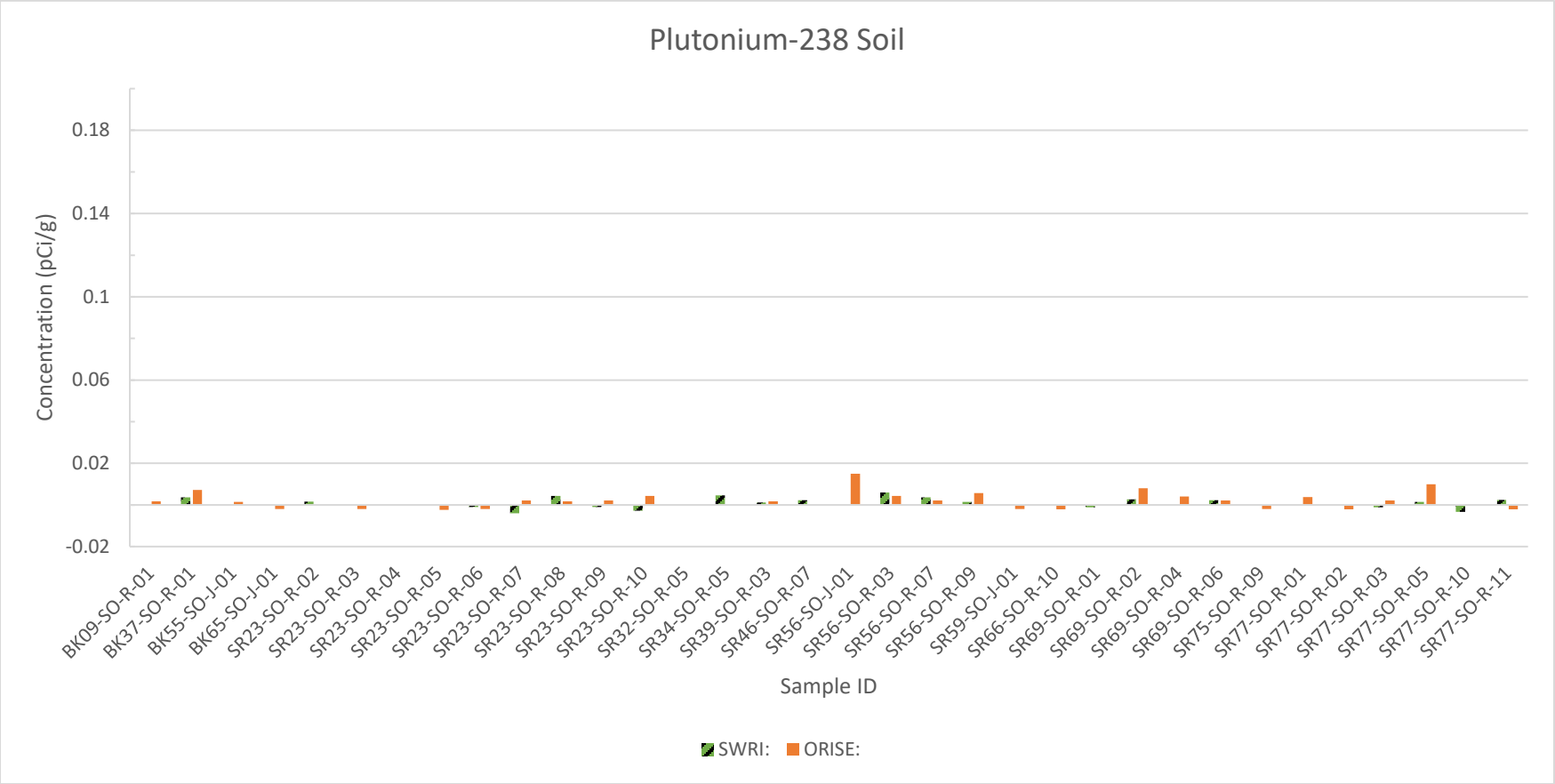
Table A-5 is also included as a separate pdf.

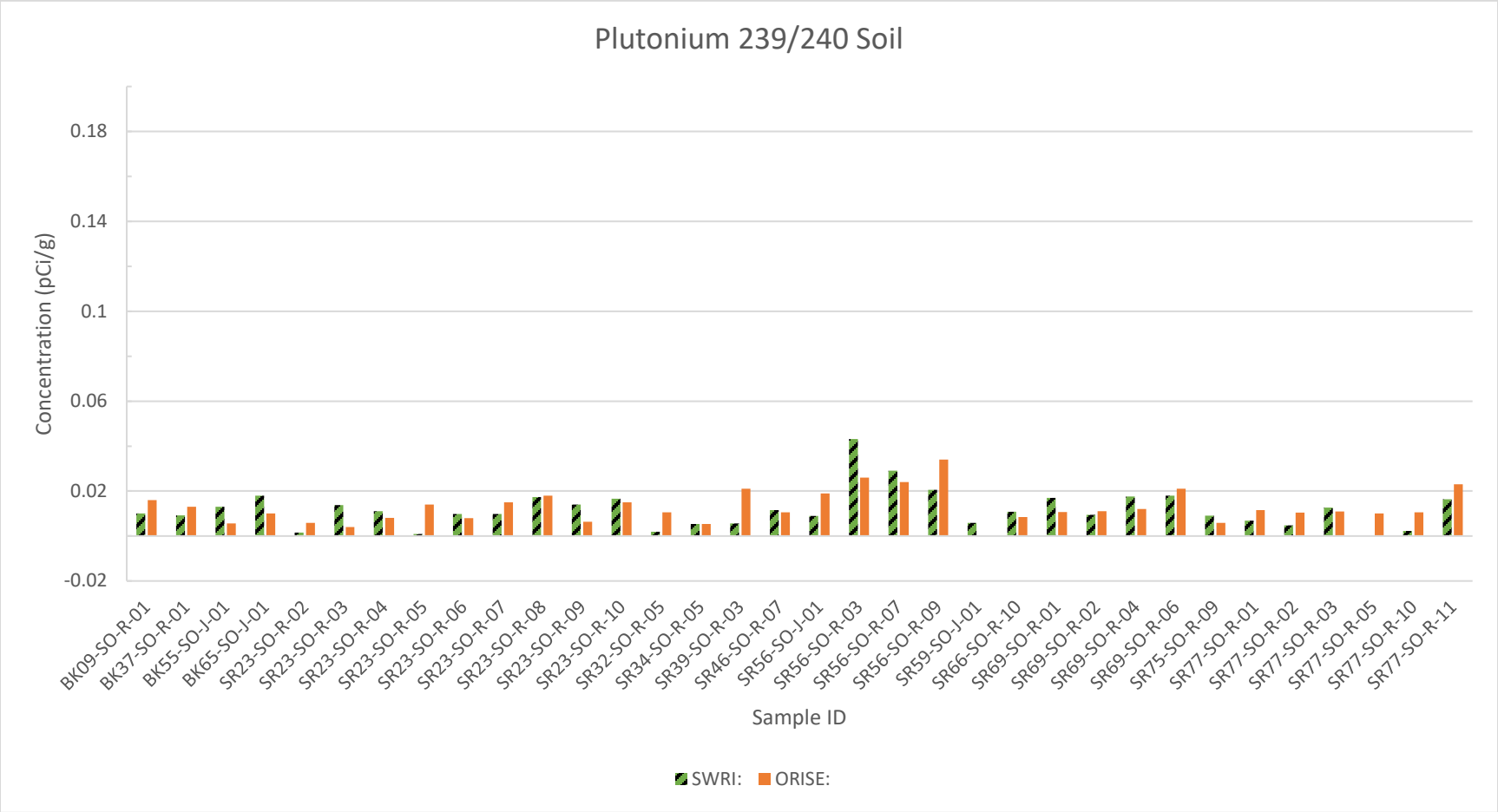
		Analysis ⇕				Alpha								DRC II				LSC		NextION	
		Isotope ⇕	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Neptunium-237	Plutonium-239	Plutonium-240	Uranium-234	Uranium-235	Uranium-236	Uranium-238	Technetium-99	Uranium-234	Uranium-235	Uranium-238
Matrix	Sample ID	Units ⇕	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
SO	S34350028	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1060 (-0.0054 ± 0.1220)	<0.1500 (-0.0048 ± 0.1730)	<0.1500 (-0.0052 ± 0.1730)	0.1230 ± 0.0686	16.0000 ± 3.0800	<0.1420 (-0.0138 ± 0.1640)	2250.0000 ± 364.0000	nr	nr	nr	nr
SO	S34350033	pCi/g	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	<0.3900 (0.2500 ± 0.2400)	nr	nr	nr
SO	S34350033	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1190 (-0.0039 ± 0.1370)	<0.1340 (-0.0043 ± 0.1550)	<0.1340 (-0.0032 ± 0.1550)	0.1400 ± 0.0615	18.9000 ± 3.3700	<0.1240 (-0.0148 ± 0.1430)	2640.0000 ± 427.0000	nr	nr	nr	nr
SO	S34350035	pCi/g	<0.0263 (0.0000 ± 0.0096)	<0.0181 (0.0000 ± 0.0082)	<0.0222 (0.0000 ± 0.0082)	<0.0290 (0.0000 ± 0.0113)	1.4500 ± 0.2390	0.0800 ± 0.0353	1.5200 ± 0.2490	nr	nr	nr	nr	nr	nr	nr	<0.4000 (0.0200 ± 0.2380)	nr	nr	nr
SO	S34350035	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.0922 (-0.0048 ± 0.1060)	<0.1440 (-0.0027 ± 0.1660)	<0.1440 (-0.0080 ± 0.1660)	0.2420 ± 0.0702	31.4000 ± 5.2800	<0.1260 (-0.0098 ± 0.1460)	4520.0000 ± 731.0000	nr	nr	nr	nr
SO	S34350039	pCi/g	<0.0196 (0.0100 ± 0.0096)	<0.0221 (0.0000 ± 0.0082)	<0.0282 (0.0000 ± 0.0079)	<0.0248 (0.0100 ± 0.0113)	1.1000 ± 0.1910	0.0800 ± 0.0345	1.1500 ± 0.1970	nr	nr	nr	nr	nr	nr	nr	<0.3560 (0.0950 ± 0.2140)	nr	nr	nr
SO	S34350039	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1180 (0.0011 ± 0.1360)	<0.1480 (-0.0054 ± 0.1710)	<0.1480 (-0.0041 ± 0.1710)	0.1920 ± 0.0622	23.0000 ± 3.9600	<0.1170 (-0.0118 ± 0.1350)	3250.0000 ± 526.0000	nr	nr	nr	nr
SO	S34350042	pCi/g	<0.0216 (0.0100 ± 0.0128)	<0.0220 (0.0000 ± 0.0070)	<0.0202 (0.0000 ± 0.0064)	<0.0220 (0.0000 ± 0.0081)	0.8600 ± 0.1500	0.0400 ± 0.0213	0.8500 ± 0.1480	nr	nr	nr	nr	nr	nr	nr	<0.3580 (0.1900 ± 0.2180)	nr	nr	nr
SO	S34350042	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1100 (-0.0020 ± 0.1270)	<0.1360 (-0.0015 ± 0.1570)	<0.1360 (-0.0053 ± 0.1570)	0.1660 ± 0.0565	20.2000 ± 3.5000	<0.1080 (-0.0070 ± 0.1250)	2870.0000 ± 464.0000	nr	nr	nr	nr
SO	S34350044	pCi/g	<0.0303 (0.0100 ± 0.0157)	<0.0210 (0.0000 ± 0.0059)	<0.0187 (0.0000 ± 0.0080)	<0.0204 (0.0200 ± 0.0163)	0.6900 ± 0.1310	0.0400 ± 0.0260	0.7100 ± 0.1340	nr	nr	nr	nr	nr	nr	nr	<0.4220 (0.0900 ± 0.2530)	nr	nr	nr
SO	S34350044	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1120 (-0.0085 ± 0.1290)	<0.1300 (-0.0034 ± 0.1500)	<0.1300 (-0.0009 ± 0.1500)	0.1230 ± 0.0649	17.2000 ± 3.1800	<0.1340 (-0.0106 ± 0.1550)	2390.0000 ± 387.0000	nr	nr	nr	nr
SO	S34350046	pCi/g	<0.0294 (0.0100 ± 0.0119)	<0.0264 (0.0000 ± 0.0098)	0.0300 ± 0.0190	<0.0211 (0.0100 ± 0.0137)	1.0600 ± 0.1760	0.0700 ± 0.0364	1.0100 ± 0.1700	nr	nr	nr	nr	nr	nr	nr	<0.4070 (0.2200 ± 0.2480)	nr	nr	nr
SO	S34350046	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1340 (-0.0040 ± 0.1550)	<0.1320 (0.0030 ± 0.1520)	<0.1320 (0.0024 ± 0.1520)	0.1540 ± 0.0554	18.8000 ± 3.2800	<0.1070 (-0.0086 ± 0.1240)	2710.0000 ± 438.0000	nr	nr	nr	nr
SO	B439-SO-R-01-8	pCi/g	<0.0093 (0.0049 ± 0.0027)	<0.0410 (0.0000 ± 0.0067)	<0.0128 (0.0000 ± 0.0024)	<0.0240 (0.0100 ± 0.0058)	1.4200 ± 0.1050	0.0562 ± 0.0109	1.3700 ± 0.1020	nr	nr	nr	nr	nr	nr	nr	<0.3910 (-0.0699 ± 0.1150)	nr	nr	nr
SO	B439-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2580 (-0.0615 ± 0.2980)	<0.1390 (-0.0177 ± 0.1610)	<0.1390 (-0.0212 ± 0.1610)	nr	nr	<0.2740 (-0.0322 ± 0.3160)	nr	nr	0.1830 ± 0.0699	23.9000 ± 4.1800	3350.0000 ± 542.0000
SO	B410-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2560 (-0.0550 ± 0.2880)	<0.1210 (-0.0151 ± 0.1400)	<0.1210 (-0.0213 ± 0.1400)	nr	nr	<0.2620 (0.0099 ± 0.3030)	nr	nr	0.2270 ± 0.0708	29.9000 ± 5.0700	4370.0000 ± 707.0000
SO	B411-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2300 (-0.0560 ± 0.2660)	<0.1400 (-0.0192 ± 0.1620)	<0.1400 (-0.0182 ± 0.1620)	nr	nr	<0.2470 (0.0328 ± 0.2850)	nr	nr	0.1950 ± 0.0652	25.6000 ± 4.3800	3660.0000 ± 592.0000
SO	B412-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2100 (-0.0552 ± 0.2430)	<0.1320 (-0.0166 ± 0.1520)	<0.1320 (-0.0200 ± 0.1520)	nr	nr	<0.2170 (-0.0323 ± 0.2510)	nr	nr	0.1620 ± 0.0565	21.5000 ± 3.7000	3060.0000 ± 495.0000
SO	B415-SO-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2370 (-0.0616 ± 0.2740)	<0.1870 (-0.0156 ± 0.2160)	<0.1870 (-0.0276 ± 0.2160)	nr	nr	<0.2150 (-0.0349 ± 0.2480)	nr	nr	0.1470 ± 0.0549	21.0000 ± 3.6100	2950.0000 ± 477.0000
SO	B416-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2750 (-0.0706 ± 0.3180)	<0.1880 (-0.0152 ± 0.2170)	<0.1880 (-0.0232 ± 0.2170)	nr	nr	<0.2360 (-0.0421 ± 0.2730)	nr	nr	0.2500 ± 0.0678	30.2000 ± 5.0700	4340.0000 ± 702.0000
SO	B418-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.4880 (-0.1220 ± 0.5640)	<0.1180 (-0.0156 ± 0.1360)	<0.1180 (-0.0130 ± 0.1360)	nr	nr	<0.3140 (-0.0421 ± 0.3630)	nr	nr	0.2760 ± 0.0852	35.6000 ± 6.0400	5030.0000 ± 813.0000
SO	B421-SO-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.3370 (-0.0874 ± 0.3890)	<0.1090 (-0.0166 ± 0.1260)	<0.1090 (-0.0156 ± 0.1260)	nr	nr	<0.2600 (-0.0377 ± 0.3000)	nr	nr	0.2590 ± 0.0732	33.6000 ± 5.6400	4740.0000 ± 767.0000
SO	B422-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2420 (-0.0527 ± 0.2800)	<0.1310 (-0.0131 ± 0.1510)	<0.1310 (-0.0181 ± 0.1510)	nr	nr	<0.2620 (-0.0357 ± 0.3030)	nr	nr	0.3470 ± 0.0826	44.0000 ± 7.2700	6190.0000 ± 1000.0000
SO	B423-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2200 (-0.0530 ± 0.2540)	<0.1210 (-0.0110 ± 0.1400)	<0.1210 (-0.0179 ± 0.1400)	nr	nr	<0.2050 (-0.0246 ± 0.2370)	nr	nr	0.2380 ± 0.0610	30.3000 ± 5.0400	4220.0000 ± 682.0000
SO	B424-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2060 (-0.0487 ± 0.2380)	<0.1610 (-0.0188 ± 0.1860)	<0.1610 (-0.0195 ± 0.1860)	nr	nr	<0.2310 (-0.0316 ± 0.2670)	nr	nr	0.1640 ± 0.0595	21.4000 ± 3.7100	3030.0000 ± 490.0000
SO	B425-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.3630 (-0.0893 ± 0.4190)	<0.1210 (-0.0131 ± 0.1400)	<0.1210 (-0.0148 ± 0.1400)	nr	nr	<0.2380 (-0.0339 ± 0.2750)	nr	nr	0.2450 ± 0.0678	28.8000 ± 4.8600	4140.0000 ± 670.0000
SO	B427-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1760 (-0.0481 ± 0.2030)	<0.1140 (-0.0126 ± 0.1320)	<0.1140 (-0.0238 ± 0.1320)	nr	nr	<0.2160 (-0.0269 ± 0.2490)	nr	nr	0.1610 ± 0.0564	20.5000 ± 3.5400	2880.0000 ± 466.0000
SO	B428-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2060 (-0.0481 ± 0.2380)	<0.1350 (-0.0157 ± 0.1560)	<0.1350 (-0.0168 ± 0.1560)	nr	nr	<0.2000 (-0.0291 ± 0.2310)	nr	nr	0.1920 ± 0.0556	24.1000 ± 4.0600	3420.0000 ± 553.0000
SO	B429-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1730 (-0.0414 ± 0.2000)	<0.1340 (-0.0098 ± 0.1550)	<0.1340 (-0.0145 ± 0.1550)	nr	nr	<0.1890 (-0.0204 ± 0.2180)	nr	nr	0.1640 ± 0.0510	19.9000 ± 3.4000	2810.0000 ± 454.0000
SO	B437-SO-R-01-8	pCi/g	<0.0210 (0.0052 ± 0.0045)	<0.0092 (0.0024 ± 0.0021)	<0.0227 (0.0037 ± 0.0045)	<0.0141 (0.0092 ± 0.0046)	0.9010 ± 0.0664	0.0297 ± 0.0066	0.9270 ± 0.0681	nr	nr	nr	nr	nr	nr	nr	<0.3480 (-0.1140 ± 0.1020)	nr	nr	nr
SO	B437-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2180 (-0.0527 ± 0.2520)	<0.1230 (-0.0159 ± 0.1420)	<0.1230 (-0.0140 ± 0.1420)	nr	nr	<0.2250 (-0.0212 ± 0.2600)	nr	nr	0.1710 ± 0.0589	22.0000 ± 3.7900	3150.0000 ± 509.0000
SO	B438-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2110 (-0.0528 ± 0.2440)	<0.1230 (-0.0120 ± 0.1420)	<0.1230 (-0.0159 ± 0.1420)	nr	nr	<0.2090 (-0.0330 ± 0.2410)	nr	nr	0.1720 ± 0.0557	22.9000 ± 3.8900	3230.0000 ± 522.0000
SO	B439-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1830 (-0.0494 ± 0.2110)	<0.1190 (-0.0141 ± 0.1370)	<0.1190 (-0.0168 ± 0.1370)	nr	nr	<0.2360 (-0.0342 ± 0.2730)	nr	nr	0.1770 ± 0.0616	23.1000 ± 3.9800	3240.0000 ± 524.0000
SO	B440-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1650 (-0.0269 ± 0.1910)	<0.1330 (-0.0153 ± 0.1540)	<0.1330 (-0.0171 ± 0.1540)	nr	nr	<0.2360 (-0.0351 ± 0.2730)	nr	nr	0.1420 ± 0.0591	19.4000 ± 3.4200	2720.0000 ± 440.0000
SO	B441-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2320 (-0.0609 ± 0.2680)	<0.2120 (-0.0021 ± 0.2450)	<0.2120 (-0.0037 ± 0.2450)	nr	nr	<0.1880 (-0.0481 ± 0.2170)	nr	nr	0.1590 ± 0.0505	21.6000 ± 3.6600	3090.0000 ± 500.0000
SO	B442-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2890 (-0.0639 ± 0.3340)	<0.3050 (0.0061 ± 0.3520)	<0.3050 (0.0217 ± 0.3520)	nr	nr	<0.2960 (-0.0611 ± 0.3730)	nr	nr	0.2150 ± 0.0645	30.1000 ± 5.0500	4290.0000 ± 694.0000
SO	B443-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2850 (-0.0705 ± 0.3290)	<0.2580 (0.0062 ± 0.2980)	<0.2580 (0.0134 ± 0.2980)	nr	nr	<0.2040 (-0.0581 ± 0.2360)	nr	nr	0.1740 ± 0.0549	24.3000 ± 4.1000	3510.0000 ± 568.0000
SO	B444-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.3920 (-0.0973 ± 0.4530)	<0.2740 (0.0021 ± 0.3160)	<0.2740 (0.0264 ± 0.3160)	nr	nr	<0.2760 (-0.0617 ± 0.3190)	nr	nr	0.8410 ± 0.1500	105.0000 ± 17.1000	14500.0000 ± 2340.0000
SO	B445-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.3750 (-0.1000 ± 0.4330)	<0.2720 (0.0040 ± 0.3140)	<0.2720 (0.0076 ± 0.3140)	nr	nr	<0.3110 (-0.0829 ± 0.3590)	nr	nr	0.8230 ± 0.1510	108.0000 ± 17.6000	15100.0000 ± 2440.0000
SO	B446-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.3560 (-0.1020 ± 0.4110)	<0.3900 (0.0038 ± 0.4500)	<0.3900 (0.0233 ± 0.4500)	nr	nr	<0.2560 (-0.0701 ± 0.2963)	nr	nr	0.4960 ± 0.0896	63.0000 ± 10.3000	8800.0000 ± 1420.0000
SO	B447-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.3550 (-0.0722 ± 0.3520)	<0.8530 (-0.1220 ± 0.9270)	<0.8530 (-0.1323 ± 0.9270)	nr	nr	<0.2380 (-0.0700 ± 0.2750)	nr	nr	0.3020 ± 0.0735	39.3000 ± 6.5000	5510.0000 ± 891.0000
SO	B448-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.3060 (-0.0796 ± 0.3540)	<0.6370 (-0.1120 ± 0.7360)	<0.6370 (-0.1030 ± 0.7360)	nr	nr	<0.2350 (-0.0599 ± 0.2720)	nr	nr	0.3420 ± 0.0774	44.7000 ± 7.3500	6300.0000 ± 1020.0000
SO	B449-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2850 (-0.0714 ± 0.3290)	<0.6680 (-0.1010 ± 0.7725)	<0.6680 (-0.0771 ± 0.7715)	nr	nr	<0.2300 (-0.0606 ± 0.2660)	nr	nr	0.2720 ± 0.0691	36.0000 ± 5.9700	5030.0000 ± 813.0000
SO	B435-SO-J-01-8	pCi/g	<0.0231 (0.0118 ± 0.0058)	<0.0088 (-0.0009 ± 0.0013)	<0.0235 (0.0000 ± 0.0040)	0.0130 ± 0.0050	0.6010 ± 0.0470	0.0232 ± 0.0060	0.6370 ± 0.0494	nr	nr	nr	nr	nr	nr	nr	<0.3450 (-0.0563 ± 0.1020)	nr	nr	nr
SO	B435-SO-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2830 (-0.0691 ± 0.3270)	<0.6690 (-0.0889 ± 0.7730)	<0.6690 (-0.0795 ± 0.7730)	nr	nr	<0.2320 (-0.0582 ± 0.2680)	nr	nr	0.1050 ± 0.0562	14.6000 ± 2.7100	2070.0000 ± 335.0000
SO	B436-SO-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.3660 (-0.0894 ± 0.4230)	<0.7310 (-0.0795 ± 0.8440)	<0.7310 (-0.0995 ± 0.8440)	nr	nr	<0.2390 (-0.0677 ± 0.2760)	nr	nr	0.1560 ± 0.0606	19.6000 ± 3.4300	2830.0000 ± 458.0000
SO	B437-SO-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2740 (-0.0648 ± 0.3170)	<0.6400 (-0.0796 ± 0.7390)	<0.6400 (-0.0814 ± 0.7390)	nr	nr	<0.2500 (-0.0637 ± 0.2890)	nr	nr	0.2790 ± 0.0733	36.6000 ± 6.0900	5180.0000 ± 838.0000
SO	B438-SO-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.3920 (-0.0940 ± 0.4530)	<0.6490 (-0.0840 ± 0.7500)	<0.6490 (-0.0712 ± 0.7490)	nr	nr	<0.2660 (-0.0710 ± 0.3070)	nr	nr	0.2600 ± 0.0744	33.4000 ± 5.6100	4730.0000 ± 765.0000
SO	B439-SO-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.4670 (-0.1090 ± 0.5400)	<0.8770 (-0.1150 ± 1.0100)	<0.8770 (-0.1140 ± 1.0100)	nr	nr	<0.2410 (-0.0717 ± 0.2790)	nr	nr	0.1060 ± 0.0582	14.7000 ± 2.7500	2070.0000 ± 335.0000
SO	B432-SO-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2440 (-0.0577 ± 0.2820)	<0.6670 (-0.1070 ± 0.7700)	<0.6670 (-0.0915 ± 0.7700)	nr	nr	<0.2160 (-0.0548 ± 0.2500)	nr	nr	0.1630 ± 0.0563	23.2000 ± 3.9500	3350.0000 ± 542.0000
SO	B433-SO-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2240 (-0.0529 ± 0.2590)	<0.5580 (-0.0797 ± 0.6440)	<0.5580 (-0.0681 ± 0.6440)	nr	nr	<0.2090 (-0.0537 ± 0.2410)	nr	nr	0.1320 ± 0.0529	18.5000 ± 3.2300	2690.0000 ± 435.0000
SO	B434-SO-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2880 (-0.0819 ± 0.3330)	<0.7350 (-0.0950 ± 0.8490)	<0.7350 (-0.1160 ± 0.8490)	nr	nr	<0.2280 (-0.0603 ± 0.2630)	nr	nr	0.1510 ± 0.0581	21.1000 ± 3.6600	3030.0000 ± 490.0000
SO	B435-SO-J-01-8	pCi/g	<0.0140 (0.0073 ± 0.0039)	<0.0086 (0.0011 ± 0.0016)	<0.0156 (0.0000 ± 0.0023)	0.0179 ± 0.0058	1.1300 ± 0.0831	0.0449 ± 0.0088	1.1700 ± 0.0859	nr	nr	nr	nr	nr	nr	nr	<0.3680 (-0.2500 ± 0.1060)	nr	nr	nr
SO	B435-SO-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2830 (-0.0616 ± 0.3270)	<0.8690 (-0.1380 ± 1.0000)	<0.8690 (-0.1350 ± 1.0000)	nr	nr	<0.2240 (-0.0656 ± 0.2590)	nr	nr	0.2040 ± 0.0613	27.0000 ± 4.5500	3910.0000 ± 632.0000
SO	B436-SO-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2000 (-0.0543 ± 0.2310)	<0.1650 (-0.0174 ± 0.1910)	<0.1650 (-0.0268 ± 0.1910)	nr	nr	<0.1800 (-0.0323 ± 0.2080)	nr	nr	0.1640 ± 0.0651	22.6000 ± 3.9500	3180.0000 ± 514.0000
SO	B471-SO-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.2620 (-0.0596 ± 0.3030)	<0.7300 (-0.1020 ± 0.8430)	<0.7300 (-0.0881 ± 0.8430)	nr	nr	<0.2210 (-0.0585 ± 0.2550)	nr	nr	0.2140 ± 0.0618	30.4000 ± 5.0800	4370.0000 ± 707.0000
SO	B472-SO-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.3070 (-0.0798 ± 0.3550)	<0.8340 (-0.1030 ± 0.9630)	<0.8340 (-0.1080 ± 0.9630)	nr	nr	<0.2350 (-0.0624 ± 0.2720)	nr	nr	0.1720 ± 0.0610	23.1000 ± 3.9800	3370.0000 ± 545.0000
SO	SJ11-SO-J-02-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1340 (-0.0059 ± 0.1550)	<0.2100 (-0.0003 ± 0.2420)	<0.2100 (-0.0024 ± 0.2420)	nr	nr	<0.1790 (-0.0109 ± 0.2070)	nr	nr	0.2170 ± 0.0542	26.8000 ± 4.4600	4030.0000 ± 652.0000
SO	SJ12-SO-J-02-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1770 (-0.0052 ± 0.2040)	<0.2410 (0.0029 ± 0.2780)	<0.2410 (0.0066 ± 0.2780)	nr	nr	<0.1700 (-0.0132 ± 0.1960)	nr	nr	0.3080 ± 0.0634	37.3000 ± 6.1100	5300.0000 ± 857.0000
SO	SJ13-SO-J-03-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1400 (-0.0075 ± 0.1620)	<0.2630 (0.0020 ± 0.3040)	<0.2630 (0.0016 ± 0.3040)	nr	nr	<0.2470 (0.0272 ± 0.2850)	nr	nr	0.2470 ± 0.0697	30.5000 ± 5.1400	3680.0000 ± 595.0000
SO	SJ13-SO-R-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1340 (-0.0039 ± 0.1550)	<0.2190 (0.0004 ± 0.2530)	<0.2190 (0.0065 ± 0.2530)	nr	nr	<0.1570 (-0.0088 ± 0.1810)	nr	nr	0.1800 ± 0.0465	23.7000 ± 3.9400	3580.0000 ± 579.0000
SO	SJ14-SO-J-01-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1660 (-0.0081 ± 0.1920)	<0.2550 (-0.0006 ± 0.2940)	<0.2550 (0.0001 ± 0.2940)	nr	nr	<0.1840 (-0.0213 ± 0.2120)	nr	nr	0.1960 ± 0.0530	24.4000 ± 4.0900	3570.0000 ± 577.0000
SO	SJ14-SO-J-03-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.4990 (-0.0317 ± 0.5760)	<0.5590 (0.0009 ± 0.6450)	<0.5590 (0.0002 ± 0.6450)	nr	nr	<0.4990 (-0.0244 ± 0.5760)	nr	nr	0.1090 ± 0.1170	12.3000 ± 3.5100	1820.0000 ± 295.0000
SO	SJ14-SO-R-04-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1440 (-0.0057 ± 0.1660)	<0.2280 (0.0014 ± 0.2630)	<0.2280 (0.0039 ± 0.2630)	nr	nr	<0.1560 (-0.0164 ± 0.1800)	nr	nr	0.1760 ± 0.0460	23.0000 ± 3.8300	3370.0000 ± 545.0000
SO	SJ14-SO-R-05-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1700 (-0.0100 ± 0.1960)	<0.2570 (0.0006 ± 0.2970)	<0.2570 (-0.0030 ± 0.2970)	nr	nr	<0.2530 (-0.0238 ± 0.2920)	nr	nr	0.1400 ± 0.0628	17.4000 ± 3.1700	2570.0000 ± 416.0000
SO	SJ14-SO-R-06-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1620 (-0.0072 ± 0.1870)	<0.1930 (0.0021 ± 0.2230)	<0.1930 (0.0034 ± 0.2230)	nr	nr	<0.1480 (-0.0058 ± 0.1710)	nr	nr	0.1920 ± 0.0463	24.0000 ± 3.9700	3420.0000 ± 553.0000
SO	SJ14-SO-R-07-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1170 (-0.0058 ± 0.1350)	<0.1930 (0.0004 ± 0.2230)	<0.1930 (0.0017 ± 0.2230)	nr	nr	<0.1640 (-0.0082 ± 0.1890)	nr	nr	0.1590 ± 0.0458	19.5000 ± 3.2900	2930.0000 ± 474.0000
SO	SJ14-SO-R-08-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1560 (-0.0069 ± 0.1800)	<0.2100 (-0.0014 ± 0.2420)	<0.2100 (0.0010 ± 0.2420)	nr	nr	<0.1850 (-0.0123 ± 0.2140)	nr	nr	0.1630 ± 0.0502	19.6000 ± 3.3400	2810.0000 ± 454.0000
SO	SJ14-SO-R-11-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1510 (-0.0142 ± 0.1740)	<0.1950 (0.0027 ± 0.2250)	<0.1950 (0.0047 ± 0.2250)	nr	nr	<0.1420 (-0.0063 ± 0.1640)	nr	nr	0.1630 ± 0.0420	21.3000 ± 3.5400	3120.0000 ± 505.0000
SO	SJ16-SO-J-05-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1180 (-0.0054 ± 0.1360)	<0.1880 (0.0034 ± 0.2170)	<0.1880 (0.0008 ± 0.2170)	nr	nr	<0.1450 (-0.0120 ± 0.1670)	nr	nr	0.1490 ± 0.0413	19.1800 ± 3.2000	2840.0000 ± 459.0000
SO	SJ22-SO-J-02-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1310 (-0.0120 ± 0.1580)	<0.1630 (0.0002 ± 0.1883)	<0.1630 (-0.0006 ± 0.1883)	nr	nr	<0.1460 (-0.0113 ± 0.1690)	nr	nr	0.7060 ± 0.1190	87.0000 ± 14.1000	12200.0000 ± 1970.0000
SO	SJ22-SO-J-05-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1300 (-0.0034 ± 0.1500)	<0.2220 (-0.0015 ± 0.2560)	<0.2220 (0.0010 ± 0.2560)	nr	nr	<0.1650 (-0.0137 ± 0.1910)	nr	nr	0.9170 ± 0.1530	110.0000 ± 17.8000	15300.0000 ± 2470.0000
SO	SJ22-SO-J-06-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1790 (-0.0158 ± 0.2070)	<0.2620 (-0.0007 ± 0.3030)	<0.2620 (0.0022 ± 0.3030)	nr	nr	<0.1350 (-0.0097 ± 0.1560)	nr	nr	1.0700 ± 0.1760	129.0000 ± 21.0000	18300.0000 ± 2960.0000
SO	SJ25-SO-R-04-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1700 (-0.0185 ± 0.1960)	<0.1940 (-0.0005 ± 0.2240)	<0.1940 (0.0009 ± 0.2240)	nr	nr	<0.1650 (-0.0136 ± 0.1910)	nr	nr	0.2630 ± 0.0570	32.1000 ± 5.2800	4540.0000 ± 734.0000
SO	SR02-SO-R-07-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1020 (-0.0084 ± 0.1180)	<0.1640 (-0.0012 ± 0.1890)	<0.1640 (0.0000 ± 0.1890)	nr	nr	<0.1370 (-0.0099 ± 0.1580)	nr	nr	0.1700 ± 0.0419	21.5000 ± 3.5700	3180.0000 ± 514.0000
SO	SR12-SO-R-02-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1340 (-0.0128 ± 0.1550)	<0.1900 (-0.0022 ± 0.2190)	<0.1900 (0.0000 ± 0.2190)	nr	nr	<0.1320 (-0.0124 ± 0.1520)	nr	nr	2.2680 ± 0.3530	33.4000 ± 5.4000	4790.0000 ± 775.0000
SO	SR12-SO-R-06-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1380 (-0.0131 ± 0.1590)	<0.1930 (0.0003 ± 0.2230)	<0.1930 (0.0000 ± 0.2230)	nr	nr	<0.1300 (-0.0080 ± 0.1500)	nr	nr	0.2360 ± 0.0486	28.9000 ± 4.7300	4070.0000 ± 658.0000
SO	SR18-SO-R-07-8	pCi/g	<0.0130 (0.0028 ± 0.0028)	<0.0268 (-0.0019 ± 0.0043)	<0.0171 (0.0018 ± 0.0031)	0.0142 ± 0.0054	1.1900 ± 0.0962	0.0589 ± 0.0120	1.3400 ± 0.1070	nr	nr	nr	nr	nr	nr	nr	<0.3820 (-0.1130 ± 0.1120)	nr	nr	nr
SO	SR18-SO-R-07-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1770 (-0.0208 ± 0.2040)	<0.1530 (-0.0217 ± 0.1770)	<0.1530 (-0.0387 ± 0.1770)	nr	nr	<0.1280 (-0.0041 ± 0.1483)	nr	nr	0.1220 ± 0.0354	16.0000 ± 2.6900	2020.0000 ± 0.0000
SO	SR18-SO-R-08-8	pCi/g	<0.0152 (0.0119 ± 0.0055)	<0.0377 (-0.0043 ± 0.0053)	<0.0241 (0.0000 ± 0.0042)	0.0192 ± 0.0063	1.0300 ± 0.0845	0.0492 ± 0.0107	1.0900 ± 0.0884	nr	nr	nr	nr	nr	nr	nr	<0.3830 (0.0950 ± 0.1150)	nr	nr	nr
SO	SR18-SO-R-08-8	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1910 (-0.0238 ± 0.2210)	<0.1510 (-0.0334 ± 0.1740)	<0.1510 (-0.0445 ± 0.1750)	nr	nr	<0.1340 (-0.0125 ± 0.1550)	nr	nr	0.1320 ± 0.0375	17.4000 ± 2.9200	2370.0000 ± 0.0000
SO	SR18-SO-R-09-8	pCi/g	<0.0166 (0.0019 ± 0.0030)	<0.0333 (-0.0038 ± 0.0047)	<0.0196 (0.0014 ± 0.0036)	<0.0166 (0.0041 ± 0.0036)	1.0100 ± 0.0812	0.0649 ± 0.0120	1.0300 ± 0.0829

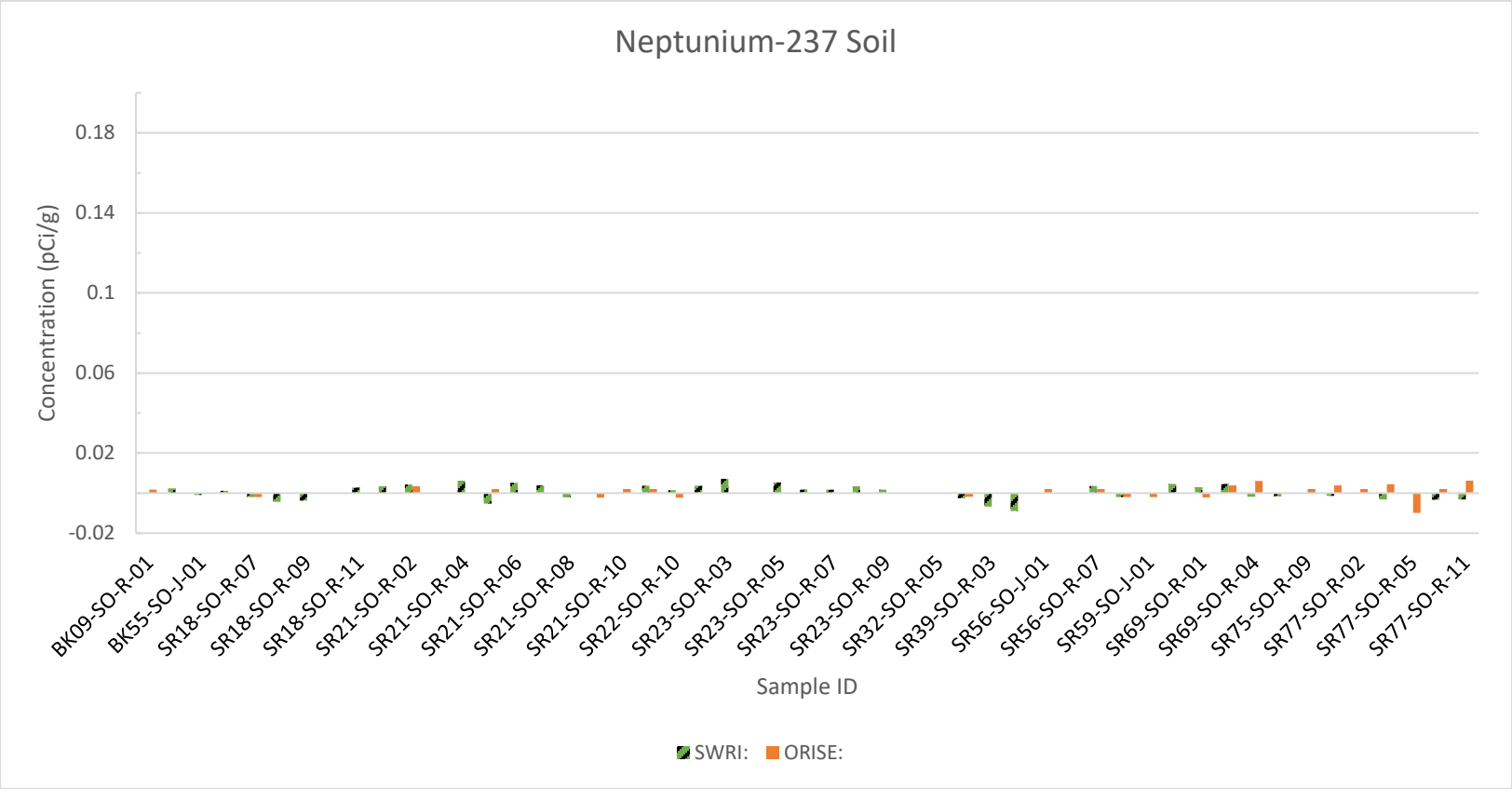
Table A-5 is also included as a separate pdf.

