OAK RIDGE INSTITUTE
FOR SCIENCE AND EDUCATION
Shaping the Future of Science

August 2, 2019

Ms. Marlayna Doell
U.S. Nuclear Regulatory Commission
Office of Nuclear Materials Safety and Safeguards
Division of Decommissioning, Uranium Recovery, and Waste Programs
Reactor Decommissioning Branch
11555 Rockville Pike
TWFN Mail Stop T-5A10
Rockville, MD 20852

SUBJECT: PROJECT-SPECIFIC PLAN FOR CONFIRMATORY SURVEY ACTIVITIES FOR THE GENERAL ATOMICS TRIGA REACTOR FACILITY BUILDING G21 AND ASSOCIATED LAND AREA, SAN DIEGO, CALIFORNIA DOCKET NO. 05000089 AND 05000163; RFTA NO. 19-005; DCN 5339-PL-01-0

Dear Ms. Doell:

The Oak Ridge Institute for Science and Education (ORISE) is pleased to provide the attached project-specific plan for the confirmatory survey activities for the General Atomics TRIGA Reactor Facility and associated land area.

Please feel free to contact me at 865.576.6659 or Kaitlin Engel at 865.574.7008 if you have any questions or comments.

Sincerely,

Erika N. Bailey
Survey Projects Manager
ORISE

KME:jc

Attachment

Electronic distribution: K. Conway, NRC; R. Evans, NRC; D. Hagemeyer, ORISE; K. Engel, ORISE; File/5339

Distribution approval and concurrence:	Initials
Group Manager/Technical Review	NAA

PROJECT-SPECIFIC PLAN FOR CONFIRMATORY SURVEY ACTIVITIES FOR THE GENERAL ATOMICS TRIGA REACTOR FACILITY BUILDING G21 AND ASSOCIATED LAND AREA, SAN DIEGO, CALIFORNIA

Prepared by
K. M. Engel

FINAL PLAN

Prepared for the
U.S. Nuclear Regulatory Commission

AUGUST 2019

This document was prepared for the U.S. Nuclear Regulatory Commission (NRC) by the Oak Ridge Institute for Science and Education (ORISE) through Interagency Agreement 31310018N0014 between the NRC and the U.S. Department of Energy (DOE). ORISE is managed by Oak Ridge Associated Universities under DOE contract number DE-SC0014664.

PROJECT-SPECIFIC PLAN FOR CONFIRMATORY SURVEY ACTIVITIES FOR THE GENERAL ATOMICS TRIGA REACTOR FACILITY BUILDING G21 AND ASSOCIATED LAND AREA, SAN DIEGO, CALIFORNIA

1. INTRODUCTION

General Atomics (GA, the licensee) developed the Training, Research, Isotopes, General Atomics (TRIGA) class of research reactor, which was designed to be used in both industrial and academic applications. Between 1957 and 1966, three TRIGA reactors were constructed at the GA main site on the Torrey Pines mesa, also known as the TRIGA Reactor Facility (TRF), in San Diego, CA. The three reactors were the TRIGA Mark I, Mark F, and Mark III. The Mark III reactor was shut down in 1972 and has been decommissioned with its license terminated, and is therefore not within the scope of this confirmatory survey plan (GA 2019). The pool-type TRIGA Mark I reactor was operational from 1958 until 1997. It was licensed to operate at a power level of 250 kilowatts (kw) and could be rapidly pulsed to power levels of over 1000 megawatts (MW). Currently it is in a SAFeSTORage (SAFSTOR) status (NRC 2018a). The pool-type TRIGA Mark F reactor was operational from 1960 until 1995. This reactor was designed to provide controlled instantaneous pulses of intense neutron and gamma radiation. Currently it is in a SAFTSTOR status (NRC 2018b).

