United States Department of Agriculture
Office of the Assistant Secretary for Administration
Office of Homeland Security and Emergency Coordination
Radiation Safety Division
5601 Sunnyside Avenue, MS 5510
Beltsville, MD 20705

L-8

November 24, 2015

US Nuclear Regulatory Commission
Region I
ATTN: Mark Roberts, Decommissioning Branch, DNMS
2100 Renaissance Boulevard
Renaissance Park
King of Prussia, PA 19406-1415

License No. 19-00915-03
Docket No. 030-04530

Dear Mr. Roberts:

This is in reference to Condition 29 of NRC License Number 19-00915-03 incorporating the Decommissioning Plan (DP) and Final Status Survey (FSS) for the low-level radioactive burial site in Beltsville, Maryland. Excavation activities at the Beltsville site have identified the actual locations and depths of buried materials (which were all within the well-defined burial site area). We have determined that the vadose zone soil and groundwater sampling and surveying protocols described in the DP and FSS are somewhat contradictory, incomplete, or are not consistent with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) guidance. The enclosed BARC Technical Memo, Post Excavation Sampling of Water and Undisturbed Soil (BTM-06 Rev. 0) dated October 2015 (developed for USDA by TPMC – Energy Solutions Services, LLC), describes proposed changes to the number and location of soil samples to be analyzed, type of radiation level surveys to be performed, and extent of area to be surveyed. These changes are consistent with MARSSIM guidance and will ensure that we obtain sufficient radioactive contamination survey data to adequately evaluate the site for release for unrestricted use.

We understand that we may have exceeded the timeframe for continuing decommissioning activities at the Beltsville site and we apologize for the delay. We have been coordinating with the Environmental Protection Agency to ensure that the soil and groundwater sampling methods described in the attached proposal comply with EPA requirements for sampling for hazardous (non-radioactive) materials at the site. The EPA has had an opportunity to review the proposal and has no objections to the proposal.

We would appreciate your expedited review of this request so that we can continue to move forward with this important work. If you have any questions, please contact me on 301-504-2441.

Sincerely,

John T. Jensen
Chief

Enclosure

BARC Technical Memo
Post Excavation Sampling of Water and Undisturbed Soil

BTM-06
Rev. 0

Low Level Radioactive Burial Site Remediation
Beltsville Agricultural Research Center
Beltsville, Maryland

Contract No. W52P1J-11-D-0001

Prepared for:

United States Department of Agriculture

Prepared by:

*TPMC-Energy*Solutions *Environmental Services*, LLC

October 2015

Technical Memo – Title Page

WORK INSTRUCTION

Project:		Project No.	91003
		TM No.	BTM-06
		Rev. No.	0
		Effective Date:	October 28, 2015

Written By/Date		
Kelly Ellis	October 28, 2015	Kelly D Ellis
Reviewed By/Date		
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Approved By/Date		
Dan Caputo	October 28, 2015	

Title: Post Excavation Sampling of Water and Undisturbed Soil

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1.0 PURPOSE

This document details the approach for post excavation sampling of undisturbed soil and water for the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) closure and the Nuclear Regulatory Commission (NRC) license termination of the Beltsville Agricultural Research Center Low Level Radioactive Burial Site, (BARC LLRBS).

2.0 BACKGROUND

The USDA located in Beltsville, MD requires the free release/decommissioning, NRC license termination, and CERCLA closure of the BARC LLRBS. The BARC LLRBS decommissioning plan (DP) was prepared by Cabrera Services for the United States Department of Agriculture (USDA) and approved by the NRC in January 2012. TPMC-Energy*Solutions* Environmental Services 2008, LLC (TES) was selected to perform the decommissioning activities and began site mobilization in May 2013. TES completed major site decommissioning activities and demobilized from the site in August 2014.

3.0 POST EXCAVATION SAMPLING FOR EPA CLOSURE

The BARC project was planned with an emphasis on the termination of the BARC LLRBS NRC license. Consequently the BARC project documents contain limited guidance regarding CERCLA closure. Excerpts from the BARC project documents that contain guidance regarding CERCLA closure are provided below. The Environmental Protection Agency (EPA) is in general agreement with the need for site closure and for the proposed vadose zone soil and water sampling plan, which is described in Section 3.4.