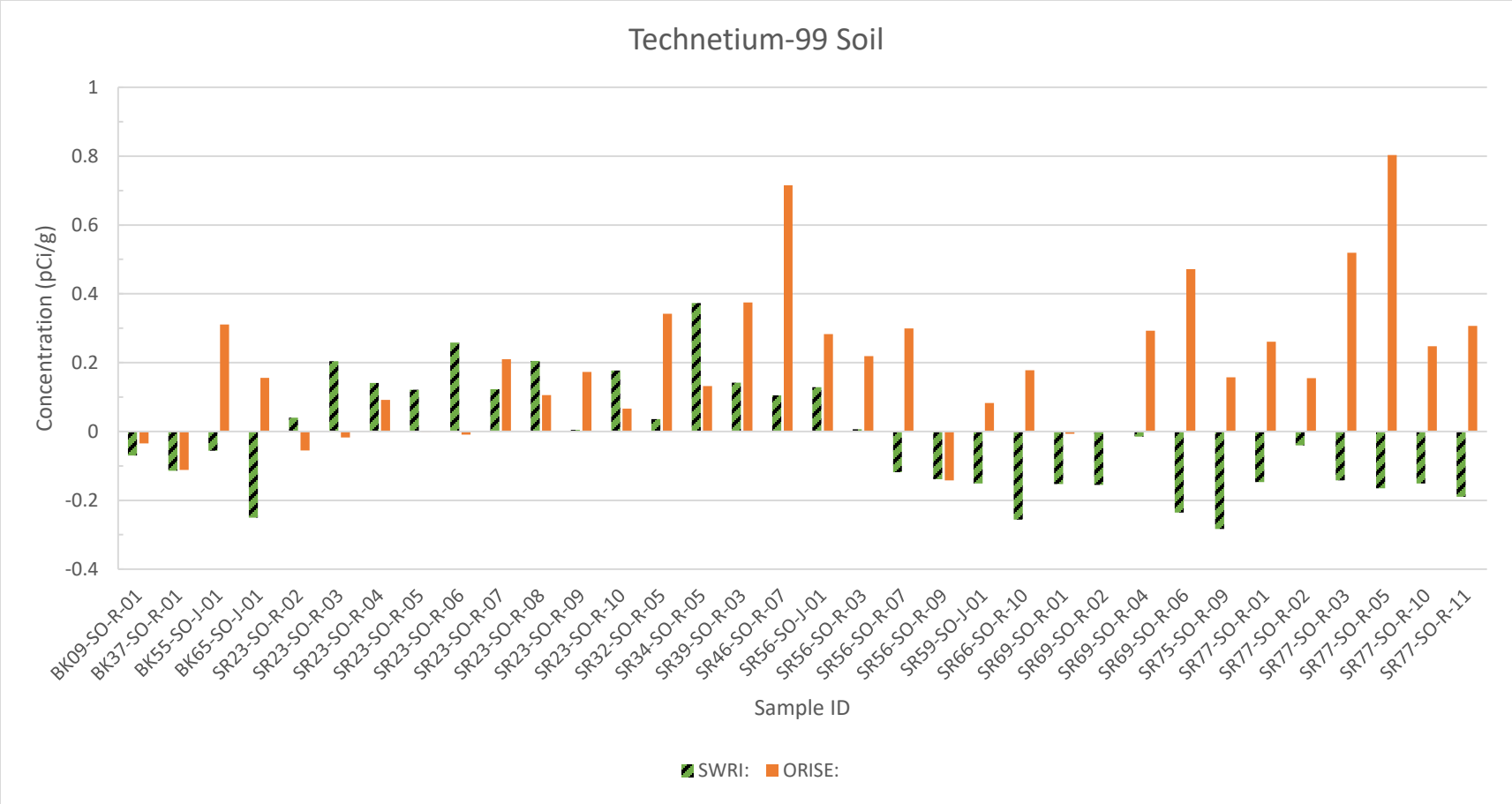
		Analysis è				Alpha							DRC II				LSC		NexION	
		Isotope è	Americium-241	Neptunium-237	Plutonium-238	Plutonium-239/240	Uranium-233/234	Uranium-235/236	Uranium-238	Neptunium-237	Plutonium-239	Plutonium-240	Uranium-234	Uranium-235	Uranium-236	Uranium-238	Technetium-99	Uranium-234	Uranium-235	Uranium-238
Matrix	Sample ID	Units è	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
SO	SR21-SO-R-07-B	pCi/g	<0.0229 (0.0060 ± 0.0052)	<0.0296 (0.0039 ± 0.0055)	<0.0164 (0.0128 ± 0.0057)	0.0275 ± 0.0082	1.2600 ± 0.1020	0.0694 ± 0.0136	1.2600 ± 0.1020	nr	nr	nr	nr	nr	nr	nr	<0.4410 (-0.1200 ± 0.1300)	nr	nr	nr
SO	SR21-SO-R-07-B	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1800 (-0.0310 ± 0.2080)	<0.1920 (-0.0368 ± 0.2220)	<0.1920 (-0.0262 ± 0.2220)	nr	nr	<0.1590 (-0.0243 ± 0.1840)	nr	nr	0.1500 ± 0.0441	20.0000 ± 3.3600	2570.0000 ± 416.0000
SO	SR21-SO-R-08-B	pCi/g	<0.0204 (0.0117 ± 0.0061)	<0.0296 (-0.0021 ± 0.0047)	<0.0131 (0.0017 ± 0.0024)	<0.0162 (0.0135 ± 0.0054)	1.1600 ± 0.0939	0.0740 ± 0.0136	1.1500 ± 0.0929	nr	nr	nr	nr	nr	nr	nr	<0.3830 (-0.2210 ± 0.1110)	nr	nr	nr
SO	SR21-SO-R-08-B	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1910 (-0.0335 ± 0.2210)	<0.2270 (-0.0406 ± 0.2620)	<0.2270 (-0.0483 ± 0.2620)	nr	nr	<0.1580 (-0.0173 ± 0.1820)	nr	nr	0.1520 ± 0.0439	20.9000 ± 3.5000	2880.0000 ± 0.0000
SO	SR21-SO-R-09-B	pCi/g	<0.0116 (0.0074 ± 0.0038)	<0.0223 (0.0000 ± 0.0041)	<0.0157 (0.0034 ± 0.0034)	<0.0170 (0.0111 ± 0.0055)	1.0700 ± 0.0862	0.0578 ± 0.0115	1.0900 ± 0.0871	nr	nr	nr	nr	nr	nr	nr	<0.4350 (-0.1210 ± 0.1280)	nr	nr	nr
SO	SR21-SO-R-09-B	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1320 (-0.0136 ± 0.1520)	<0.1650 (-0.0444 ± 0.1910)	<0.1650 (-0.0333 ± 0.1910)	nr	nr	<0.1490 (-0.0095 ± 0.1720)	nr	nr	0.1620 ± 0.0432	22.5000 ± 3.7400	3060.0000 ± 0.0000
SO	SR21-SO-R-10-B	pCi/g	<0.0145 (0.0076 ± 0.0043)	<0.0298 (0.0000 ± 0.0055)	<0.0140 (0.0000 ± 0.0026)	<0.0139 (0.0055 ± 0.0037)	1.0300 ± 0.0841	0.0595 ± 0.0116	1.1400 ± 0.0925	nr	nr	nr	nr	nr	nr	nr	<0.3300 (-0.2660 ± 0.0955)	nr	nr	nr
SO	SR21-SO-R-10-B	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1800 (-0.0421 ± 0.2080)	<0.2050 (-0.0335 ± 0.2370)	<0.2050 (-0.0419 ± 0.2370)	nr	nr	<0.1810 (-0.0201 ± 0.2090)	nr	nr	0.1560 ± 0.0488	20.9000 ± 3.5400	2720.0000 ± 440.0000
SO	SR21-SO-R-11-B	pCi/g	<0.0153 (0.0060 ± 0.0040)	<0.0279 (0.0037 ± 0.0052)	<0.0194 (0.0025 ± 0.0036)	<0.0218 (-0.0025 ± 0.0031)	0.9980 ± 0.0828	0.0540 ± 0.0117	1.0200 ± 0.0844	nr	nr	nr	nr	nr	nr	nr	<0.4160 (-0.3120 ± 0.1200)	nr	nr	nr
SO	SR21-SO-R-11-B	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1650 (-0.0154 ± 0.1910)	<0.1810 (-0.0386 ± 0.2090)	<0.1810 (-0.0286 ± 0.2090)	nr	nr	<0.1500 (-0.0071 ± 0.1730)	nr	nr	0.0736 ± 0.0367	9.5900 ± 1.7800	1270.0000 ± 205.0000
SO	SR22-SO-R-10-B	pCi/g	<0.0114 (0.0040 ± 0.0029)	<0.0202 (0.0014 ± 0.0032)	<0.0134 (-0.0010 ± 0.0021)	<0.0144 (0.0038 ± 0.0033)	0.8870 ± 0.0702	0.0645 ± 0.0111	1.0100 ± 0.0787	nr	nr	nr	nr	nr	nr	nr	<0.3470 (-0.1790 ± 0.1010)	nr	nr	nr
SO	SR22-SO-R-10-B	ug/Kg	nr	nr	nr	nr	nr	nr	nr	<0.1330 (-0.0236 ± 0.1540)	<0.1530 (-0.0261 ± 0.1770)	<0.1530 (-0.0414 ± 0.1770)	nr	nr	<0.1240 (-0.0187 ± 0.1430)	nr	nr	0.1290 ± 0.0355	19.2000 ± 3.1900	2640.0000 ± 0.0000
SO	SR23-SO-R-02-B	pCi/g	<0.0160 (0.0011 ± 0.0025)	<0.0282 (0.0037 ± 0.0052)	<0.0194 (0.0016 ± 0.0035)	<0.0120 (0.0016 ± 0.0022)	1.0500 ± 0.0854	0.0708 ± 0.0133	1.0900 ± 0.0884	nr	nr	nr	nr	nr	nr	nr	<0.4510 (0.0397 ± 0.1340)	nr	nr	nr
SO	SR23-SO-R-03-B	pCi/g	<0.0151 (0.0075 ± 0.0045)	<0.0275 (0.0072 ± 0.0062)	<0.0177 (0.0000 ± 0.0033)	<0.0176 (0.0138 ± 0.0062)	1.0400 ± 0.0844	0.0599 ± 0.0123	0.9200 ± 0.0760	nr	nr	nr	nr	nr	nr	nr	<0.4790 (0.2040 ± 0.1460)	nr	nr	nr
SO	SR23-SO-R-04-B	pCi/g	<0.0186 (0.0043 ± 0.0040)	<0.0262 (0.0000 ± 0.0049)	<0.0194 (0.0000 ± 0.0027)	<0.0170 (0.0111 ± 0.0055)	0.9530 ± 0.0753	0.0377 ± 0.0086	0.8560 ± 0.0685	nr	nr	nr	nr	nr	nr	nr	<0.4290 (0.1410 ± 0.1290)	nr	nr	nr
SO	SR23-SO-R-05-B	pCi/g	0.0172 ± 0.0057	<0.0410 (0.0054 ± 0.0076)	<0.0149 (0.0000 ± 0.0028)	<0.0135 (0.0010 ± 0.0022)	0.8130 ± 0.0645	0.0460 ± 0.0089	0.8540 ± 0.0673	nr	nr	nr	nr	nr	nr	nr	<0.3240 (0.1210 ± 0.0982)	nr	nr	nr
SO	SR23-SO-R-06-B	pCi/g	<0.0181 (0.0038 ± 0.0038)	<0.0250 (0.0018 ± 0.0040)	<0.0140 (-0.0010 ± 0.0022)	<0.0151 (0.0099 ± 0.0049)	1.1100 ± 0.0867	0.0467 ± 0.0097	1.0600 ± 0.0829	nr	nr	nr	nr	nr	nr	nr	<0.3870 (0.2580 ± 0.1190)	nr	nr	nr
SO	SR23-SO-R-07-B	pCi/g	<0.0268 (0.0057 ± 0.0059)	<0.0244 (0.0017 ± 0.0039)	<0.0284 (-0.0040 ± 0.0040)	<0.0187 (0.0098 ± 0.0052)	0.9810 ± 0.0815	0.0506 ± 0.0112	0.9710 ± 0.0807	nr	nr	nr	nr	nr	nr	nr	<0.4460 (0.1230 ± 0.1340)	nr	nr	nr
SO	SR23-SO-R-08-B	pCi/g	<0.0213 (0.0075 ± 0.0052)	<0.0264 (0.0035 ± 0.0049)	<0.0111 (0.0044 ± 0.0029)	0.0173 ± 0.0053	1.1400 ± 0.0935	0.0648 ± 0.0131	1.1800 ± 0.0963	nr	nr	nr	nr	nr	nr	nr	<0.3600 (0.2050 ± 0.1100)	nr	nr	nr
SO	SR23-SO-R-09-B	pCi/g	<0.0164 (0.0057 ± 0.0040)	<0.0247 (0.0018 ± 0.0039)	<0.0202 (-0.0010 ± 0.0027)	<0.0174 (0.0140 ± 0.0059)	1.1200 ± 0.0903	0.0436 ± 0.0106	1.1600 ± 0.0927	nr	nr	nr	nr	nr	nr	nr	<0.4750 (0.0045 ± 0.1410)	nr	nr	nr
SO	SR23-SO-R-10-B	pCi/g	<0.0152 (0.0035 ± 0.0033)	<0.0303 (0.0000 ± 0.0056)	<0.0186 (-0.0028 ± 0.0025)	0.0166 ± 0.0060	0.9990 ± 0.0793	0.0434 ± 0.0094	0.9810 ± 0.0780	nr	nr	nr	nr	nr	nr	nr	<0.4050 (0.1770 ± 0.1230)	nr	nr	nr
SO	SR32-SO-R-05-B	pCi/g	<0.0166 (0.0042 ± 0.0036)	<0.0321 (0.0000 ± 0.0045)	<0.0164 (0.0000 ± 0.0023)	<0.0144 (0.0019 ± 0.0027)	2.4200 ± 0.1820	0.1520 ± 0.0205	2.3900 ± 0.1800	nr	nr	nr	nr	nr	nr	nr	<0.4100 (0.0363 ± 0.1220)	nr	nr	nr
SO	SR34-SO-R-05-B	pCi/g	<0.0085 (0.0054 ± 0.0028)	<0.0227 (-0.0026 ± 0.0032)	<0.0128 (0.0046 ± 0.0033)	<0.0138 (0.0054 ± 0.0036)	1.1400 ± 0.0876	0.0657 ± 0.0109	1.0300 ± 0.0798	nr	nr	nr	nr	nr	nr	nr	0.3730 ± 0.1130	nr	nr	nr
SO	SR39-SO-R-03-B	pCi/g	<0.0144 (0.0094 ± 0.0047)	<0.0369 (-0.0067 ± 0.0047)	<0.0226 (0.0011 ± 0.0038)	<0.0158 (0.0056 ± 0.0041)	1.3800 ± 0.1070	0.0687 ± 0.0124	1.4500 ± 0.1120	nr	nr	nr	nr	nr	nr	nr	<0.4250 (0.1420 ± 0.1290)	nr	nr	nr
SO	SR46-SO-R-07-B	pCi/g	<0.0149 (0.0017 ± 0.0027)	<0.0386 (-0.0090 ± 0.0048)	<0.0177 (0.0023 ± 0.0033)	<0.0176 (0.0115 ± 0.0057)	0.8660 ± 0.0708	0.0689 ± 0.0126	0.9510 ± 0.0768	nr	nr	nr	nr	nr	nr	nr	<0.4790 (0.1050 ± 0.1430)	nr	nr	nr
SO	SR56-SO-J-01-B	pCi/g	<0.0143 (0.0071 ± 0.0042)	<0.0317 (0.0000 ± 0.0059)	<0.0153 (0.0000 ± 0.0028)	<0.0140 (0.0089 ± 0.0046)	2.2800 ± 0.1740	0.1500 ± 0.0204	2.1200 ± 0.1620	nr	nr	nr	nr	nr	nr	nr	<0.3680 (0.1290 ± 0.1110)	nr	nr	nr
SO	SR56-SO-R-03-B	pCi/g	<0.0179 (0.0070 ± 0.0047)	<0.0505 (0.0000 ± 0.0094)	<0.0277 (0.0059 ± 0.0059)	0.0432 ± 0.0140	3.4700 ± 0.2560	0.1770 ± 0.0247	3.2600 ± 0.2410	nr	nr	nr	nr	nr	nr	nr	<0.3990 (0.0060 ± 0.1180)	nr	nr	nr
SO	SR56-SO-R-07-B	pCi/g	<0.0165 (0.0129 ± 0.0058)	<0.0266 (0.0035 ± 0.0049)	<0.0172 (0.0037 ± 0.0037)	0.0291 ± 0.0090	1.7500 ± 0.1330	0.0981 ± 0.0152	1.8500 ± 0.1390	nr	nr	nr	nr	nr	nr	nr	<0.4190 (-0.1180 ± 0.1220)	nr	nr	nr
SO	SR56-SO-R-09-B	pCi/g	<0.0146 (0.0010 ± 0.0023)	<0.0283 (-0.0020 ± 0.0045)	<0.0113 (0.0015 ± 0.0021)	0.0206 ± 0.0064	1.2600 ± 0.0995	0.0618 ± 0.0125	1.1800 ± 0.0939	nr	nr	nr	nr	nr	nr	nr	<0.4130 (-0.1390 ± 0.1200)	nr	nr	nr
SO	SR59-SO-J-01-B	pCi/g	<0.0154 (0.0055 ± 0.0040)	<0.0242 (0.0000 ± 0.0034)	<0.0114 (0.0000 ± 0.0017)	<0.0090 (0.0059 ± 0.0029)	2.6200 ± 0.2050	0.1320 ± 0.0194	2.6800 ± 0.2090	nr	nr	nr	nr	nr	nr	nr	<0.3220 (-0.1510 ± 0.0938)	nr	nr	nr
SO	SR66-SO-R-10-B	pCi/g	<0.0142 (0.0030 ± 0.0031)	<0.0345 (0.0045 ± 0.0064)	<0.0208 (0.0000 ± 0.0039)	<0.0235 (0.0108 ± 0.0064)	1.5500 ± 0.1220	0.1020 ± 0.0166	1.5100 ± 0.1190	nr	nr	nr	nr	nr	nr	nr	<0.4490 (-0.2560 ± 0.1300)	nr	nr	nr
SO	SR69-SO-R-01-B	pCi/g	<0.0113 (0.0044 ± 0.0030)	<0.0222 (0.0029 ± 0.0041)	<0.0151 (-0.0011 ± 0.0024)	0.0170 ± 0.0065	1.1700 ± 0.0899	0.0722 ± 0.0121	1.3000 ± 0.0994	nr	nr	nr	nr	nr	nr	nr	<0.4350 (-0.1530 ± 0.1270)	nr	nr	nr
SO	SR69-SO-R-02-B	pCi/g	<0.0122 (0.0026 ± 0.0026)	<0.0353 (0.0046 ± 0.0065)	<0.0207 (0.0027 ± 0.0038)	<0.0269 (0.0094 ± 0.0065)	1.0300 ± 0.0810	0.0674 ± 0.0121	1.1700 ± 0.0909	nr	nr	nr	nr	nr	nr	nr	<0.4120 (-0.1550 ± 0.1200)	nr	nr	nr
SO	SR69-SO-R-04-B	pCi/g	<0.0194 (0.0022 ± 0.0035)	<0.0260 (-0.0019 ± 0.0041)	<0.0154 (0.0000 ± 0.0023)	0.0176 ± 0.0057	1.6300 ± 0.1250	0.0944 ± 0.0149	1.5300 ± 0.1180	nr	nr	nr	nr	nr	nr	nr	<0.4560 (-0.0152 ± 0.1350)	nr	nr	nr
SO	SR69-SO-R-06-B	pCi/g	<0.0111 (0.0071 ± 0.0037)	<0.0241 (-0.0017 ± 0.0038)	<0.0172 (0.0023 ± 0.0032)	0.0179 ± 0.0069	1.9400 ± 0.1450	0.1070 ± 0.0156	1.9100 ± 0.1430	nr	nr	nr	nr	nr	nr	nr	<0.4260 (-0.2360 ± 0.1230)	nr	nr	nr
SO	SR75-SO-R-09-B	pCi/g	<0.0116 (0.0027 ± 0.0025)	<0.0201 (0.0000 ± 0.0037)	<0.0158 (0.0000 ± 0.0022)	<0.0138 (0.0090 ± 0.0045)	0.8770 ± 0.0685	0.0478 ± 0.0091	0.8570 ± 0.0671	nr	nr	nr	nr	nr	nr	nr	<0.3760 (-0.2830 ± 0.1090)	nr	nr	nr
SO	SR77-SO-R-01-B	pCi/g	<0.0166 (0.0021 ± 0.0032)	<0.0192 (-0.0014 ± 0.0031)	<0.0116 (0.0000 ± 0.0022)	<0.0106 (0.0068 ± 0.0035)	1.6000 ± 0.1190	0.0761 ± 0.0118	1.6200 ± 0.1210	nr	nr	nr	nr	nr	nr	nr	<0.3070 (-0.1470 ± 0.0892)	nr	nr	nr
SO	SR77-SO-R-02-B	pCi/g	<0.0253 (-0.0011 ± 0.0038)	<0.0260 (0.0000 ± 0.0037)	<0.0092 (0.0000 ± 0.0017)	<0.0172 (0.0048 ± 0.0038)	1.8600 ± 0.1440	0.0964 ± 0.0151	1.6400 ± 0.1280	nr	nr	nr	nr	nr	nr	nr	<0.3610 (-0.0401 ± 0.1060)	nr	nr	nr
SO	SR77-SO-R-03-B	pCi/g	<0.0173 (0.0043 ± 0.0038)	<0.0276 (-0.0032 ± 0.0039)	<0.0256 (-0.0011 ± 0.0039)	<0.0185 (0.0127 ± 0.0059)	1.8800 ± 0.1440	0.0871 ± 0.0138	1.8200 ± 0.1400	nr	nr	nr	nr	nr	nr	nr	<0.3600 (-0.1420 ± 0.1050)	nr	nr	nr
SO	SR77-SO-R-05-B	pCi/g	<0.0195 (0.0068 ± 0.0047)	<0.0262 (0.0000 ± 0.0037)	<0.0110 (0.0014 ± 0.0020)	<0.0176 (0.0000 ± 0.0029)	1.4100 ± 0.1080	0.0824 ± 0.0135	1.5200 ± 0.1160	nr	nr	nr	nr	nr	nr	nr	<0.4280 (-0.1650 ± 0.1240)	nr	nr	nr
SO	SR77-SO-R-10-B	pCi/g	<0.0156 (0.0054 ± 0.0038)	<0.0361 (-0.0033 ± 0.0046)	<0.0222 (-0.0033 ± 0.0030)	<0.0192 (0.0022 ± 0.0035)	1.7100 ± 0.1310	0.1100 ± 0.0160	1.6600 ± 0.1280	nr	nr	nr	nr	nr	nr	nr	<0.3930 (-0.1510 ± 0.1150)	nr	nr	nr
SO	SR77-SO-R-11-B	pCi/g	<0.0172 (0.0138 ± 0.0059)	<0.0398 (-0.0031 ± 0.0058)	<0.0090 (0.0024 ± 0.0021)	0.0164 ± 0.0047	1.6500 ± 0.1290	0.0800 ± 0.0138	1.6400 ± 0.1290	nr	nr	nr	nr	nr	nr	nr	<0.3700 (-0.1900 ± 0.1080)	nr	nr	nr
SW	5343R0004	pCi/sample	<0.0919 (0.0700 ± 0.0585)	<0.0712 (0.0200 ± 0.0323)	<0.1050 (0.0200 ± 0.0441)	<0.0841 (0.0300 ± 0.0442)	0.2300 ± 0.0994	<0.0903 (0.0400 ± 0.0474)	0.2300 ± 0.0994	nr	nr	nr	nr	nr	nr	nr	<0.9010 (0.4400 ± 0.5500)	nr	nr	nr
SW	5343R0004	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0016 (-0.0001 ± 0.0019)	<0.0021 (0.0000 ± 0.0025)	<0.0021 (0.0000 ± 0.0025)	0.0005 ± 0.0005	0.0061 ± 0.0015	<0.0019 (0.0004 ± 0.0022)	0.8440 ± 0.1370	nr	nr	nr	nr
SW	5343R0006	pCi/sample	<0.0965 (0.0500 ± 0.0539)	<0.0734 (0.0200 ± 0.0333)	<0.0939 (0.0100 ± 0.0340)	<0.0750 (0.0000 ± 0.0278)	0.1000 ± 0.0652	<0.0918 (0.0200 ± 0.0417)	<0.0738 (0.0500 ± 0.0477)	nr	nr	nr	nr	nr	nr	nr	<0.9160 (0.0400 ± 0.5430)	nr	nr	nr
SW	5343R0006	ug/sample	nr	nr	nr	nr	nr	nr	nr	<0.0016 (-0.0001 ± 0.0019)	<0.0019 (0.0000 ± 0.0022)	<0.0019 (0.0000 ± 0.0022)	<0.0004 (0.0000 ± 0.0004)	0.0019 ± 0.0011	<0.0019 (0.0006 ± 0.0022)	0.1740 ± 0.0294	nr	nr	nr	nr


Americium-241 Soil
Concentration (pCi/g)
0.18
0.14
0.1
0.06
0.02
-0.02
BK09-SO-R-01
BK37-SO-R-01
BK55-SO-J-01
BK65-SO-J-01
SR18-SO-R-07
SR18-SO-R-08
SR18-SO-R-09
SR18-SO-R-10
SR18-SO-R-11
SR21-SO-R-01
SR21-SO-R-02
SR21-SO-R-03
SR21-SO-R-04
SR21-SO-R-05
SR21-SO-R-06
SR21-SO-R-07
SR21-SO-R-08
SR21-SO-R-09
SR21-SO-R-10
SR21-SO-R-11
SR22-SO-R-10
SR23-SO-R-02
SR23-SO-R-03
SR23-SO-R-04
SR23-SO-R-05
SR23-SO-R-06
SR23-SO-R-07
SR23-SO-R-08
SR23-SO-R-09
SR23-SO-R-10
SR32-SO-R-05
SR34-SO-R-05
SR39-SO-R-03
SR46-SO-R-07
SR56-SO-J-01
SR56-SO-R-03
SR56-SO-R-07
SR56-SO-R-09
SR59-SO-J-01
SR66-SO-R-10
SR69-SO-R-01
SR69-SO-R-02
SR69-SO-R-04
SR69-SO-R-06
SR75-SO-R-09
SR77-SO-R-01
SR77-SO-R-02
SR77-SO-R-03
SR77-SO-R-05
SR77-SO-R-10
SR77-SO-R-11
Sample ID
SWRI:
ORISE:


Plutonium-238 Soil
Concentration (pCi/g)
0.18
0.14
0.1
0.06
0.02
-0.02
BK09-SO-R-01
BK37-SO-R-01
BK55-SO-J-01
BK65-SO-J-01
SR23-SO-R-02
SR23-SO-R-03
SR23-SO-R-04
SR23-SO-R-05
SR23-SO-R-06
SR23-SO-R-07
SR23-SO-R-08
SR23-SO-R-09
SR23-SO-R-10
SR32-SO-R-05
SR34-SO-R-05
SR39-SO-R-03
SR46-SO-R-07
SR56-SO-J-01
SR56-SO-R-03
SR56-SO-R-07
SR56-SO-R-09
SR59-SO-J-01
SR66-SO-R-10
SR69-SO-R-01
SR69-SO-R-02
SR69-SO-R-04
SR69-SO-R-06
SR75-SO-R-09
SR77-SO-R-01
SR77-SO-R-02
SR77-SO-R-03
SR77-SO-R-05
SR77-SO-R-10
SR77-SO-R-11
Sample ID
SWRI:
ORISE:


Plutonium 239/240 Soil
Concentration (pCi/g)
0.18
0.14
0.1
0.06
0.02
-0.02
BK09-SO-R-01
BK37-SO-R-01
BK55-SO-J-01
BK65-SO-J-01
SR23-SO-R-02
SR23-SO-R-03
SR23-SO-R-04
SR23-SO-R-05
SR23-SO-R-06
SR23-SO-R-07
SR23-SO-R-08
SR23-SO-R-09
SR23-SO-R-10
SR32-SO-R-05
SR34-SO-R-05
SR39-SO-R-03
SR46-SO-R-07
SR56-SO-J-01
SR56-SO-R-03
SR56-SO-R-07
SR56-SO-R-09
SR59-SO-J-01
SR66-SO-R-10
SR69-SO-R-01
SR69-SO-R-02
SR69-SO-R-04
SR69-SO-R-06
SR75-SO-R-09
SR77-SO-R-01
SR77-SO-R-02
SR77-SO-R-03
SR77-SO-R-05
SR77-SO-R-10
SR77-SO-R-11
Sample ID
SWRI:
ORISE:


Neptunium-237 Soil
Concentration (pCi/g)
0.18
0.14
0.1
0.06
0.02
-0.02
BK09-SO-R-01
BK55-SO-J-01
SR18-SO-R-07
SR18-SO-R-09
SR18-SO-R-11
SR21-SO-R-02
SR21-SO-R-04
SR21-SO-R-06
SR21-SO-R-08
SR21-SO-R-10
SR22-SO-R-10
SR23-SO-R-03
SR23-SO-R-05
SR23-SO-R-07
SR23-SO-R-09
SR32-SO-R-05
SR39-SO-R-03
SR56-SO-J-01
SR56-SO-R-07
SR59-SO-J-01
SR69-SO-R-01
SR69-SO-R-04
SR75-SO-R-09
SR77-SO-R-02
SR77-SO-R-05
SR77-SO-R-11
Sample ID
SWRI:
ORISE:


Technetium-99 Soil
Concentration (pCi/g)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
BK09-SO-R-01
BK37-SO-R-01
BK55-SO-J-01
BK65-SO-J-01
SR23-SO-R-02
SR23-SO-R-03
SR23-SO-R-04
SR23-SO-R-05
SR23-SO-R-06
SR23-SO-R-07
SR23-SO-R-08
SR23-SO-R-09
SR23-SO-R-10
SR32-SO-R-05
SR34-SO-R-05
SR39-SO-R-03
SR46-SO-R-07
SR56-SO-J-01
SR56-SO-R-03
SR56-SO-R-07
SR56-SO-R-09
SR59-SO-J-01
SR66-SO-R-10
SR69-SO-R-01
SR69-SO-R-02
SR69-SO-R-04
SR69-SO-R-06
SR75-SO-R-09
SR77-SO-R-01
SR77-SO-R-02
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SR77-SO-R-05
SR77-SO-R-10
SR77-SO-R-11
Sample ID
SWRI:
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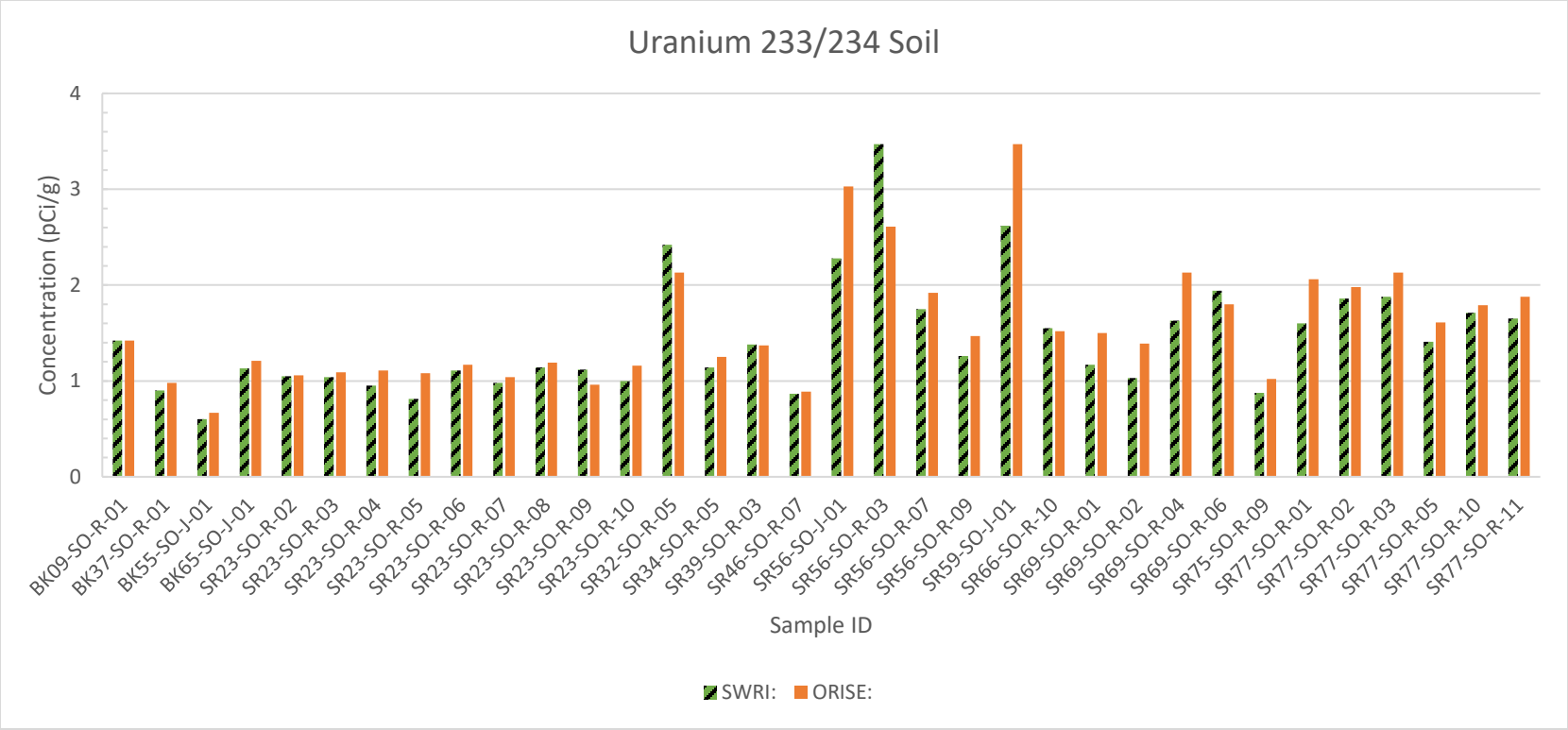
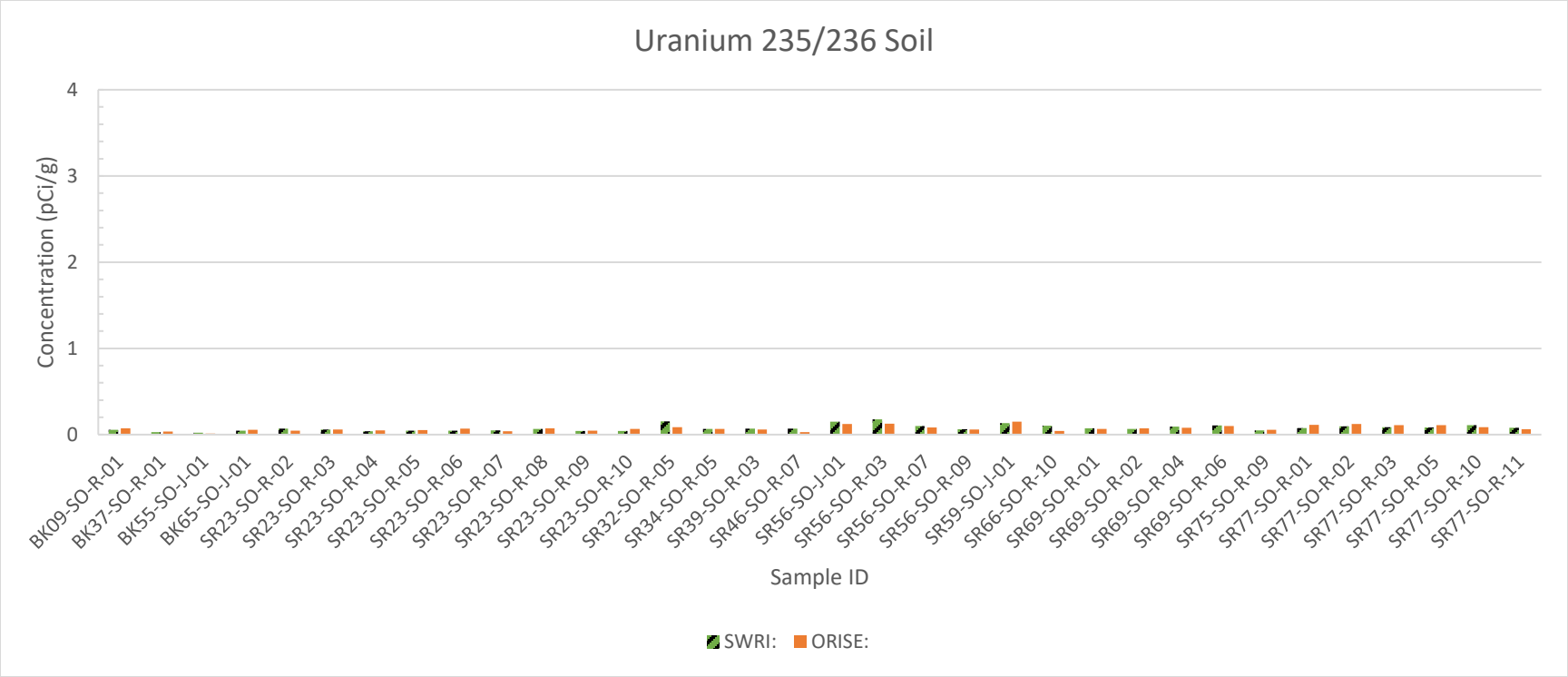
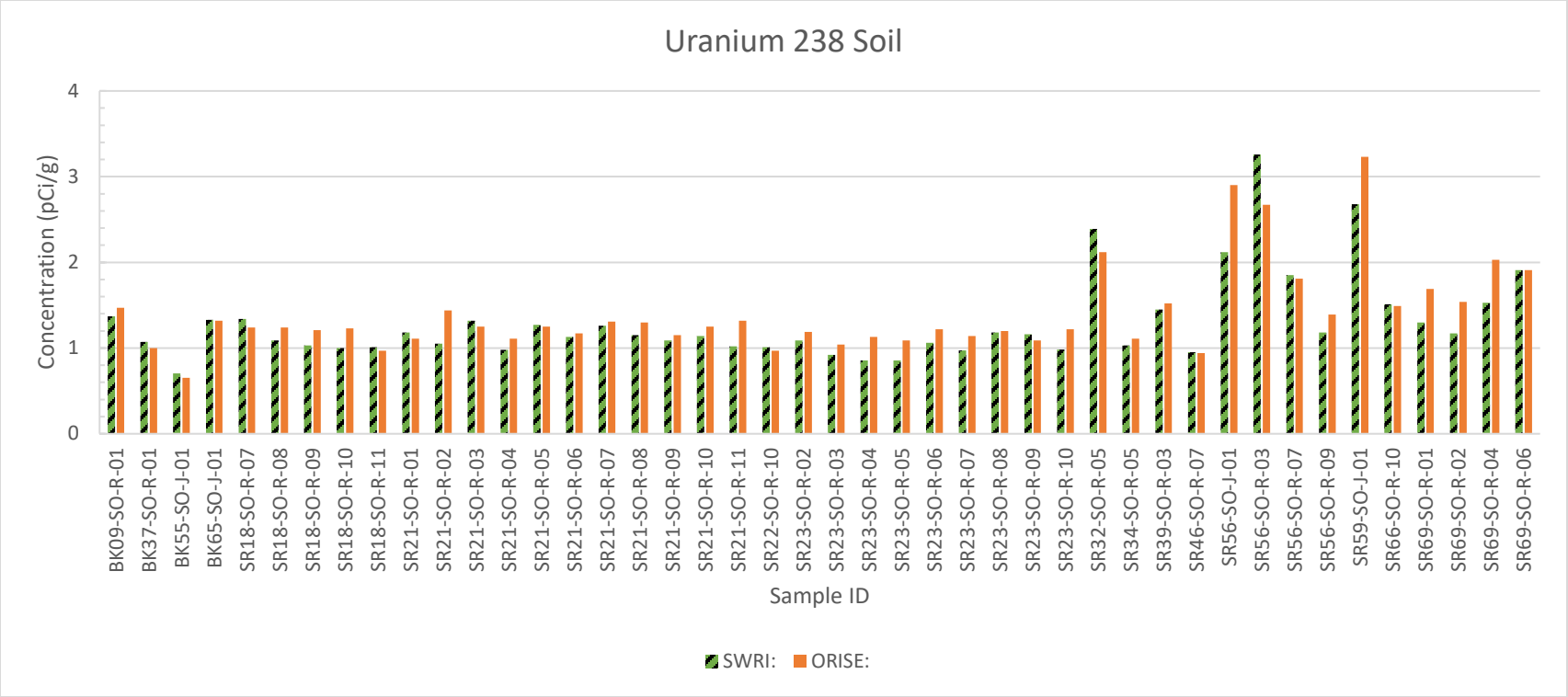

Uranium 233/234 Soil
Concentration (pCi/g)
0
1
2
3
4
BK09-SO-R-01
BK37-SO-R-01
BK55-SO-J-01
BK65-SO-J-01
SR23-SO-R-02
SR23-SO-R-03
SR23-SO-R-04
SR23-SO-R-05
SR23-SO-R-06
SR23-SO-R-07
SR23-SO-R-08
SR23-SO-R-09
SR23-SO-R-10
SR32-SO-R-05
SR34-SO-R-05
SR39-SO-R-03
SR46-SO-R-07
SR56-SO-J-01
SR56-SO-R-03
SR56-SO-R-07
SR56-SO-R-09
SR59-SO-J-01
SR66-SO-R-10
SR69-SO-R-01
SR69-SO-R-02
SR69-SO-R-04
SR69-SO-R-06
SR75-SO-R-09
SR77-SO-R-01
SR77-SO-R-02
SR77-SO-R-03
SR77-SO-R-05
SR77-SO-R-10
SR77-SO-R-11
Sample ID
SWRI:
ORISE:


Uranium 235/236 Soil
Concentration (pCi/g)
4
3
2
1
0
BK09-SO-R-01
BK37-SO-R-01
BK55-SO-J-01
BK65-SO-J-01
SR23-SO-R-02
SR23-SO-R-03
SR23-SO-R-04
SR23-SO-R-05
SR23-SO-R-06
SR23-SO-R-07
SR23-SO-R-08
SR23-SO-R-09
SR23-SO-R-10
SR32-SO-R-05
SR34-SO-R-05
SR39-SO-R-03
SR46-SO-R-07
SR56-SO-J-01
SR56-SO-R-03
SR56-SO-R-07
SR56-SO-R-09
SR59-SO-J-01
SR66-SO-R-10
SR69-SO-R-01
SR69-SO-R-02
SR69-SO-R-04
SR69-SO-R-06
SR75-SO-R-09
SR77-SO-R-01
SR77-SO-R-02
SR77-SO-R-03
SR77-SO-R-05
SR77-SO-R-10
SR77-SO-R-11
Sample ID
SWRI:
ORISE:


Uranium 238 Soil
Concentration (pCi/g)
0
1
2
3
4
BK09-SO-R-01
BK37-SO-R-01
BK55-SO-J-01
BK65-SO-J-01
SR18-SO-R-07
SR18-SO-R-08
SR18-SO-R-09
SR18-SO-R-10
SR18-SO-R-11
SR21-SO-R-01
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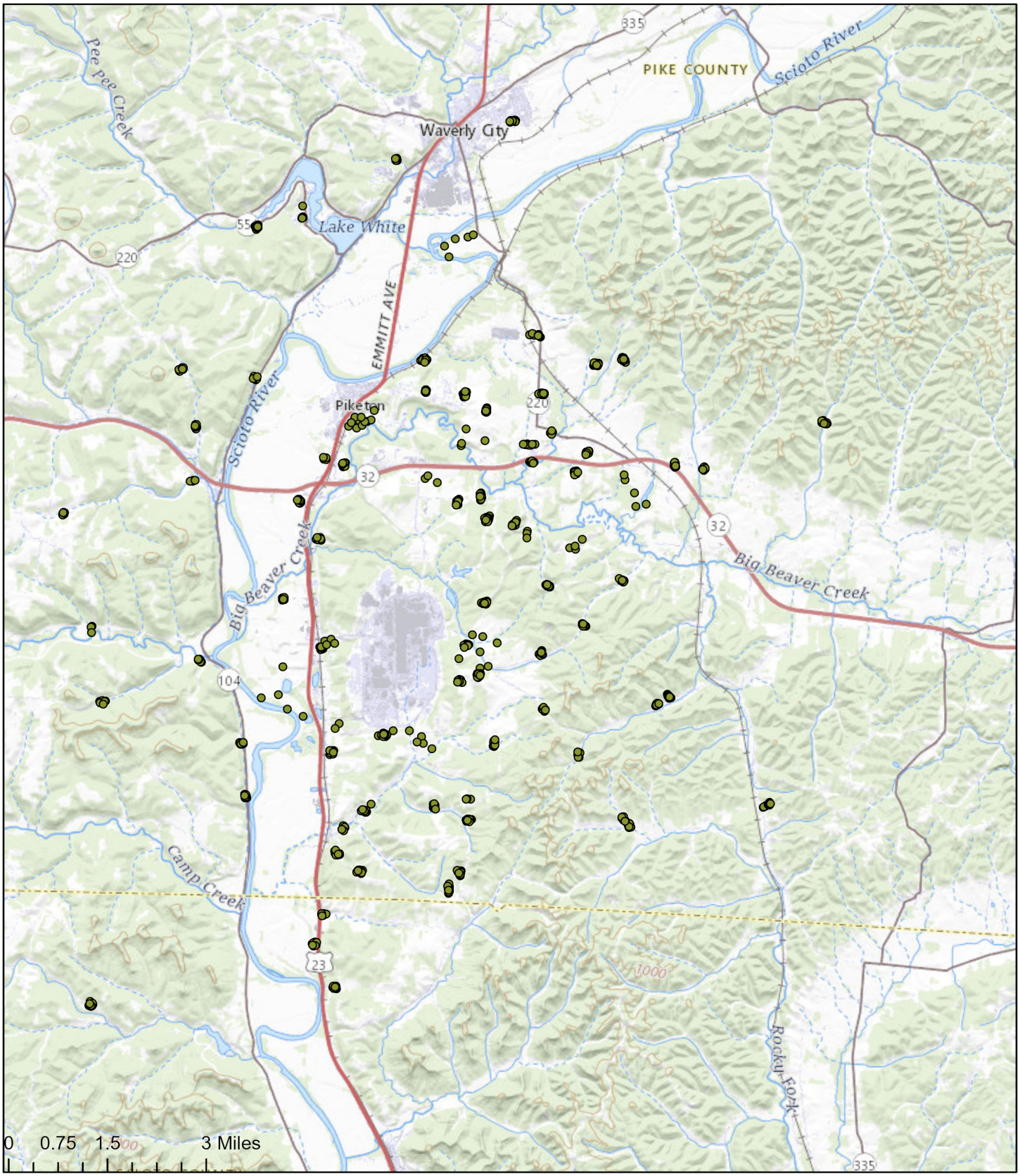
SR23-SO-R-06
SR23-SO-R-07
SR23-SO-R-08
SR23-SO-R-09
SR23-SO-R-10
SR32-SO-R-05
SR34-SO-R-05
SR39-SO-R-03
SR46-SO-R-07
SR56-SO-J-01
SR56-SO-R-03
SR56-SO-R-07
SR56-SO-R-09
SR59-SO-J-01
SR66-SO-R-10
SR69-SO-R-01
SR69-SO-R-02
SR69-SO-R-04
SR69-SO-R-06
Sample ID
SWRI:
ORISE:

Attachment B

Locations of Samples Containing Detectable Quantities of ROCs



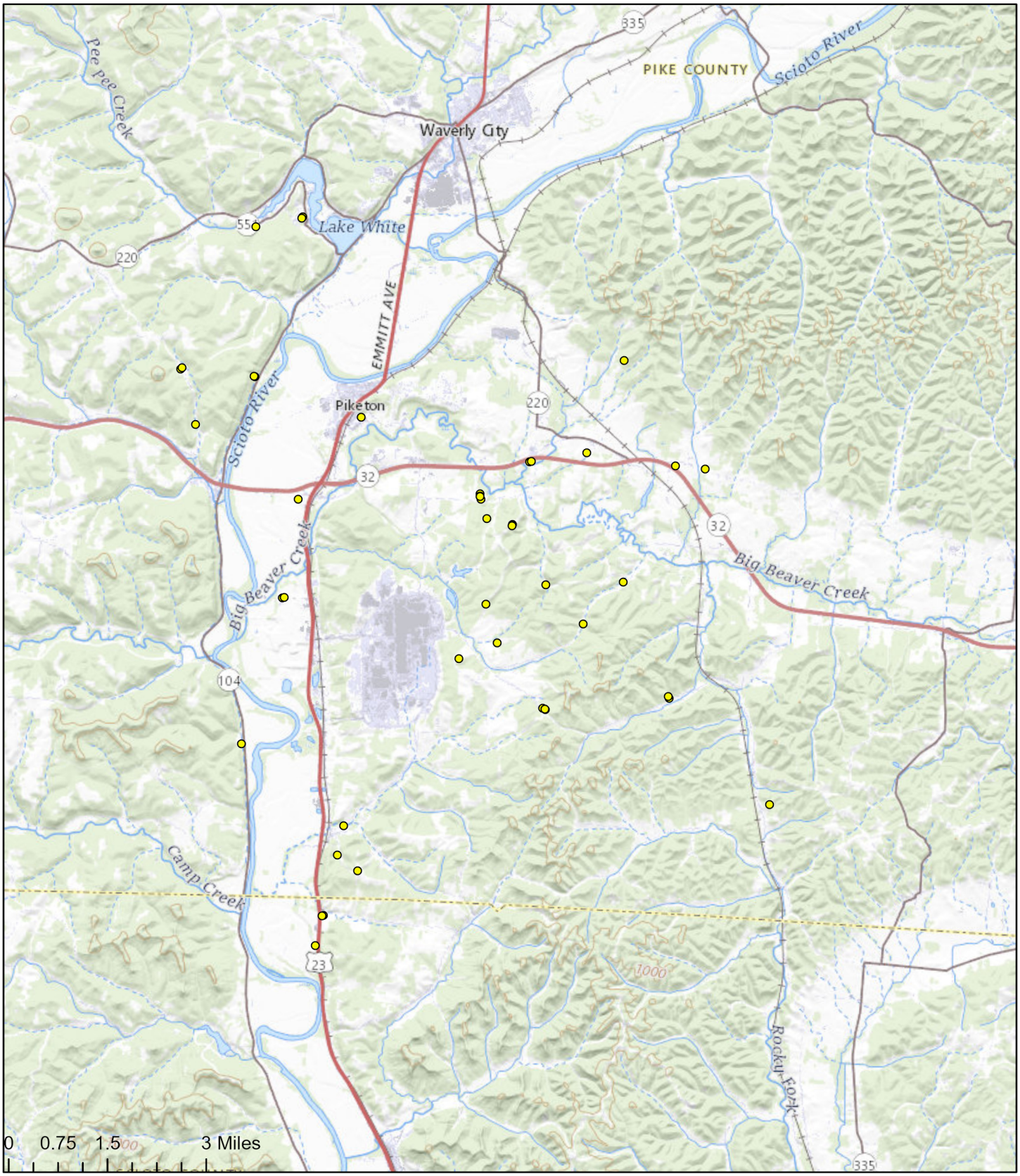
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment All Soil Locations

Sample Locations

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



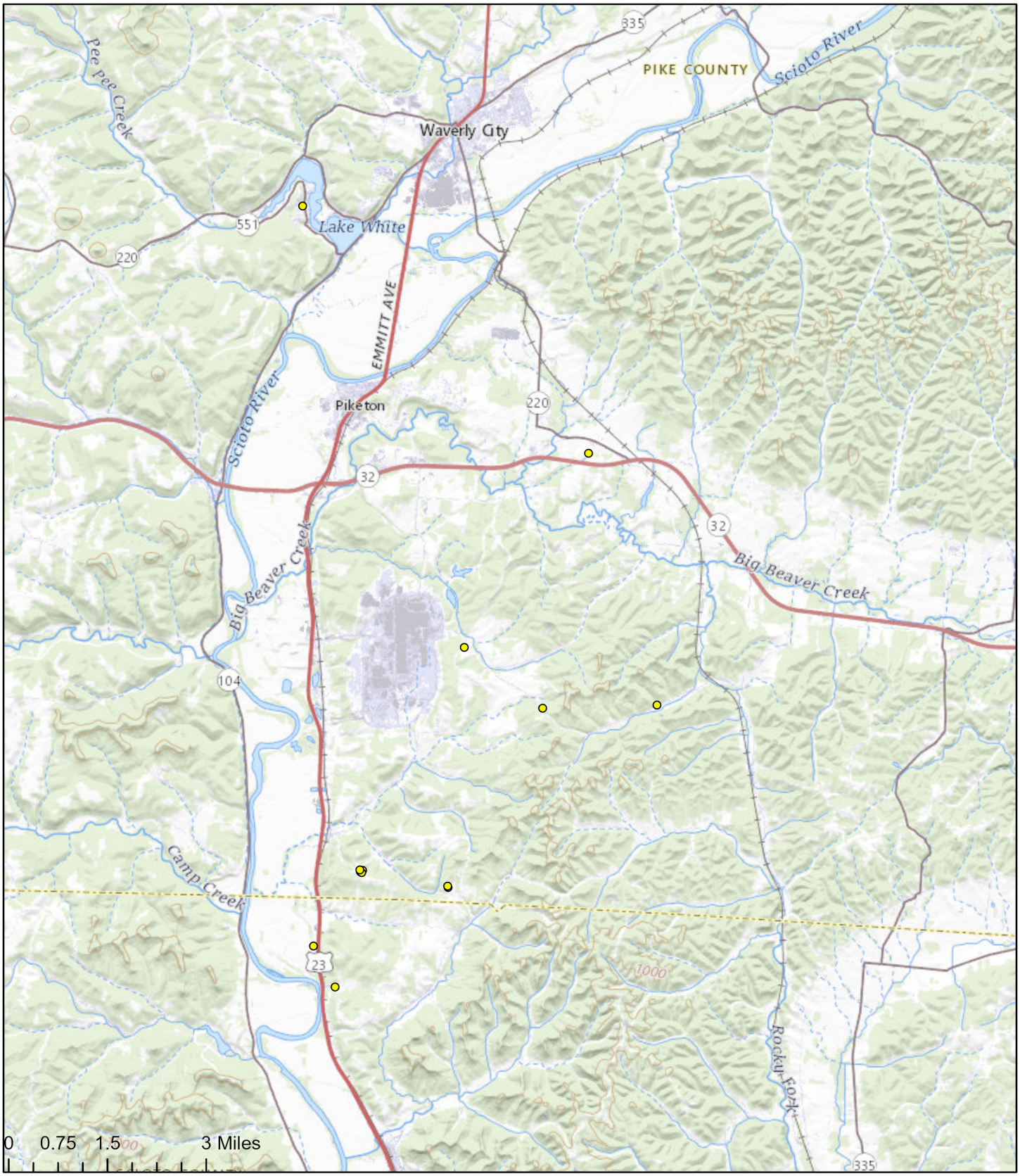
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment Americium-241
Soil with Garden

0.000 - 0.025 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



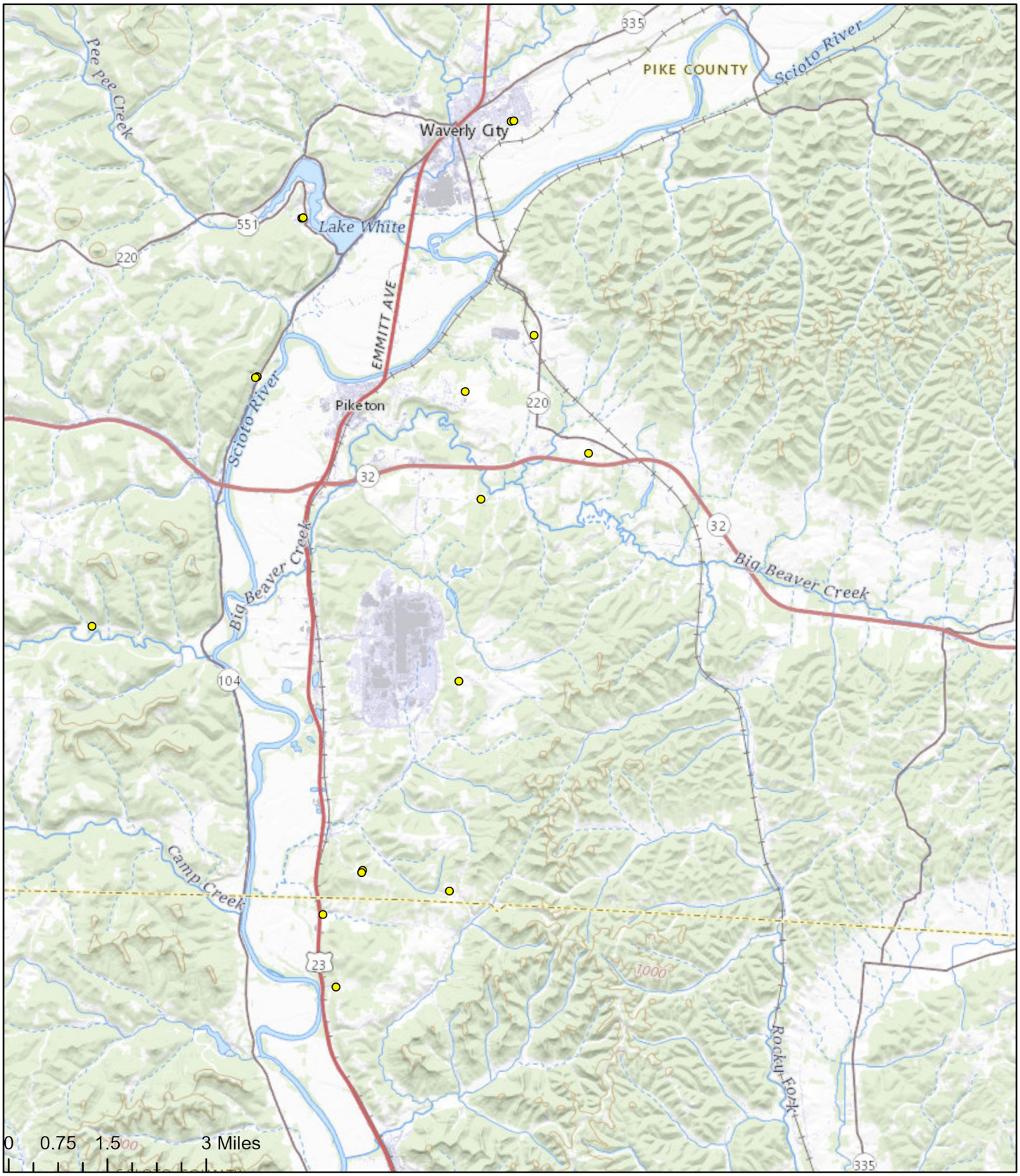
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment Neptunium-237
Soil with Garden