In 1997, GA ceased all remaining TRIGA reactor operations at the Torrey Pines facility. All irradiated fuel, activated and contaminated hardware, startup neutron sources, and balance of plant components associated with the Mark I and Mark F reactors have been removed from the facility. The two reactors are located in building G21 and are currently undergoing decontamination and decommissioning with the goal of unrestricted release of the Mark I and Mark F reactor pools, reactor rooms, and other impacted areas within building G21 that supported reactor operations, as well as several exterior areas adjacent to the G21 building. This will allow termination of GA's U.S. Nuclear Regulatory Commission (NRC) reactor licenses R-38 and R-67 (GA 2019).

The NRC has requested that the Oak Ridge Institute for Science and Education (ORISE) perform confirmatory survey activities within the impacted areas of the GA TRIGA site. This project-specific plan was developed to support the confirmatory survey activities requested.

2. SITE DESCRIPTION

The TRIGA reactor facility is located 24 kilometers north of San Diego, CA. Building G21 and the associated support facilities are located on a 120 hectare tract acquired by the General Dynamics Corporation from the city of San Diego in 1956. Figure 2.1 provides a site map of the TRF showing the location of the Mark I and Mark F reactor pits and impacted support rooms, as well as the associated land area. There are 14 survey units (SUs) associated with the TRF: nine Class 1 SUs, four Class 2 SUs, and one non-impacted SU (this area has previously been released). Table 2.1 provides the licensee's SUs and classifications.

Table 2.1. TRIGA Building (G21) Survey Units and Classification (GA 2019)

Survey Unit #	Description	Initial Class	Area (m^2)
1	Mark I Reactor Pit	1	9.0
2	Mark F Reactor Pit	1	14.8
3	Mark I Reactor Room (floors and lower walls)	1	84.8
4	Mark I Reactor Room (upper walls and ceiling)	1	93.8
5	Mark F Reactor Room (floors and lower walls)	1	72.7
6	Mark F Reactor Room (upper walls and ceiling)	1	87.5
7	Soil Lab	1	27.4
8	Mezzanine 1	1	23.6
9	Mezzanine 2	2	30.6
10	TRIGA Waste Yard	1	117.7
11	TRIGA Front Yard (asphalt)	2	546
12	TRIGA Back Yard (soil)	2	886
13	Room 112	2	36.47
14	Non-Impacted Areas	Non-Impacted	283.6

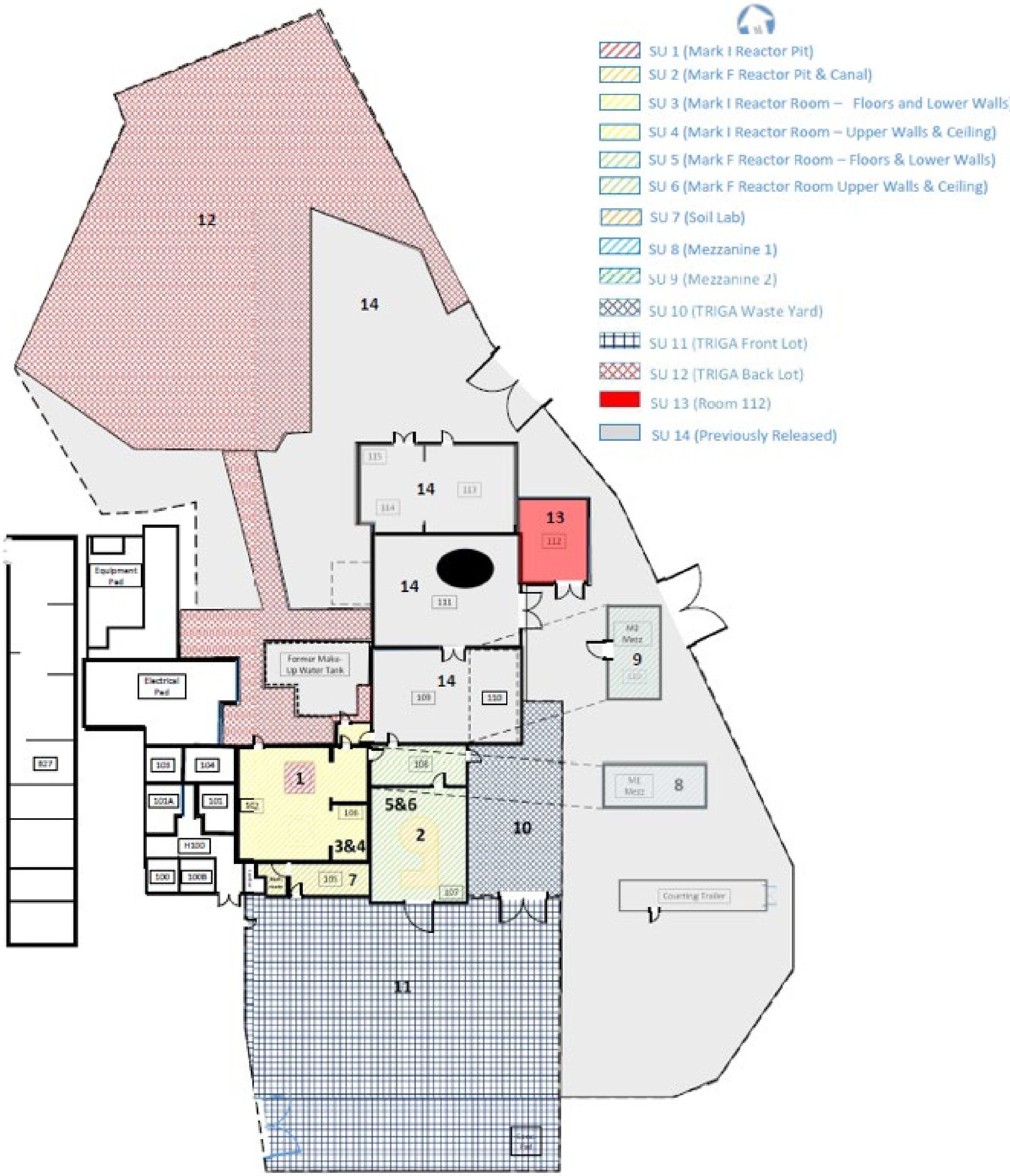

Figure 2.1. TRIGA Reactor Facility Site Map

3. PROJECT HEALTH AND SAFETY

ORISE will adhere to all applicable regulatory requirements and participate in any required site-specific training or briefings. Confirmatory activities will be performed under the site's overall health and safety plan (HASP) and radiological protection plan during site activities. The ORISE project manager is responsible for the overall health and safety of the ORISE project personnel. The licensee is expected to inform ORISE of known and potential hazards in order to effectively apply required safety precautions. A walk-down of the project area prior to the survey will assist ORISE in evaluating any additional potential health and safety issues that are not currently addressed in approved survey procedures or job hazard analyses (JHAs) (ORAU 2016). Should ORISE identify a hazard not covered in the *Oak Ridge Associated Universities (ORAU) Radiological and Environmental Survey Procedures Manual* (ORAU 2016) or the site HASP, work will not be initiated or continued until the hazard is addressed by an appropriate JHA.

4. DATA QUALITY OBJECTIVES

The data quality objectives (DQOs) described herein are consistent with the *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA 2006) and provide a formalized method for planning radiation surveys, improving survey efficiency and effectiveness, and ensuring that the type, quality, and quantity of data collected are adequate for the intended decision applications. The seven steps in the DQO process are outlined below:

1. State the problem
2. Identify the decision/objective
3. Identify inputs to the decision/objective
4. Define the study boundaries
5. Develop a decision rule
6. Specify limits on decision errors
7. Optimize the design for obtaining data

4.1 State the Problem

The first step in the DQO process defines the problem that necessitates the study. The licensee is requesting approval from the NRC for the unrestricted release of the TRIGA reactor pools, reactor rooms, and all impacted survey units noted in Table 2.1 that supported reactor operations. The NRC has requested that ORISE perform confirmatory surveys to generate independent radiological data to assist the NRC in evaluating the licensee's final status survey (FSS) results. Therefore, the problem statement is as follows:

> Confirmatory surveys must be performed to generate independent radiological data to assist the NRC with their assessment and determination of the adequacy of the FSS design, implementation, and results for demonstrating compliance with the release criteria.