0.000 - 0.018 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



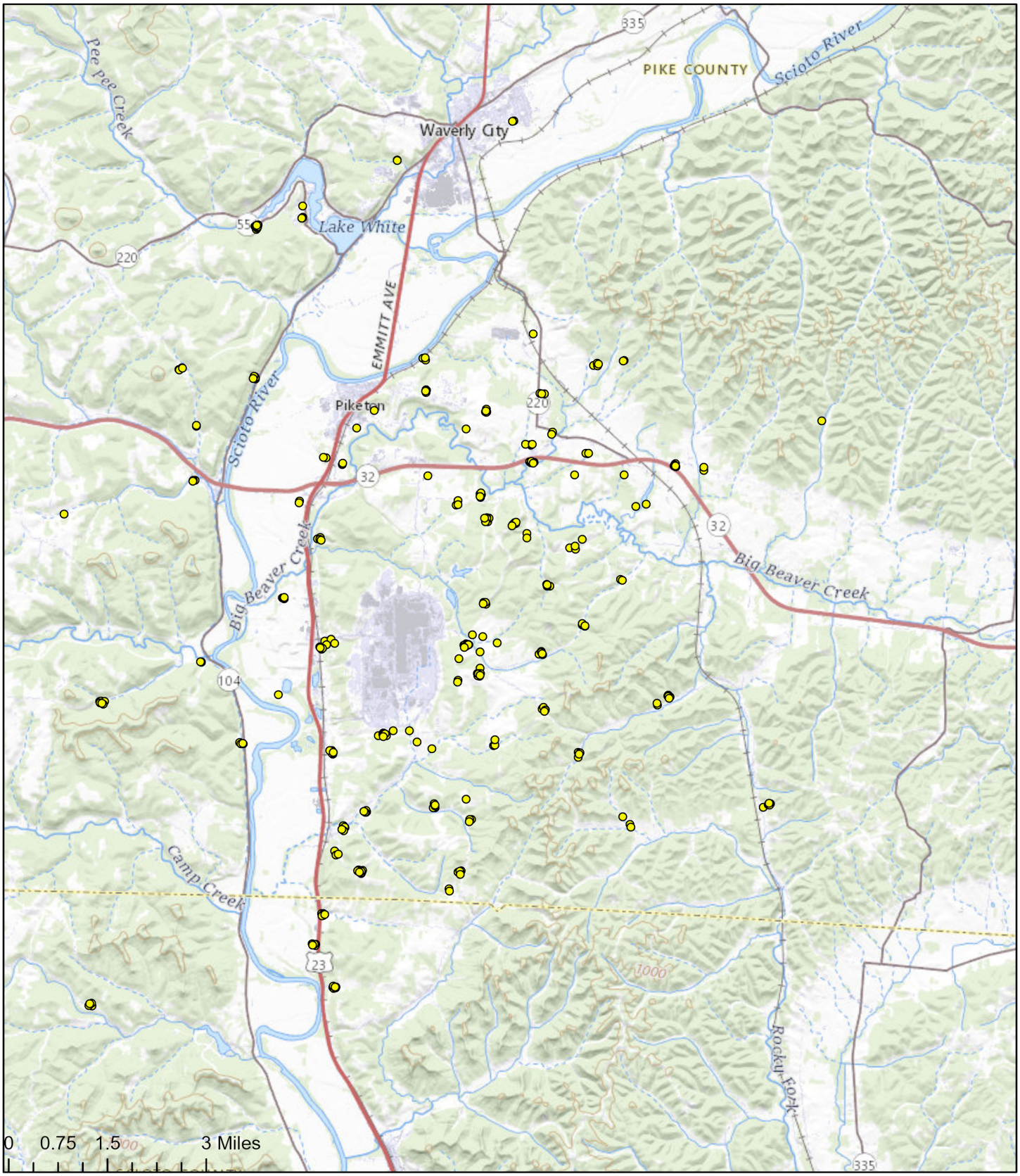
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment Plutonium-238
Soil with Garden

-0.007 - 0.016 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



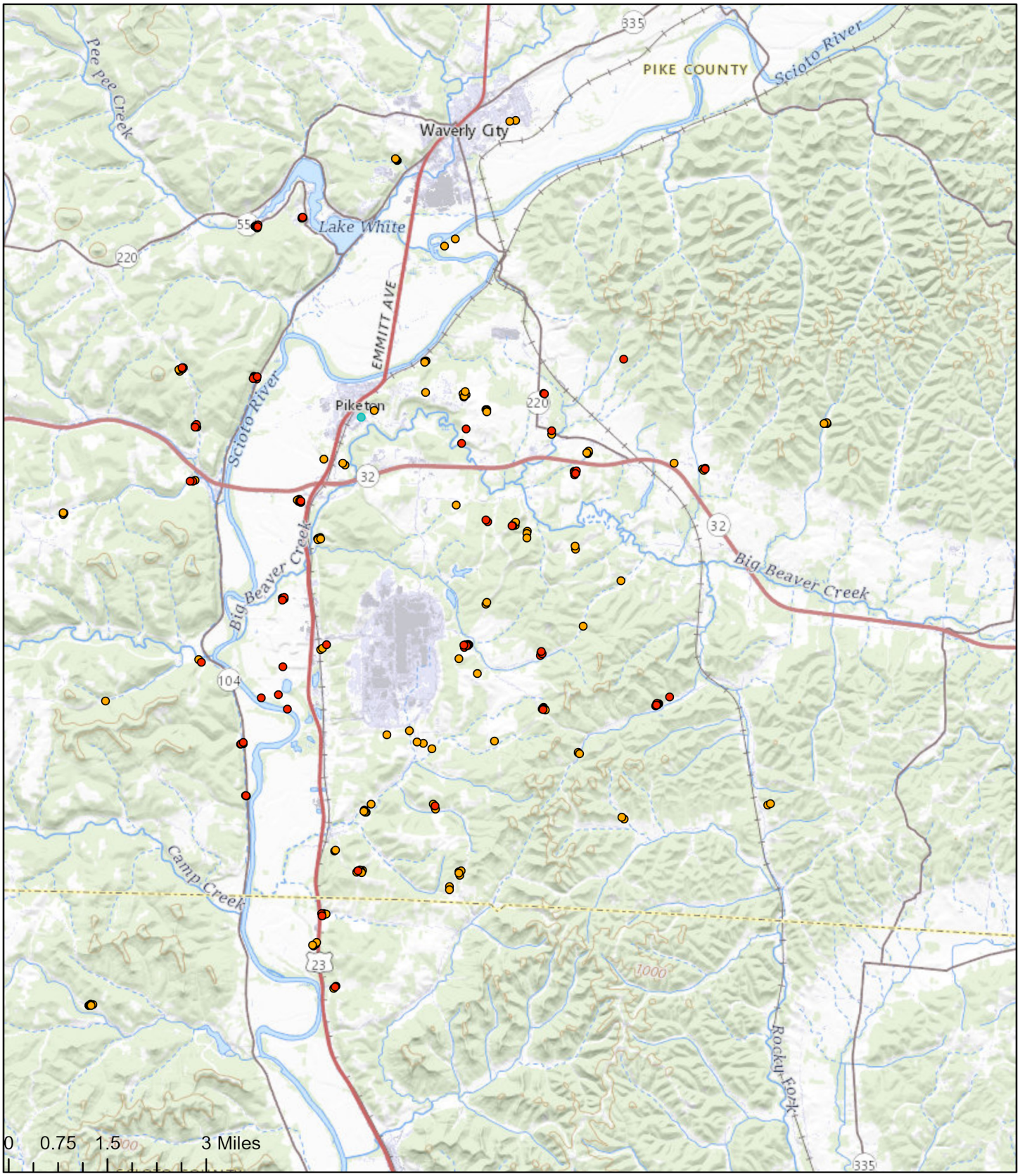
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment
Plutonium-239/240 Soil with Garden

-0.006 - 0.057 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



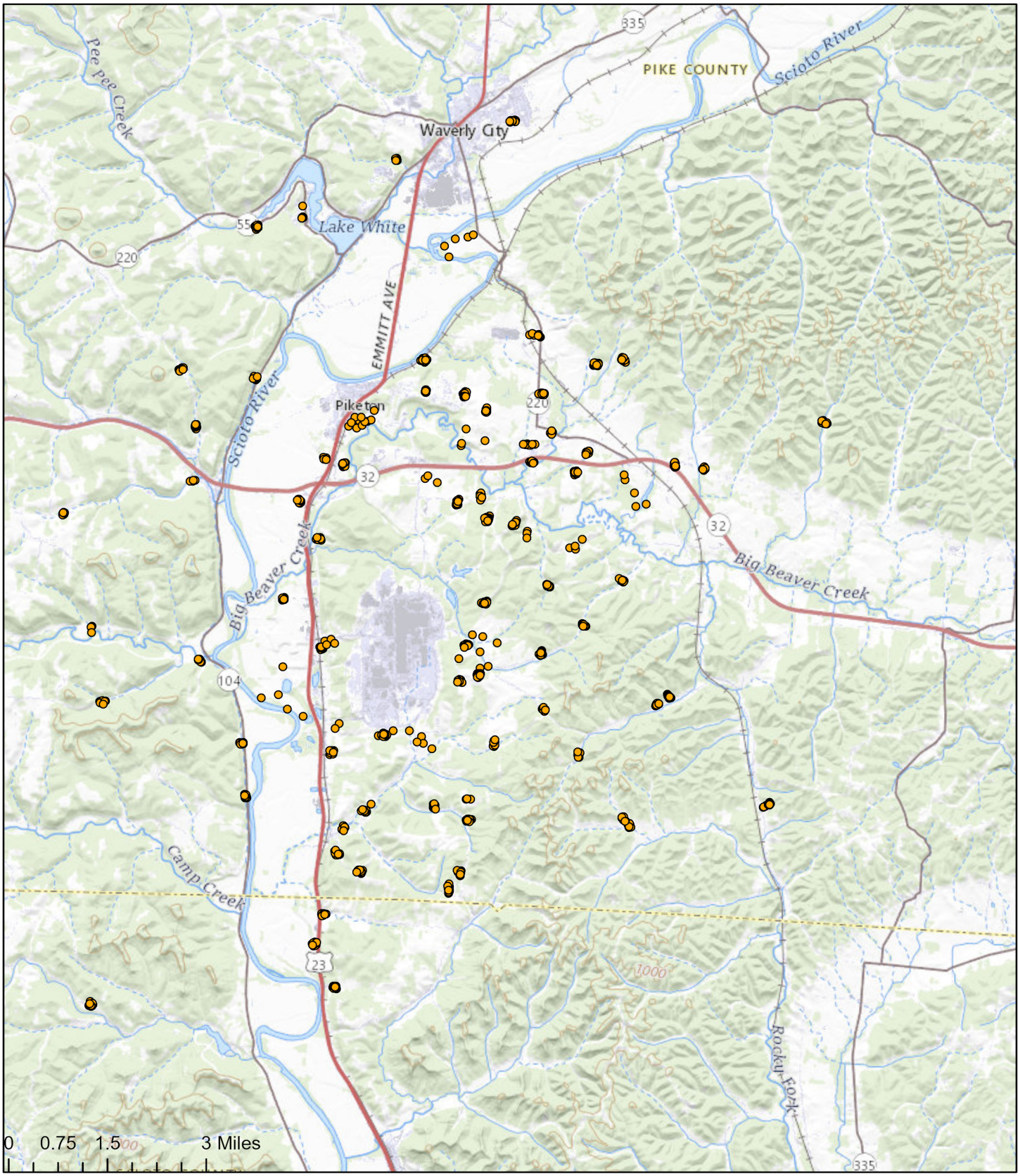
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment Technetium-99 Soil with Garden

- 0.037 - 0.327 (Between 10^-4 and 10^-6 Risk)
- 0.328 - 6.924 (Exceeds 10^-4 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



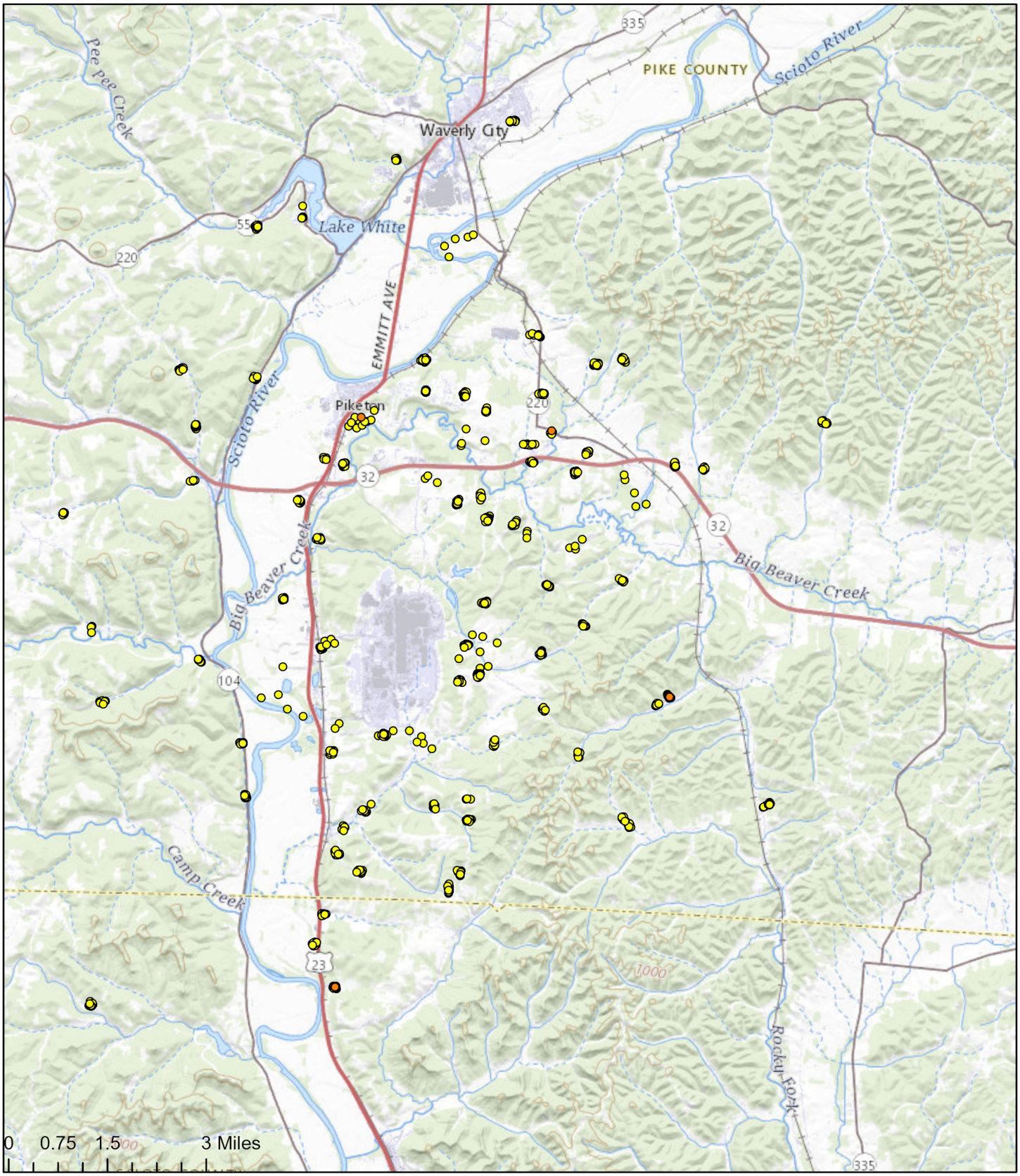
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment
Uranium-233/234 Soil with Garden

● 0.491 - 7.140 (Between 10^-6 and 10^-4 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



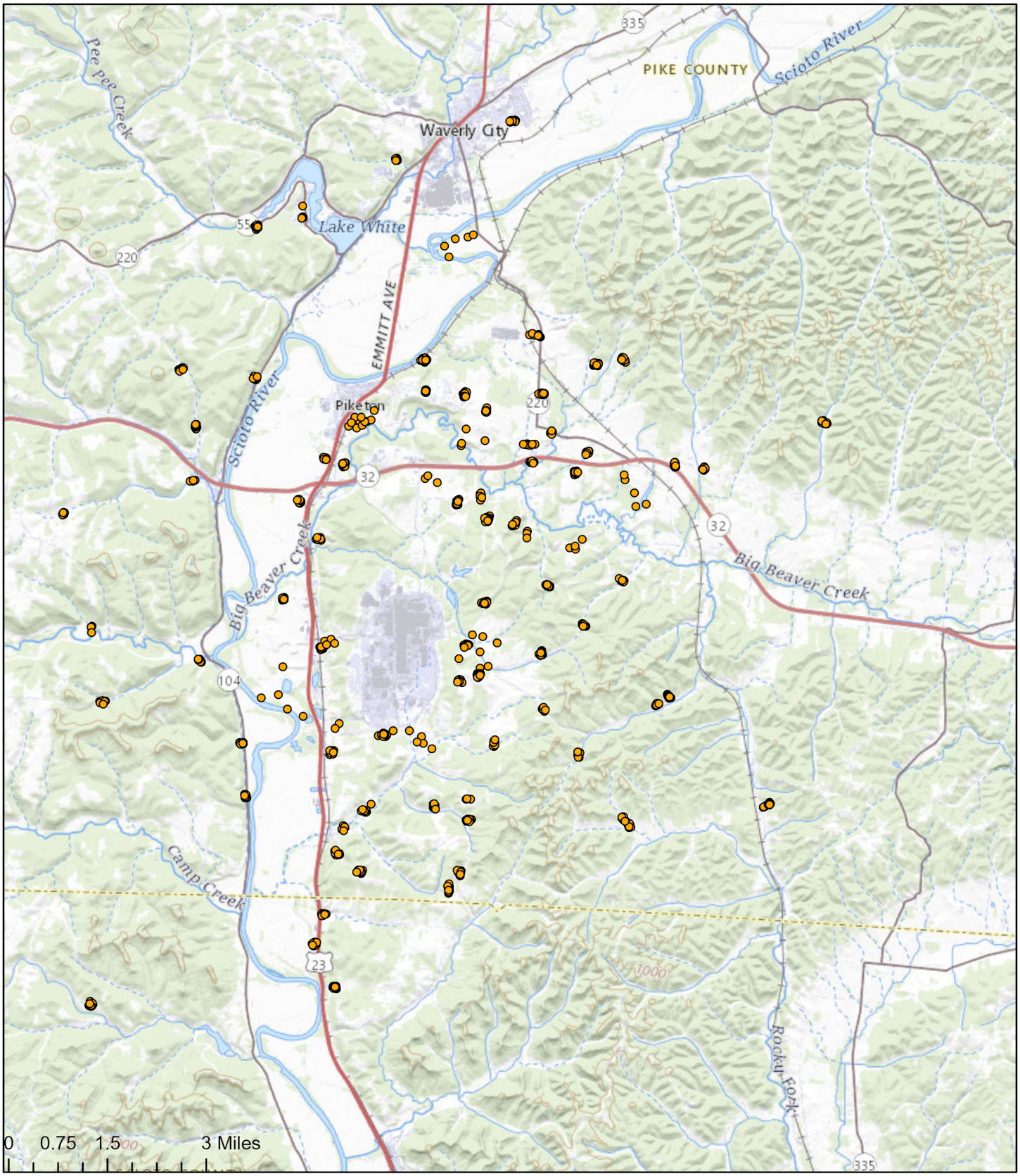
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment
Uranium-235/236 Soil with Garden

- 0.013 - 0.138 (Below 10^-6 Risk)
- 0.139 - 0.365 (Between 10^-6 and 10^-4 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



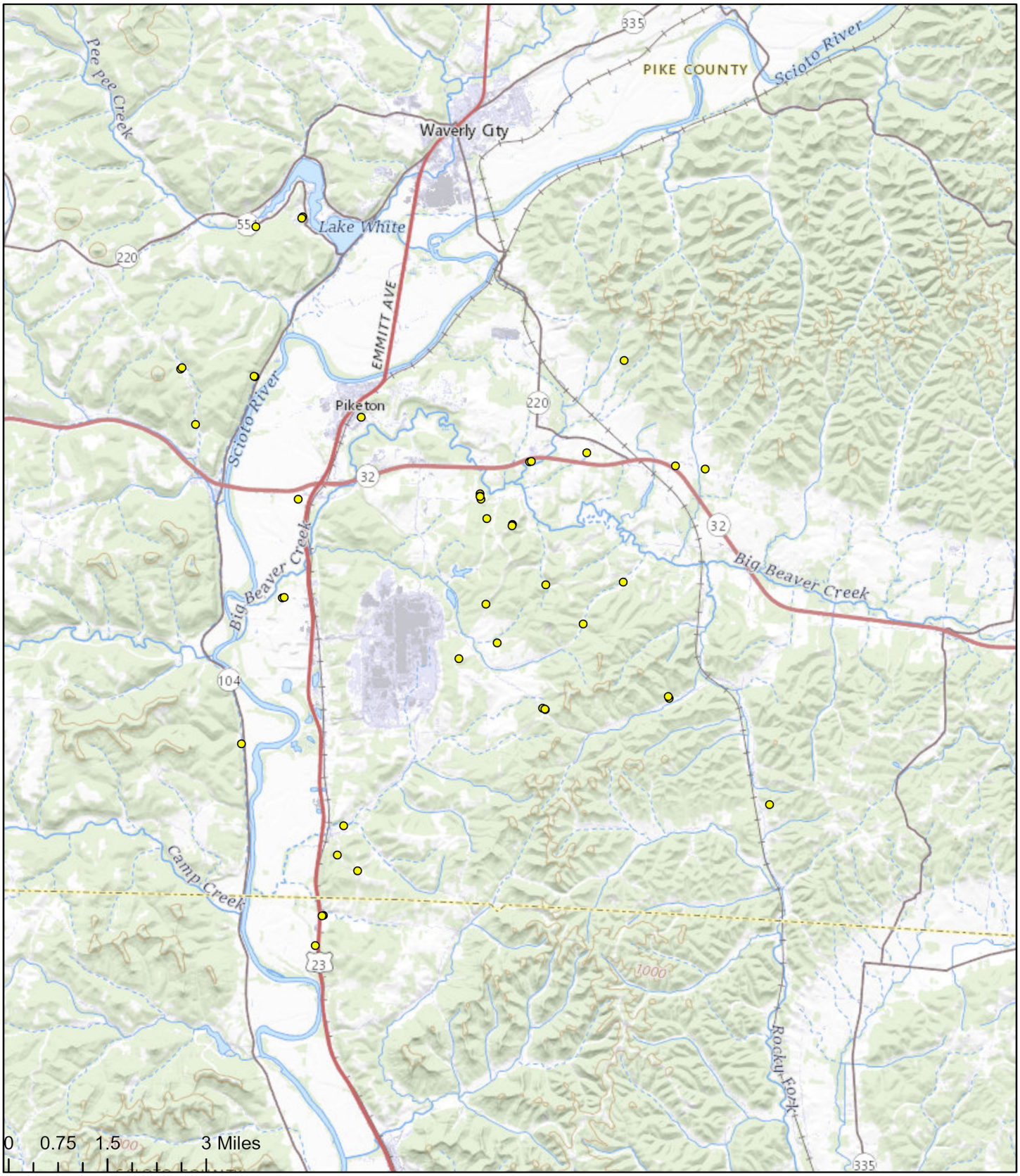
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment Uranium-238 Soil with Garden

● 0.505 - 7.080 (Between 10^-6 and 10^-4 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



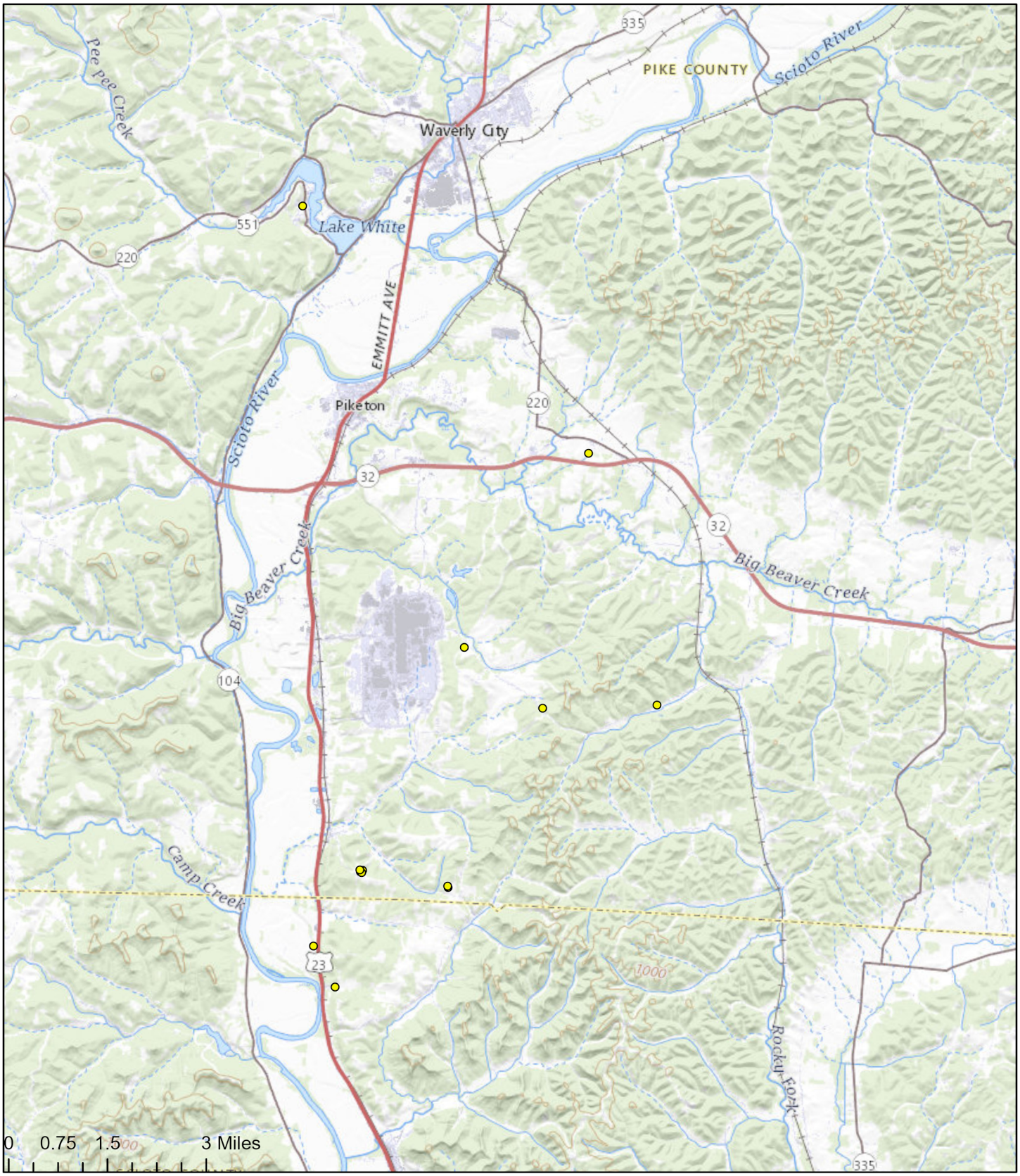
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment Americium-241
Soil without Garden

0.000 - 0.025 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



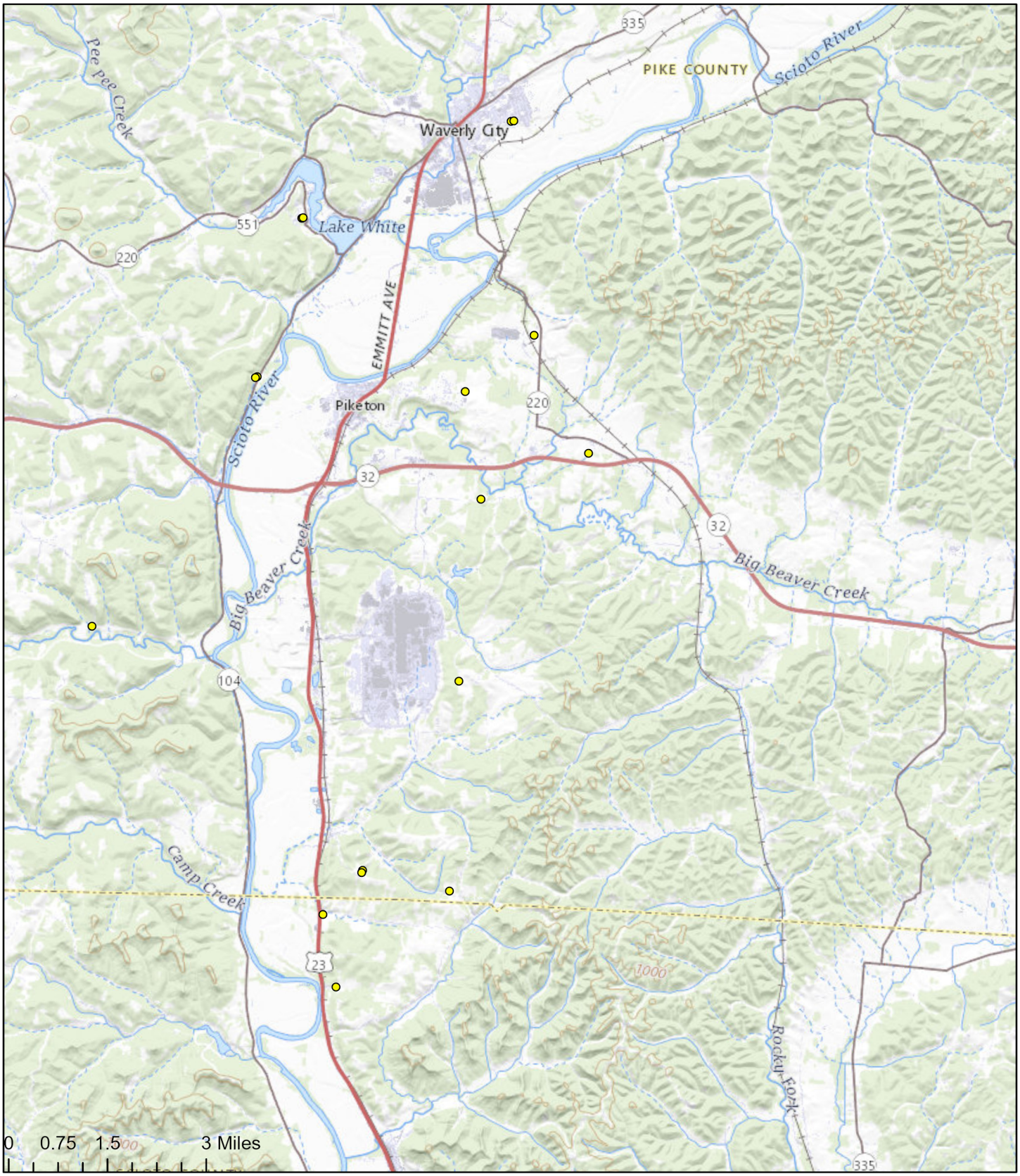
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment Neptunium-237
Soil without Garden

0.000 - 0.018 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



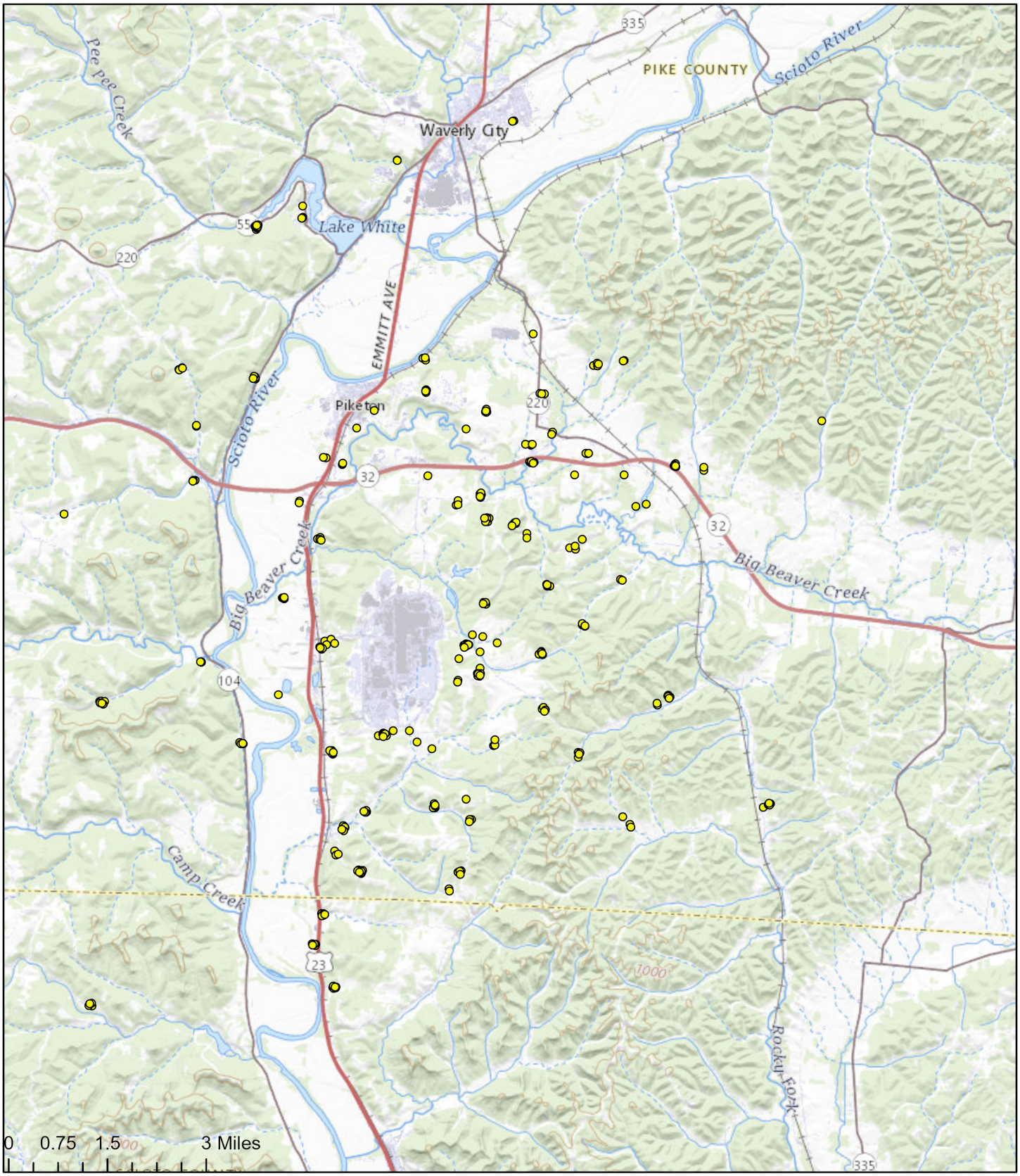
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment Plutonium-238 Soil without Garden

-0.007 - 0.016 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



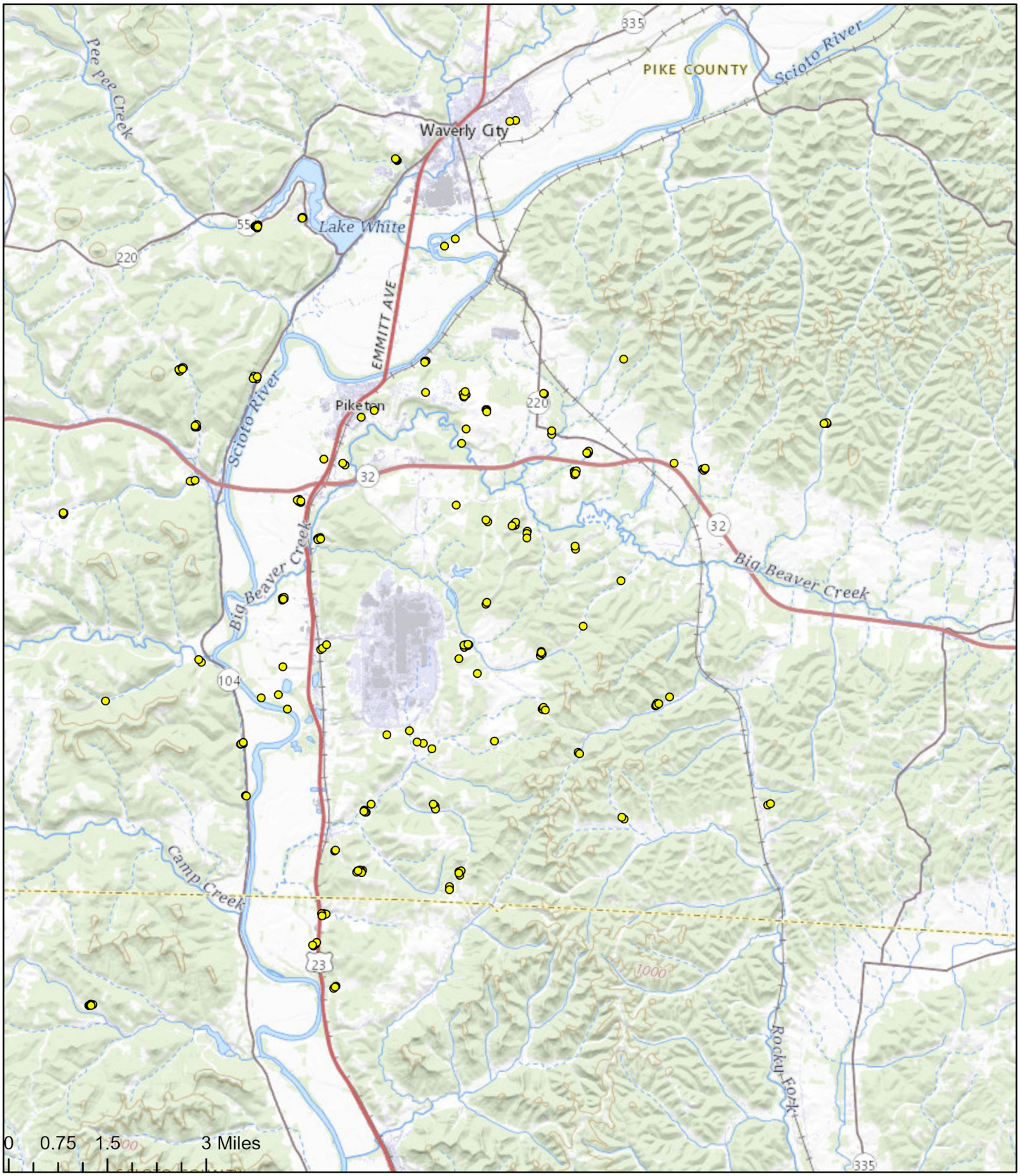
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment
Plutonium-239/240 Soil without Garden

-0.006 - 0.057 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



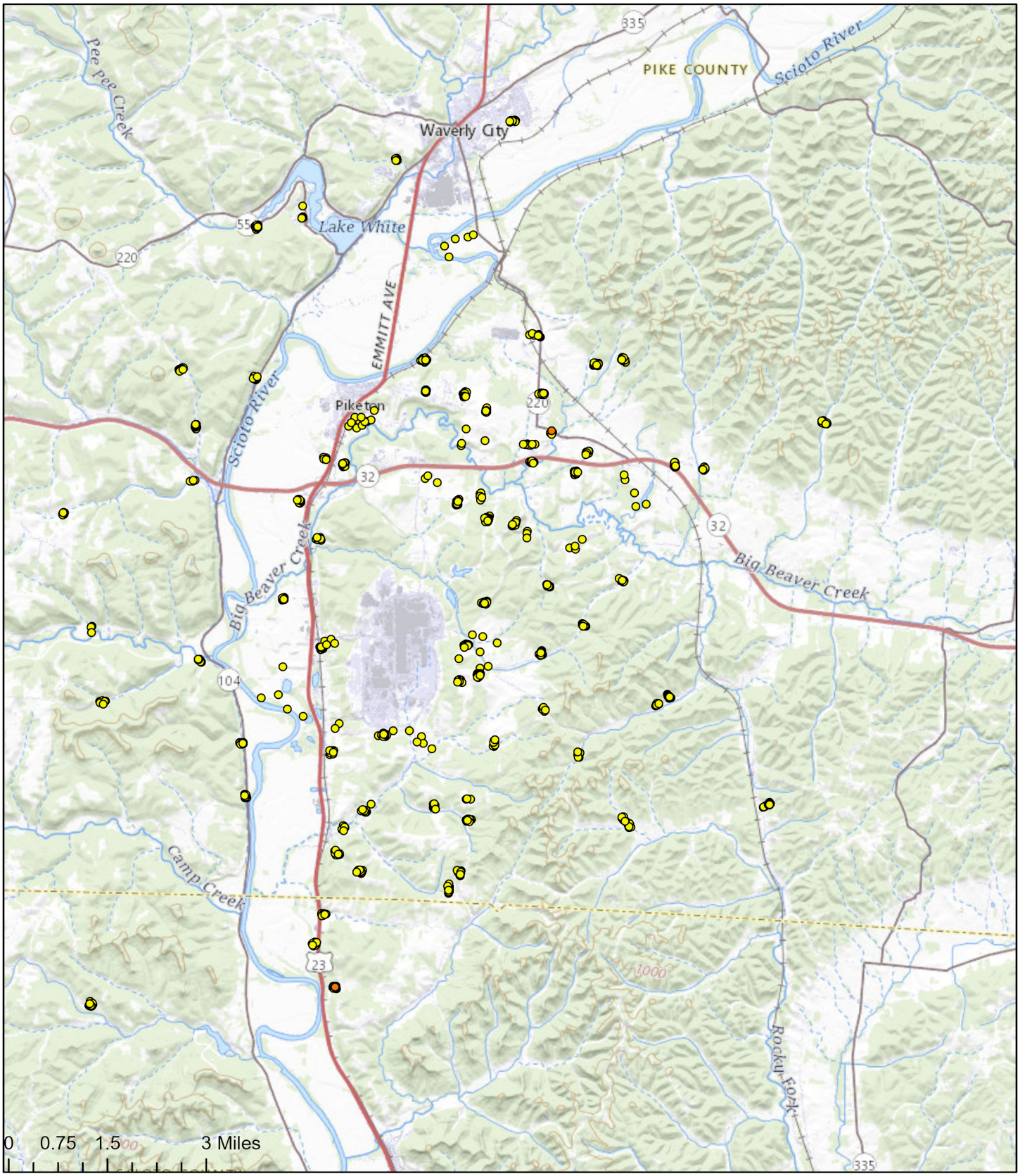
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment Technetium-99
Soil without Garden

0.037 - 6.924 (Below 10^-6 Risk

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



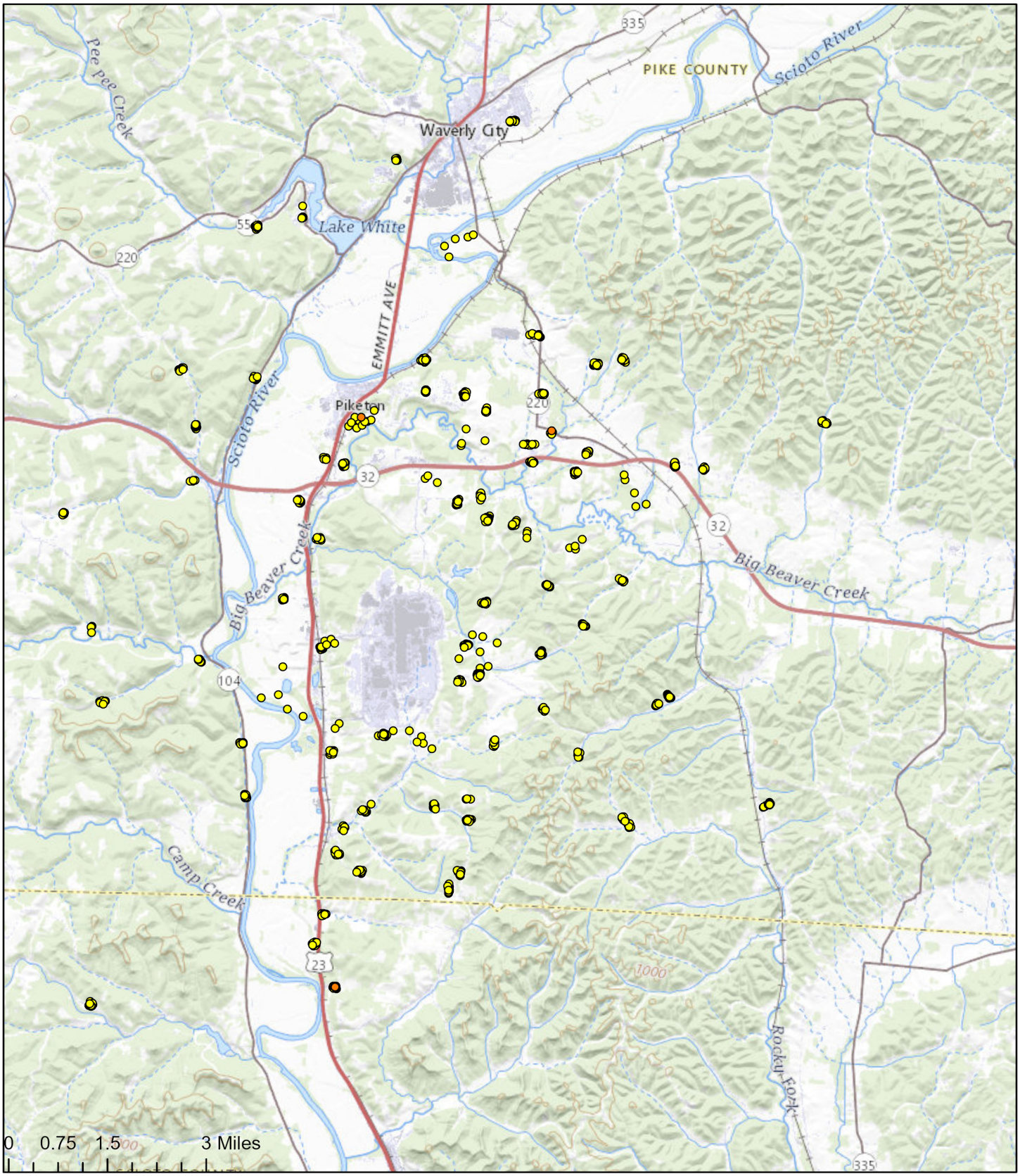
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment
Uranium-233/234 Soil without Garden

- 0.491 - 5.827 (Below 10^-6 Risk)
- 5.828 - 7.140 (Between 10^-6 and 10^-4 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



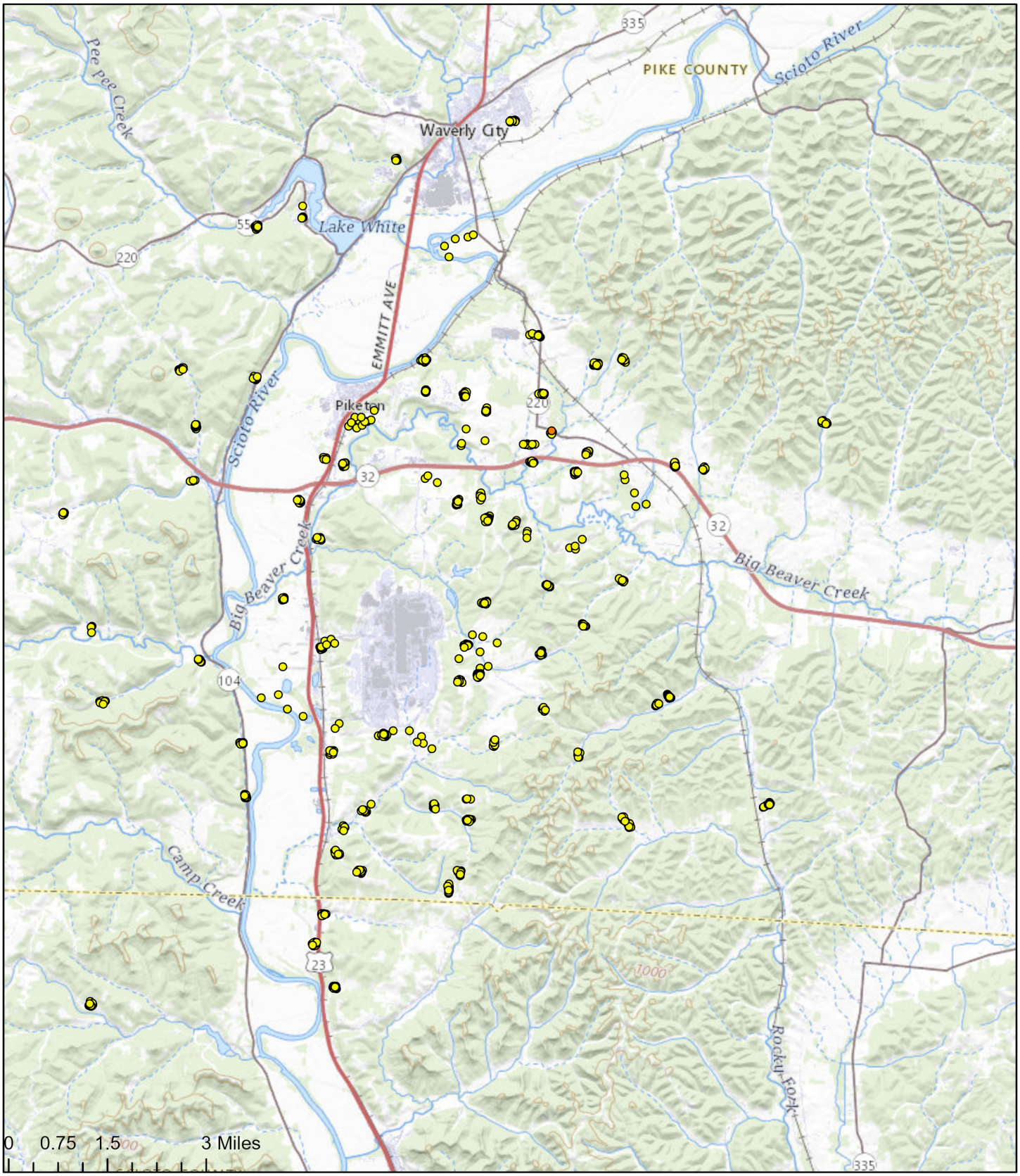
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment
Uranium-235/236 Soil without Garden

- 0.013 - 0.203 (Below 10^-6 Risk)
- 0.204 - 0.365 (Between 10^-6 and 10^-4 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



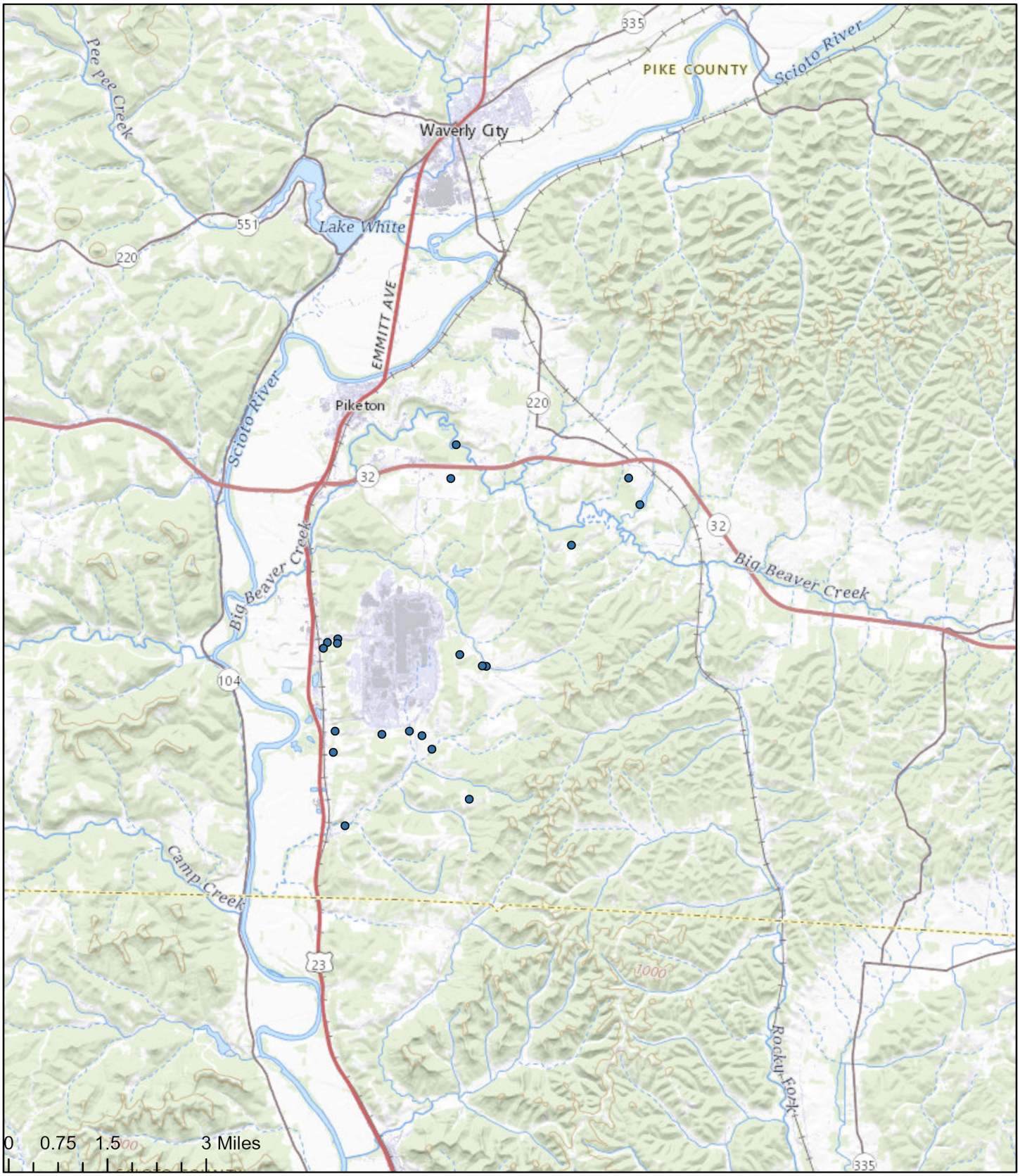
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment Uranium-238 Soil without Garden