4.2 Identify the Decision

The second step in the DQO process identifies the principal study questions (PSQs) and alternative actions (AAs), develops a decision statement, and organizes multiple decisions, as appropriate. This second step is completed by specifying AAs that could result from a "yes" response to the PSQs and combining the PSQs and AAs into a decision statement. Table 4.1 presents the PSQs, AAs, and decision statements.

Table 4.1. Confirmatory Survey Decision Process	
Principal Study Questions	**Alternative Actions**
PSQ1: Are residual radioactivity concentrations associated with the TRIGA Reactor Facility below applicable limits?	**Yes:** Compile confirmatory data and report results to the NRC for their decision making. Provide independent interpretation that confirmatory field surveys did not identify anomalous areas of residual radioactivity, quantitative field and laboratory data satisfied the NRC-approved decommissioning criteria, and/or that statistical sample population examination/assessment conditions were met. **No:** Compile confirmatory data and report results to the NRC for their decision making. Provide independent interpretation of confirmatory survey results identifying any anomalous field or laboratory data and/or when statistical sample population examination/assessment conditions were not satisfied for the NRC's determination of the adequacy of the FSS data.
PSQ2: Do analytical results confirm the absence of fission and activation products not identified in the final status survey plan (FSSP), including hard to detect (HTD) radionuclides, within select confirmatory samples? Note: The NRC will determine the specific laboratory analyses to be performed and select the samples for additional analyses.	**Yes:** Provide analytical minimum detectable concentrations (MDCs), and the less than MDC results to NRC. **No:** Provide analytical results to NRC that include all identified radionuclides for their assessment and decision making. Provide independent interpretation of confirmatory sample results identifying anomalous results.
PSQ3: Do the confirmatory results support the MARSSIM classification of the FSS SUs?	**Yes:** Confirmatory results support the classification of the FSS SUs. Compile confirmatory survey data and present results to NRC for their decision making. **No:** Confirmatory results do not support the classification of the FSS SUs. Summarize the discrepancies and provide technical comments to NRC for their decision making.
Decision Statements	
Confirmatory survey results did/did not identify volumetric concentrations and/or surface activity levels that exceed the release criteria. Confirmatory survey results did/did not identify other fission and activation products and/or HTD radionuclides in select confirmatory samples. Confirmatory survey results do/do not agree with the FSS SUs MARSSIM classification.	

4.3 IDENTIFY INPUTS TO THE DECISION

The third step in the DQO process identifies both the information needed and the sources of this information, determines the basis for action levels, and identifies sampling and analytical methods that will meet data requirements. For this effort, information inputs include the following:

- The site's final status survey plan (FSSP) (note that at the time this plan was developed the FSS is in progress)
- ORISE confirmatory survey results including:
  - Surface scans in the G21 building and SUs exterior to the building (land and asphalt or concrete)
  - Static direct measurements performed in SUs interior and exterior to the building (surfaces, land, asphalt, and concrete)
  - Samples for removable activity including hard to detects (HTDs) for select locations in the G21 building and on structural surfaces in SUs exterior to the building
  - Volumetric samples from the land area and/or G21 building.
- Radionuclides of Concern (ROCs) and their associated limits, discussed in Section 4.3.1 below.

4.3.1 Radionuclides of Concern

The primary ROCs are beta-gamma emitters – fission and activation products resulting from reactor operation. Based on the historical site assessment, the site has determined the potential ROCs are cobalt-60 (Co-60), cesium-137 (Cs-137), europium-152 (Eu-152), and europium-154 (Eu-154) (GA 2019).

The radiological release criteria of in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20, "Standards for Protection Against Radiation." Subpart E, "Radiological Criteria for License Termination," for unrestricted use will be used for the TRF. In order to demonstrate compliance with the 25 millirem per year (mrem/yr) release criterion, default screening values are used instead of site-specific derived concentration guideline levels ($DCGL_W$s) for soil. Commonly used radionuclide default screening values are from NUREG-1757, *Consolidated Decommissioning Guidance: Characterization, Survey, and Determination of Radiological* Criteria, Vol.2. DandD v. 2.1 software was used to determine default screening values for radionuclides that are not listed in NUREG-1757

(NRC 2006, GA 2019). For building surfaces and structures, the release limits listed in GA's decommissioning plan will be implemented, hereafter also referred to as screening values for consistency (GA 1999). Based on FSSP commitments, elevated measurement comparisons (i.e. $DCGL_{EMC}$) will not be implemented; therefore, the screening values are treated as "not-to-exceed" threshold values (GA 2019).

Tables 4.2 and 4.3 provide the default screening values for the ROCs for surfaces and structures and concrete and soil, respectively (note that in Table 4.2 the maximum values are not applicable as individual FSS/confirmatory measurements will be compared to the average limit). The SU is determined to meet the release criterion provided that all measurements are less than the screening values and any sum-of-fractions (SOF) calculations result in values less than 1. Removable contamination measurements will be directly compared to the applicable screening values (GA 2019).

Table 4.2. Surfaces and Structures Screening Values (GA 1999)

Radionuclides of Concern[a]	dpm/100 cm^{2}[b]		
	Average[c]	Maximum[d]	Removable[e]
U-nat, U-235, U-238, and associated decay products	5,000	15,000	1,000
Transuranics, Ra-226, Ra-228, Th-230, Th-228, I-125, I-129	100	300	20
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-133, I-131	1,000	3,000	200
Beta/gamma emitters (nuclides with decay modes other than alpha), except Sr-90 and others noted above	5,000	15,000	1,000

[a] Where surface contamination by both alpha- and beta-gamma- emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.
[b] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrument.
[c] Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.
[d] The maximum contamination level applies to an area of not more than 100 cm^2.
[e] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that are with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

Table 4.3. Concrete and Soil Screening Values (GA 2019)	
Radionuclides of Concern	**Screening Level for Unrestricted Release (pCi/g)**
Co-60	3.8
Cs-137	11.0
Eu-152	7.0[a]
Eu-154	8.0

[a] This value is lower than the value listed in NUREG-1757 (8.7 pCi/g) due to the memorandum of understanding between the EPA and the NRC.

Additionally, radionuclide-specific results (i.e. volumetric samples) are evaluated using the SOF approach SOF calculations are performed as follows:

$$SOF_{TOTAL} = \sum_{j=0}^{n} SOF_j = \sum_{j=0}^{n} \frac{C_j}{DCGL_{W,j}}$$

Where C_j is the concentration of ROC "j" and $DCGL_{W,j}$ is the screening value for ROC "j". Note that gross concentrations are considered here for conservatism.

4.4 Define the Study Boundaries

The fourth step in the DQO process defines target populations and spatial boundaries, determines the timeframe for collecting data and making decisions, addresses practical constraints, and determines the smallest subpopulations, area, volume, and time for which separate decisions must be made.

Confirmatory survey activities will take place in the G21 building and SUs exterior to the building listed in Table 2.1. SUs with similar radiological characteristics may be combined into confirmatory units (CUs) for the purposes of this survey. Confirmatory survey activities will be performed during the week of August 5, 2019, which constitutes the temporal boundary of the study. Priority will be given to the Class 1 CUs. Additional CUs may also be selected for confirmatory survey activities as time permits. See Section 4.7 for the priority listing of the CUs investigated.