- 0.505 - 6.350 (Below 10^-6 Risk)
- 6.351 - 7.080 (Between 10^-6 and 10^-4 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



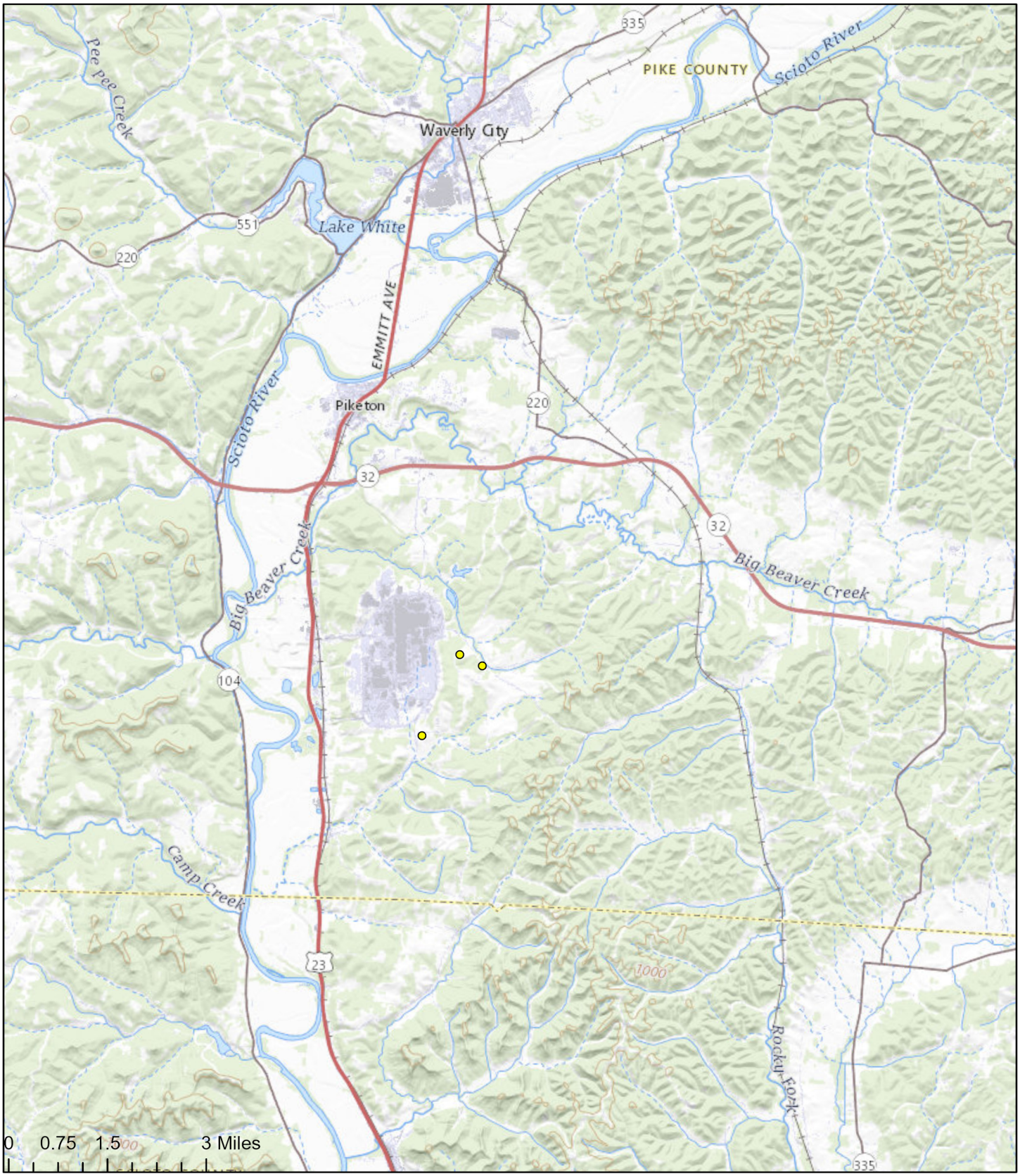
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment All Sediment Locations

Sample Location

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



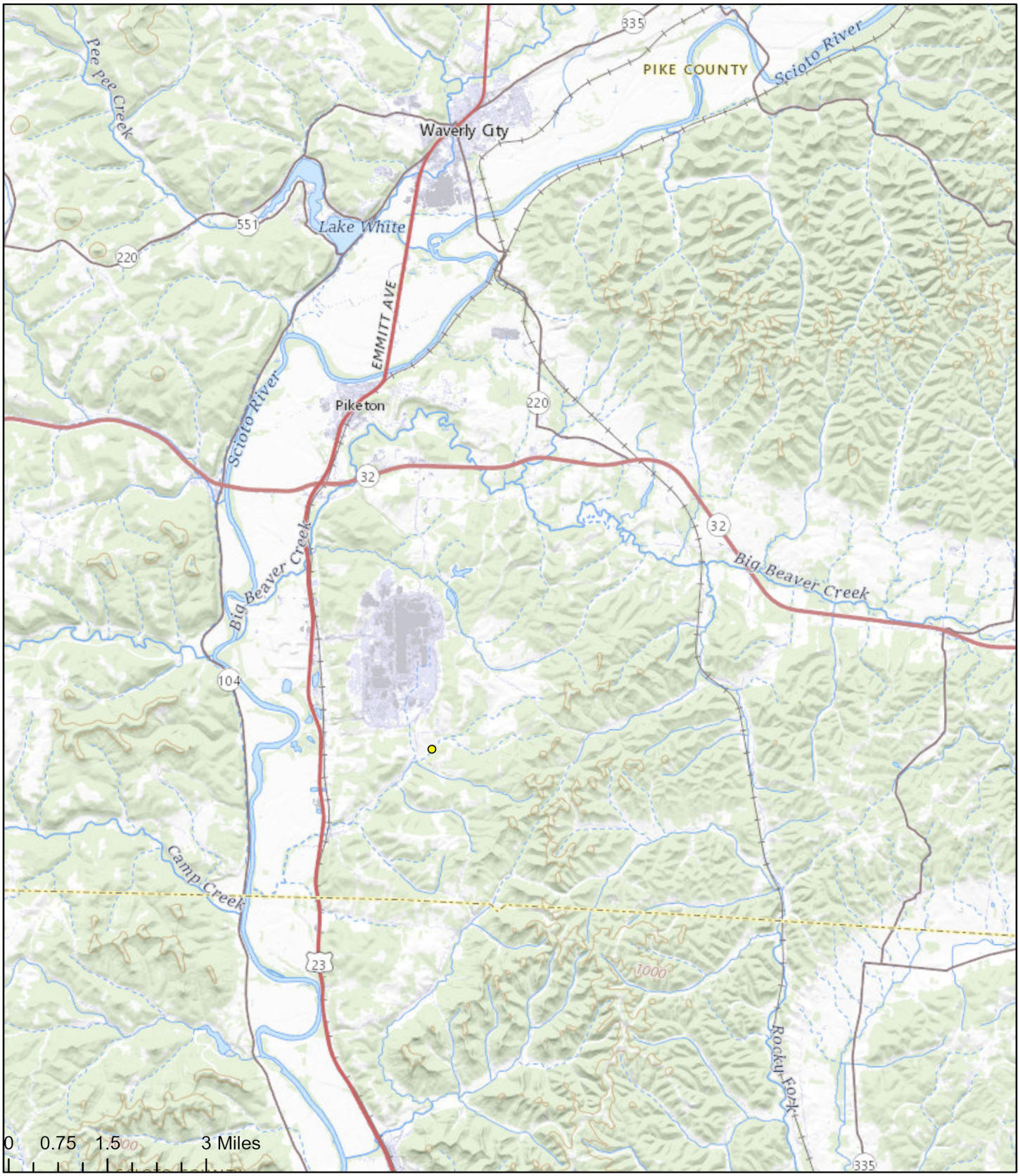
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment Americium-241
Sediment with Garden

0.016 - 0.025 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



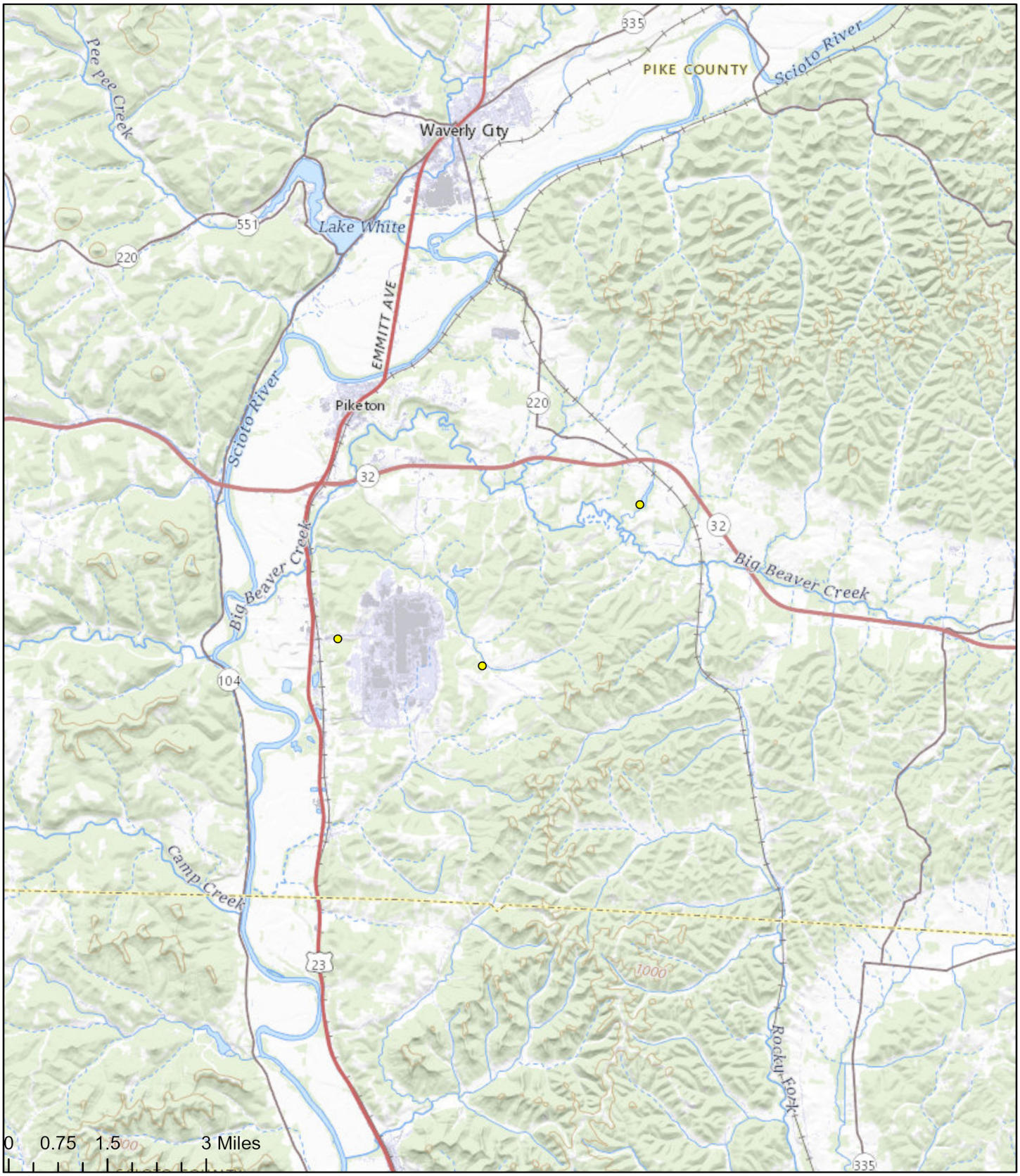
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment Plutonium-238
Sediment with Garden

0.017 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



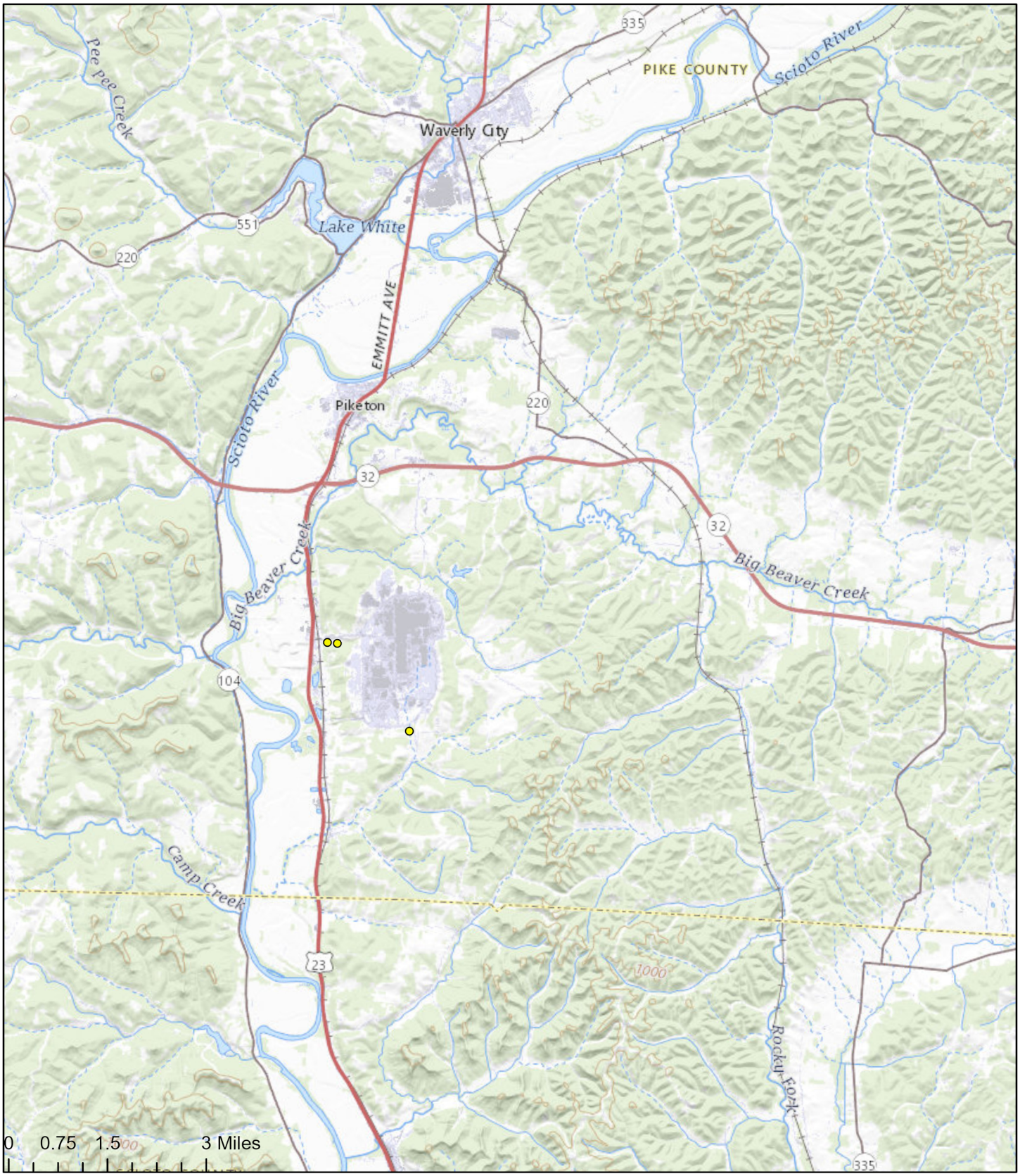
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment
Plutonium-239/240 Sediment
with Garden

0.007 - 0.028 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



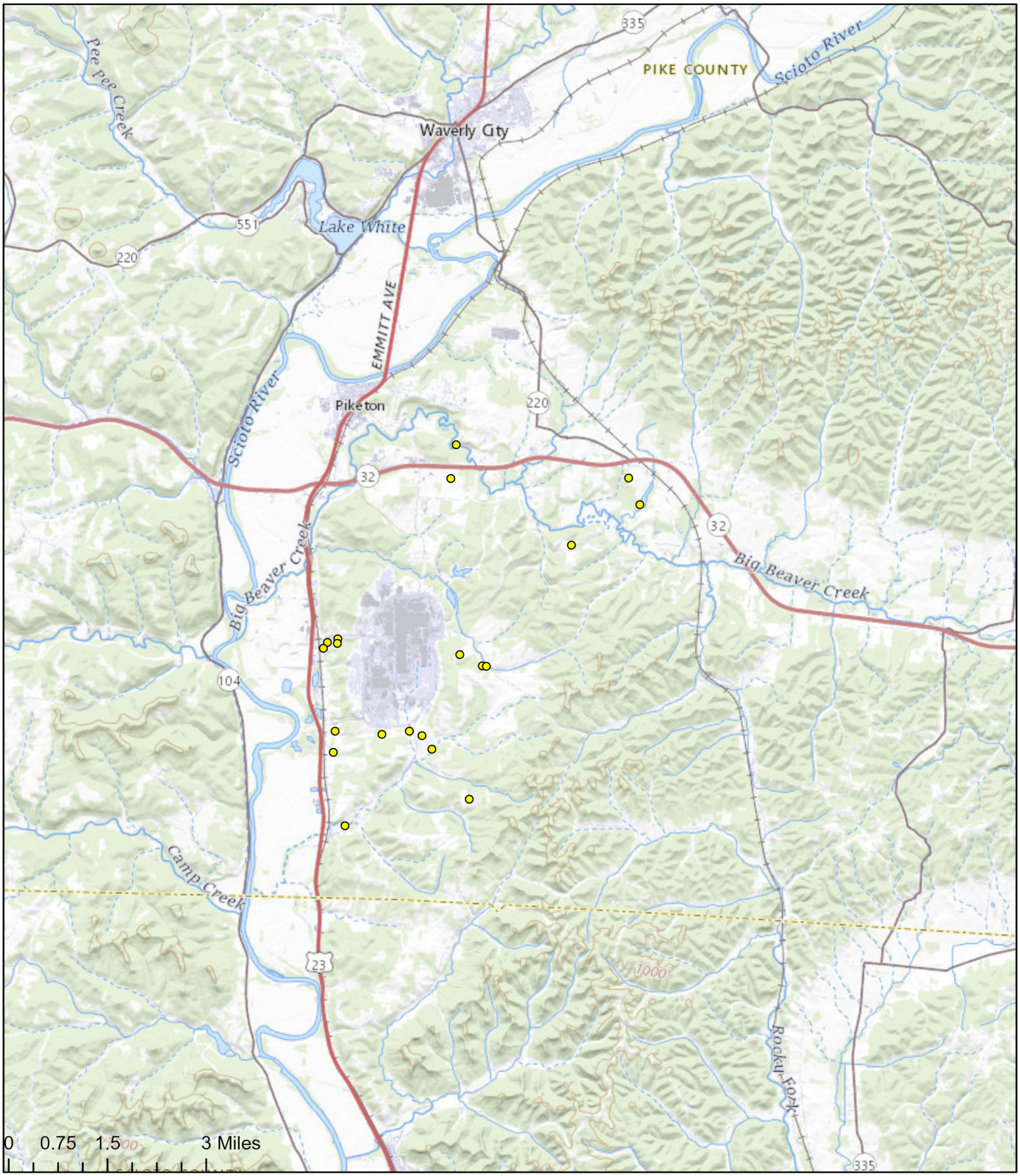
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment Technetium-99
Sediment with Garden

0.038 - 0.296 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



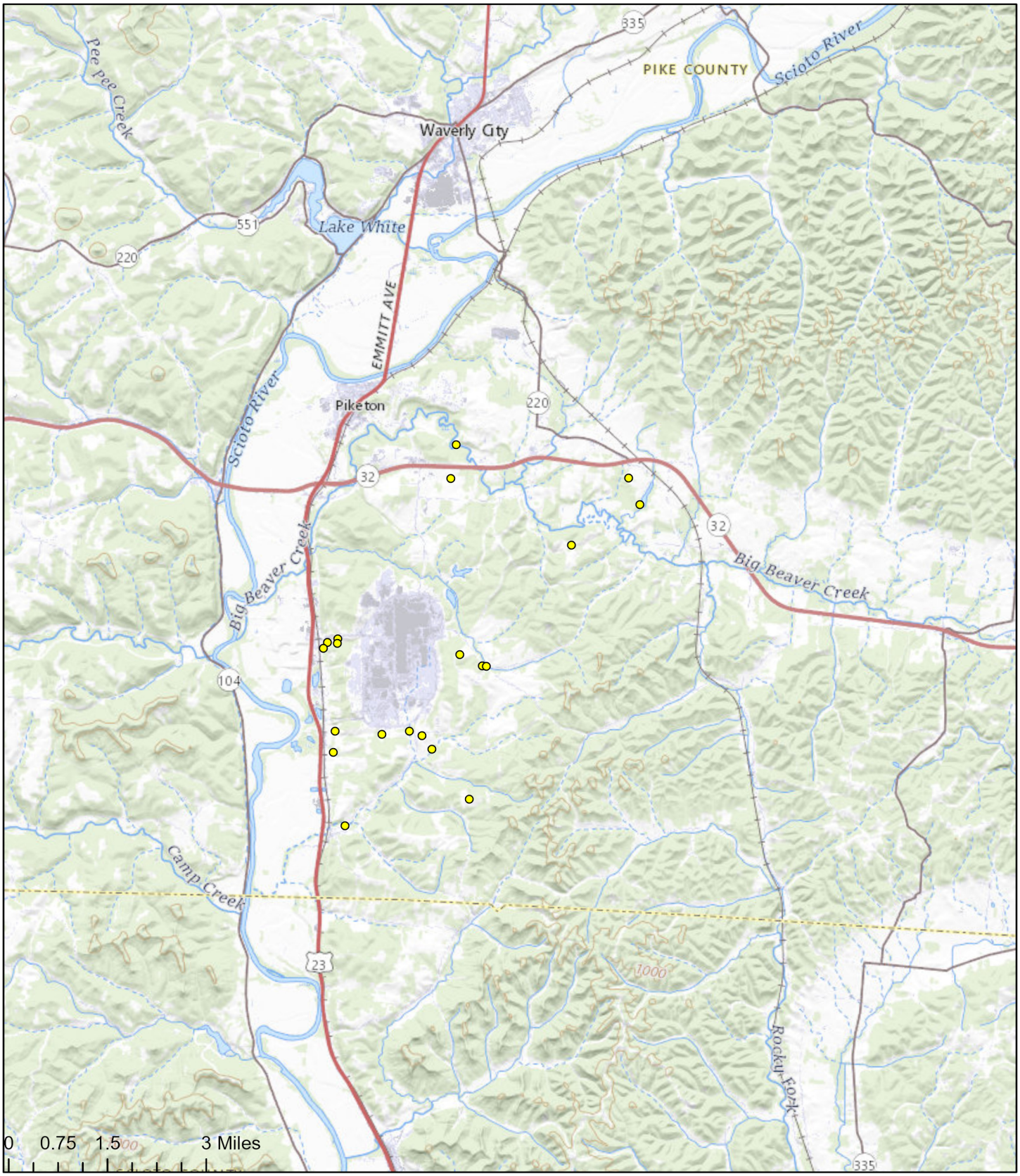
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment
Uranium-233/234 Sediment with Garden

0.607 - 1.550 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



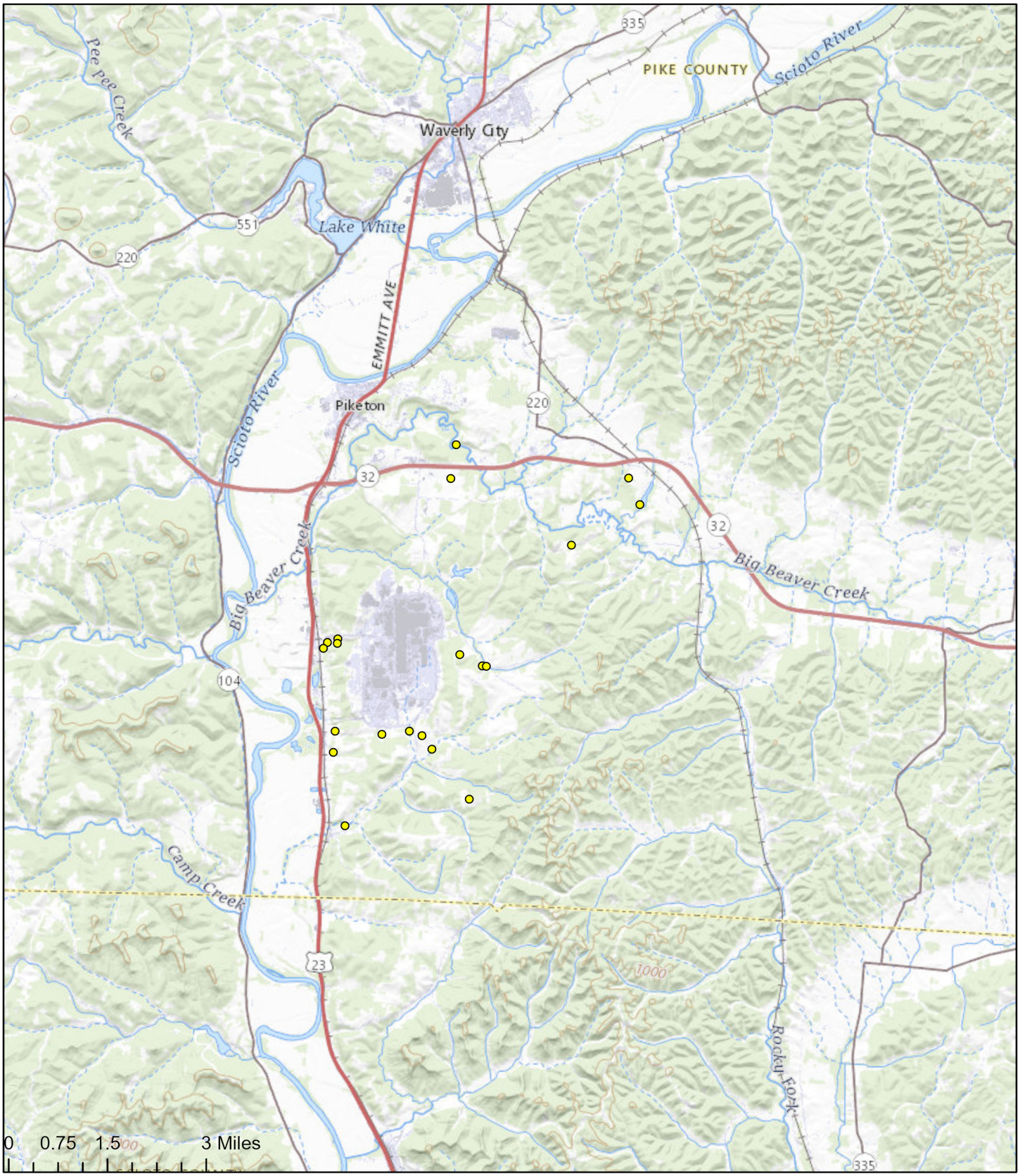
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment
Uranium-235/236 Sediment with Garden

0.018 - 0.075 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



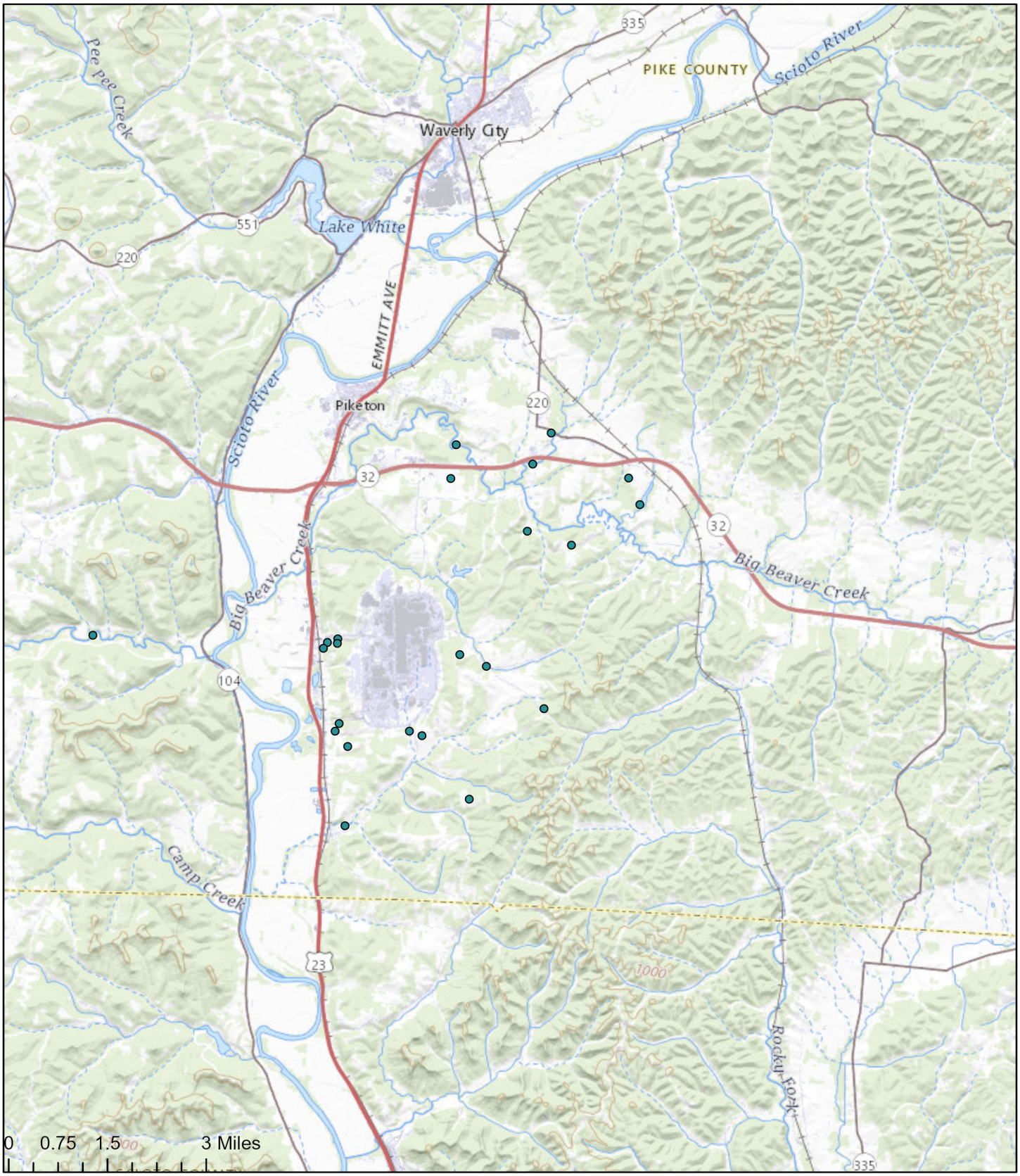
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment Uranium-238 Sediment with Garden

● 0.479 - 1.310 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



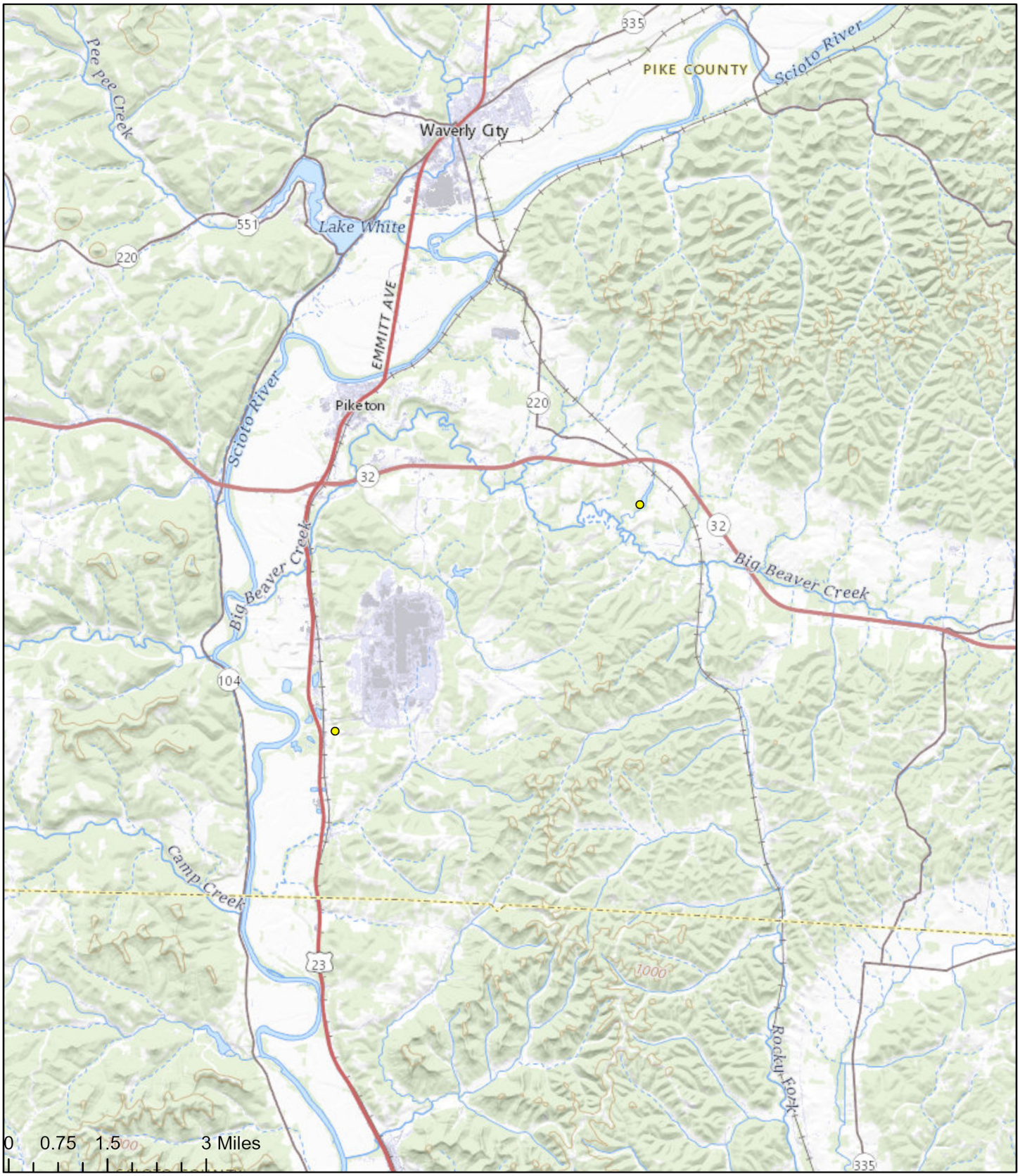
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment All Surface Water Locations

Sample Location

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



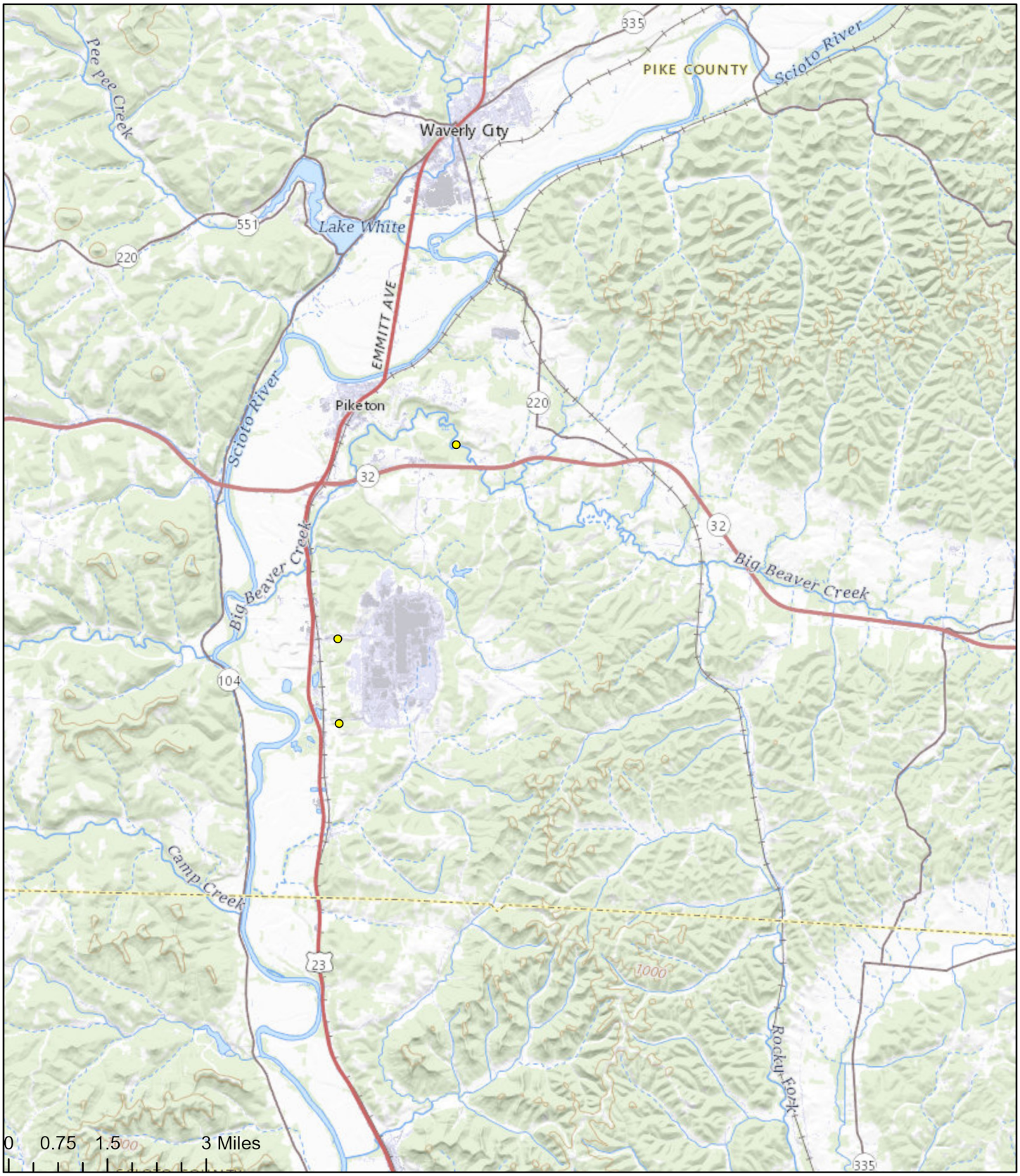
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment Plutonium-238 Surface Water with Garden

0.038 - 0.040 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



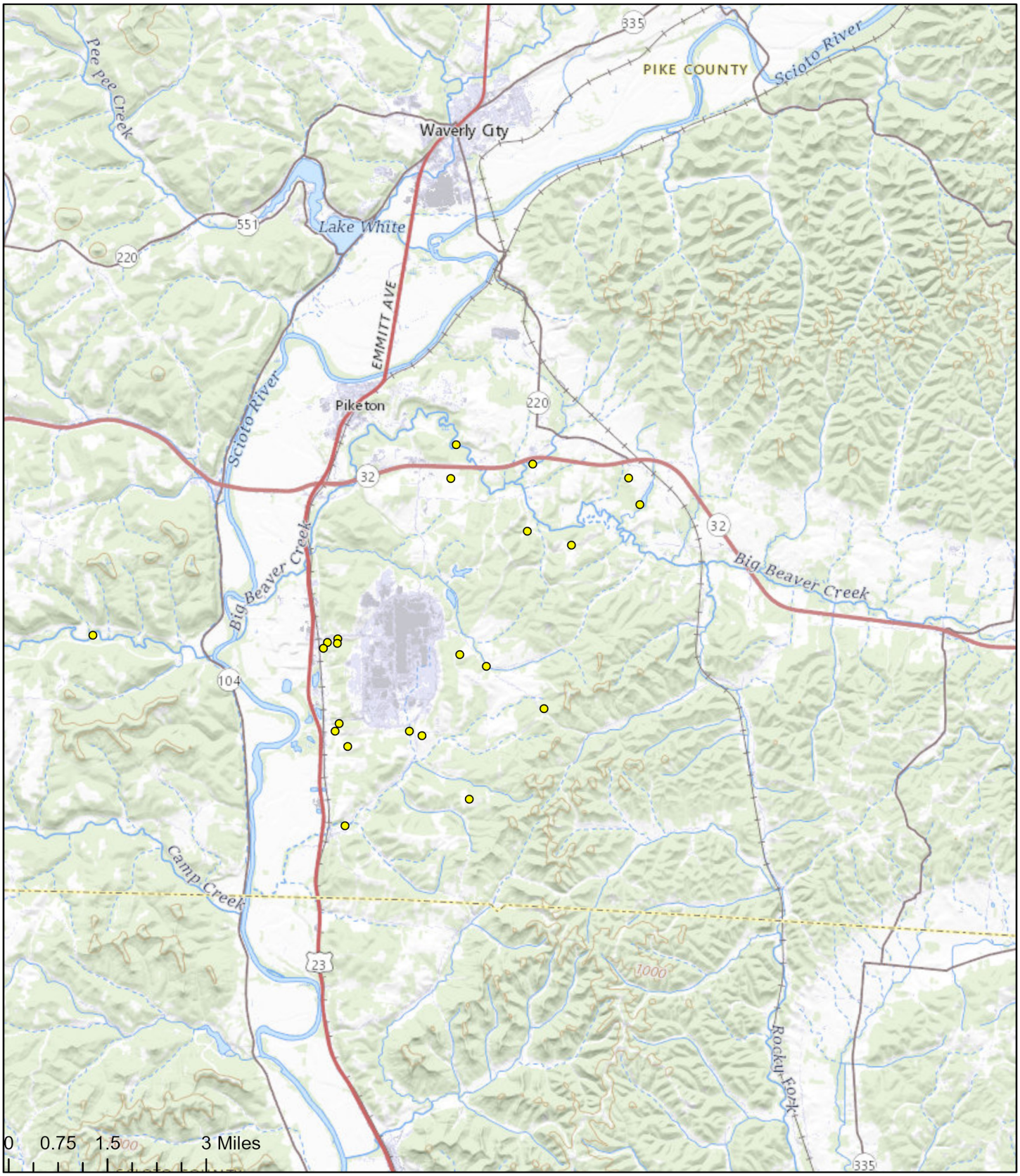
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment Technetium-99 Surface Water with Garden

1.431 - 2.796 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



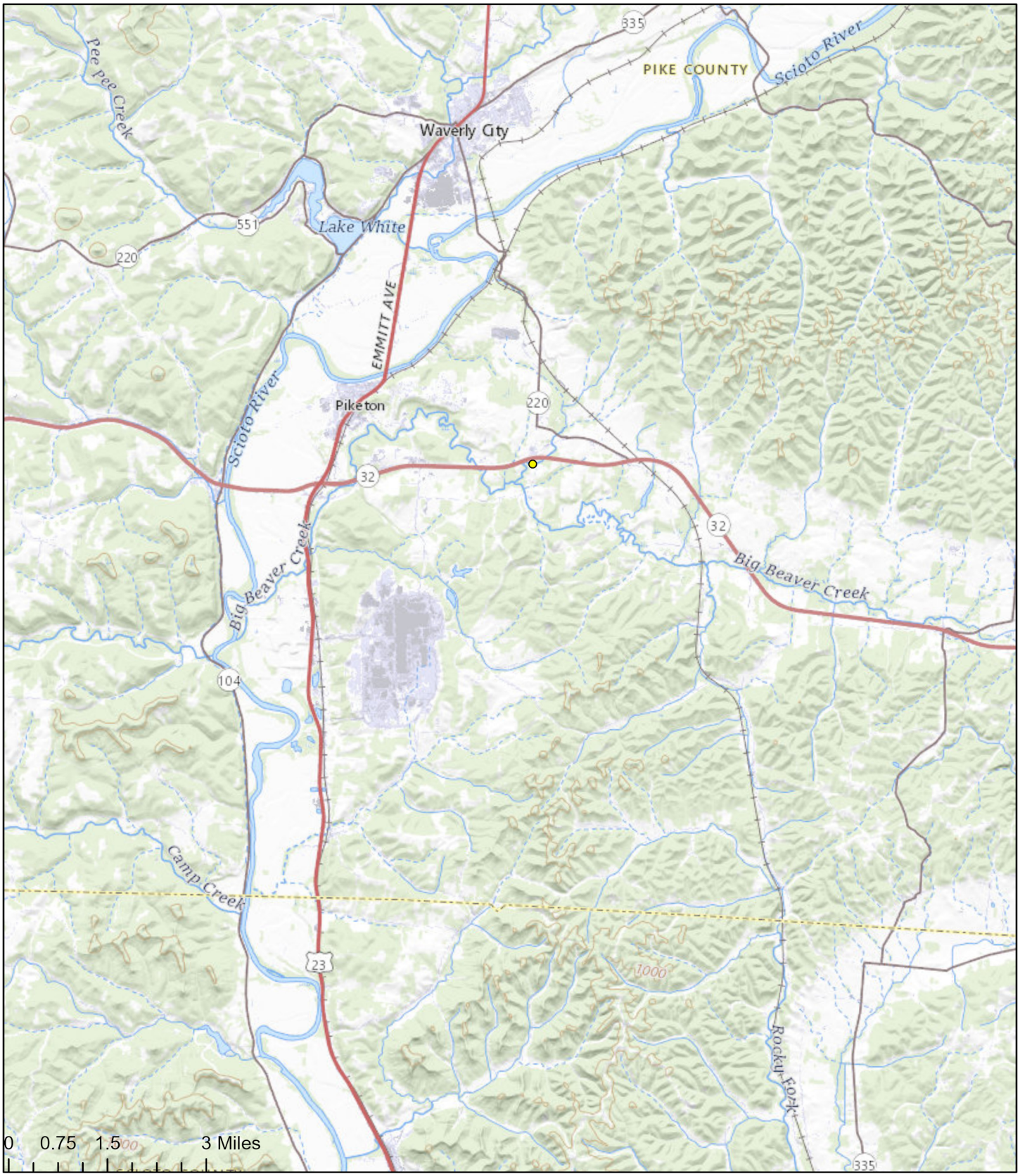
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment
Uranium-233/234 Surface Water
with Garden

0.096 - 1.120 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



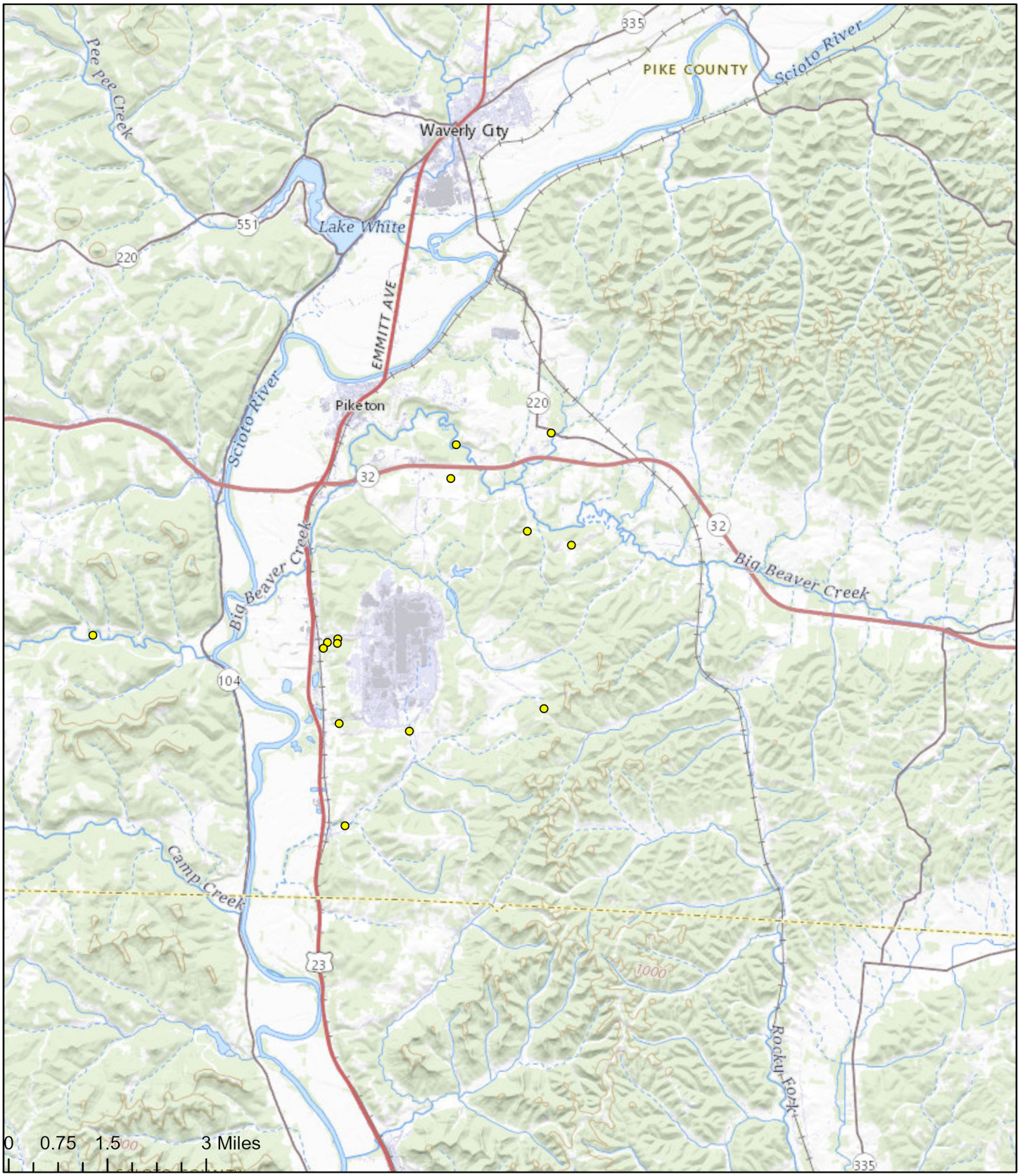
Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment
Uranium-235/236 Surface Water
with Garden

0.120 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky



Auxier & Associates, Inc.
Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

N

Risk Assessment Uranium-238
Surface Water with Garden

0.120 - 0.720 (Below 10^-6 Risk)

Project:
USA/Ports
Date:
December, 2022
Illustrator:
Eric Majersky

Attachment C

Statistician's Qualifications and Report

DOUGLAS E. SPLITSTONE
ASA Accredited Professional Statistician

SPLITSTONE & ASSOCIATES
PMB #110
4530 WILLIAM PENN HIGHWAY
MURRYSVILLE, PENNSYLVANIA 15668

Telephone (724) 325-7421
FAX (724) 327-5958
E-Mail: splide@comcast.net

EDUCATION: B.S./1965/Mathematics - Baldwin Wallace College
M.S./1967/Mathematical Statistics - Iowa State University

EXPERIENCE:

Mr. Splitstone has more than 40 years of experience in the application of statistical tools to the solution of environmental problems. He has designed data collection programs to investigate potential environmental impacts in air, water, and soil. Mr. Splitstone has conducted statistical analyses of data related to the extent of site contamination and remedial planning, industrial wastewater discharges, and the dispersion of airborne contaminants.