4.5 Develop a Decision Rule

The fifth step in the DQO process specifies appropriate population parameters (e.g., mean, median), confirms action levels are above detection limits, and develops an if…then… decision rule statement. Any positive detection may require some action, thus a formal statistical comparison is unnecessary. Rather, the confirmatory survey will focus on scanning to identify locations that could exceed the applicable screening values and/or analytical minimum detectable concentrations (MDCs). A limited random data set will be collected—time permitting—to provide NRC with an un-biased estimate of the mean CU concentration.

Qualitative parameters of interest include scanning data collected across the surface of accessible SUs. For this study, the quantitative parameters of interest are individual sample concentrations (volumetric and removable), surface activity results (direct measurements), and the associated MDCs. The decision rules for each CU, as applicable, are stated as follows:

> If the individual concentrations of ROCs in the volumetric samples are below a SOF of 1 [unity], then recommend acceptance; otherwise, provide technical comments/recommendations to the NRC for their decision making.
>
> If individual surface activity measurements are below their respective screening values, then recommend acceptance; otherwise, perform further evaluation(s) and provide technical comments/recommendations to the NRC for their decision making.
>
> If other fission and activation products including HTDs are not positively identified in confirmatory samples, then provide NRC with the analytical MDCs along with the less than values; otherwise, summarize results and present to NRC along with technical recommendations, as necessary.

Confirmatory survey sample data sets may be compared with the FSS data at a later date, based on survey findings and/or direction from NRC. Graphical methods, such as quantile-quantile plots, histograms, etc. may be used for this comparison. Although not specifically planned, formal statistical comparisons may be made through the appropriate two-sample population test—provided that underlying assumptions of the test are met—to evaluate potential biases in the data sets.

4.6 SPECIFY LIMITS ON DECISION ERRORS

The sixth step in the DQO process examines the consequences of making an incorrect decision and establishes bounds of decision errors. Decision errors are controlled both during the confirmatory investigations and during data quality assessment. Detector scan MDCs are expected to be below screening values based on procedures in Section 5. Any anomalies above background identified while performing the surveys or subsequent data assessment will be thoroughly investigated and discussed with the NRC staff.

The FSS data were unavailable at the issuance of this survey plan; therefore, the number of random samples collected during the confirmatory survey will be based on developing a non-parametric confidence interval of the median CU concentration. Visual Sample Plan (VSP), version 7.10 was used to determine the number of samples required such that the estimated CU median is within 30 percentiles above or below the true CU median at the 95% confidence level. For this effort, based on the previously described planning inputs, 12 measurements will be collected in each CU.

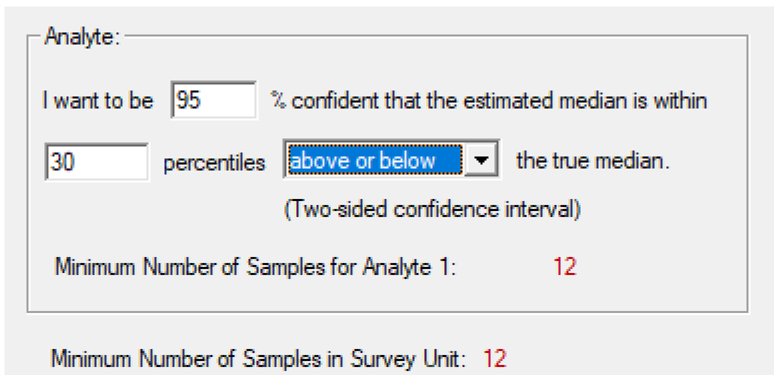

Figure 4.1. VSP Confirmatory Survey Planning Inputs

4.7 OPTIMIZE THE DESIGN FOR OBTAINING DATA

The seventh step in the DQO process is used to review DQO outputs, develop data collection design alternatives, formulate mathematical expressions for each design, select the sample size to satisfy DQOs, decide on the most resource-effective design of agreed alternatives, and document requisite details. The confirmatory survey will follow a graded approach, such that survey efforts are concentrated on the areas that have the highest potential for contamination. Confirmatory survey activities will be prioritized as follows (from highest to lowest priority):

1. Scans performed in CU1 (SUs 1 and 3) and CU2 (SUs 2 and 5). Judgmental measurement/sample collection in CUs 1 and 2 based on scan results.
2. Scans performed in CU3 (SU 7) and CU4 (SU 13). Judgmental measurement/sample collection in CUs 3 and 4 based on scan results.