He has also designed sampling plans for the collection of data to assess the extent of possible contamination of buildings and structures by polychlorinated biphenyls (PCBs), asbestos, and radioactive material. Mr. Splitstone has also developed statistical decision criteria for evaluating when acceptable environmental cleanup levels have been achieved.

He has successfully employed geostatistical analysis and estimation techniques for mapping the areal extent and total volume of dioxin contaminated soils at the site of a former New Jersey pesticide plant. He has also successfully employed these techniques to map the extent of contamination in the sediments of the Passaic River and design the sampling plan for the collection of data to assess the extent of possible contamination by radioactive material in the environs of Department of Energy's (DOE's) Feed Materials Production Center near Fernald, Ohio.

Mr. Splitstone has successfully established statistical service groups devoted to environmental problem solution at Burlington Environmental, Inc. and the International Technology Corporation. As a former manager in the Environmental Affairs Department for USX Corporation in Pittsburgh, Pennsylvania, Mr. Splitstone managed a multi-disciplinary group of environmental specialists who were responsible for identifying the nature and cause of industrial emissions and developing cost-effective environmental control solutions. Mr. Splitstone has served as an expert witness in environmental litigation and has successfully defended his application of statistical techniques before the U. S. Environmental Protection Agency (USEPA).

Mr. Splitstone is a recognized expert in the application of statistical techniques for the investigation and solution of environmental problems. He is accredited as a Professional Statistician by the American Statistical Association. Mr. Splitstone has been retained as a Subject Matter Expert on behalf of the U. S. Department of Energy and the New York State Energy Research and Development Authority in regard to environmental issues involving the West Valley Demonstration Project and Western New York Nuclear Service Center.

Mr. Splitstone has served as a member of the Task Group on Epidemiology and Statistical Methodology for the USEPA's Center for Environmental Epidemiology at the University of Pittsburgh's Graduate School of Public Health; a member of the Peer Review Group, Salt Host-Rock Portion of the DOE's Civilian Radioactive Waste Management Program for Argonne National Laboratory; and as a consultant to the USEPA's Science Advisory Board serving on the Air Toxics Monitoring Subcommittee; the Contaminated Sediments Science Plan review panel and the Environmental Engineering Committee's Quality Management and Secondary Data Use Subcommittees. In 2005, Mr. Splitstone was asked to serve on two SAB panels reviewing the USEPA response to hurricane Katrina. These panels reviewed the USEPA sampling plan for assessing contamination of soil and sediment along the Mississippi Gulf Coast and the sampling of flood water residue in South East Louisiana.

Mr. Splitstone served as a member of the faculty of the annual 1992 summer school of the Health Physics Society and an adjunct faculty member of The Pennsylvania State University and Indiana University of Pennsylvania. He was an invited instructor at the 1993 annual seminar for senior managers and partners of Price Waterhouse.

At the request of the USEPA, he provided comments on the statistical procedures specified in SW-846 and the draft of the guidance document, Methods for Evaluating the Attainment of Cleanup Standards - Volume 1: Soils and Solid Media. Mr. Splitstone has published numerous articles and made many invited presentations on the application of statistical techniques to environmental studies. Some of these presentations were made at the USEPA Conferences on the Interpretation of Environmental Data and the DOE's 28th Hanford Symposium.

Mr. Splitstone is a member of the American Statistical Association (ASA) and is a founder and past chairman of that organization's Committee on Statistics and the Environment. He was awarded the Distinguished Achievement Medal by the ASA's Section on Statistics and the Environment in 1993. His invited participation in the 1994 workshop on *Ethical Issues in Statistics in Expert Testimony* reflects his long standing interest in the interface between science and the law. This workshop conducted by the ASA was sponsored by the National Science Foundation (NSF) as part of the NSF Ethics and Values Studies program.

Mr. Splitstone also holds membership in the Air and Waste Management Association. He was chairman for the Sixth Symposium on Statistics and the Environment that was held at the National Academy of Sciences and served as a technical reviewer for *Atmospheric Environment*, *Environmental Science and Technology, Environmental Forensics Journal* and the *Journal of Official Statistics*, a statistics publication in Sweden. Mr. Splitstone was also a contributing author for *Statistics and the Law*, published by John Wiley and Sons and has been an Editorial Collaborator for the *Journal of Environmental and Ecological Statistics*.

PUBLICATIONS AND MAJOR PRESENTATIONS

Ginevan, M.E. and D.E. Splitstone, *Statistical Tools for Environmental Quality Measurement*, CRC Press, 2003.

Ginevan, M.E. and D.E. Splitstone, "Bootstrap upper bounds for arithmetic mean, and the use on censored data." *Environmetrics* , Vol.13. 2002.

Splitstone, D. E., "Sample support and related scale issues in composite sampling," *Environmental and Ecological Statistics*, Vol. 8 No. 8, June 2001.

Ginevan, M.E. and D.E. Splitstone, "Risk-based geostatistical analysis and data visualization: Improving remediation decisions for hazardous waste sites." *Environmental Science & Technology* Vol. 31, No. , 1997 pp. 92-96.

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November 30, 2022

Ms. Rebeccah Collins
Auxier & Associates
9821 Cogdill Road, Suite 1
Knoxville,, TN 37932

Subject: Statistical Summary of Radiological Sample Analyses - Portsmouth

Dear Becky:

Splitstone and Associates (Splitstone) received analytical results of radionuclide concentrations in samples collected for the Pike County Community within a 6-mile radius of the former Portsmouth Gaseous Diffusion Plant. These validated data were compiled by sampled media to represent radiological conditions within the study area. Many concentrations are very low and there are a number of negative results. Auxier &Associates (Auxier) attempted to obtain Upper Confidence Limits (UCLs) for the mean concentration via the EPA ProUCL calculator. Upon running the calculator, Auxier found that some recommended UCLs were estimated to be unrealistic negative concentrations. As recommended by the EPA ProUCL output, Auxier sought the professional statistical expertise from Splitstone for the purpose of determining more appropriate UCLs to represent exposure point concentrations within the study area. Using EPA methodology, selected exposure point concentrations will be used to calculate incremental lifetime cancer risks for the population.

Splitstone employed the commercially available statistical software package **Systat**® to calculate basic statistical summaries of the radionuclide concentrations by sampled media. The following Tables1-4 present these summaries respectively by sampled medium: Soil, Sediment, Surface Water and Smear samples.

TABLE 1

Soil Sample Statistics PCi/gm										
Analyte	Nobs	Min	Max	Median	Mean	Mode	Std Dev	Std Err	95% Confidence Limits	
									Lcl	Ucl
Americium-241	843	-0.00840	0.025000	0.004600	0.005492	0.000000	0.004721	0.000163	0.005173	0.005811
Neptunium-237	843	-0.00990	0.018000	0.000000	0.000734	0.000000	0.002829	0.000097	0.000543	0.000925
Plutonium-238	843	-0.01400	0.016000	0.001800	0.001491	0.000000	0.003130	0.000108	0.001279	0.001702
Plutonium-239/240	843	-0.00600	0.057000	0.009000	0.010229	0.016000	0.006981	0.000240	0.009757	0.010701
Technetium-99	843	-0.26089	6.923950	0.092613	0.151831		0.405934	0.013981	0.124389	0.179273
Uranium-233/234	843	-0.36000	7.140000	1.150000	1.217040		0.536031	0.018462	1.180804	1.253277
Uranium-235/236	843	0.01300	0.365000	0.054000	0.057429	0.046000	0.027541	0.000949	0.055568	0.059291
Uranium-238	843	0.50500	7.080000	1.170000	1.242260	1.170000	0.522248	0.017987	1.206955	1.277565

Table 2

Sediment Samples PCi/gm										
									95% Confidence	
Analyte	Nobs	Min	Max	Median	Mean	Mode	Std Dev	Std ERR	LCL	UCL
Americium-241	20	-0.0025	0.025	0.004	0.00526	0	0.00721	0.0016	0.0019	0.0086
Neptunium-237	20	-0.004	0.0078	0	0.00111	0	0.00246	0.001	0	0.0023
Plutonium-238	20	-0.002	0.017	0.0018	0.002785	0	0.00431	0.001	0.001	0.0048
Plutonium-239/240	20	0	0.028	0.0044	0.006485		0.00689	0.0015	0.0033	0.0097
Technetium-99	20	-0.23191	0.295652	-0.04	-0.015		0.1290708	0.02886	-0.0754	0.04537
Uranium-233/234	20	0.607	1.55	0.965	1.03035		0.222051	0.04965	0.926426	1.134273
Uranium-235/236	20	0.018	0.075	0.0475	0.0455	0.05	0.011825	0.0026	0.03997	0.05103
Uranium-238	20	0.479	1.31	0.96	0.96195		0.2017926	0.04512	0.867508	1.05639

Table 3

Surface Water Samples pCi/L										
									95% Confidence	
Analyte	Nobs	MIN	MAX)	Median	Mean	Mode	STd Dev	Std ERR	LCL	UCL
Americium-241	26	-0.02000	0.10900	0.01900	0.02962	0.00000	0.03406	0.00668	0.01586	0.04337
Neptunium-237	26	-0.04100	0.03700	0.00000	-0.00235	0.00000	0.01697	0.00333	-0.00920	0.00451
Plutonium-238	26	-0.01800	0.06000	0.02650	0.02638		0.02103	0.00412	0.01789	0.03488
Plutonium-239/240	26	-0.01900	0.07600	0.01950	0.02762		0.02651	0.00520	0.01691	0.03832
Technetium-99	26	-1.81523	2.79602	0.15520	0.10201		1.09176	0.21411	-0.33897	0.54298
Uranium-233/234	26	0.00000	1.12000	0.17000	0.26973		0.28244	0.05539	0.15565	0.38381
Uranium-235/236	26	0.00000	0.12000	0.02350	0.02550	0.00000	0.02521	0.00494	0.01532	0.03568
Uranium-238	26	0.02000	0.72000	0.12300	0.18946		0.19126	0.03751	0.11221	0.26671

Table 4

Smear Samples Pci/cm^2										
									95% Confidence	
Analyte	Nobs	Min	Max	Median	Mean	Mode	Std Dev	Std Err	Lcl	Ucl
Americium-241	182	-0.000087	0.000140	0.000026	0.000033	0.000000	0.000042	0.000003	0.000027	0.000040
Neptunium-237	182	-0.000066	0.000100	0.000000	0.000005	0.000000	0.000024	0.000002	0.000001	0.000008
Plutonium-238	182	-0.000065	0.000103	0.000020	0.000022	0.000000	0.000030	0.000002	0.000018	0.000026
Plutonium-239/240	182	-0.000022	0.000160	0.000040	0.000043	0.000000	0.000035	0.000003	0.000038	0.000048
Technetium-99	182	-0.005023	0.012595	0.001028	0.001032		0.002604	0.000193	0.000651	0.001413
Uranium-233/234	182	0.000023	0.024300	0.000160	0.000317	0.000130	0.001790	0.000133	0.000055	0.000578
Uranium-235/236	182	-0.000065	0.000830	0.000000	0.000017	0.000000	0.000067	0.000005	0.000007	0.000027
Uranium-238	182	-0.000022	0.023700	0.000160	0.000301		0.001747	0.000129	0.000046	0.000557

Please, feel free to contact me with any questions.

Very truly yours,

SPLITSTONE & ASSOCIATES

Douglas E. Splitstone
ASA Accredited Professional Statistician

Attachment D

Applicable Equations from the EPA PRG and BPRG Calculators

Included in this attachment are applicable equations excerpted from the Preliminary Remediation Goals (PRG) and Building Preliminary Remediation Goals (BPRG) Calculators user's guides (EPA 2022a and EPA 2022b) as of December 16, 2022.

All SF (slope factor), ACF (area correction factor), BCF (bioconcentration factor), and GSF_o (gamma shielding factor) variables are radionuclide-specific. Units are as presented herein.

Symbols for soil, sediment, and surface water are defined in Table D-1. Symbols for settled dust are defined in Table D-2. Where a constant value applies, the numerical value used in risk calculations for this project are presented in this attachment.

Soil - Soil Ingestion Equation (Resident)

$$Risk = Concentration\ (pCi/g)\ x\ SF_s \left(\frac{risk}{pCi}\right)\ x\ IFS_{res-adj}(1{,}120{,}000\ mg)\ x\ \left(\frac{1\ g}{1000\ mg}\right)$$

where:

$$IFS_{res-adj}(1{,}120{,}000\ mg) = \left(\begin{array}{l}\left(EF_{res-c}\left(\frac{350\ days}{year}\right)\ x\ ED_{res-c}\ (6\ years)\ x\ IRS_{res-c}\left(\frac{200\ mg}{day}\right)\right) + \\ \left(EF_{res-a}\left(\frac{350\ days}{year}\right)\ x\ ED_{res-a}\ (20\ years)\ x\ IRS_{res-a}\left(\frac{100\ mg}{day}\right)\right)\end{array}\right)$$

Sediment - Sediment Ingestion Equation (Recreator)

$$Risk = Concentration\ (pCi/g)\ x\ SF_s \left(\frac{risk}{pCi}\right) x\ IFS_{rec-adj}(38{,}400\ mg)\ x\ \left(\frac{1\ g}{1000\ mg}\right)$$

where:

$$IFS_{rec-adj}(38{,}400\ mg) = \left(\begin{array}{l}\left(EF_{rec-c}\left(\frac{12\ days}{year}\right)\ x\ ED_{rec-c}\ (6\ years)\ x\ IRS_{rec-c}\left(\frac{200\ mg}{day}\right)\right) + \\ \left(EF_{rec-a}\left(\frac{12\ days}{year}\right)\ x\ ED_{rec-a}\ (20\ years)\ x\ IRS_{rec-a}\left(\frac{100\ mg}{day}\right)\right)\end{array}\right)$$

Surface Water - Surface Water Ingestion Equation (Recreator)

$$Risk = Concentration\ (pCi/L)\ x\ SF_W \left(\frac{risk}{pCi}\right) x\ IFW_{rec-adj}(20.16\ L)$$

where:

$$IFW_{rec-adj}(20.16\ L) = \left(\begin{array}{l}\left(EF_{rec-c}\left(\frac{12\ d}{yr}\right)\ x\ ED_{rec-c}\ (6\ yrs)\ x\ ET_{event-rec-}\ \left(\frac{0.5\ hrs}{event}\right)\ x\ EV_{rec-c}\left(\frac{1\ event}{day}\right) x\ IRW_{rec-c}\left(\frac{0.12\ L}{hour}\right)\right) + \\ \left(EF_{rec-a}\left(\frac{12\ d}{yr}\right)\ x\ ED_{rec-a}\ (20\ yrs)\ x\ ET_{event-rec-}\ \left(\frac{0.6\ hrs}{event}\right)\ x\ EV_{rec-a}\left(\frac{1\ event}{day}\right) x\ IRW_{rec-a}\left(\frac{0.11\ L}{hour}\right)\right)\end{array}\right)$$

Soil - Inhalation of Particulates Emitted Equation (Resident)

$$Risk = Concentration\ (pCi/g)\ x\ SF_i\ \left(\frac{risk}{pCi}\right)\ x\ IFA_{res-adj}(161{,}000\ m^3)\ x\ \frac{1}{PEF\left(\frac{1{,}359{,}344{,}438\ m^3}{kg}\right)} x \left(\frac{1000\ g}{1\ kg}\right)$$

where:

$$IFA_{res-adj}(161{,}000\ m^3) = \left(\begin{array}{l}\left(EF_{res-c}\left(\frac{350\ days}{year}\right)\ x\ ED_{res-c}\ (6\ years)\ x\ ET_{res-c}\left(\frac{24\ hours}{1\ day}\right)\ x\ \left(\frac{1\ day}{24\ hours}\right)\ x\ IRA_{res-c}\left(\frac{10\ m^3}{day}\right)\right) + \\ \left(EF_{res-a}\left(\frac{350\ days}{year}\right)\ x\ ED_{res-a}\ (20\ years)\ x\ ET_{res-a}\left(\frac{24\ hours}{1\ day}\right)\ x\ \left(\frac{1\ day}{24\ hours}\right)\ x\ IRA_{res-a}\left(\frac{20\ m^3}{day}\right)\right)\end{array}\right)$$

Soil - External Exposure Equation (Resident)

$$Risk = Concentration\ (pCi/g)\ x\ SF_{ext-sv}\ \left(\frac{risk/year}{pCi/g}\right)\ x\ EF_{res}\left(\frac{350\ days}{year}\right)\ x\ \left(\frac{1\ year}{365\ days}\right)\ x\ ED_{res}\ (26\ years)\ x\ ACF_{ext-sv}\ x\ \left[\left(ET_{res-o}\left(\frac{1.752\ hours}{day}\right)\ x\ \left(\frac{1\ day}{24\ hours}\right)\ x\ GSF_{o-ext-sv}\right) + \left(ET_{res-i}\left(\frac{16.416\ hours}{day}\right)\ x\ \left(\frac{1\ day}{24\ hou}\right)\ x\ GSF_{i-total}\right)\right]$$

Soil - Consumption of Fruits and Vegetables (Resident)

$$Risk = Concentration\ (pCi/g)\ x \left(SF_f \left(\frac{risk}{pCi}\right) x\ IF_{res-adj}(3{,}193{,}973\ g)\ x\ CF_{res-produce}(1) \right)$$

where:

$$IFS_{res-adj}(3{,}193{,}973\ g) = \left(\begin{array}{l} \left(EF_{res} \left(\frac{92\ days}{year}\right) x\ ED_{res-c}\ (6\ years)\ x\ IR_{res-c} \left(\frac{816.4\ g}{day}\right) \right) + \\ \left(EF_{res-a} \left(\frac{92\ days}{year}\right) x\ ED_{res-a}\ (20\ years)\ x\ IR_{res-a} \left(\frac{1485.5\ g}{day}\right) \right) \end{array} \right)$$

Sediment - External Exposure Equation (Recreator)

$$Risk = Concentration\ (pCi/g)\ x \left(\begin{array}{c} SF_{ext-sv} \left(\frac{risk/year}{pCi/g}\right) x\ EF_{rec} \left(\frac{12\ days}{year}\right) x \left(\frac{1\ year}{365\ days}\right) x\ ACF_{ext-sv}\ x \\ ED_{rec}\ (26\ years)\ x\ ET_{rec} \left(\frac{hours}{day}\right) x \left(\frac{1\ day}{24\ hours}\right) x\ GSF_{o-ext-sv} \end{array} \right)$$

Surface Water - Surface Water Immersion (External) Equation (Recreator)

$$Risk = Concentration\ (pCi/L)\ x\ SF_{imm} \left(\frac{risk/year}{pCi/L}\right) x \left(\frac{1\ year}{8760\ hours}\right) x\ DFA_{rec-adj}(180\ hours)$$

where:

$$DFA_{rec-adj}(180\ hours) = \left(\begin{array}{l} \left(EF_{rec-c} \left(\frac{12\ days}{year}\right) x\ ED_{rec-c}\ (6\ years)\ x\ EV_{rec-c} \left(\frac{1\ event}{day}\right) x\ ET_{event-rec-} \left(\frac{0.5\ hours}{event}\right) \right) + \\ \left(EF_{rec-a} \left(\frac{12\ days}{year}\right) x\ ED_{rec-a}\ (20\ years)\ x\ EV_{rec-a} \left(\frac{1\ event}{day}\right) x\ ET_{event-rec-a} \left(\frac{0.6\ hours}{event}\right) \right) \end{array} \right)$$

Surface Water - Fish Ingestion Equation (Farmer)

$$Risk = Concentration\ \ (pCi/L)\ x\ BCF\left(\frac{L}{kg}\right) x \left(\frac{1\ kg}{1000\ g}\right)\ x\ SF_f\left(\frac{risk}{pCi}\right)\ x\ IFFI_{far-adj}(339{,}404\ g)\ x\ CF_{far-finfish}(1)$$

where:

$$IFFI_{far-adj}(339{,}404\ g) = \left(\begin{array}{c}\left(EF_{far-c}\left(\frac{214\ days}{yr}\right)\ x\ ED_{far-c}(6\ yr)\ x\ IRFI_{far-c}\left(\frac{61\ g}{day}\right)\right) + \\ \left(EF_{far-a}\left(\frac{214\ days}{yr}\right)\ x\ ED_{far-a}(20\ yr)\ x\ IRFI_{far-a}\left(\frac{61\ g}{day}\right)\right)\end{array}\right)$$

Settled Dust - Dust Ingestion Equation (Resident)

$$Risk = Concentration\ (pCi/cm^2)\ x\ \frac{\left(\left(\frac{1-e^{-kt_{res}}}{kt_{res}}\right)\ x\ \left(1-e^{-\lambda t_{res}}\right)\ x\ SF_o\left(\frac{risk}{pCi}\right)\ x\ IFD_{res-adj}(11{,}350{,}612\ cm^2)\ x\ F_{in}(1)\ x\ F_i(1)\right)}{t_{res}\ (year)\ x\ \lambda\left(\frac{1}{year}\right)}$$

where:

$$IFD_{res-adj}(11{,}350{,}612\ cm^2) = \left(\begin{array}{c}\left(\begin{array}{c}\left[\left(FTSS_{c,h}(1)\ x\ ET_{res-c,h}\left(\frac{6\ hours}{day}\right)\right) + \left(FTSS_{res-c,s}(1)\ x\ ET_{res-c,s}\left(\frac{10\ hours}{day}\right)\right)\right]\ x \\ EF_{res-c}\left(\frac{350\ day}{year}\right) x\ ED_{res-c}(6\ years)\ x\ SA_{res-c}\left(\frac{223\ cm^2}{event}\right)\ x\ FQ_c\left(\frac{17.7\ events}{hou}\right)\ x\ FSA_{res-c}\ (0.1)\ x\ SE(0.5)\end{array}\right) + \\ \left(\begin{array}{c}\left[\left(FTSS_{a,h}(1)\ xET_{res-a,h}\left(\frac{6\ hour}{day}\right)\right) + \left(FTSS_{res-a,s}(1)\ \ x\ ET_{res-a,s}\left(\frac{10\ hou}{day}\right)\right)\right] x \\ EF_{res-a}\left(\frac{350\ days}{year}\right) x\ ED_{res-a}(20\ years)\ x\ SA_{res-a}\left(\frac{398\ cm^2}{event}\right)\ x\ FQ_a\left(\frac{3.025\ events}{hour}\right)\ x\ FSA_{res-a}\ (0.07)\ x\ SE(0.5)\end{array}\right)\end{array}\right)$$

Settled Dust – External Exposure Equation (Resident)

$$Risk = Concentration\ (pCi/cm^2)\ x\ \frac{\left(\begin{array}{c}\left(\frac{1-e^{-kt_{res}}}{kt_{res}}\right) x\ \left(1-e^{-\lambda t_{res}}\right)\ x\ SF_{ext-gp}\left(\frac{risk/year}{pCi/cm^2}\right) x\ F_{in}(1)\ x\ F_i(1)\ x\ F_{AM}\ (1)\ x\ F_{OFF-SET}\ (1)\ x \\ ET_{res}\left(\frac{24\ hours}{day}\right) x\ \left(\frac{1\ day}{24\ hours}\right) x\ EF_{res}\left(\frac{350\ days}{year}\right) x\ \left(\frac{1\ year}{365\ days}\right) x\ ED_{res}(26\ years)\end{array}\right)}{t_{res}\ (26\ year)\ x\ \lambda\left(\frac{1}{year}\right)}$$

From: https://epa-prgs.ornl.gov/radionuclides/users_guide.html
For soil, sediment, and surface water pathways, risks were calculated using the PRG Calculator (EPA 2022a). Below in Table D-1 are the definitions of symbols included in soil, sediment, and surface water equations in this attachment, along with default exposure parameter values and source references as they are presented in Table 1 of the PRG Calculator.

Each "t_{res}" (time of residential exposure) value is 26 years.

Table D-1 Variable Definitions and Default Exposure Parameter Values

Slope Factors			
Symbol	Definition (units)	Default	Reference
SFext-sv	Slope Factor - external exposure (risk/yr per pCi/g)	Isotope-specific	ORNL 2014c
SFf	Food Ingestion Slope Factor (risk/pCi)	Isotope-specific	ORNL 2014c
SFi	Slope Factor - inhalation (risk/pCi)	Isotope-specific	ORNL 2014c
SFimm	Slope Factor - immersion (risk/yr per pCi/L)	Isotope-specific	ORNL 2014c
SFs	Soil Ingestion Slope Factor - population (risk/pCi)	Isotope-specific	ORNL 2014c
SFw	Water Ingestion Slope Factor (risk/pCi)	Isotope-specific	ORNL 2014c
Miscellaneous Variables			
Symbol	Definition (units)	Default	Reference
ACFext-sv	Area Correction Factor - soil volume (unitless)	Isotope-specific	ORNL 2014a
CFfar-fin-fish	Fish Contaminated Fraction - farmer (unitless)	1	Developed for Radionuclide Soil Screening calculator
CFres-produce	Produce Contaminated Fraction - resident (unitless)	1	U.S. EPA 2011, U.S. EPA 2005
GSFi	Gamma Shielding Factor - Indoor (unitless)	0.4	U.S. EPA 2000a. (pg. 2-22). U.S. EPA 2000b. (pg. 2-18)
GSFo-ext-sv	Gamma Shielding Factor - soil volume (unitless)	Isotope-specific	ORNL 2014a
Tissue Transfer Factors and Animal Intake Rates of Fodder, Water, and Soil			
Symbol	Definition (units)	Default	Reference
BCF	Fin Fish & Shellfish Transfer Factor (L/kg)	radionuclide-specific & species-specific	hierarchy selection in Section 2.4.2
Inhalation, Ingestion, and Consumption Rates			
Symbol	Definition (units)	Default	Reference
DFArec-adj	Recreator Immersion Factor - age-adjusted (hours)	Site-Specific	U.S. EPA 1991a (pg. 15)
IFAres-adj	Resident Inhalation Fraction - age-adjusted (m^3)	161,100	Calculated using the age-adjusted intake factors equation.
IFFIfar-adj	Farmer Fin Fish Ingestion Fraction - age-adjusted (g)	1,931,020	Calculated using the age-adjusted intake factors equation
IFres-adj	Resident Produce Ingestion Fraction - age-adjusted (g)	plant-specific	Calculated using the age-adjusted intake factors equation
IFSrec-adj	Recreator Soil Ingestion Fraction - age-adjusted (mg)	Site-Specific	Calculated using the age-adjusted intake factors equation.
IFSres-adj	Resident Soil Ingestion Fraction - age-adjusted (mg)	1,120,000	Calculated using the age-adjusted intake factors equation.
IFWrec-adj	Recreator Surface Water Ingestion Fraction - age-adjusted (L)	Site-Specific	Calculated using the age-adjusted intake factors equation.
IRAres-a	Resident Inhalation Rate - adult (m^3/day)	20	U.S. EPA 1991a (pg. 15)

IRAres-c	Resident Inhalation Rate - child (m^3/day)	10	U.S. EPA 1997a (pg. 5-11)
IRFIfar-a	Farmer Fin Fish Intake Rate - adult (g/day)	155.9	U.S. EPA 2011 (Tables 10-7 and 13-20)
IRFIfar-c	Farmer Fin Fish Intake Rate - child (g/day)	36.1	U.S. EPA 2011 (Tables 10-7 and 13-20)
IRres-a	Resident Produce Intake Rate - adult (g/day)	plant-specific	U.S. EPA 2011 (Table 13-31 - Table 13-57); U.S. EPA 2018 (Table 9-5)
IRres-c	Resident Produce Intake Rate - child (g/day)	plant-specific	U.S. EPA 2011 (Table 13-31 - Table 13-57); U.S. EPA 2018 (Table 9-5)
IRSrec-a	Recreator Soil Ingestion Rate - adult (mg/day)	100	U.S. EPA 1991a (pg. 15)
IRSrec-c	Recreator Soil Ingestion Rate - child (mg/day)	200	U.S. EPA 1991a (pg. 15)
IRSres-a	Resident Soil Ingestion Rate - adult (mg/day)	100	U.S. EPA 1991a (pg. 15)
IRSres-c	Resident Soil Ingestion Rate - child (mg/day)	200	U.S. EPA 1991a (pg. 15)
IRWrec-a	Recreator Surface Water Ingestion Rate - adult (L/hour)	0.11	Time weighted average was calculated based on the upper percentile from Table 3.7 of EFH 2019.
IRWrec-c	Recreator Surface Water Ingestion Rate - child (L/hour)	0.12	Child upper percentile from Table 3.5 of EFH 2011
Exposure Frequency, Exposure Duration, and Exposure Time Variables			
Symbol	Definition (units)	Default	Reference
EDfar	Farmer Exposure Duration (years)	40	U.S. EPA 2005 (Table 6-3)
EDfar-a	Farmer Exposure Duration - adult (years)	34	U.S. EPA 1994a
EDfar-c	Farmer Exposure Duration - child (years)	6	U.S. EPA 2005 (Table 6-3)
EDrec-a	Recreator Exposure Duration - adult (years)	Site-Specific	-
EDrec-c	Recreator Exposure Duration - child (years)	Site-Specific	U.S. EPA 1991a, Pages 6 and 15
EDres-a	Resident Exposure Duration - adult (years)	20	EDres (26 years) - EDres-c (6 years)
EDres-c	Resident Exposure Duration - child (years)	6	U.S. EPA 1991a, Pages 6 and 15
EFfar	Farmer Exposure Frequency (days/year)	350	U.S. EPA 1991a (pg. 15)
EFrec-a	Recreator Exposure Frequency - adult (days/year)	Site-Specific	U.S. EPA 1991a (pg. 15)
EFrec-c	Recreator Exposure Frequency - child (days/year)	Site-Specific	U.S. EPA 1991a (pg. 15)
EFres-a	Resident Exposure Frequency - adult (days/year)	350	U.S. EPA 1991a (pg. 15)
EFres-c	Resident Exposure Frequency - child (days/year)	350	U.S. EPA 1991a (pg. 15)
ETrec-a	Recreator Exposure Time - adult (hours/day)	Site-Specific	
ETrec-c	Recreator Exposure Time - child (hours/day)	Site-Specific	
ETres	Resident Exposure Time (hours/day)	24	24 Hours per 24 hour Day
ETres-i	Resident Exposure Time - indoor (hours/day)	16.416	U.S. EPA 2011 (Table 16-16 50th%)
ETres-o	Resident Exposure Time - outdoor (hours/day)	1.752	U.S. EPA 2011 (Table 16-20 50th%))
EVrec-a	Number of bathing events per day - adult recreator (events/day)	Site-Specific	-
EVrec-c	Number of bathing events per day - child recreator (events/day)	Site-Specific	U.S. EPA 1991a, Pages 6 and 15

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U.S. EPA (1991a). U.S. Environmental Protection Agency (U.S. EPA). Human health evaluation manual, supplemental guidance: "Standard default exposure factors". OSWER Directive 9285.6-03.

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U.S. EPA (2005). Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities. Office of Solid Waste, Washington, DC. https://archive.epa.gov/epawaste/hazard/tsd/td/web/html/risk.html. The pdf is available here.

U.S. EPA (2011). Exposure Factors Handbook 2011 Edition (Final). National Center for Environmental Assessment, Office of Research and Development. Washington D.C.

U.S. EPA (2018). Update for Chapter 19 of the Exposure Factors Handbook. Environmental Protection Agency, Washington, D.C. EPA/600/R-18/121F. July, 2018.

From: https://epa-bprg.ornl.gov/users_guide.html
For settled dust pathways, risks were calculated using the BPRG Calculator (EPA 2022b). Below in Table D-2 are the definitions of symbols included in settled dust equations in this attachment, along with default exposure parameter values and source references as they are presented in Table 1 of the BPRG Calculator.

In settled dust equations, each "k" value is radionuclide-specific, as is each lambda (λ) value. Each "k" value and each lambda (λ) value is/are in units of "per year". Also, in settled dust equations, "F" values (F_{in}, F_i, F_{AM}, and $F_{OFF\text{-}SET}$) are equal to unitless one (1). Additionally, each "t_{res}" (time of residential exposure) value is 26 years.

Table D-2 Variable Definitions and Default Exposure Parameter Values (BPRG)

Slope Factors			
Symbol	Definition (units)	Default	Reference
SFext-gp	External Exposure Slope Factor - dust (risk/yr per pCi/cm^2)	Isotope-specific	ORNL 2014c
SFo	Dust Ingestion Slope Factor - population (risk/pCi)	Isotope-specific	ORNL 2014c
Dose and Decay Constant Variables			
Symbol	Definition (units)	Default	Reference
k	Dissipation Rate Constant - (yr^{-1})	0	EPA 2003 (pg. D-8)
tres	Time - resident (yr)	26	U.S. EPA 2014 (Attachment 1)
λ	decay constant = 0.693/half-life (year^{-1}) where 0.693 = ln(2)	Isotope-specific	EPA's "Preliminary Remediation Goals for Radionuclide Contaminants at Superfund Sites" (NCRP 1996)
Miscellaneous Variables			
Symbol	Definition (units)	Default	Reference
FAM	Area and Material Factor (unitless)	1	ANL 2001 (Fig 8.6)
FOFF-SET	Off-set Factor (unitless)	1	ANL 2001 (Fig 8.6)
Inhalation and Ingestion Rates			
Symbol	Definition (units)	Default	Reference
IFDres-adj	Age-Adjusted Dust Ingestion Fraction - resident (cm^2)	3,115,591	Calculated Value based on EPA 2003 (pg. D-4)
Exposure Variables			
Symbol	Definition (units)	Default	Reference
EDres-a	Exposure Duration - adult resident (yr)	20	U.S. EPA 2014 (Attachment 1)
EDres-a	Exposure Duration - adult resident (yr)	20	U.S. EPA 2014 (Attachment 1)
EDres-c	Exposure Duration - child resident (yr)	6	U.S. EPA 2014 (Attachment 1)
EFres-a	Exposure Frequency - resident adult(day/yr)	350	U.S. EPA 2014 (Attachment 1)
EFres-c	Exposure Frequency - resident child(day/yr)	350	U.S. EPA 2014 (Attachment 1)
ETres-a	Air Exposure Time - resident adult(hr/day)	24	U.S. EPA 2014 (Attachment 1)
ETres-a,h	Exposure Time - adult resident hard surface (hr/day)	6	EPA 2003 (pg. D-4)
ETres-a,s	Exposure Time - adult resident soft surface (hr/day)	10	EPA 2003 (pg. D-4)

ETres-c	Air Exposure Time - resident child(hr/day)	24	U.S. EPA 2014 (Attachment 1)
ETres-c,h	Exposure Time - child hard surface (hr/day)	6	EPA 2003 (pg. D-4)
ETres-c,s	Exposure Time - child soft surface (hr/day)	10	EPA 2003 (pg. D-4)
Fi	Fraction of time spent in compartment (unitless)	1	ANL 2001 (Fig 8.1)
Fin	Fraction time spent indoors (unitless)	1	ANL 2001 (Fig 8.1)
FQres-a	Frequency of Hand to Mouth - adult (event/hr)	3.025	EPA 2017 Table 5-13. Average of all age groups for ages 6+ years.
FQres-c	Frequency of Hand to Mouth - child (event/hr)	17.7	EPA 2017 Table 5-13. Average of all age groups for ages birth to 6 years.
FTSSres-a,h	Fraction Transferred Surface to Skin - hard surface - adult (unitless)	0.4	EPA 2017 Table 5-13. Average of all age groups for ages 6+ years.
FTSSres-a,s	Fraction Transferred Surface to Skin - soft surface - adult (unitless)	0.08	EPA 2017 Table 5-13. Average of all age groups for ages 6+ years.
FTSSres-c,h	Fraction Transferred Surface to Skin - hard surface - child (unitless)	0.64	EPA 2017 Table 5-13. Average of all age groups from birth to 6 years.
FTSSres-c,s	Fraction Transferred Surface to Skin - soft surface - child (unitless)	0.14	EPA 2017 Table 5-13. Average of all age groups from birth to 6 years.
SAres-a	Surface Area of Hand - adult (cm^2)	398	EPA 2017 Table 5-13. Average of all age groups for ages 6+ years.
SAres-c	Surface Area of Hand - child (cm^2)	223	EPA 2017 Table 5-13. Average of all age groups for ages birth to 6 years.
SE	Saliva Extraction Factor (unitless)	0.5	EPA 2017 Table 5-13 midpoint for all age ranges.

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Attachment E

Dose Assessment

ATTACHMENT E - DOSE ASSESSMENT

A dose assessment was performed to assess potential doses to local residents in the Piketon community. This dose assessment is a supplemental assessment to the HHRA. It uses a different methodology to evaluate radiological conditions in the study area and, as its title suggests, provides a projection of potential doses from radiological impacts in the Community instead of risks.

E.1 CREATION OF CONCEPTUAL MODEL

A dose assessment requires an understanding of the potentially exposed receptor, and the nature and extent of radionuclides in the surrounding environment. The dose assessment team uses this information to create an idealized description of the postulated exposure(s) to that receptor. This description, or "conceptual model", is introduced and explained in Section 3.1 of the HHRA. This model, reproduced below as Figure A-1, includes multiple exposure pathways from a variety of media.

E.2 DOSE ASSESSMENT METHODOLOGY

To assess potential doses from this system, a multi-pathway dose assessment approach embodied in the well-accepted, peer-reviewed RESRAD[1] family of environmental assessment computer codes maintained by Argonne National Laboratory was selected. In this investigation, Version 7.2 of the RESRAD was selected to calculate dose rates from exposure pathways considered herein. It is an industry-standard computer code used to evaluate doses from soil via multiple transport and exposure pathways.[2]

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[1] RESRAD's user's manual describes RESRAD as "… a computer model designed to estimate radiation doses from residual radioactive materials. Since its release in 1989, resrad has been used widely by the U.S. Department Of Energy (DOE), its operations and area offices, and its contractors for deriving limits for radionuclides in soil. RESRAD was also used by the U.S. Environmental Protection Agency (EPA) in its 1994 technical support document for the development of radionuclide cleanup levels for soil. Other entities using RESRAD include the U.S. Army Corps Of Engineers, the U.S. Nuclear Regulatory Commission (NRC), industrial firms, universities, and foreign government agencies and institutions."

[2] RESRAD has been benchmarked against other exposure assessment codes in the environmental assessment and site cleanup arena (ANL 2006). The code has been used in model validation studies such as the International Atomic Energy Agency's Biospheric Model Validation Study II and the Environmental Modeling for Radiation Safety (EMRAS) programs, and the EMRAS Naturally Occurring Radioactive Material working group used RESRAD-OFFSITE in its model comparison study (ANL 2007).

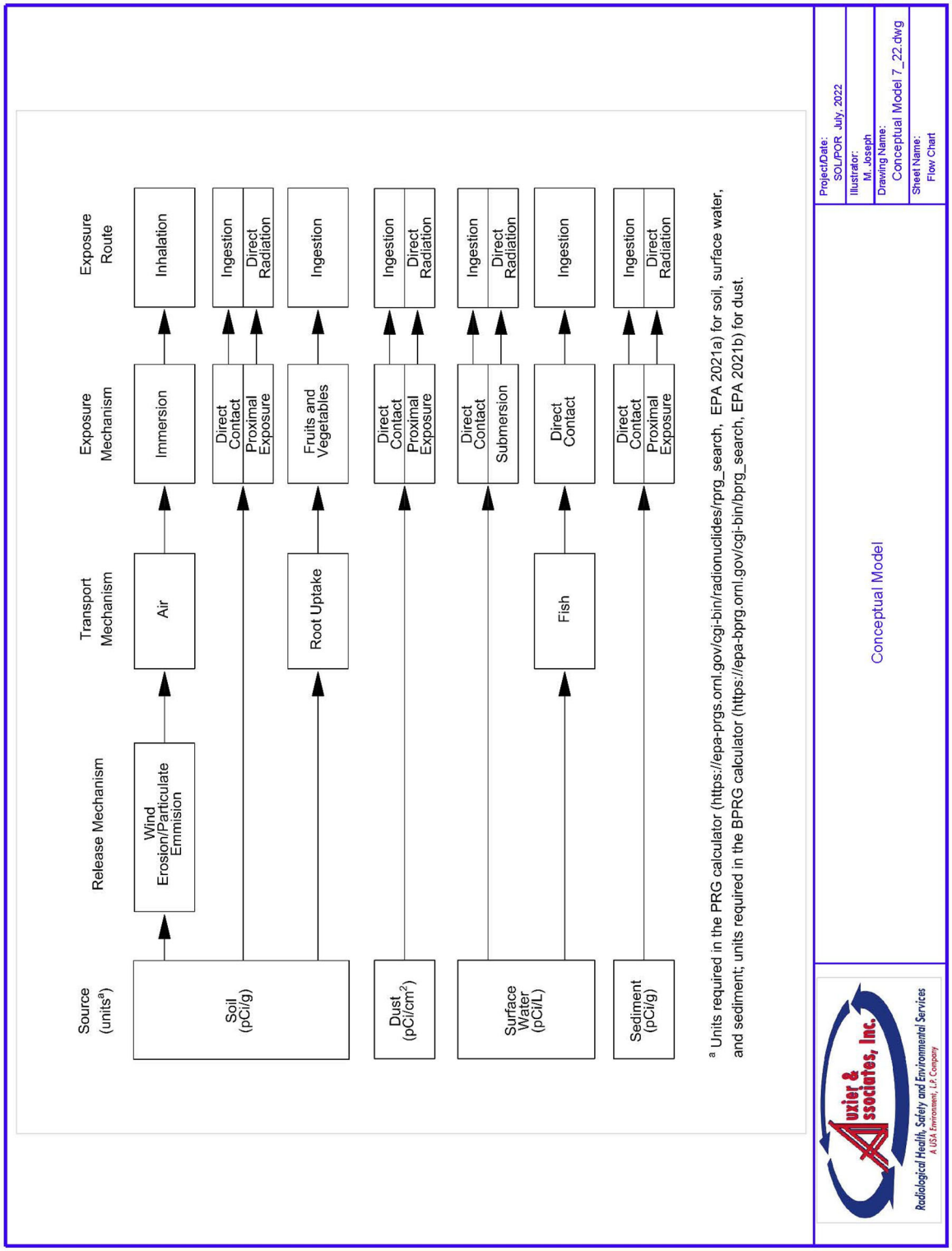

Figure E-1 Conceptual Model

E.3 SCENARIO DESCRIPTION

Doses were assessed for the scenario producing the greatest projected risks in the HHRA. This scenario described a hypothetical resident with a garden. Plausibly complete exposure pathways evaluated for this hypothetical receptor include:

- External gamma exposure
- Inhalation of resuspended particles
- Ingestion of produce and
- Incidental ingestion of soil

A RESRAD simulation was constructed to calculate prospective doses to this hypothetical resident gardener from environmental exposures.

To quantitatively assess annual doses to featured receptors within the RESRAD simulation, parameter values are required for calculations. Parameters include, for example, radionuclide concentrations, rates of inhalation and ingestion, soil-to-plant transfer factors, etc. RESRAD contains default values for all parameters except soil concentrations. For the scenarios considered in this assessment, default parameters were replaced by more representative values where possible. A detailed list of parameter values used and pathways evaluated by the scenario is included in the RESRAD output file at the end of this attachment.

The user interfaces of the EPA's PRG calculator and the RESRAD model differ, requiring conversion of certain input parameters and metrics such as converting inhalation rates from liter per hour to cubic meters per year. To the extent feasible, aggregate quantitative descriptions of the scenario used in the dose assessment are equivalent to those used in the risk assessment. Table E-1 lists notable differences between the two input arrays.

Table E-1 Summary of Differences between HHRA Risk and Doses Assessment Metrics

Parameter	Input for PRG Calculator	Input for RESRAD	Notes
Produce Ingestion Rate	92 days/year with produce-specific ingestion rates for adult and child	422.3 kg/y of fruit, non-leafy vegetables, and grain 43.6 kg/y of leafy vegetables	Age-weighted average
Soil Ingestion Rate	100 mg/d (adult) 200 mg/d (child)	43.1 grams/y	Age-weighted average
Inhalation Rate	20 m^3/d (adult) 10 m^3/d (child)	6,192.3 m^3/y	Age-weighted average
Indoor Time	16.416 h/d [a]	0.684	Assumes 24 h/d and 350 d/y; RESRAD input is a time fraction.
Outdoor Time	1.752 h/d	0.073	Assumes 24 h/d and 350 d/y; RESRAD input is a time fraction.

[a] Significant figures are provided for quality assurance purposes.

E.4 PROJECTED DOSES

The exposure scenario depicted in Figure E-1 and site-specific information described in Section 2 and Section 3 of the HHRA was used to create the RESRAD simulation used to project doses to featured receptors. Projected peak doses and doses over time from that simulation are depicted in Figure E-2 and Figure E-3. This dose is less than RESRAD's default limit of 25 mrem/y to the public (40 CFR 190).

```
RESRAD-ONSITE, Version 7.2      T« Limit = 180 days        12/09/2022  15:48  Page  16
Summary : CCSE Soil 20221209
File    : G:\COMMON\1PROJECT\USA FOR\RAD II CENTRAL WETLANDS\FINAL STATUS SURVEYS\UNIT RESRAD\CCSE SOIL 20221209.RAD

     Contaminated Zone Dimensions            Initial Soil Concentrations, pCi/g
     ----------------------------            ----------------------------------
       Area:  10000.00 square meters                Am-241     5.810E-03
  Thickness:      2.00 meters                       Np-237     9.250E-04
Cover Depth:      0.00 meters                       Pu-238     1.700E-03
                                                    Pu-239     1.070E-02
                                                    Pu-240     1.070E-02
                                                    Tc-99      1.790E-01
                                                    U-234      1.280E+00
                                                    U-235      5.930E-02
                                                    U-236      5.930E-02
                                                    U-238      1.280E+00

                                  Total Dose TDOSE(t), mrem/yr
                             Basic Radiation Dose Limit = 2.500E+01 mrem/yr
            Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)
            ---------------------------------------------------------------------------
   t (years):  0.000E+00  1.000E+00  3.000E+00  1.000E+01  3.000E+01  1.000E+02  3.000E+02  1.000E+03
    TDOSE(t):  7.847E-01  6.174E-01  5.866E-01  4.229E-01  3.938E-01  3.144E-01  1.739E-01  3.770E-01
        M(t):  3.139E-02  2.469E-02  2.347E-02  1.692E-02  1.575E-02  1.258E-02  6.956E-03  1.508E-02
Maximum TDOSE(t):  7.847E-01 mrem/yr   at t = 0.000E+00 years
```

Figure E-2 Image of RESRAD Output

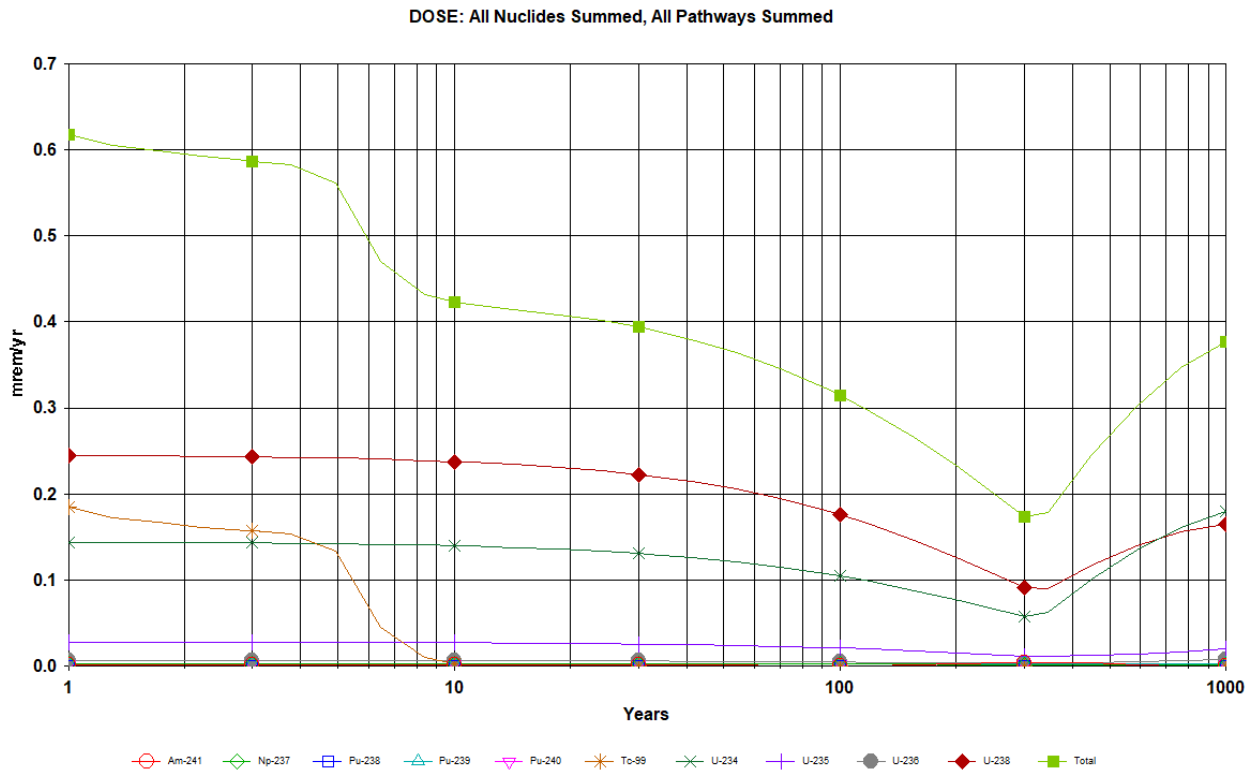

Figure E-3 Doses Over Time

Study Area Soil RESRAD Output

The following results are generated via version 7.2 of the RESRAD simulation. The concentrations used herein are those of soil samples collected for this project in the study area. The pathways are consistent with the soil pathways of the conceptual model discussed in Section 3.1 in the main body of this HHRA Report.

The results of this dose assessment have been provided as a companion to risk results provided in the main body. The dose assessment uses a different set of metrics (dose rates instead of risks) to evaluate the health protectiveness of an exposure scenario. This is offered to provide a way to evaluate the reasonableness of the risk assessment results.

Peak dose rates were projected to be < 1 mrem/y, with isotopes of uranium and Tc-99 contributing the largest shares. These dose rates are far below the 25 mrem/y Nuclear Regulatory Commission limit for doses from inactive sites (10 CFR 20.1402).

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-225 (Source: ICRP 60)	5.775E-02	5.775E-02	DCF1(1)
A-1	Ac-227 (Source: ICRP 60)	4.485E-04	4.485E-04	DCF1(2)
A-1	Ac-228 (Source: ICRP 60)	5.662E+00	5.662E+00	DCF1(3)
A-1	Am-241 (Source: ICRP 60)	3.719E-02	3.719E-02	DCF1(4)
A-1	At-217 (Source: ICRP 60)	1.654E-03	1.654E-03	DCF1(5)
A-1	At-218 (Source: ICRP 60)	4.878E-03	4.878E-03	DCF1(6)
A-1	Bi-210 (Source: ICRP 60)	5.476E-03	5.476E-03	DCF1(7)
A-1	Bi-211 (Source: ICRP 60)	2.373E-01	2.373E-01	DCF1(8)
A-1	Bi-212 (Source: ICRP 60)	1.114E+00	1.114E+00	DCF1(9)
A-1	Bi-213 (Source: ICRP 60)	7.158E-01	7.158E-01	DCF1(10)
A-1	Bi-214 (Source: ICRP 60)	9.325E+00	9.325E+00	DCF1(11)
A-1	Fr-221 (Source: ICRP 60)	1.413E-01	1.413E-01	DCF1(12)
A-1	Fr-223 (Source: ICRP 60)	1.813E-01	1.813E-01	DCF1(13)
A-1	Np-237 (Source: ICRP 60)	6.971E-02	6.971E-02	DCF1(14)
A-1	Pa-231 (Source: ICRP 60)	1.762E-01	1.762E-01	DCF1(15)
A-1	Pa-233 (Source: ICRP 60)	9.419E-01	9.419E-01	DCF1(16)
A-1	Pa-234 (Source: ICRP 60)	1.088E+01	1.088E+01	DCF1(17)
A-1	Pa-234m (Source: ICRP 60)	9.867E-02	9.867E-02	DCF1(18)
A-1	Pb-209 (Source: ICRP 60)	7.550E-04	7.550E-04	DCF1(19)
A-1	Pb-210 (Source: ICRP 60)	1.981E-03	1.981E-03	DCF1(20)
A-1	Pb-211 (Source: ICRP 60)	2.915E-01	2.915E-01	DCF1(21)
A-1	Pb-212 (Source: ICRP 60)	6.466E-01	6.466E-01	DCF1(22)
A-1	Pb-214 (Source: ICRP 60)	1.243E+00	1.243E+00	DCF1(23)
A-1	Po-210 (Source: ICRP 60)	4.934E-05	4.934E-05	DCF1(24)
A-1	Po-211 (Source: ICRP 60)	4.485E-02	4.485E-02	DCF1(25)
A-1	Po-212 (Source: ICRP 60)	0.000E+00	0.000E+00	DCF1(26)
A-1	Po-213 (Source: ICRP 60)	0.000E+00	0.000E+00	DCF1(27)
A-1	Po-214 (Source: ICRP 60)	4.840E-04	4.840E-04	DCF1(28)
A-1	Po-215 (Source: ICRP 60)	9.456E-04	9.456E-04	DCF1(29)
A-1	Po-216 (Source: ICRP 60)	9.830E-05	9.830E-05	DCF1(30)
A-1	Po-218 (Source: ICRP 60)	5.326E-05	5.326E-05	DCF1(31)
A-1	Pu-238 (Source: ICRP 60)	1.166E-04	1.166E-04	DCF1(32)
A-1	Pu-239 (Source: ICRP 60)	2.635E-04	2.635E-04	DCF1(33)
A-1	Pu-240 (Source: ICRP 60)	1.129E-04	1.129E-04	DCF1(34)
A-1	Ra-223 (Source: ICRP 60)	5.532E-01	5.532E-01	DCF1(35)
A-1	Ra-224 (Source: ICRP 60)	4.728E-02	4.728E-02	DCF1(36)
A-1	Ra-225 (Source: ICRP 60)	8.634E-03	8.634E-03	DCF1(37)
A-1	Ra-226 (Source: ICRP 60)	2.915E-02	2.915E-02	DCF1(38)
A-1	Ra-228 (Source: ICRP 60)	0.000E+00	0.000E+00	DCF1(39)
A-1	Rn-219 (Source: ICRP 60)	2.859E-01	2.859E-01	DCF1(40)
A-1	Rn-220 (Source: ICRP 60)	2.130E-03	2.130E-03	DCF1(41)
A-1	Rn-222 (Source: ICRP 60)	2.186E-03	2.186E-03	DCF1(42)
A-1	Tc-99 (Source: ICRP 60)	1.086E-04	1.086E-04	DCF1(43)
A-1	Th-227 (Source: ICRP 60)	4.803E-01	4.803E-01	DCF1(44)
A-1	Th-228 (Source: ICRP 60)	7.176E-03	7.176E-03	DCF1(45)
A-1	Th-229 (Source: ICRP 60)	2.897E-01	2.897E-01	DCF1(46)
A-1	Th-230 (Source: ICRP 60)	1.071E-03	1.071E-03	DCF1(47)
A-1	Th-231 (Source: ICRP 60)	3.214E-02	3.214E-02	DCF1(48)
A-1	Th-232 (Source: ICRP 60)	4.560E-04	4.560E-04	DCF1(49)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	Th-234 (Source: ICRP 60)	2.130E-02	2.130E-02	DCF1(50)
A-1	Tl-207 (Source: ICRP 60)	2.299E-02	2.299E-02	DCF1(51)
A-1	Tl-208 (Source: ICRP 60)	2.186E+01	2.186E+01	DCF1(52)
A-1	Tl-209 (Source: ICRP 60)	1.226E+01	1.226E+01	DCF1(53)
A-1	Tl-210 (Source: ICRP 60)	1.661E+01	1.661E+01	DCF1(54)
A-1	U-233 (Source: ICRP 60)	1.265E-03	1.265E-03	DCF1(55)
A-1	U-234 (Source: ICRP 60)	3.439E-04	3.439E-04	DCF1(56)
A-1	U-235 (Source: ICRP 60)	6.597E-01	6.597E-01	DCF1(57)
A-1	U-236 (Source: ICRP 60)	1.781E-04	1.781E-04	DCF1(58)
A-1	U-238 (Source: ICRP 60)	7.961E-05	7.961E-05	DCF1(59)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	2.104E+00	2.035E+00	DCF2(1)
B-1	Am-241	3.552E-01	3.552E-01	DCF2(2)
B-1	Np-237+D	1.850E-01	1.850E-01	DCF2(3)
B-1	Pa-231	5.180E-01	5.180E-01	DCF2(4)
B-1	Pb-210+D	3.697E-02	2.072E-02	DCF2(5)
B-1	Pu-238	4.070E-01	4.070E-01	DCF2(6)
B-1	Pu-239	4.440E-01	4.440E-01	DCF2(8)
B-1	Pu-240	4.440E-01	4.440E-01	DCF2(9)
B-1	Ra-226+D	3.526E-02	3.515E-02	DCF2(11)
B-1	Ra-228+D	5.929E-02	5.920E-02	DCF2(12)
B-1	Tc-99	4.810E-05	4.810E-05	DCF2(13)
B-1	Th-228+D	1.614E-01	1.480E-01	DCF2(14)
B-1	Th-229+D	9.481E-01	8.880E-01	DCF2(15)
B-1	Th-230	3.700E-01	3.700E-01	DCF2(16)
B-1	Th-232	4.070E-01	4.070E-01	DCF2(17)
B-1	U-233	3.552E-02	3.552E-02	DCF2(18)
B-1	U-234	3.478E-02	3.478E-02	DCF2(19)
B-1	U-235+D	3.145E-02	3.145E-02	DCF2(20)
B-1	U-236	3.219E-02	3.219E-02	DCF2(21)
B-1	U-238	2.960E-02	2.960E-02	DCF2(22)
B-1	U-238+D	2.963E-02	2.960E-02	DCF2(23)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	4.473E-03	4.070E-03	DCF3(1)
D-1	Am-241	7.400E-04	7.400E-04	DCF3(2)
D-1	Np-237+D	4.102E-04	4.070E-04	DCF3(3)
D-1	Pa-231	2.627E-03	2.627E-03	DCF3(4)
D-1	Pb-210+D	6.998E-03	2.553E-03	DCF3(5)
D-1	Pu-238	8.510E-04	8.510E-04	DCF3(6)
D-1	Pu-239	9.250E-04	9.250E-04	DCF3(8)
D-1	Pu-240	9.250E-04	9.250E-04	DCF3(9)
D-1	Ra-226+D	1.037E-03	1.036E-03	DCF3(11)
D-1	Ra-228+D	2.555E-03	2.553E-03	DCF3(12)
D-1	Tc-99	2.368E-06	2.368E-06	DCF3(13)
D-1	Th-228+D	5.301E-04	2.664E-04	DCF3(14)
D-1	Th-229+D	2.269E-03	1.813E-03	DCF3(15)
D-1	Th-230	7.770E-04	7.770E-04	DCF3(16)
D-1	Th-232	8.510E-04	8.510E-04	DCF3(17)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-1	U-233	1.887E-04	1.887E-04	DCF3(18)
D-1	U-234	1.813E-04	1.813E-04	DCF3(19)
D-1	U-235+D	1.752E-04	1.739E-04	DCF3(20)
D-1	U-236	1.739E-04	1.739E-04	DCF3(21)
D-1	U-238	1.665E-04	1.665E-04	DCF3(22)
D-1	U-238+D	1.791E-04	1.665E-04	DCF3(23)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(2,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF(2,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(2,3)
D-34				
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(3,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(3,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(4,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(4,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(5,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(5,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(5,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(6,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(8,3)
D-34				
D-34	Pu-240 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Pu-240 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Pu-240 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(9,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(11,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(11,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(11,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(12,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(12,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(12,3)
D-34				

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Tc-99 , plant/soil concentration ratio, dimensionless	5.000E+00	5.000E+00	RTF(13,1)
D-34	Tc-99 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(13,2)
D-34	Tc-99 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(13,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(14,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(14,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(14,3)
D-34				
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(15,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(15,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(15,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(16,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(16,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(16,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(17,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(17,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(17,3)
D-34				
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(18,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(18,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(18,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(19,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(19,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(19,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(20,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(20,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(20,3)
D-34				
D-34	U-236 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(21,1)
D-34	U-236 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(21,2)
D-34	U-236 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(21,3)
D-34				
D-34	U-238 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(22,1)
D-34	U-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(22,2)
D-34	U-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(22,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(23,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(23,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(23,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(3,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(3,2)
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(4,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(4,2)
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(5,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(5,2)
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(6,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(6,2)
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(8,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(8,2)
D-5	Pu-240 , fish	3.000E+01	3.000E+01	BIOFAC(9,1)
D-5	Pu-240 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(9,2)
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(11,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(11,2)
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(12,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(12,2)
D-5	Tc-99 , fish	2.000E+01	2.000E+01	BIOFAC(13,1)
D-5	Tc-99 , crustacea and mollusks	5.000E+00	5.000E+00	BIOFAC(13,2)
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(14,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(14,2)
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(15,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(15,2)
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(16,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(16,2)
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(17,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(17,2)
D-5	U-233 , fish	1.000E+01	1.000E+01	BIOFAC(18,1)
D-5	U-233 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(18,2)
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(19,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(19,2)
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(20,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(20,2)
D-5	U-236 , fish	1.000E+01	1.000E+01	BIOFAC(21,1)
D-5	U-236 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(21,2)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	U-238 , fish	1.000E+01	1.000E+01	BIOFAC(22,1)
D-5	U-238 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(22,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(23,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(23,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	1.000E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00	---	SUBMFRACT
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Am-241	5.810E-03	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Np-237	9.250E-04	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Pu-238	1.700E-03	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): Pu-239	1.070E-02	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g): Pu-240	1.070E-02	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): Tc-99	1.790E-01	0.000E+00	---	S1(13)
R012	Initial principal radionuclide (pCi/g): U-234	1.280E+00	0.000E+00	---	S1(19)
R012	Initial principal radionuclide (pCi/g): U-235	5.930E-02	0.000E+00	---	S1(20)
R012	Initial principal radionuclide (pCi/g): U-236	5.930E-02	0.000E+00	---	S1(21)
R012	Initial principal radionuclide (pCi/g): U-238	1.280E+00	0.000E+00	---	S1(22)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Np-237	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L): Pu-240	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): Tc-99	not used	0.000E+00	---	W1(13)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(19)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(20)
R012	Concentration in groundwater (pCi/L): U-236	not used	0.000E+00	---	W1(21)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(22)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	---	PRECIP

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	4.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Am-241				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.245E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Np-237				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.469E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Pu-238				
R016	Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.332E-05	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Pu-239				
R016	Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.332E-05	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for Pu-240				
R016	Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.332E-05	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for Tc-99				
R016	Contaminated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.790E-01	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(13)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(19)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(19,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(19)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.319E-03	ALEACH(19)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(19)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(20)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(20,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(20)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.319E-03	ALEACH(20)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(20)
R016	Distribution coefficients for U-236				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(21)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(21,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(21)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.319E-03	ALEACH(21)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(21)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(22)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(22,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(22)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.319E-03	ALEACH(22)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(22)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.245E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.319E-03	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.663E-03	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.374E-03	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.374E-03	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(14)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(14,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(14)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.778E-06	ALEACH(14)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(14)
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(15)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(15,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(15)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.778E-06	ALEACH(15)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(15)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(16)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(16,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(16)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.778E-06	ALEACH(16)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(16)
R016	Distribution coefficients for daughter Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(17)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(17,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(17)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.778E-06	ALEACH(17)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(17)
R016	Distribution coefficients for daughter U-233				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(18)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(18,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(18)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.319E-03	ALEACH(18)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(18)
R017	Inhalation rate (m**3/yr)	6.192E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	2.600E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.840E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	7.300E-02	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	4.223E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	4.360E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	4.310E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	257	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	10000.00 square meters	Am-241	5.810E-03
Thickness:	2.00 meters	Np-237	9.250E-04
Cover Depth:	0.00 meters	Pu-238	1.700E-03
		Pu-239	1.070E-02
		Pu-240	1.070E-02
		Tc-99	1.790E-01
		U-234	1.280E+00
		U-235	5.930E-02
		U-236	5.930E-02
		U-238	1.280E+00

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	7.847E-01	6.174E-01	5.866E-01	4.229E-01	3.938E-01	3.144E-01	1.739E-01	3.770E-01
M(t):	3.139E-02	2.469E-02	2.347E-02	1.692E-02	1.575E-02	1.258E-02	6.956E-03	1.508E-02

Maximum TDOSE(t): 7.847E-01 mrem/yr at t = 0.000E+00 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.151E-04	0.0001	7.462E-05	0.0001	0.000E+00	0.0000	9.981E-04	0.0013	0.000E+00	0.0000	0.000E+00	0.0000	1.396E-04	0.0002
Np-237	4.891E-04	0.0006	6.216E-06	0.0000	0.000E+00	0.0000	1.767E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	1.238E-05	0.0000
Pu-238	1.078E-07	0.0000	2.504E-05	0.0000	0.000E+00	0.0000	3.361E-04	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	4.701E-05	0.0001
Pu-239	1.484E-06	0.0000	1.726E-04	0.0002	0.000E+00	0.0000	2.308E-03	0.0029	0.000E+00	0.0000	0.000E+00	0.0000	3.229E-04	0.0004
Pu-240	6.557E-07	0.0000	1.726E-04	0.0002	0.000E+00	0.0000	2.308E-03	0.0029	0.000E+00	0.0000	0.000E+00	0.0000	3.229E-04	0.0004
Tc-99	7.131E-06	0.0000	2.173E-07	0.0000	0.000E+00	0.0000	3.506E-01	0.4468	0.000E+00	0.0000	0.000E+00	0.0000	9.607E-06	0.0000
U-234	2.338E-04	0.0003	1.615E-03	0.0021	0.000E+00	0.0000	1.350E-01	0.1720	0.000E+00	0.0000	0.000E+00	0.0000	7.559E-03	0.0096
U-235	2.152E-02	0.0274	6.767E-05	0.0001	0.000E+00	0.0000	6.046E-03	0.0077	0.000E+00	0.0000	0.000E+00	0.0000	3.384E-04	0.0004
U-236	5.657E-06	0.0000	6.925E-05	0.0001	0.000E+00	0.0000	5.999E-03	0.0076	0.000E+00	0.0000	0.000E+00	0.0000	3.359E-04	0.0004
U-238	1.035E-01	0.1319	1.376E-03	0.0018	0.000E+00	0.0000	1.334E-01	0.1699	0.000E+00	0.0000	0.000E+00	0.0000	7.467E-03	0.0095
Total	1.259E-01	0.1604	3.579E-03	0.0046	0.000E+00	0.0000	6.387E-01	0.8139	0.000E+00	0.0000	0.000E+00	0.0000	1.655E-02	0.0211

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.327E-03	0.0017
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.275E-03	0.0029
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.082E-04	0.0005
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.805E-03	0.0036
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.804E-03	0.0036
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.506E-01	0.4468
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.444E-01	0.1840
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.798E-02	0.0357
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.410E-03	0.0082
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.457E-01	0.3131
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.847E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.140E-04	0.0002	7.389E-05	0.0001	0.000E+00	0.0000	9.884E-04	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	1.382E-04	0.0002
Np-237	4.888E-04	0.0008	6.212E-06	0.0000	0.000E+00	0.0000	1.766E-03	0.0029	0.000E+00	0.0000	0.000E+00	0.0000	1.237E-05	0.0000
Pu-238	1.069E-07	0.0000	2.484E-05	0.0000	0.000E+00	0.0000	3.334E-04	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	4.664E-05	0.0001
Pu-239	1.484E-06	0.0000	1.726E-04	0.0003	0.000E+00	0.0000	2.308E-03	0.0037	0.000E+00	0.0000	0.000E+00	0.0000	3.229E-04	0.0005
Pu-240	6.556E-07	0.0000	1.726E-04	0.0003	0.000E+00	0.0000	2.308E-03	0.0037	0.000E+00	0.0000	0.000E+00	0.0000	3.228E-04	0.0005
Tc-99	3.272E-06	0.0000	9.972E-08	0.0000	0.000E+00	0.0000	1.617E-01	0.2620	0.000E+00	0.0000	0.000E+00	0.0000	4.408E-06	0.0000
U-234	2.331E-04	0.0004	1.610E-03	0.0026	0.000E+00	0.0000	1.346E-01	0.2180	0.000E+00	0.0000	0.000E+00	0.0000	7.534E-03	0.0122
U-235	2.145E-02	0.0347	6.747E-05	0.0001	0.000E+00	0.0000	6.034E-03	0.0098	0.000E+00	0.0000	0.000E+00	0.0000	3.374E-04	0.0005
U-236	5.638E-06	0.0000	6.902E-05	0.0001	0.000E+00	0.0000	5.979E-03	0.0097	0.000E+00	0.0000	0.000E+00	0.0000	3.348E-04	0.0005
U-238	1.031E-01	0.1671	1.371E-03	0.0022	0.000E+00	0.0000	1.329E-01	0.2153	0.000E+00	0.0000	0.000E+00	0.0000	7.442E-03	0.0121
Total	1.254E-01	0.2032	3.568E-03	0.0058	0.000E+00	0.0000	4.489E-01	0.7272	0.000E+00	0.0000	0.000E+00	0.0000	1.650E-02	0.0267

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years
Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.315E-03	0.0021
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.274E-03	0.0037
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.050E-04	0.0007
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.805E-03	0.0045
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.804E-03	0.0045
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.293E-02	0.0371	0.000E+00	0.0000	0.000E+00	0.0000	1.847E-01	0.2991
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.439E-01	0.2332
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.789E-02	0.0452
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.389E-03	0.0103
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.449E-01	0.3966
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.293E-02	0.0371	0.000E+00	0.0000	0.000E+00	0.0000	6.174E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.118E-04	0.0002	7.245E-05	0.0001	0.000E+00	0.0000	9.691E-04	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	1.355E-04	0.0002
Np-237	4.881E-04	0.0008	6.204E-06	0.0000	0.000E+00	0.0000	1.764E-03	0.0030	0.000E+00	0.0000	0.000E+00	0.0000	1.235E-05	0.0000
Pu-238	1.052E-07	0.0000	2.445E-05	0.0000	0.000E+00	0.0000	3.281E-04	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	4.590E-05	0.0001
Pu-239	1.483E-06	0.0000	1.726E-04	0.0003	0.000E+00	0.0000	2.308E-03	0.0039	0.000E+00	0.0000	0.000E+00	0.0000	3.228E-04	0.0006
Pu-240	6.553E-07	0.0000	1.725E-04	0.0003	0.000E+00	0.0000	2.307E-03	0.0039	0.000E+00	0.0000	0.000E+00	0.0000	3.227E-04	0.0006
Tc-99	6.889E-07	0.0000	2.100E-08	0.0000	0.000E+00	0.0000	3.405E-02	0.0580	0.000E+00	0.0000	0.000E+00	0.0000	9.281E-07	0.0000
U-234	2.317E-04	0.0004	1.599E-03	0.0027	0.000E+00	0.0000	1.337E-01	0.2279	0.000E+00	0.0000	0.000E+00	0.0000	7.485E-03	0.0128
U-235	2.131E-02	0.0363	6.709E-05	0.0001	0.000E+00	0.0000	6.010E-03	0.0102	0.000E+00	0.0000	0.000E+00	0.0000	3.354E-04	0.0006
U-236	5.600E-06	0.0000	6.856E-05	0.0001	0.000E+00	0.0000	5.940E-03	0.0101	0.000E+00	0.0000	0.000E+00	0.0000	3.326E-04	0.0006
U-238	1.025E-01	0.1747	1.362E-03	0.0023	0.000E+00	0.0000	1.320E-01	0.2251	0.000E+00	0.0000	0.000E+00	0.0000	7.393E-03	0.0126
Total	1.246E-01	0.2124	3.545E-03	0.0060	0.000E+00	0.0000	3.194E-01	0.5445	0.000E+00	0.0000	0.000E+00	0.0000	1.639E-02	0.0279

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years
Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.289E-03	0.0022
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.271E-03	0.0039
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.986E-04	0.0007
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.804E-03	0.0048
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.803E-03	0.0048
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.227E-01	0.2091	0.000E+00	0.0000	0.000E+00	0.0000	1.567E-01	0.2672
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.430E-01	0.2438
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.772E-02	0.0473
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.347E-03	0.0108
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.433E-01	0.4147
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.227E-01	0.2091	0.000E+00	0.0000	0.000E+00	0.0000	5.866E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.043E-04	0.0002	6.762E-05	0.0002	0.000E+00	0.0000	9.046E-04	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	1.265E-04	0.0003
Np-237	4.859E-04	0.0011	6.176E-06	0.0000	0.000E+00	0.0000	1.756E-03	0.0042	0.000E+00	0.0000	0.000E+00	0.0000	1.230E-05	0.0000
Pu-238	9.950E-08	0.0000	2.312E-05	0.0001	0.000E+00	0.0000	3.103E-04	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	4.341E-05	0.0001
Pu-239	1.482E-06	0.0000	1.724E-04	0.0004	0.000E+00	0.0000	2.306E-03	0.0055	0.000E+00	0.0000	0.000E+00	0.0000	3.225E-04	0.0008
Pu-240	6.544E-07	0.0000	1.723E-04	0.0004	0.000E+00	0.0000	2.304E-03	0.0054	0.000E+00	0.0000	0.000E+00	0.0000	3.223E-04	0.0008
Tc-99	2.951E-09	0.0000	8.993E-11	0.0000	0.000E+00	0.0000	1.458E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	3.975E-09	0.0000
U-234	2.277E-04	0.0005	1.564E-03	0.0037	0.000E+00	0.0000	1.306E-01	0.3088	0.000E+00	0.0000	0.000E+00	0.0000	7.315E-03	0.0173
U-235	2.082E-02	0.0492	6.583E-05	0.0002	0.000E+00	0.0000	5.928E-03	0.0140	0.000E+00	0.0000	0.000E+00	0.0000	3.286E-04	0.0008
U-236	5.472E-06	0.0000	6.698E-05	0.0002	0.000E+00	0.0000	5.803E-03	0.0137	0.000E+00	0.0000	0.000E+00	0.0000	3.249E-04	0.0008
U-238	1.001E-01	0.2367	1.331E-03	0.0031	0.000E+00	0.0000	1.290E-01	0.3050	0.000E+00	0.0000	0.000E+00	0.0000	7.223E-03	0.0171
Total	1.218E-01	0.2879	3.469E-03	0.0082	0.000E+00	0.0000	2.791E-01	0.6599	0.000E+00	0.0000	0.000E+00	0.0000	1.602E-02	0.0379

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.203E-03	0.0028
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.260E-03	0.0053
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.769E-04	0.0009
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.802E-03	0.0066
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.799E-03	0.0066
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.609E-03	0.0062	0.000E+00	0.0000	0.000E+00	0.0000	2.755E-03	0.0065
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.397E-01	0.3304
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.715E-02	0.0642
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.201E-03	0.0147
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.377E-01	0.5619
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.609E-03	0.0062	0.000E+00	0.0000	0.000E+00	0.0000	4.229E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	8.571E-05	0.0002	5.553E-05	0.0001	0.000E+00	0.0000	7.429E-04	0.0019	0.000E+00	0.0000	0.000E+00	0.0000	1.039E-04	0.0003
Np-237	4.797E-04	0.0012	6.097E-06	0.0000	0.000E+00	0.0000	1.733E-03	0.0044	0.000E+00	0.0000	0.000E+00	0.0000	1.214E-05	0.0000
Pu-238	8.483E-08	0.0000	1.971E-05	0.0001	0.000E+00	0.0000	2.645E-04	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	3.700E-05	0.0001
Pu-239	1.479E-06	0.0000	1.720E-04	0.0004	0.000E+00	0.0000	2.301E-03	0.0058	0.000E+00	0.0000	0.000E+00	0.0000	3.218E-04	0.0008
Pu-240	6.520E-07	0.0000	1.716E-04	0.0004	0.000E+00	0.0000	2.295E-03	0.0058	0.000E+00	0.0000	0.000E+00	0.0000	3.211E-04	0.0008
Tc-99	5.052E-16	0.0000	1.540E-17	0.0000	0.000E+00	0.0000	2.497E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.806E-16	0.0000
U-234	2.238E-04	0.0006	1.466E-03	0.0037	0.000E+00	0.0000	1.223E-01	0.3106	0.000E+00	0.0000	0.000E+00	0.0000	6.851E-03	0.0174
U-235	1.950E-02	0.0495	6.281E-05	0.0002	0.000E+00	0.0000	5.713E-03	0.0145	0.000E+00	0.0000	0.000E+00	0.0000	3.110E-04	0.0008
U-236	5.121E-06	0.0000	6.268E-05	0.0002	0.000E+00	0.0000	5.431E-03	0.0138	0.000E+00	0.0000	0.000E+00	0.0000	3.041E-04	0.0008
U-238	9.368E-02	0.2379	1.245E-03	0.0032	0.000E+00	0.0000	1.207E-01	0.3066	0.000E+00	0.0000	0.000E+00	0.0000	6.760E-03	0.0172
Total	1.140E-01	0.2894	3.262E-03	0.0083	0.000E+00	0.0000	2.615E-01	0.6641	0.000E+00	0.0000	0.000E+00	0.0000	1.502E-02	0.0381

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years
Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.880E-04	0.0025
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.231E-03	0.0057
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.213E-04	0.0008
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.796E-03	0.0071
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.789E-03	0.0071
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.441E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.690E-10	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.308E-01	0.3323
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.559E-02	0.0650
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.803E-03	0.0147
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.224E-01	0.5648
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.441E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.938E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	4.306E-05	0.0001	2.787E-05	0.0001	0.000E+00	0.0000	3.730E-04	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	5.213E-05	0.0002
Np-237	4.584E-04	0.0015	5.827E-06	0.0000	0.000E+00	0.0000	1.657E-03	0.0053	0.000E+00	0.0000	0.000E+00	0.0000	1.160E-05	0.0000
Pu-238	4.856E-08	0.0000	1.127E-05	0.0000	0.000E+00	0.0000	1.513E-04	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	2.116E-05	0.0001
Pu-239	1.467E-06	0.0000	1.707E-04	0.0005	0.000E+00	0.0000	2.283E-03	0.0073	0.000E+00	0.0000	0.000E+00	0.0000	3.193E-04	0.0010
Pu-240	6.434E-07	0.0000	1.694E-04	0.0005	0.000E+00	0.0000	2.265E-03	0.0072	0.000E+00	0.0000	0.000E+00	0.0000	3.168E-04	0.0010
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	2.816E-04	0.0009	1.172E-03	0.0037	0.000E+00	0.0000	9.741E-02	0.3098	0.000E+00	0.0000	0.000E+00	0.0000	5.451E-03	0.0173
U-235	1.551E-02	0.0493	5.464E-05	0.0002	0.000E+00	0.0000	5.039E-03	0.0160	0.000E+00	0.0000	0.000E+00	0.0000	2.589E-04	0.0008
U-236	4.061E-06	0.0000	4.969E-05	0.0002	0.000E+00	0.0000	4.305E-03	0.0137	0.000E+00	0.0000	0.000E+00	0.0000	2.410E-04	0.0008
U-238	7.425E-02	0.2362	9.875E-04	0.0031	0.000E+00	0.0000	9.572E-02	0.3044	0.000E+00	0.0000	0.000E+00	0.0000	5.359E-03	0.0170
Total	9.055E-02	0.2880	2.649E-03	0.0084	0.000E+00	0.0000	2.092E-01	0.6653	0.000E+00	0.0000	0.000E+00	0.0000	1.203E-02	0.0383

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.961E-04	0.0016
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.133E-03	0.0068
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.838E-04	0.0006
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.774E-03	0.0088
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.752E-03	0.0088
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.043E-01	0.3318
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.086E-02	0.0663
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.600E-03	0.0146
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.763E-01	0.5608
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.144E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	6.082E-06	0.0000	3.888E-06	0.0000	0.000E+00	0.0000	5.230E-05	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	7.274E-06	0.0000
Np-237	4.028E-04	0.0023	5.121E-06	0.0000	0.000E+00	0.0000	1.456E-03	0.0084	0.000E+00	0.0000	0.000E+00	0.0000	1.020E-05	0.0001
Pu-238	1.005E-08	0.0000	2.283E-06	0.0000	0.000E+00	0.0000	3.067E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	4.288E-06	0.0000
Pu-239	1.435E-06	0.0000	1.669E-04	0.0010	0.000E+00	0.0000	2.232E-03	0.0128	0.000E+00	0.0000	0.000E+00	0.0000	3.122E-04	0.0018
Pu-240	6.195E-07	0.0000	1.631E-04	0.0009	0.000E+00	0.0000	2.181E-03	0.0125	0.000E+00	0.0000	0.000E+00	0.0000	3.051E-04	0.0018
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	7.752E-04	0.0045	6.258E-04	0.0036	0.000E+00	0.0000	5.310E-02	0.3053	0.000E+00	0.0000	0.000E+00	0.0000	2.873E-03	0.0165
U-235	8.071E-03	0.0464	3.595E-05	0.0002	0.000E+00	0.0000	3.367E-03	0.0194	0.000E+00	0.0000	0.000E+00	0.0000	1.528E-04	0.0009
U-236	2.094E-06	0.0000	2.558E-05	0.0001	0.000E+00	0.0000	2.216E-03	0.0127	0.000E+00	0.0000	0.000E+00	0.0000	1.241E-04	0.0007
U-238	3.823E-02	0.2198	5.088E-04	0.0029	0.000E+00	0.0000	4.931E-02	0.2835	0.000E+00	0.0000	0.000E+00	0.0000	2.761E-03	0.0159
Total	4.749E-02	0.2731	1.537E-03	0.0088	0.000E+00	0.0000	1.139E-01	0.6552	0.000E+00	0.0000	0.000E+00	0.0000	6.550E-03	0.0377

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.166E-03	0.0240	0.000E+00	0.0000	0.000E+00	0.0000	4.235E-03	0.0244
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.874E-03	0.0108
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.725E-05	0.0002
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.231E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.713E-03	0.0156
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.650E-03	0.0152
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.738E-02	0.3299
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.182E-04	0.0013	0.000E+00	0.0000	0.000E+00	0.0000	1.185E-02	0.0681
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.368E-03	0.0136
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.081E-02	0.5222
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.384E-03	0.0252	0.000E+00	0.0000	0.000E+00	0.0000	1.739E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	6.269E-08	0.0000	4.660E-09	0.0000	0.000E+00	0.0000	2.573E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.805E-09	0.0000
Np-237	2.561E-04	0.0007	3.257E-06	0.0000	0.000E+00	0.0000	9.254E-04	0.0025	0.000E+00	0.0000	0.000E+00	0.0000	6.488E-06	0.0000
Pu-238	1.063E-09	0.0000	8.609E-09	0.0000	0.000E+00	0.0000	1.234E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.634E-08	0.0000
Pu-239	1.327E-06	0.0000	1.543E-04	0.0004	0.000E+00	0.0000	2.064E-03	0.0055	0.000E+00	0.0000	0.000E+00	0.0000	2.887E-04	0.0008
Pu-240	5.426E-07	0.0000	1.428E-04	0.0004	0.000E+00	0.0000	1.910E-03	0.0051	0.000E+00	0.0000	0.000E+00	0.0000	2.672E-04	0.0007
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	2.376E-03	0.0063	1.039E-04	0.0003	0.000E+00	0.0000	1.618E-02	0.0429	0.000E+00	0.0000	0.000E+00	0.0000	4.628E-04	0.0012
U-235	8.199E-04	0.0022	6.183E-06	0.0000	0.000E+00	0.0000	5.923E-04	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	2.161E-05	0.0001
U-236	2.113E-07	0.0000	2.506E-06	0.0000	0.000E+00	0.0000	2.171E-04	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	1.215E-05	0.0000
U-238	3.746E-03	0.0099	4.998E-05	0.0001	0.000E+00	0.0000	4.847E-03	0.0129	0.000E+00	0.0000	0.000E+00	0.0000	2.711E-04	0.0007
Total	7.200E-03	0.0191	4.630E-04	0.0012	0.000E+00	0.0000	2.673E-02	0.0709	0.000E+00	0.0000	0.000E+00	0.0000	1.330E-03	0.0035

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.302E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.336E-05	0.0000
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.485E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.191E-03	0.0032
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.566E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.151E-07	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.086E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.508E-03	0.0067
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.400E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.321E-03	0.0062
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.600E-01	0.4244	0.000E+00	0.0000	0.000E+00	0.0000	1.791E-01	0.4751
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.835E-02	0.0487	0.000E+00	0.0000	0.000E+00	0.0000	1.979E-02	0.0525
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.994E-03	0.0186	0.000E+00	0.0000	0.000E+00	0.0000	7.226E-03	0.0192
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.559E-01	0.4136	0.000E+00	0.0000	0.000E+00	0.0000	1.648E-01	0.4372
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.413E-01	0.9052	0.000E+00	0.0000	0.000E+00	0.0000	3.770E-01	1.0000

*Sum of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	2.285E-01	2.262E-01	2.218E-01	2.071E-01	1.700E-01	8.534E-02	7.289E-01	2.250E-03
Am-241	Np-237+D	1.000E+00	3.796E-07	1.165E-06	2.718E-06	7.903E-06	2.076E-05	4.896E-05	6.811E-05	4.931E-05
Am-241	U-233	1.000E+00	4.511E-14	2.490E-13	1.144E-12	9.170E-12	6.871E-11	5.438E-10	3.757E-09	4.063E-08
Am-241	Th-229+D	1.000E+00	8.800E-18	1.226E-16	1.384E-15	3.538E-14	8.052E-13	2.284E-11	3.386E-10	2.737E-09
Am-241	-DSR(j)		2.285E-01	2.262E-01	2.218E-01	2.071E-01	1.701E-01	8.538E-02	7.290E-01	2.299E-03
Np-237+D	Np-237+D	1.000E+00	2.460E+00	2.458E+00	2.455E+00	2.444E+00	2.412E+00	2.305E+00	2.026E+00	1.288E+00
Np-237+D	U-233	1.000E+00	3.584E-07	8.898E-07	1.912E-06	5.427E-06	1.494E-05	4.275E-05	8.787E-05	3.627E-04
Np-237+D	Th-229+D	1.000E+00	1.046E-10	6.976E-10	3.617E-09	3.180E-08	2.604E-07	2.574E-06	1.788E-05	9.324E-05
Np-237+D	-DSR(j)		2.460E+00	2.458E+00	2.455E+00	2.444E+00	2.412E+00	2.306E+00	2.026E+00	1.288E+00
Pu-238	Pu-238	1.840E-09	4.419E-10	4.384E-10	4.314E-10	4.080E-10	3.478E-10	1.989E-10	4.029E-11	1.507E-13
Pu-238	Pu-238	1.000E+00	2.401E-01	2.382E-01	2.345E-01	2.217E-01	1.890E-01	1.081E-01	2.189E-02	8.191E-05
Pu-238	U-234	1.000E+00	1.542E-07	4.702E-07	1.093E-06	3.165E-06	8.226E-06	1.841E-05	1.909E-05	4.053E-05
Pu-238	Th-230	1.000E+00	1.046E-12	6.880E-12	3.508E-11	3.009E-10	2.343E-09	1.973E-08	9.191E-08	1.982E-07
Pu-238	Ra-226+D	1.000E+00	6.419E-15	1.003E-13	1.188E-12	3.112E-11	7.128E-10	2.009E-08	2.822E-07	1.755E-06
Pu-238	Pb-210+D	1.000E+00	6.754E-17	1.782E-15	3.985E-14	2.731E-12	1.582E-10	1.052E-08	2.362E-07	2.112E-06
Pu-238	-DSR(j)		2.401E-01	2.382E-01	2.345E-01	2.217E-01	1.890E-01	1.081E-01	2.191E-02	1.265E-04
Pu-239	Pu-239	1.000E+00	2.622E-01	2.622E-01	2.621E-01	2.619E-01	2.613E-01	2.593E-01	2.535E-01	2.344E-01
Pu-239	U-235+D	1.000E+00	2.306E-10	6.940E-10	1.617E-09	4.797E-09	1.347E-08	3.953E-08	8.677E-08	1.691E-07
Pu-239	Pa-231	1.000E+00	2.032E-14	1.481E-13	7.938E-13	7.058E-12	5.708E-11	5.312E-10	3.098E-09	2.023E-08
Pu-239	Ac-227+D	1.000E+00	1.312E-16	1.749E-15	1.875E-14	4.426E-13	8.632E-12	1.648E-10	1.434E-09	5.055E-08
Pu-239	-DSR(j)		2.622E-01	2.622E-01	2.621E-01	2.619E-01	2.613E-01	2.593E-01	2.535E-01	2.344E-01
Pu-240	Pu-240	4.950E-08	1.297E-08	1.297E-08	1.297E-08	1.295E-08	1.290E-08	1.273E-08	1.226E-08	1.074E-08
Pu-240	Pu-240	1.000E+00	2.621E-01	2.620E-01	2.619E-01	2.616E-01	2.606E-01	2.572E-01	2.476E-01	2.169E-01
Pu-240	U-236	1.000E+00	1.547E-09	4.732E-09	1.109E-08	3.298E-08	9.264E-08	2.711E-07	5.897E-07	2.119E-06
Pu-240	Th-232	1.000E+00	6.565E-20	4.325E-19	2.216E-18	1.936E-17	1.586E-16	1.588E-15	1.148E-14	6.992E-14
Pu-240	Ra-228+D	1.000E+00	1.698E-19	2.643E-18	3.001E-17	6.663E-16	1.044E-14	1.478E-13	1.190E-12	7.682E-12
Pu-240	Th-228+D	1.000E+00	2.912E-21	7.855E-20	1.612E-18	7.163E-17	1.659E-15	2.740E-14	2.296E-13	1.467E-12
Pu-240	-DSR(j)		2.621E-01	2.620E-01	2.619E-01	2.616E-01	2.606E-01	2.572E-01	2.476E-01	2.169E-01
Tc-99	Tc-99	1.000E+00	1.959E+00	1.032E+00	8.757E-01	1.539E-02	2.620E-09	5.334E-33	0.000E+00	0.000E+00
U-234	U-234	1.000E+00	1.128E-01	1.124E-01	1.117E-01	1.091E-01	1.021E-01	8.093E-02	4.165E-02	1.267E-01
U-234	Th-230	1.000E+00	1.065E-06	3.056E-06	6.994E-06	2.057E-05	5.766E-05	1.696E-04	3.767E-04	5.731E-04
U-234	Ra-226+D	1.000E+00	9.262E-09	6.704E-08	3.585E-07	3.188E-06	2.588E-05	2.443E-04	1.483E-03	5.542E-03
U-234	Pb-210+D	1.000E+00	1.131E-10	1.461E-09	1.536E-08	3.617E-07	7.251E-06	1.494E-04	1.318E-03	7.133E-03
U-234	-DSR(j)		1.128E-01	1.125E-01	1.117E-01	1.092E-01	1.022E-01	8.150E-02	4.483E-02	1.399E-01
U-235+D	U-235+D	1.000E+00	4.717E-01	4.701E-01	4.670E-01	4.563E-01	4.270E-01	3.385E-01	1.743E-01	1.359E-01
U-235+D	Pa-231	1.000E+00	6.379E-05	1.961E-04	4.590E-04	1.352E-03	3.680E-03	9.611E-03	1.477E-02	4.217E-02
U-235+D	Ac-227+D	1.000E+00	5.064E-07	3.185E-06	1.560E-05	1.224E-04	7.714E-04	3.705E-03	1.071E-02	1.557E-01
U-235+D	-DSR(j)		4.718E-01	4.703E-01	4.675E-01	4.578E-01	4.315E-01	3.518E-01	1.997E-01	3.338E-01

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-236	U-236	1.000E+00	1.081E-01	1.077E-01	1.070E-01	1.046E-01	9.785E-02	7.756E-02	3.994E-02	1.219E-01
U-236	Th-232	1.000E+00	6.383E-12	1.832E-11	4.193E-11	1.233E-10	3.457E-10	1.017E-09	2.263E-09	3.461E-09
U-236	Ra-228+D	1.000E+00	2.352E-11	1.671E-10	8.353E-10	5.852E-09	2.796E-08	1.027E-07	2.418E-07	4.006E-07
U-236	Th-228+D	1.000E+00	4.740E-13	6.108E-12	5.591E-11	7.473E-10	4.863E-09	1.962E-08	4.712E-08	7.340E-08
U-236	-DSR(j)		1.081E-01	1.077E-01	1.070E-01	1.046E-01	9.785E-02	7.756E-02	3.994E-02	1.219E-01
U-238	U-238	5.400E-05	5.584E-06	5.565E-06	5.529E-06	5.402E-06	5.055E-06	4.007E-06	2.063E-06	6.300E-06
U-238+D	U-238+D	9.999E-01	1.919E-01	1.913E-01	1.900E-01	1.857E-01	1.737E-01	1.377E-01	7.091E-02	1.284E-01
U-238+D	U-234	9.999E-01	1.598E-07	4.781E-07	1.108E-06	3.248E-06	8.830E-06	2.306E-05	3.549E-05	3.598E-04
U-238+D	Th-230	9.999E-01	1.052E-12	6.902E-12	3.528E-11	3.059E-10	2.455E-09	2.284E-08	1.343E-07	4.322E-07
U-238+D	Ra-226+D	9.999E-01	6.425E-15	1.005E-13	1.193E-12	3.150E-11	7.381E-10	2.245E-08	3.801E-07	3.852E-06
U-238+D	Pb-210+D	9.999E-01	6.759E-17	1.785E-15	3.999E-14	2.758E-12	1.628E-10	1.158E-08	3.117E-07	5.734E-06
U-238+D	-DSR(j)		1.919E-01	1.913E-01	1.900E-01	1.857E-01	1.738E-01	1.377E-01	7.095E-02	1.288E-01

The DSR includes contributions from associated (half-life ó 180 days) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	1.094E+02	1.105E+02	1.127E+02	1.207E+02	1.470E+02	2.928E+02	3.429E+01	1.087E+04
Np-237	1.016E+01	1.017E+01	1.018E+01	1.023E+01	1.036E+01	1.084E+01	1.234E+01	1.941E+01
Pu-238	1.041E+02	1.049E+02	1.066E+02	1.128E+02	1.323E+02	2.313E+02	1.141E+03	1.976E+05
Pu-239	9.535E+01	9.536E+01	9.538E+01	9.546E+01	9.567E+01	9.643E+01	9.861E+01	1.067E+02
Pu-240	9.538E+01	9.540E+01	9.544E+01	9.556E+01	9.593E+01	9.721E+01	1.010E+02	1.153E+02
Tc-99	1.276E+01	2.423E+01	2.855E+01	1.625E+03	9.541E+09	*1.697E+10	*1.697E+10	*1.697E+10
U-234	2.216E+02	2.223E+02	2.238E+02	2.290E+02	2.446E+02	3.068E+02	5.577E+02	1.786E+02
U-235	5.299E+01	5.315E+01	5.347E+01	5.461E+01	5.794E+01	7.107E+01	1.252E+02	7.490E+01
U-236	2.313E+02	2.320E+02	2.336E+02	2.391E+02	2.555E+02	3.223E+02	6.260E+02	2.052E+02
U-238	1.302E+02	1.307E+02	1.316E+02	1.346E+02	1.439E+02	1.815E+02	3.524E+02	1.941E+02

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 0.000E+00 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Am-241	5.810E-03	334.2 ± 0.7	7.370E-01	3.392E+01	2.285E-01	1.094E+02
Np-237	9.250E-04	0.000E+00	2.460E+00	1.016E+01	2.460E+00	1.016E+01
Pu-238	1.700E-03	0.000E+00	2.401E-01	1.041E+02	2.401E-01	1.041E+02
Pu-239	1.070E-02	0.000E+00	2.622E-01	9.535E+01	2.622E-01	9.535E+01
Pu-240	1.070E-02	0.000E+00	2.621E-01	9.538E+01	2.621E-01	9.538E+01
Tc-99	1.790E-01	0.000E+00	1.959E+00	1.276E+01	1.959E+00	1.276E+01
U-234	1.280E+00	1.000E+03	1.399E-01	1.786E+02	1.128E-01	2.216E+02
U-235	5.930E-02	0.000E+00	4.718E-01	5.299E+01	4.718E-01	5.299E+01
U-236	5.930E-02	1.000E+03	1.219E-01	2.052E+02	1.081E-01	2.313E+02
U-238	1.280E+00	0.000E+00	1.919E-01	1.302E+02	1.919E-01	1.302E+02

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	1.327E-03	1.314E-03	1.289E-03	1.203E-03	9.879E-04	4.958E-04	4.235E-03	1.307E-05
Np-237	Am-241	1.000E+00	2.205E-09	6.771E-09	1.579E-08	4.592E-08	1.206E-07	2.844E-07	3.957E-07	2.865E-07
Np-237	Np-237	1.000E+00	2.275E-03	2.274E-03	2.271E-03	2.260E-03	2.231E-03	2.133E-03	1.874E-03	1.191E-03
Np-237	-DOSE(j)		2.275E-03	2.274E-03	2.271E-03	2.261E-03	2.232E-03	2.133E-03	1.874E-03	1.191E-03
U-233	Am-241	1.000E+00	2.621E-16	1.446E-15	6.648E-15	5.328E-14	3.992E-13	3.160E-12	2.183E-11	2.360E-10
U-233	Np-237	1.000E+00	3.315E-10	8.231E-10	1.769E-09	5.020E-09	1.382E-08	3.954E-08	8.128E-08	3.355E-07
U-233	-DOSE(j)		3.315E-10	8.231E-10	1.769E-09	5.020E-09	1.382E-08	3.954E-08	8.130E-08	3.357E-07
Th-229	Am-241	1.000E+00	5.113E-20	7.126E-19	8.040E-18	2.056E-16	4.678E-15	1.327E-13	1.967E-12	1.590E-11
Th-229	Np-237	1.000E+00	9.675E-14	6.453E-13	3.346E-12	2.941E-11	2.408E-10	2.381E-09	1.654E-08	8.625E-08
Th-229	-DOSE(j)		9.675E-14	6.453E-13	3.346E-12	2.942E-11	2.408E-10	2.381E-09	1.654E-08	8.627E-08
Pu-238	Pu-238	1.840E-09	7.512E-13	7.452E-13	7.334E-13	6.935E-13	5.912E-13	3.381E-13	6.849E-14	2.562E-16
Pu-238	Pu-238	1.000E+00	4.082E-04	4.050E-04	3.986E-04	3.769E-04	3.213E-04	1.837E-04	3.722E-05	1.393E-07
Pu-238	-DOSE(j)		4.082E-04	4.050E-04	3.986E-04	3.769E-04	3.213E-04	1.837E-04	3.722E-05	1.393E-07
U-234	Pu-238	1.000E+00	2.622E-10	7.993E-10	1.858E-09	5.380E-09	1.398E-08	3.129E-08	3.245E-08	6.891E-08
U-234	U-234	1.000E+00	1.444E-01	1.439E-01	1.430E-01	1.397E-01	1.307E-01	1.036E-01	5.331E-02	1.622E-01
U-234	U-238	9.999E-01	2.046E-07	6.119E-07	1.419E-06	4.158E-06	1.130E-05	2.952E-05	4.543E-05	4.606E-04
U-234	-DOSE(j)		1.444E-01	1.439E-01	1.430E-01	1.397E-01	1.307E-01	1.036E-01	5.335E-02	1.626E-01
Th-230	Pu-238	1.000E+00	1.779E-15	1.170E-14	5.963E-14	5.116E-13	3.983E-12	3.355E-11	1.562E-10	3.370E-10
Th-230	U-234	1.000E+00	1.363E-06	3.912E-06	8.952E-06	2.633E-05	7.381E-05	2.171E-04	4.822E-04	7.335E-04
Th-230	U-238	9.999E-01	1.346E-12	8.834E-12	4.515E-11	3.915E-10	3.142E-09	2.923E-08	1.720E-07	5.533E-07
Th-230	-DOSE(j)		1.363E-06	3.912E-06	8.952E-06	2.633E-05	7.381E-05	2.172E-04	4.824E-04	7.341E-04
Ra-226	Pu-238	1.000E+00	1.091E-17	1.706E-16	2.020E-15	5.291E-14	1.212E-12	3.415E-11	4.798E-10	2.983E-09
Ra-226	U-234	1.000E+00	1.186E-08	8.581E-08	4.589E-07	4.080E-06	3.312E-05	3.127E-04	1.898E-03	7.094E-03
Ra-226	U-238	9.999E-01	8.224E-15	1.287E-13	1.527E-12	4.033E-11	9.448E-10	2.873E-08	4.865E-07	4.931E-06
Ra-226	-DOSE(j)		1.186E-08	8.582E-08	4.589E-07	4.080E-06	3.312E-05	3.127E-04	1.899E-03	7.099E-03
Pb-210	Pu-238	1.000E+00	1.148E-19	3.030E-18	6.775E-17	4.643E-15	2.689E-13	1.788E-11	4.015E-10	3.591E-09
Pb-210	U-234	1.000E+00	1.448E-10	1.870E-09	1.966E-08	4.630E-07	9.281E-06	1.912E-04	1.687E-03	9.130E-03
Pb-210	U-238	9.999E-01	8.652E-17	2.285E-15	5.118E-14	3.531E-12	2.084E-10	1.482E-08	3.990E-07	7.339E-06
Pb-210	-DOSE(j)		1.448E-10	1.870E-09	1.966E-08	4.630E-07	9.281E-06	1.913E-04	1.687E-03	9.138E-03
Pu-239	Pu-239	1.000E+00	2.805E-03	2.805E-03	2.804E-03	2.802E-03	2.796E-03	2.774E-03	2.713E-03	2.508E-03
U-235	Pu-239	1.000E+00	2.467E-12	7.426E-12	1.730E-11	5.133E-11	1.442E-10	4.230E-10	9.285E-10	1.809E-09
U-235	U-235	1.000E+00	2.797E-02	2.788E-02	2.770E-02	2.706E-02	2.532E-02	2.007E-02	1.033E-02	8.057E-03
U-235	-DOSE(j)		2.797E-02	2.788E-02	2.770E-02	2.706E-02	2.532E-02	2.007E-02	1.033E-02	8.057E-03
Pa-231	Pu-239	1.000E+00	2.175E-16	1.585E-15	8.493E-15	7.552E-14	6.108E-13	5.684E-12	3.315E-11	2.164E-10
Pa-231	U-235	1.000E+00	3.783E-06	1.163E-05	2.722E-05	8.017E-05	2.182E-04	5.699E-04	8.757E-04	2.501E-03
Pa-231	-DOSE(j)		3.783E-06	1.163E-05	2.722E-05	8.017E-05	2.182E-04	5.699E-04	8.757E-04	2.501E-03
Ac-227	Pu-239	1.000E+00	1.403E-18	1.871E-17	2.006E-16	4.735E-15	9.236E-14	1.763E-12	1.534E-11	5.409E-10