3. Scans performed in CU5 (SU 12). Judgmental sample collection in CU 5 based on scan results.
4. Scans performed in CU6 (SU 10) and CU7 (SU 11). Judgmental sample collection in CUs 6 and 7 based on scan results.
5. Scans performed in CU8 (SU 8) and CU9 (SU 9). Judgmental sample collection in CUs 8 and 9 based on scan results.
6. Random measurement/sample collection in CUs investigated; may be performed concurrently with judgmental measurement/sample collection.
7. Scans and judgmental sample collection in areas with the potential for accumulation, such as ventilation or drains, or any other areas identified by the NRC.

Specific survey procedures are presented in Section 5.

5. PROCEDURES

The ORISE survey team will perform visual inspections, measurements, and sampling activities within the accessible portions of the open-land areas, or as specifically requested by the NRC. Survey activities will be conducted in accordance with the *ORAU Radiological and Environmental Survey Procedures Manual* and the *ORAU Environmental Services and Radiation Training Quality Program Manual* (ORAU 2016 and 2019a). During survey activities, ORISE will immediately inform NRC of any findings and/or recommendations.

5.1 REFERENCE SYSTEM

ORISE will reference confirmatory measurement/sampling locations to the licensee's reference system or global positioning system (GPS) coordinates. Other prominent site features also may be referenced. Measurement and sampling locations will be documented on detailed survey maps. Specific areas also may be digitally photographed.

5.2 SURFACE SCANS

Surface scans of land areas and structural surfaces will be performed with Ludlum model 44-10 sodium iodide scintillation detectors coupled to Ludlum model 2221 ratemeter-scalers with audible indicators. For the land area surveys, ratemeter-scalers may be coupled to GPS systems that enable real-time gamma count rate and spatial data capture.

Surface scans of structural surfaces will also be performed with either Ludlum model 43-68 gas proportional hand-held detectors (or equivalent) or Ludlum model 43-37 gas-flow proportional floor monitors operated in alpha-plus-beta mode. Both detector types will be coupled to Ludlum model 2221 ratemeter-scalers with audible indicators. For the structural surface surveys, ratemeter-scalers may be coupled to hand-held data loggers for electronically recording the count-rate data. Scans with the floor monitor are qualitative (scan MDCs are not calculated), but ORISE experience is that floor monitors are effective at, and efficient for, identifying low levels of surface contamination that can be quantitatively investigated using other hand-held instruments.

The Class 1 CUs will receive high-density scan coverage (i.e., 100% coverage) and Class 2 CUS will receive medium-density scan coverage (at least 50% coverage). Scan coverage will be low-density throughout the balance of the building and land area, as time allows, and will focus on other judgmentally selected areas based on the potential for material accumulation, material pathways (such as ventilation access points or drain openings) and/or other indication of residual contamination. Locations of elevated direct radiation, suggesting the presence of residual contamination, will be marked and identified for further investigation.

5.3 Surface Activity Measurements

Surface activity measurements will be performed with Ludlum model 2221 ratemeter-scalers with audible output paired with Ludlum model 43-68 gas-flow proportional detectors (or equivalent) with 0.8 mg/cm^2 thick Mylar windows. Detector efficiency will be based on the most restrictive ROC given the information available at this time, which is Co-60. An *a posteriori* efficiency may be determined based on collected data.

Direct measurement locations will be determined based on the results of scanning and at random locations. Material-specific background measurements will be collected as necessary from non-impacted materials that are, to the extent possible, of similar construction to the target materials. These background measurements will be used for correcting gross measurement counts for conversion to surface activity levels.