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	U-235	1.000E+00	3.003E-08	1.889E-07	9.248E-07	7.258E-06	4.574E-05	2.197E-04	6.350E-04	9.234E-03
Ac-227	-DOSE(j)		3.003E-08	1.889E-07	9.248E-07	7.258E-06	4.574E-05	2.197E-04	6.350E-04	9.234E-03
Pu-240	Pu-240	4.950E-08	1.388E-10	1.388E-10	1.387E-10	1.386E-10	1.380E-10	1.362E-10	1.312E-10	1.149E-10
Pu-240	Pu-240	1.000E+00	2.804E-03	2.804E-03	2.803E-03	2.799E-03	2.789E-03	2.752E-03	2.650E-03	2.321E-03
Pu-240	-DOSE(j)		2.804E-03	2.804E-03	2.803E-03	2.799E-03	2.789E-03	2.752E-03	2.650E-03	2.321E-03
U-236	Pu-240	1.000E+00	1.655E-11	5.063E-11	1.186E-10	3.529E-10	9.912E-10	2.901E-09	6.310E-09	2.267E-08
U-236	U-236	1.000E+00	6.410E-03	6.389E-03	6.347E-03	6.201E-03	5.803E-03	4.600E-03	2.368E-03	7.226E-03
U-236	-DOSE(j)		6.410E-03	6.389E-03	6.347E-03	6.201E-03	5.803E-03	4.600E-03	2.368E-03	7.226E-03
Th-232	Pu-240	1.000E+00	7.024E-22	4.628E-21	2.371E-20	2.071E-19	1.698E-18	1.699E-17	1.228E-16	7.482E-16
Th-232	U-236	1.000E+00	3.785E-13	1.086E-12	2.486E-12	7.313E-12	2.050E-11	6.034E-11	1.342E-10	2.052E-10
Th-232	-DOSE(j)		3.785E-13	1.086E-12	2.486E-12	7.313E-12	2.050E-11	6.034E-11	1.342E-10	2.052E-10
Ra-228	Pu-240	1.000E+00	1.817E-21	2.828E-20	3.212E-19	7.130E-18	1.117E-16	1.581E-15	1.274E-14	8.220E-14
Ra-228	U-236	1.000E+00	1.394E-12	9.909E-12	4.954E-11	3.470E-10	1.658E-09	6.093E-09	1.434E-08	2.376E-08
Ra-228	-DOSE(j)		1.394E-12	9.909E-12	4.954E-11	3.470E-10	1.658E-09	6.093E-09	1.434E-08	2.376E-08
Th-228	Pu-240	1.000E+00	3.116E-23	8.405E-22	1.724E-20	7.664E-19	1.775E-17	2.932E-16	2.456E-15	1.569E-14
Th-228	U-236	1.000E+00	2.811E-14	3.622E-13	3.316E-12	4.432E-11	2.884E-10	1.164E-09	2.794E-09	4.353E-09
Th-228	-DOSE(j)		2.811E-14	3.622E-13	3.316E-12	4.432E-11	2.884E-10	1.164E-09	2.794E-09	4.353E-09
Tc-99	Tc-99	1.000E+00	3.506E-01	1.847E-01	1.567E-01	2.755E-03	4.690E-10	0.000E+00	0.000E+00	0.000E+00
U-238	U-238	5.400E-05	7.147E-06	7.124E-06	7.077E-06	6.914E-06	6.470E-06	5.129E-06	2.641E-06	8.065E-06
U-238	U-238	9.999E-01	2.457E-01	2.449E-01	2.432E-01	2.377E-01	2.224E-01	1.763E-01	9.077E-02	1.644E-01
U-238	-DOSE(j)		2.457E-01	2.449E-01	2.432E-01	2.377E-01	2.224E-01	1.763E-01	9.077E-02	1.644E-01

THF(i) is the thread fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	5.810E-03	5.753E-03	5.641E-03	5.265E-03	4.324E-03	2.170E-03	3.027E-04	3.068E-07
Np-237	Am-241	1.000E+00	0.000E+00	1.872E-09	5.558E-09	1.786E-08	4.839E-08	1.153E-07	1.578E-07	1.071E-07
Np-237	Np-237	1.000E+00	9.250E-04	9.244E-04	9.232E-04	9.190E-04	9.072E-04	8.670E-04	7.618E-04	4.842E-04
Np-237	-S(j):		9.250E-04	9.244E-04	9.232E-04	9.191E-04	9.073E-04	8.671E-04	7.619E-04	4.843E-04
U-233	Am-241	1.000E+00	0.000E+00	4.096E-15	3.653E-14	3.930E-13	3.231E-12	2.644E-11	1.085E-10	1.580E-10
U-233	Np-237	1.000E+00	0.000E+00	4.037E-09	1.206E-08	3.966E-08	1.144E-07	3.327E-07	6.871E-07	7.368E-07
U-233	-S(j):		0.000E+00	4.037E-09	1.206E-08	3.966E-08	1.144E-07	3.327E-07	6.872E-07	7.370E-07
Th-229	Am-241	1.000E+00	0.000E+00	1.291E-19	3.461E-18	1.251E-16	3.155E-15	9.280E-14	1.389E-12	1.121E-11
Th-229	Np-237	1.000E+00	0.000E+00	1.907E-13	1.712E-12	1.884E-11	1.651E-10	1.672E-09	1.169E-08	6.107E-08
Th-229	-S(j):		0.000E+00	1.907E-13	1.712E-12	1.884E-11	1.651E-10	1.672E-09	1.170E-08	6.108E-08
Pu-238	Pu-238	1.840E-09	3.128E-12	3.103E-12	3.054E-12	2.888E-12	2.462E-12	1.408E-12	2.852E-13	1.067E-15
Pu-238	Pu-238	1.000E+00	1.700E-03	1.686E-03	1.660E-03	1.570E-03	1.338E-03	7.651E-04	1.550E-04	5.799E-07
Pu-238	-S(j):		1.700E-03	1.686E-03	1.660E-03	1.570E-03	1.338E-03	7.651E-04	1.550E-04	5.799E-07
U-234	Pu-238	1.000E+00	0.000E+00	4.792E-09	1.422E-08	4.555E-08	1.221E-07	2.763E-07	2.874E-07	3.695E-08
U-234	U-234	1.000E+00	1.280E+00	1.276E+00	1.267E+00	1.238E+00	1.159E+00	9.182E-01	4.725E-01	4.618E-02
U-234	U-238	9.999E-01	0.000E+00	3.617E-06	1.078E-05	3.510E-05	9.854E-05	2.603E-04	4.020E-04	1.311E-04
U-234	-S(j):		1.280E+00	1.276E+00	1.267E+00	1.238E+00	1.159E+00	9.185E-01	4.729E-01	4.632E-02
Th-230	Pu-238	1.000E+00	0.000E+00	2.161E-14	1.930E-13	2.089E-12	1.745E-11	1.507E-10	7.069E-10	1.524E-09
Th-230	U-234	1.000E+00	0.000E+00	1.150E-05	3.440E-05	1.133E-04	3.289E-04	9.798E-04	2.184E-03	3.315E-03
Th-230	U-238	9.999E-01	0.000E+00	1.630E-11	1.460E-10	1.597E-09	1.376E-08	1.312E-07	7.775E-07	2.484E-06
Th-230	-S(j):		0.000E+00	1.150E-05	3.440E-05	1.133E-04	3.290E-04	9.799E-04	2.184E-03	3.317E-03
Ra-226	Pu-238	1.000E+00	0.000E+00	3.121E-18	8.369E-17	3.024E-15	7.613E-14	2.218E-12	3.146E-11	1.848E-10
Ra-226	U-234	1.000E+00	0.000E+00	2.491E-09	2.233E-08	2.445E-07	2.113E-06	2.039E-05	1.246E-04	4.294E-04
Ra-226	U-238	9.999E-01	0.000E+00	2.353E-15	6.323E-14	2.303E-12	5.933E-11	1.865E-09	3.189E-08	2.757E-07
Ra-226	-S(j):		0.000E+00	2.491E-09	2.233E-08	2.445E-07	2.113E-06	2.040E-05	1.246E-04	4.297E-04
Pb-210	Pu-238	1.000E+00	0.000E+00	2.411E-20	1.917E-18	2.219E-16	1.504E-14	1.056E-12	2.408E-11	1.711E-10
Pb-210	U-234	1.000E+00	0.000E+00	2.561E-11	6.782E-10	2.351E-08	5.296E-07	1.137E-05	1.013E-04	4.005E-04
Pb-210	U-238	9.999E-01	0.000E+00	1.817E-17	1.447E-15	1.686E-13	1.165E-11	8.753E-10	2.392E-08	2.526E-07
Pb-210	-S(j):		0.000E+00	2.561E-11	6.782E-10	2.351E-08	5.296E-07	1.137E-05	1.014E-04	4.007E-04
Pu-239	Pu-239	1.000E+00	1.070E-02	1.070E-02	1.070E-02	1.069E-02	1.066E-02	1.058E-02	1.035E-02	9.565E-03
U-235	Pu-239	1.000E+00	0.000E+00	1.052E-11	3.145E-11	1.036E-10	3.004E-10	8.915E-10	1.963E-09	2.819E-09
U-235	U-235	1.000E+00	5.930E-02	5.910E-02	5.871E-02	5.736E-02	5.368E-02	4.255E-02	2.191E-02	2.146E-03
U-235	-S(j):		5.930E-02	5.910E-02	5.871E-02	5.736E-02	5.368E-02	4.255E-02	2.191E-02	2.146E-03
Pa-231	Pu-239	1.000E+00	0.000E+00	1.112E-16	9.966E-16	1.090E-14	9.379E-14	8.922E-13	5.237E-12	1.600E-11
Pa-231	U-235	1.000E+00	0.000E+00	1.251E-06	3.727E-06	1.214E-05	3.406E-05	8.994E-05	1.386E-04	4.492E-05
Pa-231	-S(j):		0.000E+00	1.251E-06	3.727E-06	1.214E-05	3.406E-05	8.994E-05	1.386E-04	4.492E-05
Ac-227	Pu-239	1.000E+00	0.000E+00	1.169E-18	3.085E-17	1.055E-15	2.300E-14	4.561E-13	3.686E-12	1.258E-11

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	U-235	1.000E+00	0.000E+00	1.966E-08	1.716E-07	1.715E-06	1.163E-05	5.724E-05	1.092E-04	3.786E-05
Ac-227	-S(j):		0.000E+00	1.966E-08	1.716E-07	1.715E-06	1.163E-05	5.724E-05	1.092E-04	3.786E-05
Pu-240	Pu-240	4.950E-08	5.296E-10	5.295E-10	5.293E-10	5.286E-10	5.266E-10	5.197E-10	5.004E-10	4.383E-10
Pu-240	Pu-240	1.000E+00	1.070E-02	1.070E-02	1.069E-02	1.068E-02	1.064E-02	1.050E-02	1.011E-02	8.854E-03
Pu-240	-S(j):		1.070E-02	1.070E-02	1.069E-02	1.068E-02	1.064E-02	1.050E-02	1.011E-02	8.854E-03
U-236	Pu-240	1.000E+00	0.000E+00	3.162E-10	9.453E-10	3.113E-09	9.019E-09	2.669E-08	5.823E-08	8.008E-08
U-236	U-236	1.000E+00	5.930E-02	5.910E-02	5.871E-02	5.736E-02	5.368E-02	4.255E-02	2.191E-02	2.146E-03
U-236	-S(j):		5.930E-02	5.910E-02	5.871E-02	5.736E-02	5.368E-02	4.255E-02	2.191E-02	2.146E-03
Th-232	Pu-240	1.000E+00	0.000E+00	7.804E-21	7.007E-20	7.723E-19	6.791E-18	6.970E-17	5.074E-16	3.095E-15
Th-232	U-236	1.000E+00	0.000E+00	2.921E-12	8.733E-12	2.877E-11	8.353E-11	2.489E-10	5.555E-10	8.478E-10
Th-232	-S(j):		0.000E+00	2.921E-12	8.733E-12	2.877E-11	8.353E-11	2.489E-10	5.555E-10	8.478E-10
Ra-228	Pu-240	1.000E+00	0.000E+00	3.043E-22	7.729E-21	2.349E-19	4.024E-18	5.859E-17	4.751E-16	3.004E-15
Ra-228	U-236	1.000E+00	0.000E+00	1.691E-13	1.404E-12	1.203E-11	6.081E-11	2.269E-10	5.359E-10	8.306E-10
Ra-228	-S(j):		0.000E+00	1.691E-13	1.404E-12	1.203E-11	6.081E-11	2.269E-10	5.359E-10	8.306E-10
Th-228	Pu-240	1.000E+00	0.000E+00	2.583E-23	1.742E-21	1.232E-19	3.234E-18	5.536E-17	4.675E-16	2.993E-15
Th-228	U-236	1.000E+00	0.000E+00	1.889E-14	4.061E-13	7.579E-12	5.368E-11	2.210E-10	5.329E-10	8.303E-10
Th-228	-S(j):		0.000E+00	1.889E-14	4.061E-13	7.579E-12	5.368E-11	2.210E-10	5.329E-10	8.303E-10
Tc-99	Tc-99	1.000E+00	1.790E-01	8.214E-02	1.729E-02	7.407E-05	1.268E-11	2.634E-35	0.000E+00	0.000E+00
U-238	U-238	5.400E-05	6.912E-05	6.889E-05	6.844E-05	6.686E-05	6.257E-05	4.960E-05	2.554E-05	2.501E-06
U-238	U-238	9.999E-01	1.280E+00	1.276E+00	1.267E+00	1.238E+00	1.159E+00	9.184E-01	4.729E-01	4.631E-02
U-238	-S(j):		1.280E+00	1.276E+00	1.267E+00	1.238E+00	1.159E+00	9.185E-01	4.729E-01	4.632E-02

THF(i) is the thread fraction of the parent nuclide.
RESCALC.EXE execution time = 4.11 seconds

Background Area Soil RESRAD Output

The following results are generated via version 7.2 of the RESRAD simulation. The concentrations used herein are those of soil samples collected for this project in the background area. The pathways are consistent with the soil pathways of the conceptual model discussed in Section 3.1 in the main body of this HHRA Report.

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-225 (Source: ICRP 60)	5.775E-02	5.775E-02	DCF1(1)
A-1	Ac-227 (Source: ICRP 60)	4.485E-04	4.485E-04	DCF1(2)
A-1	Ac-228 (Source: ICRP 60)	5.662E+00	5.662E+00	DCF1(3)
A-1	Am-241 (Source: ICRP 60)	3.719E-02	3.719E-02	DCF1(4)
A-1	At-217 (Source: ICRP 60)	1.654E-03	1.654E-03	DCF1(5)
A-1	At-218 (Source: ICRP 60)	4.878E-03	4.878E-03	DCF1(6)
A-1	Bi-210 (Source: ICRP 60)	5.476E-03	5.476E-03	DCF1(7)
A-1	Bi-211 (Source: ICRP 60)	2.373E-01	2.373E-01	DCF1(8)
A-1	Bi-212 (Source: ICRP 60)	1.114E+00	1.114E+00	DCF1(9)
A-1	Bi-213 (Source: ICRP 60)	7.158E-01	7.158E-01	DCF1(10)
A-1	Bi-214 (Source: ICRP 60)	9.325E+00	9.325E+00	DCF1(11)
A-1	Fr-221 (Source: ICRP 60)	1.413E-01	1.413E-01	DCF1(12)
A-1	Fr-223 (Source: ICRP 60)	1.813E-01	1.813E-01	DCF1(13)
A-1	Np-237 (Source: ICRP 60)	6.971E-02	6.971E-02	DCF1(14)
A-1	Pa-231 (Source: ICRP 60)	1.762E-01	1.762E-01	DCF1(15)
A-1	Pa-233 (Source: ICRP 60)	9.419E-01	9.419E-01	DCF1(16)
A-1	Pa-234 (Source: ICRP 60)	1.088E+01	1.088E+01	DCF1(17)
A-1	Pa-234m (Source: ICRP 60)	9.867E-02	9.867E-02	DCF1(18)
A-1	Pb-209 (Source: ICRP 60)	7.550E-04	7.550E-04	DCF1(19)
A-1	Pb-210 (Source: ICRP 60)	1.981E-03	1.981E-03	DCF1(20)
A-1	Pb-211 (Source: ICRP 60)	2.915E-01	2.915E-01	DCF1(21)
A-1	Pb-212 (Source: ICRP 60)	6.466E-01	6.466E-01	DCF1(22)
A-1	Pb-214 (Source: ICRP 60)	1.243E+00	1.243E+00	DCF1(23)
A-1	Po-210 (Source: ICRP 60)	4.934E-05	4.934E-05	DCF1(24)
A-1	Po-211 (Source: ICRP 60)	4.485E-02	4.485E-02	DCF1(25)
A-1	Po-212 (Source: ICRP 60)	0.000E+00	0.000E+00	DCF1(26)
A-1	Po-213 (Source: ICRP 60)	0.000E+00	0.000E+00	DCF1(27)
A-1	Po-214 (Source: ICRP 60)	4.840E-04	4.840E-04	DCF1(28)
A-1	Po-215 (Source: ICRP 60)	9.456E-04	9.456E-04	DCF1(29)
A-1	Po-216 (Source: ICRP 60)	9.830E-05	9.830E-05	DCF1(30)
A-1	Po-218 (Source: ICRP 60)	5.326E-05	5.326E-05	DCF1(31)
A-1	Pu-238 (Source: ICRP 60)	1.166E-04	1.166E-04	DCF1(32)
A-1	Pu-239 (Source: ICRP 60)	2.635E-04	2.635E-04	DCF1(33)
A-1	Pu-240 (Source: ICRP 60)	1.129E-04	1.129E-04	DCF1(34)
A-1	Ra-223 (Source: ICRP 60)	5.532E-01	5.532E-01	DCF1(35)
A-1	Ra-224 (Source: ICRP 60)	4.728E-02	4.728E-02	DCF1(36)
A-1	Ra-225 (Source: ICRP 60)	8.634E-03	8.634E-03	DCF1(37)
A-1	Ra-226 (Source: ICRP 60)	2.915E-02	2.915E-02	DCF1(38)
A-1	Ra-228 (Source: ICRP 60)	0.000E+00	0.000E+00	DCF1(39)
A-1	Rn-219 (Source: ICRP 60)	2.859E-01	2.859E-01	DCF1(40)
A-1	Rn-220 (Source: ICRP 60)	2.130E-03	2.130E-03	DCF1(41)
A-1	Rn-222 (Source: ICRP 60)	2.186E-03	2.186E-03	DCF1(42)
A-1	Tc-99 (Source: ICRP 60)	1.086E-04	1.086E-04	DCF1(43)
A-1	Th-227 (Source: ICRP 60)	4.803E-01	4.803E-01	DCF1(44)
A-1	Th-228 (Source: ICRP 60)	7.176E-03	7.176E-03	DCF1(45)
A-1	Th-229 (Source: ICRP 60)	2.897E-01	2.897E-01	DCF1(46)
A-1	Th-230 (Source: ICRP 60)	1.071E-03	1.071E-03	DCF1(47)
A-1	Th-231 (Source: ICRP 60)	3.214E-02	3.214E-02	DCF1(48)
A-1	Th-232 (Source: ICRP 60)	4.560E-04	4.560E-04	DCF1(49)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	Th-234 (Source: ICRP 60)	2.130E-02	2.130E-02	DCF1(50)
A-1	Tl-207 (Source: ICRP 60)	2.299E-02	2.299E-02	DCF1(51)
A-1	Tl-208 (Source: ICRP 60)	2.186E+01	2.186E+01	DCF1(52)
A-1	Tl-209 (Source: ICRP 60)	1.226E+01	1.226E+01	DCF1(53)
A-1	Tl-210 (Source: ICRP 60)	1.661E+01	1.661E+01	DCF1(54)
A-1	U-233 (Source: ICRP 60)	1.265E-03	1.265E-03	DCF1(55)
A-1	U-234 (Source: ICRP 60)	3.439E-04	3.439E-04	DCF1(56)
A-1	U-235 (Source: ICRP 60)	6.597E-01	6.597E-01	DCF1(57)
A-1	U-236 (Source: ICRP 60)	1.781E-04	1.781E-04	DCF1(58)
A-1	U-238 (Source: ICRP 60)	7.961E-05	7.961E-05	DCF1(59)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	2.104E+00	2.035E+00	DCF2(1)
B-1	Am-241	3.552E-01	3.552E-01	DCF2(2)
B-1	Np-237+D	1.850E-01	1.850E-01	DCF2(3)
B-1	Pa-231	5.180E-01	5.180E-01	DCF2(4)
B-1	Pb-210+D	3.697E-02	2.072E-02	DCF2(5)
B-1	Pu-238	4.070E-01	4.070E-01	DCF2(6)
B-1	Pu-239	4.440E-01	4.440E-01	DCF2(8)
B-1	Pu-240	4.440E-01	4.440E-01	DCF2(9)
B-1	Ra-226+D	3.526E-02	3.515E-02	DCF2(11)
B-1	Ra-228+D	5.929E-02	5.920E-02	DCF2(12)
B-1	Tc-99	4.810E-05	4.810E-05	DCF2(13)
B-1	Th-228+D	1.614E-01	1.480E-01	DCF2(14)
B-1	Th-229+D	9.481E-01	8.880E-01	DCF2(15)
B-1	Th-230	3.700E-01	3.700E-01	DCF2(16)
B-1	Th-232	4.070E-01	4.070E-01	DCF2(17)
B-1	U-233	3.552E-02	3.552E-02	DCF2(18)
B-1	U-234	3.478E-02	3.478E-02	DCF2(19)
B-1	U-235+D	3.145E-02	3.145E-02	DCF2(20)
B-1	U-236	3.219E-02	3.219E-02	DCF2(21)
B-1	U-238	2.960E-02	2.960E-02	DCF2(22)
B-1	U-238+D	2.963E-02	2.960E-02	DCF2(23)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	4.473E-03	4.070E-03	DCF3(1)
D-1	Am-241	7.400E-04	7.400E-04	DCF3(2)
D-1	Np-237+D	4.102E-04	4.070E-04	DCF3(3)
D-1	Pa-231	2.627E-03	2.627E-03	DCF3(4)
D-1	Pb-210+D	6.998E-03	2.553E-03	DCF3(5)
D-1	Pu-238	8.510E-04	8.510E-04	DCF3(6)
D-1	Pu-239	9.250E-04	9.250E-04	DCF3(8)
D-1	Pu-240	9.250E-04	9.250E-04	DCF3(9)
D-1	Ra-226+D	1.037E-03	1.036E-03	DCF3(11)
D-1	Ra-228+D	2.555E-03	2.553E-03	DCF3(12)
D-1	Tc-99	2.368E-06	2.368E-06	DCF3(13)
D-1	Th-228+D	5.301E-04	2.664E-04	DCF3(14)
D-1	Th-229+D	2.269E-03	1.813E-03	DCF3(15)
D-1	Th-230	7.770E-04	7.770E-04	DCF3(16)
D-1	Th-232	8.510E-04	8.510E-04	DCF3(17)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-1	U-233	1.887E-04	1.887E-04	DCF3(18)
D-1	U-234	1.813E-04	1.813E-04	DCF3(19)
D-1	U-235+D	1.752E-04	1.739E-04	DCF3(20)
D-1	U-236	1.739E-04	1.739E-04	DCF3(21)
D-1	U-238	1.665E-04	1.665E-04	DCF3(22)
D-1	U-238+D	1.791E-04	1.665E-04	DCF3(23)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(2,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF(2,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(2,3)
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(3,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(3,3)
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(4,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(4,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(5,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(5,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(5,3)
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(6,3)
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(8,3)
D-34	Pu-240 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Pu-240 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Pu-240 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(9,3)
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(11,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(11,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(11,3)
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(12,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(12,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(12,3)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Tc-99 , plant/soil concentration ratio, dimensionless	5.000E+00	5.000E+00	RTF(13,1)
D-34	Tc-99 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(13,2)
D-34	Tc-99 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(13,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(14,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(14,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(14,3)
D-34				
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(15,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(15,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(15,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(16,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(16,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(16,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(17,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(17,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(17,3)
D-34				
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(18,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(18,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(18,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(19,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(19,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(19,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(20,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(20,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(20,3)
D-34				
D-34	U-236 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(21,1)
D-34	U-236 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(21,2)
D-34	U-236 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(21,3)
D-34				
D-34	U-238 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(22,1)
D-34	U-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(22,2)
D-34	U-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(22,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(23,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(23,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(23,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(3,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(3,2)
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(4,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(4,2)
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(5,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(5,2)
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(6,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(6,2)
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(8,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(8,2)
D-5	Pu-240 , fish	3.000E+01	3.000E+01	BIOFAC(9,1)
D-5	Pu-240 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(9,2)
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(11,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(11,2)
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(12,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(12,2)
D-5	Tc-99 , fish	2.000E+01	2.000E+01	BIOFAC(13,1)
D-5	Tc-99 , crustacea and mollusks	5.000E+00	5.000E+00	BIOFAC(13,2)
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(14,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(14,2)
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(15,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(15,2)
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(16,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(16,2)
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(17,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(17,2)
D-5	U-233 , fish	1.000E+01	1.000E+01	BIOFAC(18,1)
D-5	U-233 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(18,2)
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(19,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(19,2)
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(20,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(20,2)
D-5	U-236 , fish	1.000E+01	1.000E+01	BIOFAC(21,1)
D-5	U-236 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(21,2)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	U-238 , fish	1.000E+01	1.000E+01	BIOFAC(22,1)
D-5	U-238 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(22,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(23,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(23,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	1.000E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00	---	SUBMFRACT
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Am-241	4.300E-03	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Np-237	1.030E-03	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Pu-238	2.430E-03	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): Pu-239	9.200E-03	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g): Pu-240	9.200E-03	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): Tc-99	1.100E-01	0.000E+00	---	S1(13)
R012	Initial principal radionuclide (pCi/g): U-234	1.952E+00	0.000E+00	---	S1(19)
R012	Initial principal radionuclide (pCi/g): U-235	8.500E-02	0.000E+00	---	S1(20)
R012	Initial principal radionuclide (pCi/g): U-236	8.500E-02	0.000E+00	---	S1(21)
R012	Initial principal radionuclide (pCi/g): U-238	1.919E+00	0.000E+00	---	S1(22)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Np-237	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L): Pu-240	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): Tc-99	not used	0.000E+00	---	W1(13)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(19)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(20)
R012	Concentration in groundwater (pCi/L): U-236	not used	0.000E+00	---	W1(21)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(22)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	---	PRECIP

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	4.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Am-241				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.245E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Np-237				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.469E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Pu-238				
R016	Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.332E-05	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Pu-239				
R016	Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.332E-05	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for Pu-240				
R016	Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.332E-05	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for Tc-99				
R016	Contaminated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.790E-01	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(13)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(19)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(19,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(19)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.319E-03	ALEACH(19)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(19)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(20)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(20,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(20)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.319E-03	ALEACH(20)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(20)
R016	Distribution coefficients for U-236				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(21)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(21,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(21)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.319E-03	ALEACH(21)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(21)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(22)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(22,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(22)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.319E-03	ALEACH(22)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(22)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.245E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.319E-03	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.663E-03	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.374E-03	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.374E-03	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(14)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(14,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(14)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.778E-06	ALEACH(14)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(14)
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(15)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(15,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(15)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.778E-06	ALEACH(15)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(15)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(16)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(16,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(16)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.778E-06	ALEACH(16)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(16)
R016	Distribution coefficients for daughter Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(17)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(17,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(17)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.778E-06	ALEACH(17)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(17)
R016	Distribution coefficients for daughter U-233				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(18)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(18,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(18)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.319E-03	ALEACH(18)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(18)
R017	Inhalation rate (m**3/yr)	6.192E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	2.600E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.840E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	7.300E-02	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	4.223E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	4.360E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	4.310E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	257	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	10000.00 square meters	Am-241	4.300E-03
Thickness:	2.00 meters	Np-237	1.030E-03
Cover Depth:	0.00 meters	Pu-238	2.430E-03
		Pu-239	9.200E-03
		Pu-240	9.200E-03
		Tc-99	1.100E-01
		U-234	1.952E+00
		U-235	8.500E-02
		U-236	8.500E-02
		U-238	1.919E+00

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	8.622E-01	7.581E-01	7.368E-01	6.277E-01	5.864E-01	4.677E-01	2.539E-01	5.645E-01
M(t):	3.449E-02	3.033E-02	2.947E-02	2.511E-02	2.346E-02	1.871E-02	1.016E-02	2.258E-02

Maximum TDOSE(t): 8.622E-01 mrem/yr at t = 0.000E+00 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	8.521E-05	0.0001	5.523E-05	0.0001	0.000E+00	0.0000	7.387E-04	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	1.033E-04	0.0001
Np-237	5.446E-04	0.0006	6.922E-06	0.0000	0.000E+00	0.0000	1.968E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	1.378E-05	0.0000
Pu-238	1.540E-07	0.0000	3.579E-05	0.0000	0.000E+00	0.0000	4.804E-04	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	6.720E-05	0.0001
Pu-239	1.276E-06	0.0000	1.484E-04	0.0002	0.000E+00	0.0000	1.985E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	2.776E-04	0.0003
Pu-240	5.638E-07	0.0000	1.484E-04	0.0002	0.000E+00	0.0000	1.985E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	2.776E-04	0.0003
Tc-99	4.382E-06	0.0000	1.335E-07	0.0000	0.000E+00	0.0000	2.154E-01	0.2499	0.000E+00	0.0000	0.000E+00	0.0000	5.904E-06	0.0000
U-234	3.566E-04	0.0004	2.463E-03	0.0029	0.000E+00	0.0000	2.059E-01	0.2388	0.000E+00	0.0000	0.000E+00	0.0000	1.153E-02	0.0134
U-235	3.085E-02	0.0358	9.700E-05	0.0001	0.000E+00	0.0000	8.667E-03	0.0101	0.000E+00	0.0000	0.000E+00	0.0000	4.850E-04	0.0006
U-236	8.108E-06	0.0000	9.926E-05	0.0001	0.000E+00	0.0000	8.599E-03	0.0100	0.000E+00	0.0000	0.000E+00	0.0000	4.815E-04	0.0006
U-238	1.551E-01	0.1799	2.063E-03	0.0024	0.000E+00	0.0000	1.999E-01	0.2319	0.000E+00	0.0000	0.000E+00	0.0000	1.119E-02	0.0130
Total	1.870E-01	0.2169	5.117E-03	0.0059	0.000E+00	0.0000	6.457E-01	0.7489	0.000E+00	0.0000	0.000E+00	0.0000	2.443E-02	0.0283

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.825E-04	0.0011
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.533E-03	0.0029
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.836E-04	0.0007
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.412E-03	0.0028
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.411E-03	0.0028
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.154E-01	0.2499
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.202E-01	0.2554
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.010E-02	0.0465
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.188E-03	0.0107
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.683E-01	0.4272
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.622E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	8.438E-05	0.0001	5.468E-05	0.0001	0.000E+00	0.0000	7.315E-04	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	1.023E-04	0.0001
Np-237	5.443E-04	0.0007	6.918E-06	0.0000	0.000E+00	0.0000	1.967E-03	0.0026	0.000E+00	0.0000	0.000E+00	0.0000	1.377E-05	0.0000
Pu-238	1.528E-07	0.0000	3.551E-05	0.0000	0.000E+00	0.0000	4.766E-04	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	6.667E-05	0.0001
Pu-239	1.276E-06	0.0000	1.484E-04	0.0002	0.000E+00	0.0000	1.985E-03	0.0026	0.000E+00	0.0000	0.000E+00	0.0000	2.776E-04	0.0004
Pu-240	5.637E-07	0.0000	1.484E-04	0.0002	0.000E+00	0.0000	1.984E-03	0.0026	0.000E+00	0.0000	0.000E+00	0.0000	2.776E-04	0.0004
Tc-99	2.011E-06	0.0000	6.128E-08	0.0000	0.000E+00	0.0000	9.939E-02	0.1311	0.000E+00	0.0000	0.000E+00	0.0000	2.709E-06	0.0000
U-234	3.555E-04	0.0005	2.455E-03	0.0032	0.000E+00	0.0000	2.052E-01	0.2707	0.000E+00	0.0000	0.000E+00	0.0000	1.149E-02	0.0152
U-235	3.075E-02	0.0406	9.671E-05	0.0001	0.000E+00	0.0000	8.649E-03	0.0114	0.000E+00	0.0000	0.000E+00	0.0000	4.836E-04	0.0006
U-236	8.081E-06	0.0000	9.893E-05	0.0001	0.000E+00	0.0000	8.571E-03	0.0113	0.000E+00	0.0000	0.000E+00	0.0000	4.799E-04	0.0006
U-238	1.546E-01	0.2040	2.056E-03	0.0027	0.000E+00	0.0000	1.993E-01	0.2628	0.000E+00	0.0000	0.000E+00	0.0000	1.116E-02	0.0147
Total	1.864E-01	0.2458	5.100E-03	0.0067	0.000E+00	0.0000	5.282E-01	0.6967	0.000E+00	0.0000	0.000E+00	0.0000	2.435E-02	0.0321

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years
Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.729E-04	0.0013
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.532E-03	0.0033
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.789E-04	0.0008
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.412E-03	0.0032
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.411E-03	0.0032
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.409E-02	0.0186	0.000E+00	0.0000	0.000E+00	0.0000	1.135E-01	0.1497
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.195E-01	0.2895
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.998E-02	0.0527
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.158E-03	0.0121
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.671E-01	0.4842
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.409E-02	0.0186	0.000E+00	0.0000	0.000E+00	0.0000	7.581E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	8.273E-05	0.0001	5.362E-05	0.0001	0.000E+00	0.0000	7.172E-04	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	1.003E-04	0.0001
Np-237	5.436E-04	0.0007	6.909E-06	0.0000	0.000E+00	0.0000	1.964E-03	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	1.375E-05	0.0000
Pu-238	1.504E-07	0.0000	3.495E-05	0.0000	0.000E+00	0.0000	4.690E-04	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	6.561E-05	0.0001
Pu-239	1.275E-06	0.0000	1.484E-04	0.0002	0.000E+00	0.0000	1.984E-03	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	2.775E-04	0.0004
Pu-240	5.634E-07	0.0000	1.483E-04	0.0002	0.000E+00	0.0000	1.984E-03	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	2.775E-04	0.0004
Tc-99	4.234E-07	0.0000	1.290E-08	0.0000	0.000E+00	0.0000	2.093E-02	0.0284	0.000E+00	0.0000	0.000E+00	0.0000	5.704E-07	0.0000
U-234	3.533E-04	0.0005	2.439E-03	0.0033	0.000E+00	0.0000	2.039E-01	0.2767	0.000E+00	0.0000	0.000E+00	0.0000	1.141E-02	0.0155
U-235	3.055E-02	0.0415	9.616E-05	0.0001	0.000E+00	0.0000	8.615E-03	0.0117	0.000E+00	0.0000	0.000E+00	0.0000	4.807E-04	0.0007
U-236	8.028E-06	0.0000	9.827E-05	0.0001	0.000E+00	0.0000	8.514E-03	0.0116	0.000E+00	0.0000	0.000E+00	0.0000	4.767E-04	0.0006
U-238	1.536E-01	0.2085	2.042E-03	0.0028	0.000E+00	0.0000	1.980E-01	0.2687	0.000E+00	0.0000	0.000E+00	0.0000	1.108E-02	0.0150
Total	1.851E-01	0.2513	5.068E-03	0.0069	0.000E+00	0.0000	4.470E-01	0.6067	0.000E+00	0.0000	0.000E+00	0.0000	2.419E-02	0.0328

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years
Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.539E-04	0.0013
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.528E-03	0.0034
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.697E-04	0.0008
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.411E-03	0.0033
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.410E-03	0.0033
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.540E-02	0.1023	0.000E+00	0.0000	0.000E+00	0.0000	9.632E-02	0.1307
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.181E-01	0.2960
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.974E-02	0.0539
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.097E-03	0.0123
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.647E-01	0.4950
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.540E-02	0.1023	0.000E+00	0.0000	0.000E+00	0.0000	7.368E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	7.723E-05	0.0001	5.005E-05	0.0001	0.000E+00	0.0000	6.695E-04	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	9.362E-05	0.0001
Np-237	5.411E-04	0.0009	6.877E-06	0.0000	0.000E+00	0.0000	1.955E-03	0.0031	0.000E+00	0.0000	0.000E+00	0.0000	1.369E-05	0.0000
Pu-238	1.422E-07	0.0000	3.305E-05	0.0001	0.000E+00	0.0000	4.436E-04	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	6.205E-05	0.0001
Pu-239	1.274E-06	0.0000	1.483E-04	0.0002	0.000E+00	0.0000	1.983E-03	0.0032	0.000E+00	0.0000	0.000E+00	0.0000	2.773E-04	0.0004
Pu-240	5.627E-07	0.0000	1.481E-04	0.0002	0.000E+00	0.0000	1.981E-03	0.0032	0.000E+00	0.0000	0.000E+00	0.0000	2.771E-04	0.0004
Tc-99	1.813E-09	0.0000	5.526E-11	0.0000	0.000E+00	0.0000	8.963E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	2.443E-09	0.0000
U-234	3.473E-04	0.0006	2.385E-03	0.0038	0.000E+00	0.0000	1.992E-01	0.3174	0.000E+00	0.0000	0.000E+00	0.0000	1.116E-02	0.0178
U-235	2.985E-02	0.0476	9.436E-05	0.0002	0.000E+00	0.0000	8.497E-03	0.0135	0.000E+00	0.0000	0.000E+00	0.0000	4.711E-04	0.0008
U-236	7.843E-06	0.0000	9.602E-05	0.0002	0.000E+00	0.0000	8.319E-03	0.0133	0.000E+00	0.0000	0.000E+00	0.0000	4.658E-04	0.0007
U-238	1.501E-01	0.2391	1.995E-03	0.0032	0.000E+00	0.0000	1.934E-01	0.3082	0.000E+00	0.0000	0.000E+00	0.0000	1.083E-02	0.0173
Total	1.809E-01	0.2882	4.957E-03	0.0079	0.000E+00	0.0000	4.165E-01	0.6637	0.000E+00	0.0000	0.000E+00	0.0000	2.364E-02	0.0377

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.904E-04	0.0014
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.517E-03	0.0040
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.388E-04	0.0009
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.409E-03	0.0038
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.407E-03	0.0038
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.603E-03	0.0026	0.000E+00	0.0000	0.000E+00	0.0000	1.693E-03	0.0027
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.131E-01	0.3395
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.891E-02	0.0620
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.888E-03	0.0142
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.563E-01	0.5677
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.603E-03	0.0026	0.000E+00	0.0000	0.000E+00	0.0000	6.277E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	6.343E-05	0.0001	4.110E-05	0.0001	0.000E+00	0.0000	5.498E-04	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	7.688E-05	0.0001
Np-237	5.341E-04	0.0009	6.789E-06	0.0000	0.000E+00	0.0000	1.930E-03	0.0033	0.000E+00	0.0000	0.000E+00	0.0000	1.352E-05	0.0000
Pu-238	1.213E-07	0.0000	2.817E-05	0.0000	0.000E+00	0.0000	3.781E-04	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	5.289E-05	0.0001
Pu-239	1.272E-06	0.0000	1.479E-04	0.0003	0.000E+00	0.0000	1.978E-03	0.0034	0.000E+00	0.0000	0.000E+00	0.0000	2.767E-04	0.0005
Pu-240	5.606E-07	0.0000	1.476E-04	0.0003	0.000E+00	0.0000	1.973E-03	0.0034	0.000E+00	0.0000	0.000E+00	0.0000	2.761E-04	0.0005
Tc-99	3.105E-16	0.0000	9.462E-18	0.0000	0.000E+00	0.0000	1.535E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.183E-16	0.0000
U-234	3.414E-04	0.0006	2.236E-03	0.0038	0.000E+00	0.0000	1.865E-01	0.3180	0.000E+00	0.0000	0.000E+00	0.0000	1.045E-02	0.0178
U-235	2.795E-02	0.0477	9.003E-05	0.0002	0.000E+00	0.0000	8.189E-03	0.0140	0.000E+00	0.0000	0.000E+00	0.0000	4.457E-04	0.0008
U-236	7.340E-06	0.0000	8.985E-05	0.0002	0.000E+00	0.0000	7.784E-03	0.0133	0.000E+00	0.0000	0.000E+00	0.0000	4.358E-04	0.0007
U-238	1.404E-01	0.2395	1.867E-03	0.0032	0.000E+00	0.0000	1.810E-01	0.3086	0.000E+00	0.0000	0.000E+00	0.0000	1.013E-02	0.0173
Total	1.693E-01	0.2888	4.655E-03	0.0079	0.000E+00	0.0000	3.903E-01	0.6655	0.000E+00	0.0000	0.000E+00	0.0000	2.216E-02	0.0378

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years
Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.312E-04	0.0012
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.485E-03	0.0042
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.593E-04	0.0008
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.404E-03	0.0041
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.398E-03	0.0041
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.729E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.882E-10	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.995E-01	0.3402
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.667E-02	0.0625
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.317E-03	0.0142
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.334E-01	0.5686
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.729E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.864E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.187E-05	0.0001	2.063E-05	0.0000	0.000E+00	0.0000	2.761E-04	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	3.858E-05	0.0001
Np-237	5.105E-04	0.0011	6.489E-06	0.0000	0.000E+00	0.0000	1.845E-03	0.0039	0.000E+00	0.0000	0.000E+00	0.0000	1.292E-05	0.0000
Pu-238	6.942E-08	0.0000	1.611E-05	0.0000	0.000E+00	0.0000	2.163E-04	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	3.025E-05	0.0001
Pu-239	1.262E-06	0.0000	1.468E-04	0.0003	0.000E+00	0.0000	1.963E-03	0.0042	0.000E+00	0.0000	0.000E+00	0.0000	2.745E-04	0.0006
Pu-240	5.532E-07	0.0000	1.456E-04	0.0003	0.000E+00	0.0000	1.947E-03	0.0042	0.000E+00	0.0000	0.000E+00	0.0000	2.724E-04	0.0006
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	4.294E-04	0.0009	1.787E-03	0.0038	0.000E+00	0.0000	1.486E-01	0.3176	0.000E+00	0.0000	0.000E+00	0.0000	8.312E-03	0.0178
U-235	2.223E-02	0.0475	7.832E-05	0.0002	0.000E+00	0.0000	7.223E-03	0.0154	0.000E+00	0.0000	0.000E+00	0.0000	3.711E-04	0.0008
U-236	5.820E-06	0.0000	7.122E-05	0.0002	0.000E+00	0.0000	6.170E-03	0.0132	0.000E+00	0.0000	0.000E+00	0.0000	3.455E-04	0.0007
U-238	1.113E-01	0.2380	1.480E-03	0.0032	0.000E+00	0.0000	1.435E-01	0.3068	0.000E+00	0.0000	0.000E+00	0.0000	8.035E-03	0.0172
Total	1.345E-01	0.2877	3.753E-03	0.0080	0.000E+00	0.0000	3.117E-01	0.6665	0.000E+00	0.0000	0.000E+00	0.0000	1.769E-02	0.0378

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.672E-04	0.0008
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.375E-03	0.0051
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.627E-04	0.0006
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.385E-03	0.0051
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.366E-03	0.0051
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.591E-01	0.3402
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.990E-02	0.0639
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.593E-03	0.0141
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.643E-01	0.5652
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.677E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	4.501E-06	0.0000	2.878E-06	0.0000	0.000E+00	0.0000	3.871E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	5.384E-06	0.0000
Np-237	4.485E-04	0.0018	5.702E-06	0.0000	0.000E+00	0.0000	1.621E-03	0.0064	0.000E+00	0.0000	0.000E+00	0.0000	1.135E-05	0.0000
Pu-238	1.437E-08	0.0000	3.264E-06	0.0000	0.000E+00	0.0000	4.384E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	6.129E-06	0.0000
Pu-239	1.234E-06	0.0000	1.435E-04	0.0006	0.000E+00	0.0000	1.919E-03	0.0076	0.000E+00	0.0000	0.000E+00	0.0000	2.685E-04	0.0011
Pu-240	5.326E-07	0.0000	1.402E-04	0.0006	0.000E+00	0.0000	1.875E-03	0.0074	0.000E+00	0.0000	0.000E+00	0.0000	2.623E-04	0.0010
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.182E-03	0.0047	9.544E-04	0.0038	0.000E+00	0.0000	8.098E-02	0.3189	0.000E+00	0.0000	0.000E+00	0.0000	4.381E-03	0.0173
U-235	1.157E-02	0.0456	5.153E-05	0.0002	0.000E+00	0.0000	4.826E-03	0.0190	0.000E+00	0.0000	0.000E+00	0.0000	2.190E-04	0.0009
U-236	3.002E-06	0.0000	3.667E-05	0.0001	0.000E+00	0.0000	3.177E-03	0.0125	0.000E+00	0.0000	0.000E+00	0.0000	1.779E-04	0.0007
U-238	5.732E-02	0.2257	7.628E-04	0.0030	0.000E+00	0.0000	7.393E-02	0.2912	0.000E+00	0.0000	0.000E+00	0.0000	4.139E-03	0.0163
Total	7.053E-02	0.2778	2.101E-03	0.0083	0.000E+00	0.0000	1.684E-01	0.6633	0.000E+00	0.0000	0.000E+00	0.0000	9.471E-03	0.0373

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.083E-03	0.0121	0.000E+00	0.0000	0.000E+00	0.0000	3.135E-03	0.0123
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.086E-03	0.0082
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.325E-05	0.0002
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.058E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.332E-03	0.0092
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.278E-03	0.0090
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.750E-02	0.3446
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.127E-04	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	1.698E-02	0.0669
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.395E-03	0.0134
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.362E-01	0.5362
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.396E-03	0.0134	0.000E+00	0.0000	0.000E+00	0.0000	2.539E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	4.640E-08	0.0000	3.449E-09	0.0000	0.000E+00	0.0000	1.904E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.517E-09	0.0000
Np-237	2.852E-04	0.0005	3.627E-06	0.0000	0.000E+00	0.0000	1.030E-03	0.0018	0.000E+00	0.0000	0.000E+00	0.0000	7.224E-06	0.0000
Pu-238	1.519E-09	0.0000	1.231E-08	0.0000	0.000E+00	0.0000	1.764E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.335E-08	0.0000
Pu-239	1.141E-06	0.0000	1.327E-04	0.0002	0.000E+00	0.0000	1.774E-03	0.0031	0.000E+00	0.0000	0.000E+00	0.0000	2.482E-04	0.0004
Pu-240	4.665E-07	0.0000	1.228E-04	0.0002	0.000E+00	0.0000	1.642E-03	0.0029	0.000E+00	0.0000	0.000E+00	0.0000	2.297E-04	0.0004
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	3.623E-03	0.0064	1.585E-04	0.0003	0.000E+00	0.0000	2.467E-02	0.0437	0.000E+00	0.0000	0.000E+00	0.0000	7.057E-04	0.0013
U-235	1.175E-03	0.0021	8.863E-06	0.0000	0.000E+00	0.0000	8.489E-04	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	3.097E-05	0.0001
U-236	3.029E-07	0.0000	3.591E-06	0.0000	0.000E+00	0.0000	3.112E-04	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	1.742E-05	0.0000
U-238	5.616E-03	0.0099	7.493E-05	0.0001	0.000E+00	0.0000	7.266E-03	0.0129	0.000E+00	0.0000	0.000E+00	0.0000	4.064E-04	0.0007
Total	1.070E-02	0.0190	5.050E-04	0.0009	0.000E+00	0.0000	3.754E-02	0.0665	0.000E+00	0.0000	0.000E+00	0.0000	1.646E-03	0.0029

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.638E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.885E-06	0.0000
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.768E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.327E-03	0.0024
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.386E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.074E-07	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.337E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.156E-03	0.0038
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.204E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.995E-03	0.0035
Tc-99	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.440E-01	0.4322	0.000E+00	0.0000	0.000E+00	0.0000	2.732E-01	0.4839
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.631E-02	0.0466	0.000E+00	0.0000	0.000E+00	0.0000	2.837E-02	0.0503
U-236	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.003E-02	0.0178	0.000E+00	0.0000	0.000E+00	0.0000	1.036E-02	0.0183
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.338E-01	0.4141	0.000E+00	0.0000	0.000E+00	0.0000	2.471E-01	0.4378
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.141E-01	0.9107	0.000E+00	0.0000	0.000E+00	0.0000	5.645E-01	1.0000