5.4 Surface Removable Activity Measurements

Dry smear samples, for determining gross alpha/beta activity levels, will be collected from each direct measurement location. Wet smear samples for H-3 and Ni-63 analysis will be collected in at least 10% of the locations or as requested by the NRC.

5.4 Volumetric Sampling

Soil sampling locations will be determined based on the results of scanning and at 12 random locations, as time allows. Soil samples will be collected from a depth of 0 to 15 cm using hand trowels; additional depth intervals will be collected if field investigations indicate the potential for subsurface contamination. Sampling equipment will be decontaminated after each sample to minimize the potential for cross-contamination.

Concrete samples may also be collected at judgmentally selected locations inside the G21 building.

6. SAMPLE ANALYSIS AND DATA INTERPRETATION

Samples and data collected on site will be transferred to the ORISE facility for analysis and interpretation. Sample custody will be transferred to the Radiological and Environmental Analytical Laboratory in Oak Ridge, Tennessee. Sample analyses will be performed in accordance with the *ORAU Radiological and Environmental Analytical Laboratory Procedures Manual* (ORAU 2019b). Volumetric samples will be crushed, homogenized, and a portion set aside before drying for future analyses before being analyzed by gamma spectrometry for gamma-emitting fission and activation products. For all soil samples, analytical results will be reported for the ROCs and other gamma-emitting naturally occurring radioactive material (such as the uranium, radium, etc.), for completeness. Volumetric sample results will be reported in units of gross picocuries per gram (pCi/g). Smears will be analyzed for gross alpha/gross beta activity, H-3, and Ni-63 and reported in units of disintegrations per minutes per 100 square centimeters (dpm/100 cm^2). The NRC may request additional analytes; the final confirmatory analytes list will be confirmed with NRC prior to laboratory processing of the samples. All scan results will be presented as gross counts per minute (cpm). Total surface activity measurements will be presented as net dpm/100 cm^2. Confirmatory survey findings and results will be presented in a draft report and provided to the NRC for review and comment.

7. REFERENCES

EPA 2006. *Guidance on Systematic Planning Using the Data Quality Objectives Process.* EPA QA/G-4. U.S. Environmental Protection Agency. Washington, D.C. February.

GA 1999. *General Atomics TRIGA Reactor Facility Decommissioning Plan.* Rev. 3. General Atomics. San Diego, California. July.

GA 2019. *TRIGA Reactor Facility Final Status Survey Plan.* Rev. 0. General Atomics. San Diego, California. July 15.

NRC 2002. Memorandum of Understanding Between the Environmental Protection Agency and The Nuclear Regulatory Commission: Consultation and Finality on Decommissioning and Decontamination of Contaminated Sites. U.S. Nuclear Regulatory Commission. Washington, D.C.

NRC 2006. *Consolidated Decommissioning Guidance: Characterization, Survey, and Determination of Radiological Criteria.* NUREG-1757. Vol. 2. Rev. 1. U.S, Nuclear Regulatory Commission. Washington, D.C. September.

NRC 2018a. General Atomics – TRIGA MARK I. https://www.nrc.gov/info-finder/decommissioning/research-test/general-atomics-triga-mark-i.html. Accessed July 26, 2019.

NRC 2018b. General Atomics – TRIGA MARK F. https://www.nrc.gov/info-finder/decommissioning/research-test/general-atomics-triga-mark-f.html. Accessed July 26, 2019.

ORAU 2016. *ORAU Radiological and Environmental Survey Procedures Manual.* Oak Ridge Associated Universities. Oak Ridge, Tennessee. November 10.

ORAU 2019a. *ORAU Environmental Services and Radiation Training Quality Program Manual.* Oak Ridge Associated Universities. Oak Ridge, Tennessee. April 30.

ORAU 2019b. *ORAU Radiological and Environmental Analytical Laboratory Procedures Manual.* Oak Ridge Associated Universities. Oak Ridge, Tennessee. June 27.