*Sum of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	2.285E-01	2.262E-01	2.218E-01	2.071E-01	1.700E-01	8.534E-02	7.289E-01	2.250E-03
Am-241	Np-237+D	1.000E+00	3.796E-07	1.165E-06	2.718E-06	7.903E-06	2.076E-05	4.896E-05	6.811E-05	4.931E-05
Am-241	U-233	1.000E+00	4.511E-14	2.490E-13	1.144E-12	9.170E-12	6.871E-11	5.438E-10	3.757E-09	4.063E-08
Am-241	Th-229+D	1.000E+00	8.800E-18	1.226E-16	1.384E-15	3.538E-14	8.052E-13	2.284E-11	3.386E-10	2.737E-09
Am-241	-DSR(j)		2.285E-01	2.262E-01	2.218E-01	2.071E-01	1.701E-01	8.538E-02	7.290E-01	2.299E-03
Np-237+D	Np-237+D	1.000E+00	2.460E+00	2.458E+00	2.455E+00	2.444E+00	2.412E+00	2.305E+00	2.026E+00	1.288E+00
Np-237+D	U-233	1.000E+00	3.584E-07	8.898E-07	1.912E-06	5.427E-06	1.494E-05	4.275E-05	8.787E-05	3.627E-04
Np-237+D	Th-229+D	1.000E+00	1.046E-10	6.976E-10	3.617E-09	3.180E-08	2.604E-07	2.574E-06	1.788E-05	9.324E-05
Np-237+D	-DSR(j)		2.460E+00	2.458E+00	2.455E+00	2.444E+00	2.412E+00	2.306E+00	2.026E+00	1.288E+00
Pu-238	Pu-238	1.840E-09	4.419E-10	4.384E-10	4.314E-10	4.080E-10	3.478E-10	1.989E-10	4.029E-11	1.507E-13
Pu-238	Pu-238	1.000E+00	2.401E-01	2.382E-01	2.345E-01	2.217E-01	1.890E-01	1.081E-01	2.189E-02	8.191E-05
Pu-238	U-234	1.000E+00	1.542E-07	4.702E-07	1.093E-06	3.165E-06	8.226E-06	1.841E-05	1.909E-05	4.053E-05
Pu-238	Th-230	1.000E+00	1.046E-12	6.880E-12	3.508E-11	3.009E-10	2.343E-09	1.973E-08	9.191E-08	1.982E-07
Pu-238	Ra-226+D	1.000E+00	6.419E-15	1.003E-13	1.188E-12	3.112E-11	7.128E-10	2.009E-08	2.822E-07	1.755E-06
Pu-238	Pb-210+D	1.000E+00	6.754E-17	1.782E-15	3.985E-14	2.731E-12	1.582E-10	1.052E-08	2.362E-07	2.112E-06
Pu-238	-DSR(j)		2.401E-01	2.382E-01	2.345E-01	2.217E-01	1.890E-01	1.081E-01	2.191E-02	1.265E-04
Pu-239	Pu-239	1.000E+00	2.622E-01	2.622E-01	2.621E-01	2.619E-01	2.613E-01	2.593E-01	2.535E-01	2.344E-01
Pu-239	U-235+D	1.000E+00	2.306E-10	6.940E-10	1.617E-09	4.797E-09	1.347E-08	3.953E-08	8.677E-08	1.691E-07
Pu-239	Pa-231	1.000E+00	2.032E-14	1.481E-13	7.938E-13	7.058E-12	5.708E-11	5.312E-10	3.098E-09	2.023E-08
Pu-239	Ac-227+D	1.000E+00	1.312E-16	1.749E-15	1.875E-14	4.426E-13	8.632E-12	1.648E-10	1.434E-09	5.055E-08
Pu-239	-DSR(j)		2.622E-01	2.622E-01	2.621E-01	2.619E-01	2.613E-01	2.593E-01	2.535E-01	2.344E-01
Pu-240	Pu-240	4.950E-08	1.297E-08	1.297E-08	1.297E-08	1.295E-08	1.290E-08	1.273E-08	1.226E-08	1.074E-08
Pu-240	Pu-240	1.000E+00	2.621E-01	2.620E-01	2.619E-01	2.616E-01	2.606E-01	2.572E-01	2.476E-01	2.169E-01
Pu-240	U-236	1.000E+00	1.547E-09	4.732E-09	1.109E-08	3.298E-08	9.264E-08	2.711E-07	5.897E-07	2.119E-06
Pu-240	Th-232	1.000E+00	6.565E-20	4.325E-19	2.216E-18	1.936E-17	1.586E-16	1.588E-15	1.148E-14	6.992E-14
Pu-240	Ra-228+D	1.000E+00	1.698E-19	2.643E-18	3.001E-17	6.663E-16	1.044E-14	1.478E-13	1.190E-12	7.682E-12
Pu-240	Th-228+D	1.000E+00	2.912E-21	7.855E-20	1.612E-18	7.163E-17	1.659E-15	2.740E-14	2.296E-13	1.467E-12
Pu-240	-DSR(j)		2.621E-01	2.620E-01	2.619E-01	2.616E-01	2.606E-01	2.572E-01	2.476E-01	2.169E-01
Tc-99	Tc-99	1.000E+00	1.959E+00	1.032E+00	8.757E-01	1.539E-02	2.620E-09	5.334E-33	0.000E+00	0.000E+00
U-234	U-234	1.000E+00	1.128E-01	1.124E-01	1.117E-01	1.091E-01	1.021E-01	8.093E-02	4.165E-02	1.267E-01
U-234	Th-230	1.000E+00	1.065E-06	3.056E-06	6.994E-06	2.057E-05	5.766E-05	1.696E-04	3.767E-04	5.731E-04
U-234	Ra-226+D	1.000E+00	9.262E-09	6.704E-08	3.585E-07	3.188E-06	2.588E-05	2.443E-04	1.483E-03	5.542E-03
U-234	Pb-210+D	1.000E+00	1.131E-10	1.461E-09	1.536E-08	3.617E-07	7.251E-06	1.494E-04	1.318E-03	7.133E-03
U-234	-DSR(j)		1.128E-01	1.125E-01	1.117E-01	1.092E-01	1.022E-01	8.150E-02	4.483E-02	1.399E-01
U-235+D	U-235+D	1.000E+00	4.717E-01	4.701E-01	4.670E-01	4.563E-01	4.270E-01	3.385E-01	1.743E-01	1.359E-01
U-235+D	Pa-231	1.000E+00	6.379E-05	1.961E-04	4.590E-04	1.352E-03	3.680E-03	9.611E-03	1.477E-02	4.217E-02
U-235+D	Ac-227+D	1.000E+00	5.064E-07	3.185E-06	1.560E-05	1.224E-04	7.714E-04	3.705E-03	1.071E-02	1.557E-01
U-235+D	-DSR(j)		4.718E-01	4.703E-01	4.675E-01	4.578E-01	4.315E-01	3.518E-01	1.997E-01	3.338E-01

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-236	U-236	1.000E+00	1.081E-01	1.077E-01	1.070E-01	1.046E-01	9.785E-02	7.756E-02	3.994E-02	1.219E-01
U-236	Th-232	1.000E+00	6.383E-12	1.832E-11	4.193E-11	1.233E-10	3.457E-10	1.017E-09	2.263E-09	3.461E-09
U-236	Ra-228+D	1.000E+00	2.352E-11	1.671E-10	8.353E-10	5.852E-09	2.796E-08	1.027E-07	2.418E-07	4.006E-07
U-236	Th-228+D	1.000E+00	4.740E-13	6.108E-12	5.591E-11	7.473E-10	4.863E-09	1.962E-08	4.712E-08	7.340E-08
U-236	-DSR(j)		1.081E-01	1.077E-01	1.070E-01	1.046E-01	9.785E-02	7.756E-02	3.994E-02	1.219E-01
U-238	U-238	5.400E-05	5.584E-06	5.565E-06	5.529E-06	5.402E-06	5.055E-06	4.007E-06	2.063E-06	6.300E-06
U-238+D	U-238+D	9.999E-01	1.919E-01	1.913E-01	1.900E-01	1.857E-01	1.737E-01	1.377E-01	7.091E-02	1.284E-01
U-238+D	U-234	9.999E-01	1.598E-07	4.781E-07	1.108E-06	3.248E-06	8.830E-06	2.306E-05	3.549E-05	3.598E-04
U-238+D	Th-230	9.999E-01	1.052E-12	6.902E-12	3.528E-11	3.059E-10	2.455E-09	2.284E-08	1.343E-07	4.322E-07
U-238+D	Ra-226+D	9.999E-01	6.425E-15	1.005E-13	1.193E-12	3.150E-11	7.381E-10	2.245E-08	3.801E-07	3.852E-06
U-238+D	Pb-210+D	9.999E-01	6.759E-17	1.785E-15	3.999E-14	2.758E-12	1.628E-10	1.158E-08	3.117E-07	5.734E-06
U-238+D	-DSR(j)		1.919E-01	1.913E-01	1.900E-01	1.857E-01	1.738E-01	1.377E-01	7.095E-02	1.288E-01

The DSR includes contributions from associated (half-life ó 180 days) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	1.094E+02	1.105E+02	1.127E+02	1.207E+02	1.470E+02	2.928E+02	3.429E+01	1.087E+04
Np-237	1.016E+01	1.017E+01	1.018E+01	1.023E+01	1.036E+01	1.084E+01	1.234E+01	1.941E+01
Pu-238	1.041E+02	1.049E+02	1.066E+02	1.128E+02	1.323E+02	2.313E+02	1.141E+03	1.976E+05
Pu-239	9.535E+01	9.536E+01	9.538E+01	9.546E+01	9.567E+01	9.643E+01	9.861E+01	1.067E+02
Pu-240	9.538E+01	9.540E+01	9.544E+01	9.556E+01	9.593E+01	9.721E+01	1.010E+02	1.153E+02
Tc-99	1.276E+01	2.423E+01	2.855E+01	1.625E+03	9.541E+09	*1.697E+10	*1.697E+10	*1.697E+10
U-234	2.216E+02	2.223E+02	2.238E+02	2.290E+02	2.446E+02	3.068E+02	5.577E+02	1.786E+02
U-235	5.299E+01	5.315E+01	5.347E+01	5.461E+01	5.794E+01	7.107E+01	1.252E+02	7.490E+01
U-236	2.313E+02	2.320E+02	2.336E+02	2.391E+02	2.555E+02	3.223E+02	6.260E+02	2.052E+02
U-238	1.302E+02	1.307E+02	1.316E+02	1.346E+02	1.439E+02	1.815E+02	3.524E+02	1.941E+02

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 0.000E+00 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Am-241	4.300E-03	334.2 ± 0.7	7.370E-01	3.392E+01	2.285E-01	1.094E+02
Np-237	1.030E-03	0.000E+00	2.460E+00	1.016E+01	2.460E+00	1.016E+01
Pu-238	2.430E-03	0.000E+00	2.401E-01	1.041E+02	2.401E-01	1.041E+02
Pu-239	9.200E-03	0.000E+00	2.622E-01	9.535E+01	2.622E-01	9.535E+01
Pu-240	9.200E-03	0.000E+00	2.621E-01	9.538E+01	2.621E-01	9.538E+01
Tc-99	1.100E-01	0.000E+00	1.959E+00	1.276E+01	1.959E+00	1.276E+01
U-234	1.952E+00	1.000E+03	1.399E-01	1.786E+02	1.128E-01	2.216E+02
U-235	8.500E-02	0.000E+00	4.718E-01	5.299E+01	4.718E-01	5.299E+01
U-236	8.500E-02	1.000E+03	1.219E-01	2.052E+02	1.081E-01	2.313E+02
U-238	1.919E+00	0.000E+00	1.919E-01	1.302E+02	1.919E-01	1.302E+02

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	9.825E-04	9.729E-04	9.539E-04	8.903E-04	7.312E-04	3.669E-04	3.134E-03	9.673E-06
Np-237	Am-241	1.000E+00	1.632E-09	5.011E-09	1.169E-08	3.398E-08	8.928E-08	2.105E-07	2.929E-07	2.120E-07
Np-237	Np-237	1.000E+00	2.533E-03	2.532E-03	2.528E-03	2.517E-03	2.485E-03	2.375E-03	2.086E-03	1.326E-03
Np-237	-DOSE(j)		2.533E-03	2.532E-03	2.528E-03	2.517E-03	2.485E-03	2.375E-03	2.087E-03	1.326E-03
U-233	Am-241	1.000E+00	1.940E-16	1.071E-15	4.920E-15	3.943E-14	2.955E-13	2.338E-12	1.615E-11	1.747E-10
U-233	Np-237	1.000E+00	3.691E-10	9.165E-10	1.970E-09	5.590E-09	1.539E-08	4.403E-08	9.050E-08	3.736E-07
U-233	-DOSE(j)		3.691E-10	9.165E-10	1.970E-09	5.590E-09	1.539E-08	4.403E-08	9.052E-08	3.738E-07
Th-229	Am-241	1.000E+00	3.784E-20	5.274E-19	5.951E-18	1.521E-16	3.462E-15	9.823E-14	1.456E-12	1.177E-11
Th-229	Np-237	1.000E+00	1.077E-13	7.185E-13	3.725E-12	3.275E-11	2.682E-10	2.651E-09	1.842E-08	9.604E-08
Th-229	-DOSE(j)		1.077E-13	7.185E-13	3.725E-12	3.275E-11	2.682E-10	2.652E-09	1.842E-08	9.605E-08
Pu-238	Pu-238	1.840E-09	1.074E-12	1.065E-12	1.048E-12	9.914E-13	8.451E-13	4.833E-13	9.790E-14	3.663E-16
Pu-238	Pu-238	1.000E+00	5.836E-04	5.789E-04	5.697E-04	5.388E-04	4.593E-04	2.626E-04	5.320E-05	1.991E-07
Pu-238	-DOSE(j)		5.836E-04	5.789E-04	5.697E-04	5.388E-04	4.593E-04	2.626E-04	5.320E-05	1.991E-07
U-234	Pu-238	1.000E+00	3.748E-10	1.142E-09	2.656E-09	7.690E-09	1.999E-08	4.473E-08	4.638E-08	9.850E-08
U-234	U-234	1.000E+00	2.202E-01	2.195E-01	2.180E-01	2.130E-01	1.993E-01	1.580E-01	8.130E-02	2.473E-01
U-234	U-238	9.999E-01	3.067E-07	9.174E-07	2.127E-06	6.234E-06	1.694E-05	4.425E-05	6.811E-05	6.905E-04
U-234	-DOSE(j)		2.202E-01	2.195E-01	2.181E-01	2.130E-01	1.994E-01	1.580E-01	8.136E-02	2.480E-01
Th-230	Pu-238	1.000E+00	2.543E-15	1.672E-14	8.524E-14	7.312E-13	5.694E-12	4.796E-11	2.233E-10	4.817E-10
Th-230	U-234	1.000E+00	2.078E-06	5.965E-06	1.365E-05	4.016E-05	1.126E-04	3.311E-04	7.354E-04	1.119E-03
Th-230	U-238	9.999E-01	2.018E-12	1.324E-11	6.770E-11	5.869E-10	4.710E-09	4.382E-08	2.578E-07	8.295E-07
Th-230	-DOSE(j)		2.078E-06	5.965E-06	1.365E-05	4.016E-05	1.126E-04	3.312E-04	7.356E-04	1.119E-03
Ra-226	Pu-238	1.000E+00	1.560E-17	2.438E-16	2.887E-15	7.563E-14	1.732E-12	4.882E-11	6.858E-10	4.264E-09
Ra-226	U-234	1.000E+00	1.808E-08	1.309E-07	6.998E-07	6.222E-06	5.051E-05	4.768E-04	2.895E-03	1.082E-02
Ra-226	U-238	9.999E-01	1.233E-14	1.929E-13	2.290E-12	6.046E-11	1.416E-09	4.307E-08	7.294E-07	7.393E-06
Ra-226	-DOSE(j)		1.808E-08	1.309E-07	6.998E-07	6.222E-06	5.051E-05	4.769E-04	2.895E-03	1.083E-02
Pb-210	Pu-238	1.000E+00	1.641E-19	4.331E-18	9.684E-17	6.637E-15	3.843E-13	2.555E-11	5.740E-10	5.132E-09
Pb-210	U-234	1.000E+00	2.209E-10	2.852E-09	2.998E-08	7.061E-07	1.415E-05	2.916E-04	2.573E-03	1.392E-02
Pb-210	U-238	9.999E-01	1.297E-16	3.426E-15	7.673E-14	5.293E-12	3.124E-10	2.222E-08	5.982E-07	1.100E-05
Pb-210	-DOSE(j)		2.209E-10	2.852E-09	2.998E-08	7.061E-07	1.415E-05	2.917E-04	2.573E-03	1.393E-02
Pu-239	Pu-239	1.000E+00	2.412E-03	2.412E-03	2.411E-03	2.409E-03	2.404E-03	2.385E-03	2.332E-03	2.156E-03
U-235	Pu-239	1.000E+00	2.122E-12	6.385E-12	1.487E-11	4.413E-11	1.239E-10	3.637E-10	7.983E-10	1.556E-09
U-235	U-235	1.000E+00	4.010E-02	3.996E-02	3.970E-02	3.879E-02	3.630E-02	2.877E-02	1.481E-02	1.155E-02
U-235	-DOSE(j)		4.010E-02	3.996E-02	3.970E-02	3.879E-02	3.630E-02	2.877E-02	1.481E-02	1.155E-02
Pa-231	Pu-239	1.000E+00	1.870E-16	1.362E-15	7.303E-15	6.493E-14	5.251E-13	4.887E-12	2.850E-11	1.861E-10
Pa-231	U-235	1.000E+00	5.422E-06	1.667E-05	3.902E-05	1.149E-04	3.128E-04	8.169E-04	1.255E-03	3.585E-03
Pa-231	-DOSE(j)		5.422E-06	1.667E-05	3.902E-05	1.149E-04	3.128E-04	8.169E-04	1.255E-03	3.585E-03
Ac-227	Pu-239	1.000E+00	1.207E-18	1.609E-17	1.725E-16	4.072E-15	7.941E-14	1.516E-12	1.319E-11	4.651E-10

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	U-235	1.000E+00	4.305E-08	2.707E-07	1.326E-06	1.040E-05	6.557E-05	3.150E-04	9.102E-04	1.324E-02
Ac-227	-DOSE(j)		4.305E-08	2.707E-07	1.326E-06	1.040E-05	6.557E-05	3.150E-04	9.102E-04	1.324E-02
Pu-240	Pu-240	4.950E-08	1.194E-10	1.193E-10	1.193E-10	1.191E-10	1.187E-10	1.171E-10	1.128E-10	9.877E-11
Pu-240	Pu-240	1.000E+00	2.411E-03	2.411E-03	2.410E-03	2.407E-03	2.398E-03	2.366E-03	2.278E-03	1.995E-03
Pu-240	-DOSE(j)		2.411E-03	2.411E-03	2.410E-03	2.407E-03	2.398E-03	2.366E-03	2.278E-03	1.995E-03
U-236	Pu-240	1.000E+00	1.423E-11	4.353E-11	1.020E-10	3.034E-10	8.523E-10	2.494E-09	5.425E-09	1.949E-08
U-236	U-236	1.000E+00	9.188E-03	9.158E-03	9.097E-03	8.888E-03	8.317E-03	6.593E-03	3.395E-03	1.036E-02
U-236	-DOSE(j)		9.188E-03	9.158E-03	9.097E-03	8.888E-03	8.317E-03	6.593E-03	3.395E-03	1.036E-02
Th-232	Pu-240	1.000E+00	6.040E-22	3.979E-21	2.039E-20	1.781E-19	1.460E-18	1.461E-17	1.056E-16	6.433E-16
Th-232	U-236	1.000E+00	5.426E-13	1.557E-12	3.564E-12	1.048E-11	2.939E-11	8.648E-11	1.923E-10	2.942E-10
Th-232	-DOSE(j)		5.426E-13	1.557E-12	3.564E-12	1.048E-11	2.939E-11	8.648E-11	1.923E-10	2.942E-10
Ra-228	Pu-240	1.000E+00	1.563E-21	2.432E-20	2.761E-19	6.130E-18	9.604E-17	1.360E-15	1.095E-14	7.068E-14
Ra-228	U-236	1.000E+00	1.999E-12	1.420E-11	7.100E-11	4.974E-10	2.377E-09	8.733E-09	2.056E-08	3.405E-08
Ra-228	-DOSE(j)		1.999E-12	1.420E-11	7.100E-11	4.974E-10	2.377E-09	8.733E-09	2.056E-08	3.405E-08
Th-228	Pu-240	1.000E+00	2.679E-23	7.227E-22	1.483E-20	6.590E-19	1.526E-17	2.521E-16	2.112E-15	1.349E-14
Th-228	U-236	1.000E+00	4.029E-14	5.192E-13	4.753E-12	6.352E-11	4.134E-10	1.668E-09	4.005E-09	6.239E-09
Th-228	-DOSE(j)		4.029E-14	5.192E-13	4.753E-12	6.352E-11	4.134E-10	1.668E-09	4.005E-09	6.239E-09
Tc-99	Tc-99	1.000E+00	2.154E-01	1.135E-01	9.632E-02	1.693E-03	2.882E-10	0.000E+00	0.000E+00	0.000E+00
U-238	U-238	5.400E-05	1.072E-05	1.068E-05	1.061E-05	1.037E-05	9.700E-06	7.689E-06	3.959E-06	1.209E-05
U-238	U-238	9.999E-01	3.683E-01	3.671E-01	3.647E-01	3.563E-01	3.334E-01	2.643E-01	1.361E-01	2.464E-01
U-238	-DOSE(j)		3.683E-01	3.671E-01	3.647E-01	3.563E-01	3.334E-01	2.643E-01	1.361E-01	2.464E-01

THF(i) is the thread fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	4.300E-03	4.258E-03	4.175E-03	3.897E-03	3.200E-03	1.606E-03	2.240E-04	2.271E-07
Np-237	Am-241	1.000E+00	0.000E+00	1.385E-09	4.113E-09	1.322E-08	3.581E-08	8.534E-08	1.168E-07	7.923E-08
Np-237	Np-237	1.000E+00	1.030E-03	1.029E-03	1.028E-03	1.023E-03	1.010E-03	9.654E-04	8.482E-04	5.392E-04
Np-237	-S(j):		1.030E-03	1.029E-03	1.028E-03	1.023E-03	1.010E-03	9.655E-04	8.483E-04	5.393E-04
U-233	Am-241	1.000E+00	0.000E+00	3.031E-15	2.703E-14	2.909E-13	2.391E-12	1.957E-11	8.028E-11	1.169E-10
U-233	Np-237	1.000E+00	0.000E+00	4.495E-09	1.343E-08	4.416E-08	1.274E-07	3.704E-07	7.650E-07	8.204E-07
U-233	-S(j):		0.000E+00	4.495E-09	1.343E-08	4.416E-08	1.274E-07	3.704E-07	7.651E-07	8.206E-07
Th-229	Am-241	1.000E+00	0.000E+00	9.553E-20	2.561E-18	9.260E-17	2.335E-15	6.868E-14	1.028E-12	8.297E-12
Th-229	Np-237	1.000E+00	0.000E+00	2.124E-13	1.906E-12	2.098E-11	1.838E-10	1.862E-09	1.302E-08	6.800E-08
Th-229	-S(j):		0.000E+00	2.124E-13	1.906E-12	2.098E-11	1.838E-10	1.862E-09	1.302E-08	6.801E-08
Pu-238	Pu-238	1.840E-09	4.471E-12	4.436E-12	4.365E-12	4.128E-12	3.519E-12	2.012E-12	4.077E-13	1.525E-15
Pu-238	Pu-238	1.000E+00	2.430E-03	2.411E-03	2.372E-03	2.244E-03	1.912E-03	1.094E-03	2.215E-04	8.289E-07
Pu-238	-S(j):		2.430E-03	2.411E-03	2.372E-03	2.244E-03	1.912E-03	1.094E-03	2.215E-04	8.289E-07
U-234	Pu-238	1.000E+00	0.000E+00	6.850E-09	2.032E-08	6.511E-08	1.746E-07	3.950E-07	4.108E-07	5.282E-08
U-234	U-234	1.000E+00	1.952E+00	1.946E+00	1.933E+00	1.888E+00	1.767E+00	1.400E+00	7.206E-01	7.043E-02
U-234	U-238	9.999E-01	0.000E+00	5.422E-06	1.616E-05	5.262E-05	1.477E-04	3.903E-04	6.027E-04	1.966E-04
U-234	-S(j):		1.952E+00	1.946E+00	1.933E+00	1.888E+00	1.767E+00	1.401E+00	7.212E-01	7.063E-02
Th-230	Pu-238	1.000E+00	0.000E+00	3.089E-14	2.759E-13	2.986E-12	2.495E-11	2.155E-10	1.010E-09	2.178E-09
Th-230	U-234	1.000E+00	0.000E+00	1.754E-05	5.245E-05	1.728E-04	5.016E-04	1.494E-03	3.330E-03	5.055E-03
Th-230	U-238	9.999E-01	0.000E+00	2.443E-11	2.189E-10	2.395E-09	2.062E-08	1.968E-07	1.166E-06	3.724E-06
Th-230	-S(j):		0.000E+00	1.754E-05	5.245E-05	1.728E-04	5.017E-04	1.494E-03	3.331E-03	5.058E-03
Ra-226	Pu-238	1.000E+00	0.000E+00	4.462E-18	1.196E-16	4.323E-15	1.088E-13	3.171E-12	4.497E-11	2.642E-10
Ra-226	U-234	1.000E+00	0.000E+00	3.798E-09	3.405E-08	3.729E-07	3.222E-06	3.110E-05	1.900E-04	6.549E-04
Ra-226	U-238	9.999E-01	0.000E+00	3.527E-15	9.479E-14	3.453E-12	8.894E-11	2.796E-09	4.781E-08	4.133E-07
Ra-226	-S(j):		0.000E+00	3.798E-09	3.405E-08	3.729E-07	3.222E-06	3.110E-05	1.900E-04	6.553E-04
Pb-210	Pu-238	1.000E+00	0.000E+00	3.447E-20	2.740E-18	3.172E-16	2.149E-14	1.510E-12	3.443E-11	2.446E-10
Pb-210	U-234	1.000E+00	0.000E+00	3.905E-11	1.034E-09	3.585E-08	8.076E-07	1.733E-05	1.545E-04	6.107E-04
Pb-210	U-238	9.999E-01	0.000E+00	2.725E-17	2.170E-15	2.528E-13	1.746E-11	1.312E-09	3.586E-08	3.787E-07
Pb-210	-S(j):		0.000E+00	3.905E-11	1.034E-09	3.585E-08	8.077E-07	1.733E-05	1.546E-04	6.111E-04
Pu-239	Pu-239	1.000E+00	9.200E-03	9.199E-03	9.197E-03	9.190E-03	9.169E-03	9.097E-03	8.896E-03	8.224E-03
U-235	Pu-239	1.000E+00	0.000E+00	9.045E-12	2.704E-11	8.907E-11	2.583E-10	7.665E-10	1.688E-09	2.423E-09
U-235	U-235	1.000E+00	8.500E-02	8.472E-02	8.416E-02	8.223E-02	7.694E-02	6.099E-02	3.140E-02	3.076E-03
U-235	-S(j):		8.500E-02	8.472E-02	8.416E-02	8.223E-02	7.694E-02	6.099E-02	3.140E-02	3.076E-03
Pa-231	Pu-239	1.000E+00	0.000E+00	9.564E-17	8.569E-16	9.372E-15	8.064E-14	7.671E-13	4.503E-12	1.376E-11
Pa-231	U-235	1.000E+00	0.000E+00	1.792E-06	5.342E-06	1.740E-05	4.882E-05	1.289E-04	1.987E-04	6.439E-05
Pa-231	-S(j):		0.000E+00	1.792E-06	5.342E-06	1.740E-05	4.882E-05	1.289E-04	1.987E-04	6.439E-05
Ac-227	Pu-239	1.000E+00	0.000E+00	1.005E-18	2.652E-17	9.072E-16	1.977E-14	3.922E-13	3.169E-12	1.081E-11

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ac-227	U-235	1.000E+00	0.000E+00	2.819E-08	2.460E-07	2.459E-06	1.667E-05	8.205E-05	1.565E-04	5.426E-05
Ac-227	-S(j):		0.000E+00	2.819E-08	2.460E-07	2.459E-06	1.667E-05	8.205E-05	1.565E-04	5.426E-05
Pu-240	Pu-240	4.950E-08	4.554E-10	4.553E-10	4.551E-10	4.545E-10	4.528E-10	4.469E-10	4.303E-10	3.768E-10
Pu-240	Pu-240	1.000E+00	9.200E-03	9.198E-03	9.195E-03	9.183E-03	9.148E-03	9.027E-03	8.692E-03	7.613E-03
Pu-240	-S(j):		9.200E-03	9.198E-03	9.195E-03	9.183E-03	9.148E-03	9.027E-03	8.692E-03	7.613E-03
U-236	Pu-240	1.000E+00	0.000E+00	2.719E-10	8.127E-10	2.676E-09	7.754E-09	2.295E-08	5.006E-08	6.886E-08
U-236	U-236	1.000E+00	8.500E-02	8.472E-02	8.416E-02	8.223E-02	7.694E-02	6.099E-02	3.140E-02	3.076E-03
U-236	-S(j):		8.500E-02	8.472E-02	8.416E-02	8.223E-02	7.694E-02	6.099E-02	3.140E-02	3.076E-03
Th-232	Pu-240	1.000E+00	0.000E+00	6.710E-21	6.025E-20	6.640E-19	5.839E-18	5.993E-17	4.363E-16	2.661E-15
Th-232	U-236	1.000E+00	0.000E+00	4.186E-12	1.252E-11	4.125E-11	1.197E-10	3.568E-10	7.963E-10	1.215E-09
Th-232	-S(j):		0.000E+00	4.186E-12	1.252E-11	4.125E-11	1.197E-10	3.568E-10	7.963E-10	1.215E-09
Ra-228	Pu-240	1.000E+00	0.000E+00	2.616E-22	6.645E-21	2.020E-19	3.460E-18	5.037E-17	4.085E-16	2.583E-15
Ra-228	U-236	1.000E+00	0.000E+00	2.424E-13	2.012E-12	1.725E-11	8.716E-11	3.252E-10	7.682E-10	1.191E-09
Ra-228	-S(j):		0.000E+00	2.424E-13	2.012E-12	1.725E-11	8.716E-11	3.252E-10	7.682E-10	1.191E-09
Th-228	Pu-240	1.000E+00	0.000E+00	2.221E-23	1.498E-21	1.059E-19	2.781E-18	4.760E-17	4.019E-16	2.574E-15
Th-228	U-236	1.000E+00	0.000E+00	2.707E-14	5.821E-13	1.086E-11	7.695E-11	3.168E-10	7.638E-10	1.190E-09
Th-228	-S(j):		0.000E+00	2.707E-14	5.821E-13	1.086E-11	7.695E-11	3.168E-10	7.638E-10	1.190E-09
Tc-99	Tc-99	1.000E+00	1.100E-01	5.047E-02	1.063E-02	4.552E-05	7.794E-12	1.619E-35	0.000E+00	0.000E+00
U-238	U-238	5.400E-05	1.036E-04	1.033E-04	1.026E-04	1.002E-04	9.380E-05	7.436E-05	3.828E-05	3.750E-06
U-238	U-238	9.999E-01	1.919E+00	1.913E+00	1.900E+00	1.856E+00	1.737E+00	1.377E+00	7.089E-01	6.943E-02
U-238	-S(j):		1.919E+00	1.913E+00	1.900E+00	1.856E+00	1.737E+00	1.377E+00	7.090E-01	6.944E-02

THF(i) is the thread fraction of the parent nuclide.
RESCALC.EXE execution time = 4.61 seconds

Attachment F
Radiological Conditions in Local Schools

Attachment F Radiological Conditions in Local Schools

As described in Section 2.1, settled dust was collected inside 25 local buildings (ten in the Background Area and 15 in the Study Area) to assess radiological conditions in local structures. Ten locations known to be schools (one in the Background Area and nine in the Study Area) were included as part of this sampling campaign.

A total of 182 settled dust samples were collected from interior building surfaces within the Study Area. Of these, 98 samples (54%) were collected in schools. In order to explore potential risks associated with settled dust in schools, analytical results for samples collected in schools were drawn from the full data set. A summary of the results for samples collected in study area schools and background school is provided below in Tables F-2 and F-3.

Table F-2 Results of Study Area Dust Samples in Schools

		Study Area Dust, Interior Surfaces in Schools			
Radionuclide	**Detected/ Samples**	**Range [a] (pCi/cm^2)**	**Median (pCi/cm^2)**	**Average (pCi/cm^2)**	**StDev (pCi/cm^2)**
Am-241	1/98	-8.00E-05 - 1.40E-04	4.60E-05	4.03E-05	4.21E-05
Np-237	0/98	-6.60E-05 - 6.30E-05	0	6.60E-06	2.34E-05
Pu-238	4/98	-2.30E-05 - 1.03E-04	2.10E-05	2.59E-05	3.10E-05
Pu-239/240	3/98	-2.10E-05 - 1.60E-04	4.00E-05	4.51E-05	3.51E-05
Tc-99	18/98	-3.35E-03 - 8.23E-03	1.81E-03	1.94E-03	2.23E-03
U-233/234	43/98	4.00E-05 - 5.70E-04	1.60E-04	1.84E-04	1.01E-04
U-235/236	4/98	-5.50E-05 - 1.10E-04	0	1.48E-05	3.15E-05
U-238	51/98	-2.20E-05 - 7.20E-04	1.60E-04	1.79E-04	1.05E-04

[a] These values include all reported values (i.e. both detected concentrations and the reported instrument responses that were below the method detection limit).

Table F-3 Results of Background Dust Samples in Schools

		Background Area Dust, Interior Surfaces in Schools			
Radionuclide	**Detected/ Samples**	**Range [a] (pCi/cm^2)**	**Median (pCi/cm^2)**	**Average (pCi/cm^2)**	**StDev (pCi/cm^2)**
Am-241	0/14	-2.40E-05 - 7.30E-05	2.50E-05	2.63E-05	3.32E-05
Np-237	0/14	-2.10E-05 - 2.20E-05	0.00E+00	3.29E-06	1.59E-05
Pu-238	0/14	-6.20E-05 - 6.70E-05	2.05E-05	1.28E-05	3.57E-05
Pu-239/240	0/14	-2.10E-05 - 8.30E-05	5.15E-05	4.48E-05	2.95E-05
Tc-99	0/14	-4.68E-03 - 2.09E-03	-8.60E-04	-9.40E-04	1.83E-03
U-233/234	4/14	4.50E-05 - 4.30E-04	1.45E-04	1.63E-04	1.02E-04
U-235/236	0/14	-2.80E-05 - 5.70E-05	0.00E+00	1.40E-05	2.62E-05
U-238	9/14	2.20E-05 - 2.80E-04	1.60E-04	1.58E-04	7.87E-05

[a] These values include all reported values (i.e. both detected concentrations and the reported instrument responses that were below the method detection limit).

In order to establish representative study area concentrations of radionuclides of concern (ROCs) in settled dust, efforts were made to apply the U.S. Environmental Protection Agency's (EPA's) reasonable maximum exposure (RME) concept. The few detections for most ROCs and a

number of negative concentrations led to unrealistic (e.g., negative) area concentrations. Given this complication and acknowledging the Community's sensitivity to this type of receptor, a highly conservative diversion from the RME method was taken by the risk assessment team. The maximum detected settled dust concentrations in schools within the study area were used as the exposure point concentrations. This method is likely to produce estimated risks that significantly overestimate potential risks to this subpopulation.

The exposure potential of conditions inside local school buildings was assessed using EPA's *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Part A, Interim Final* (EPA 1989) along with EPA's Building Preliminary Remediation Goal (BPRG) Calculator (EPA 2022b), as presented in Section 3.3.2.2. The target receptor in this evaluation was a student attending school from the kindergarten through the twelfth grade. After consulting the Pike County School District calendar of 2022-2023, this hypothetical receptor was assumed to attend a local school in the study area for 7.5 hours/day, 178 days/year, with a duration of 13 years.

Numerical values describing various aspects of the behaviors exhibited by hypothetical students during school hours were generally assigned using the set of EPA default values provided with the model, with one set of exceptions - the fraction of material transferred from potentially contaminated surfaces to the skin of a receptor (FTSS) and the postulated exposure times to hard and soft surfaces. For the reader's convenience, notable parameter values used in this assessment are provided below in Table F-4

Table F-4 Parameters Used to Estimate Potential Dust Exposure in Local Schools

Pathway (units)	Adult[a]	Child[a]
Exposure Duration (years)[b]	12	1
Exposure Frequency (days/year)	178	178
Exposure Time (direct exposure) (hours/day)	7.5	7.5
Exposure Time (ingestion) - hard surface (hours/day)[c]	7.5	7.5
Exposure Time (ingestion) - soft surface (hours/day)[c]	0	0
Frequency of Hand to Mouth (events/hour)	3.025	17.7
Fraction Transferred Surface to Skin (hard surfaces) (unitless)	1	1
Fraction Transferred Surface to Skin (soft surfaces) (unitless)	1	1
Fraction of Hand to Mouth (unitless)	1	1

[a] With the exception of the Fraction Transferred Surface to Skin (hard and soft surfaces) and the Fraction of Hand to Mouth, these are default value in the EPA BPRG Calculator (https://epa-bprg.ornl.gov/cgi-bin/bprg_search) (EPA 2022b).
[b] Since the method contained within the EPA BPRG Calculator (EPA 2022b) considers a person zero to six years of age to be a child and a person who has had a sixth birthday to be considered an adult, for kindergarten, the receptor is considered a child and for grades 1 through 12, the receptor is considered an adult.
[c] Knowledge of typical schools leads risk assessors to the conclusion that surfaces within schools would be classified as "hard" using this exposure model.

Calculated risks associated with settled dust in local schools are presented below in Table F-5. The sum of estimated risks associated with the maximum detected concentrations of ROCs in

dust in local schools is less than the lower end of EPA's definition of acceptable exposure levels. As addressed in Section 7.6.2 of the main report, this range is generally expressed as an excess lifetime cancer risk range starting at 10^{-6} (1 in 1,000,000) and extending up to 10^{-4} (1 in 10,000).

Table F-5 Estimated Study Area Risks to Hypothetical Student at Local Schools

	Settled Dust			
Radionuclide	**Maximum Detected Dust Concentration (pCi/cm²)**	**Ingestion Risk**	**External Exposure Risk**	**Summed Risk**
Am-241	0.000140	2.40E-08	5.13E-12	2.40E-08
Np-237	-[a]	-	-	-
Pa-233	-	-	-	-
Pa-234	0.000720	3.08E-13	1.56E-13	4.63E-13
Pa-234m	0.000720	«[b]	1.01E-17	1.01E-17
Pu-238	0.000100	2.00E-08	6.93E-14	2.00E-08
Pu-239/240	0.000160	3.42E-08	6.51E-14	3.42E-08
Tc-99	0.008234	5.60E-08	8.70E-13	5.60E-08
Th-231	0.000110	1.99E-13	8.72E-16	2.00E-13
Th-234	0.000720	3.10E-10	7.67E-14	3.10E-10
U-233/234	0.000570	7.94E-08	4.31E-13	7.94E-08
U-235/236	0.000110	1.52E-08	3.03E-11	1.53E-08
U-235m	0.000160	1.36E-20	«	1.36E-20
U-238	0.000720	9.08E-08	3.53E-13	9.08E-08
Summed Risk	**---**	**3.20E-07**	**3.75E-11**	**3.20E-07**

[a] There are no detected concentrations of this analyte in this medium within the background area.
[b] The slope factor in EPA's BPRG Calculator (EPA 2022b) is zero or does not exist.

For comparative purposes, risks were calculated from results of background area smears (dust) collected in schools (Table F-6). As with the study area dust concentrations in schools, the maximum detected concentrations of ROCs in the background area school were applied. The sum of estimated risks associated with these concentrations is less than the lower end of EPA's definition of acceptable exposure levels as described in the preceding paragraph.

Table F-6 Estimated Background Area Risks to Hypothetical Student at Local Schools

Radionuclide	Settled Dust			Summed Risk
	Maximum Detected Dust Concentration (pCi/cm^2)	Ingestion Risk	External Exposure Risk	
Am-241	-[a]	-	-	-
Np-237	-	-	-	-
Pa-233	-	-	-	-
Pa-234	0.00028	1.20E-13	6.05E-14	1.80E-13
Pa-234m	0.00028	«[b]	3.92E-18	3.92E-18
Pu-238	-	-	-	-
Pu-239/240	-	-	-	-
Tc-99	-	-	-	-
Th-231	-	-	-	-
Th-234	0.00028	1.20E-10	2.98E-14	1.20E-10
U-233/234	0.00043	5.99E-08	3.25E-13	5.99E-08
U-235/236	-	-	-	-
U-235m	-	-	-	-
U-238	0.00028	3.53E-08	1.37E-13	3.53E-08
Summed Risk	**---**	**9.53E-08**	**5.52E-13**	**9.53E-08**

[a] There are no detected concentrations of this analyte in this medium within the background area.
[b] The slope factor in EPA's BPRG Calculator (EPA 2022b) is zero or does not exist.

Interior of Zahn's Corner Middle School

On August 15-16, 2019, Solutient Technologies, LLC (Solutient) collected samples of dust from surfaces in hallways and classrooms in Zahn's Corner Middle School. Solutient then surveyed 142 groups or "lots" of items as directed by school representatives. These lots included personal belongings as well as school supplies left behind when the school closed in May 2019.

During this initial survey, Ludlum Model 2224 meters with Model 43-93 alpha beta probes were used to scan items in the lots and 165 fixed measurements of alpha and beta activity were recorded. Concurrently, removable activity was measured on item surfaces by wiping those surfaces with smears. The smears were taken to the school's library and counted on a Ludlum Model 3030 alpha/beta counter. The attached letter and data table provide additional details of this survey (See Exhibit A). The results of this survey have been converted to units of activity (disintegrations per minute, or dpm) and listed in Table F-7.

Table F-7 Results of August 2019 Survey of Zahn's Corner Middle School

Statistic	Fixed Measurements [a] (dpm/100 cm^2)		Smears [b] (dpm/smear)	
	Gross Alpha	Gross Beta	Gross Alpha	Gross Beta
Number of Lots Surveyed	165	165	158	158
Range	5 - 115	973 - 2293	0 - 57	159 - 356
Median	40	1480	5.4	237.0
Average	39	1547	8.8	236.5
St Dev	20	268	8.5	35.7
Background Average	27	1957	6.1	234.9

[a] Performed using a Ludlum Model 43-93 Alpha-Beta Scintillation Detector. Its counting efficiency for Pu-239 (α) is 20% and for Tc-99 (β) it is 15%.

[b] Counted on a Ludlum Model 3030 system. Its counting efficiency for Pu-239 (α) is 37% and for Tc-99 (β) it is 27%.

Solutient concluded "(t)here was no evidence of radioactive contamination identified. All surveyed materials removed from the school and those remaining are free from any radioactive contamination above background." A subsequent survey of the interior was planned to confirm this statement, but access to the building was denied at that time.

Exhibit A
ZCMS Letter Report

Megan Williams, Treasurer
Scioto Valley Local Board of Education
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Piketon, OH 45661
PH: 740-289-4089
E-mail: mwilliams@redstreaks.org

9/4/2019

Subject: Survey of School Materials.

Solutient Technologies, LLC performed a survey of miscellaneous materials at the Zahn's Corner Middle School at the request of the Scioto Valley Local Board of Education. The intent was to enable teachers and others working at the school to retrieve personal belongings as well as school supplies left behind when the school shut down in May 2019. On August 15-16, 2019, Solutient Technologies, LLC (Solutient) performed gross smear surveys of the hallways and classrooms and found no contamination level above background. Solutient set up their lab in the library and initiated surveys of various supplies and materials as directed by school representatives. A total of 165 sets of fixed and removable measurements were obtained consisting of 142 lots of materials. These measurements were very conservative, collecting gross smears over large areas of materials per lot and instrument scans, using a Ludlum Model 2224 with a 43-93 alpha beta probe, covering the same large areas. The instrument measurements were recorded in the field and the smears were taken to the library and counted on a Ludlum 3030 Alpha/Beta counter. An excel spreadsheet with a photo ID reference, date, material surveyed, and lot number is attached. The photo journal of free released items consisting of school equipment and teacher personal items will be sent separately.

Table-1 below shows the average results of instrument and smears for alpha and beta. The alpha results are at 1.5 times background and the beta results are background. All alpha measurements are within 1-sigma of the average. There was no evidence of radioactive contamination identified.

Table-1
Survey Summary

Description	Instrument (cpm)		Smears (cpm)	
	alpha	beta	alpha	beta
Average Gross Results (cpm)	7.9	232.1	3.3	63.9
Average Background (cpm)	5.4	293.5	2.3	63.4
Average Net Results (cpm)	2.5	-61.4	1.0	0.4
X's background	1.5	< Bkg	1.4	Bkg

All surveyed materials removed from the school and those remaining are free from any radioactive contamination above background.

Brad Squibb,
Radiation Safety Officer
Solutient Technolgies, LLC

Photo ID	Date	Location/Material	Lot #	Direct Measurement		Smears	
				Gross Measurement			
				alpha	beta	alpha	beta
1	8/15/2019	Smart Boards	1	9	181	7	94
2			2	12	271	12	74
3			3	8	222	6	70
4			4	6	209	21	83
5			5	6	220	3	70
6			6	5	290	5	58
7			7	4	232	2	76
8			8	10	297	1	64
9	8/15/2019	Rm. 115	1	7	226	BKG	BKG
10			2	8	309	BKG	BKG
11	8/15/2019	Rm. 101	1	11	229	BKG	BKG
12			2	8	259	1	60
13	8/15/2019	Floor Buffers	1	19	185	12	76
14			2	23	226	4	79
15	8/15/2019	Landscaping Equip.	1	13	220	4	64
16	8/15/2019	Mrs. Riggs' Items	1	2	337	7	87
17			2	1	272.5	2	63
18			3	6	259	4	82
19			4	7	286	2	69
20	8/15/2019	Records	outside	12	209	BKG	BKG
			inside	15	212	BKG	BKG
21	8/15/2019	Chromebook Cart #6	outside	11	277	9	70
			inside			2	67
			computers	9	297	1	69
22	8/15/2019	Office Orinter		14	232	1	68
23	8/15/2019	Chromebook Cart #3	outside	13	283	3	64
			inside	12	234	5	53
			computers	8	277	0	65
24	8/15/2019	Poster Printer		11	255	4	63
25	8/15/2019	Copier #1	copier	12	226	13	70
			tray			10	96
26	8/15/2019	Copier#2	copier	17	236	6	66
			tray	11	221	7	54

27	8/15/2019	Copier#3	copier	16	229	4	58
			tray	10	241	3	66
28	8/15/2019	Phones	1	5	223	6	89
29	8/15/2019	Chromebook Cart #6	gross	7	267	5	80
30	8/15/2019	Chromebook Cart #4	gross	2	292	2	72
31	8/15/2019	Chromebook Cart #2	gross	4	216	6	63
32	8/15/2019	Chromebook Cart #5	gross	13	272	0	78
33	8/15/2019	Chromebook Cart #8	gross	8	273	14	53
34	8/15/2019	Chromebook Cart #10	gross	6	286	8	63
35	8/15/2019	Chromebook Cart #9	gross	4	277	5	72
36	8/15/2019	Printers	1	8	232	11	63
37	8/15/2019	Smart Boards/TVs	1 screen	10	297	1	64
			1 projector	8	332	4	52
38			2	4	232	2	76
39			3	5	290	2	78
40			4 screen	9	293	2	68
			4 projector	6	283	5	70
41			5 screen	9	292	7	54
			5 projector	5	344	5	62
42			6 screen	9	328	2	65
43	8/15/2019	Admin. Printer	1	10	240	4	67
44	8/15/2019	Shredder	1	22	266	4	52
45	8/15/2019	Largre Format Printer	1	12	273	1	55
46	8/15/2019	Computer/Phone Cart	1	13	238	0	49
47	8/15/2019	Admin. Records	1	9	320	1	59
48	8/15/2019	Kitchen Supplies	1	6	193	1	49
49			2	10	208	11	73
50			3	8	146	2	48
51	8/15/2019	Steamer	1	5	191	5	75
52	8/15/2019	Computers	1	13	214	2	53
53			2	10	239	1	59
54	8/15/2019	Personal Items	1	8	191	4	63
55	8/15/2019	Science Tables	1	11	210	1	59
56			2	12	214	5	68
57			3	9	200	1	68
58			4	11	197	3	67
59			5	14	225	1	60

60			6	6	213	4	68
61			7	13	288	7	76
62	8/15/2019	Library Chromebooks	inside	1	251	1	55
			outside	6	207	1	77
			computers	6	206	1	52
63	8/15/2019	Admin. Office	1	2	221	2	63
64			2	2	249	4	49
65	8/15/2019	Chairs	1	9	290	2	76
66	8/15/2019	Rm. 112 Tables	1	10	231	3	64
67	8/15/2019	Library	1	7	288	3	67
68			2	3	210	8	74
69	8/15/2019	Rm. 114 Computers	1	10	206	1	51
70			2	3	213	3	70
71			3	5	217	2	58
72	8/15/2019	Rm. 108	1	3	249	0	60
73			2	5	255	1	51
74			3	3	219	2	66
75			4	5	255	5	62
76	8/15/2019	Library	1	8	216	2	63
77			2	6	202	2	58
78	8/15/2019	Rm. 109	1	9	231	7	53
79			2	5	254	5	58
80			3	6	234	3	57
81	8/15/2019	Rm. 123	1	6	223	2	62
82	8/15/2019	Library (cabinet)	gross	5	208	5	65
83	8/15/2019	Rm. 101	1	6	202	2	65
84	8/15/2019	Rm. 104	1	4	199	1	58
85	8/15/2019	Rm. 127	1	9	195	1	54
86	8/16/2019	Custodial Supplies	1	10	271	3	70
87			2	8	260	4	66
88	8/16/2019	Rm. 133	1	6	193	4	57
89			2	9	204	5	73
90	8/16/2019	Rm. 132	1	14	212	BKG	BKG
91			TV no.1	7	190	6	63
			TV no.2	5	206	7	69
92	8/16/2019	Rm. 131	1	11	186	BKG	BKG
			2	11	222	BKG	BKG
			3	10	179	BKG	BKG

93	8/16/2019	Rm.134	Shelf	5	206	2	55
94			1	13	194	3	72
			2	1	192	4	72
95			3	8	167	3	60
96			4	14	188	9	88
97							
98	8/16/2019	Custodial Supplies	1	6	323	5	65
99			2	11	325	2	64
100			3	7	268	2	65
101	8/16/2019	Refrigerator/Printer	1	8	175	9	65
102	8/16/2019	Main Office	Boxes	1	238	2	65
103			Cabinet	6	202	2	65
104			Cabinet	2	208	2	65
105			Cabinet	5	194	3	45
106	8/16/2019	Rm. 143	1	3	181	1	65
			2	7	219	1	46
107			2	6	184	1	65
108	8/16/2019	Rm. 141	1	3	181	1	72
			2	6	182	1	53
			3	9	194	0	62
109			4	13	182	3	43
110	8/16/2019	Rm. 144	1	5	213	0	59
111	8/16/2019	Rm. 127	1	9	197	1	46
112	8/16/2019	Rm. 140	1	8	246	1	54
113	8/16/2019	Rm. 139	1	3	213	0	56
			3	2	217	1	51
114			2	4	161	1	46
115	8/16/2019	Rm. 142	1	13	182	2	50
			2	7	211	1	65
116			3	7	207	2	60
117	8/16/2019	Rm. 137	1	9	183	1	65
118			2	9	195	1	71
119			3	12	189	3	58
120	8/16/2019	Band Equip.	1	9	216	2	61
121			2	10	197	1	65
122			3	9	196	1	71
123	8/16/2019	Cafeteria Tables	1	12	191	1	64

			2	7	214	1	61
124	8/16/2019	Nurse Supplies	1	7	210	1	66
125	8/16/2019	Kitchen Supplies	1	12	222	1	65
126			2	3	224	2	71
127	8/16/2019	Rm. 119	1	6	259	0	70
128			2	7	183	1	53
129			3	4	213	2	67
130	8/16/2019	Rm. 113	1	9	255	3	52
131	8/16/2019	Rm. 118	1	8	257	4	57
132	8/16/2019	Rm. 117	1	6	289	2	47
			2	3	222	1	61
133	8/16/2019	Rm. 116	1	5	287	2	54
			2	3	202	1	63
134	8/16/2019	Rm. 115	1	14	214	1	70
135	8/16/2019	Rm. 124	1	7	205	0	61
			2	7	204	2	68
136	8/16/2019	Rm. 106	1	8	301	2	49
137	8/16/2019	Rm. 100A	1	7	235	0	52
138	8/16/2019	Trash Cans	1	5	233	3	68
139	8/16/2019	Shelves	1	4	231	2	59
140	8/16/2019	Buffet Carts	1	7	269	2	73
141	8/16/2019	Wall Clocks	1	1	218	0	65
142	8/16/2019	Moving Dolly	1	4	218	2	70
Average Gross Results (cpm)				**7.9**	**232.1**	**3.3**	**63.9**
Average Background (cpm)				**5.4**	**293.5**	**2.3**	**63.4**
Average Net Results (cpm)				**2.5**	**-61.4**	**1.0**	**0.4**
X's background				**1.5**	**< Bkg**	**1.4**	**Bkg**