3.1 BARC Performance Work Statement (PWS) CERCLA Closure Guidance

The following excerpts are from the PWS:

(TASK 4) Site Sampling

Once the NRC has free released the site the CERCLA related sampling requirements may be conducted. If the CERCLA sampling does not interfere with the NRC free release requirements, sampling can be performed concurrently. The analysis of the soil samples to be collected will include the EPA Target Compound List for Volatile organic compounds (Method 8260B, BETX (Method 8020/8021), Semi-volatile organic compounds (Method 8270C), Polynuclear Aromatics (PAH 8207C), Organochlorine Pesticides (Method 8081A), Organophosphorus Pesticides (Method 8141), Herbicides (Method 8151) and EDB and DBCP (Method 8011).

The number of NRC closure samples is based on the estimates from the DP and the MARSSIM (NUREG-1575, Multi Agency Radiation Survey and Site Investigation Manual) requirements. The CERCLA analytical soil samples are based on the collection of 10 discrete soil samples from 0-6 inches (See attachment 4). The main waste streams that are projected to be developed during this project are Mixed waste (organics, LSV, etc), Hazardous waste (metals, organics, etc), LLRW (NORM and small sources), and contaminated soil. Projected amounts of each type of material are described in the DP. These samples will be used to release the site for the NRC and the EPA. All sample data results must be in Level 4 data packs. Samples are required to have independent third party verification of the results.

TASK 8. FINAL STATUS SURVEY REPORT (FSSR)

A stand-alone data report will be submitted and shall contain the required documentation to evaluate the site for further action under the CERCLA program. This data report will contain figures, photos, and data result tables (data shall be linked to GPS and downloaded to a posting plot). Data validation will follow the requirements as set forth in the USDA 2007 BARC Master Quality Assurance Project Plan. This document will provide the appropriate data review and summary for the final post removal sampling. These results are to be compared to the EPA Region III's RBC for a potential no further action risk evaluation. This document will present those contaminants of potential concern that remain above the RBC's for soil.

3.2 BARC DP CERCLA Closure Guidance

The following excerpts are from the BARC DP:

5.3 Surface and Groundwater

... As part of the subsequent BARC CERCLA investigation, semiannual groundwater monitoring will continue for the next five years.

8.1 Effluent Monitoring Program

Since groundwater monitoring is continuing on a semi-annual basis as part of the BARC CERCLA investigation, additional monitoring will not be needed as a part of the DP.

3.3 BARC Sampling and Analysis Plan (SAP) CERCLA Closure Guidance

The following excerpts are from the BARC SAP, Rev. 1:

SAP WORKSHEET #14 – SUMMARY OF PROJECT TASKS

Once the NRC has free released the site the CERCLA related sampling requirements will be conducted. If the CERCLA sampling does not interfere with the NRC free release requirements, sampling can be performed concurrently. The CERCLA Sampling Design, including the specific number and location of samples, will be determined when excavation is nearly complete in order to appropriately quantify the sample area and identify any biased sample locations. The CERCLA Sampling Design will be appended to this SAP and then reviewed and approved as a revision to the SAP.

Analysis

EPA Target Compound List for Volatile organic compounds (Method 8260B), Semi-volatile organic compounds (Method 8270C), Organochlorine Pesticides (Method 8081A), Organophosphorus Pesticides (Method 8141), Herbicides (Method 8151) and TAL metals (6010B and 7471) - Off-site Laboratory

3.4 Amended BARC CERCLA Sampling Effort

The BARC LLRBS CERCLA Sampling Design, as agreed upon by USDA and EPA, is detailed in the following subsections.

3.4.1 CERCLA Sample Locations

The CERCLA sample design consists of the following sample types and locations:

Soil samples will be collected from the 0-6 inch interval of undisturbed soil at 12 locations within the excavation (see Figure 1 and 2);

Groundwater samples will be collected from 14 locations within the excavation (see Figure 1 and 2);

Figure 1
Excavation Sample Locations

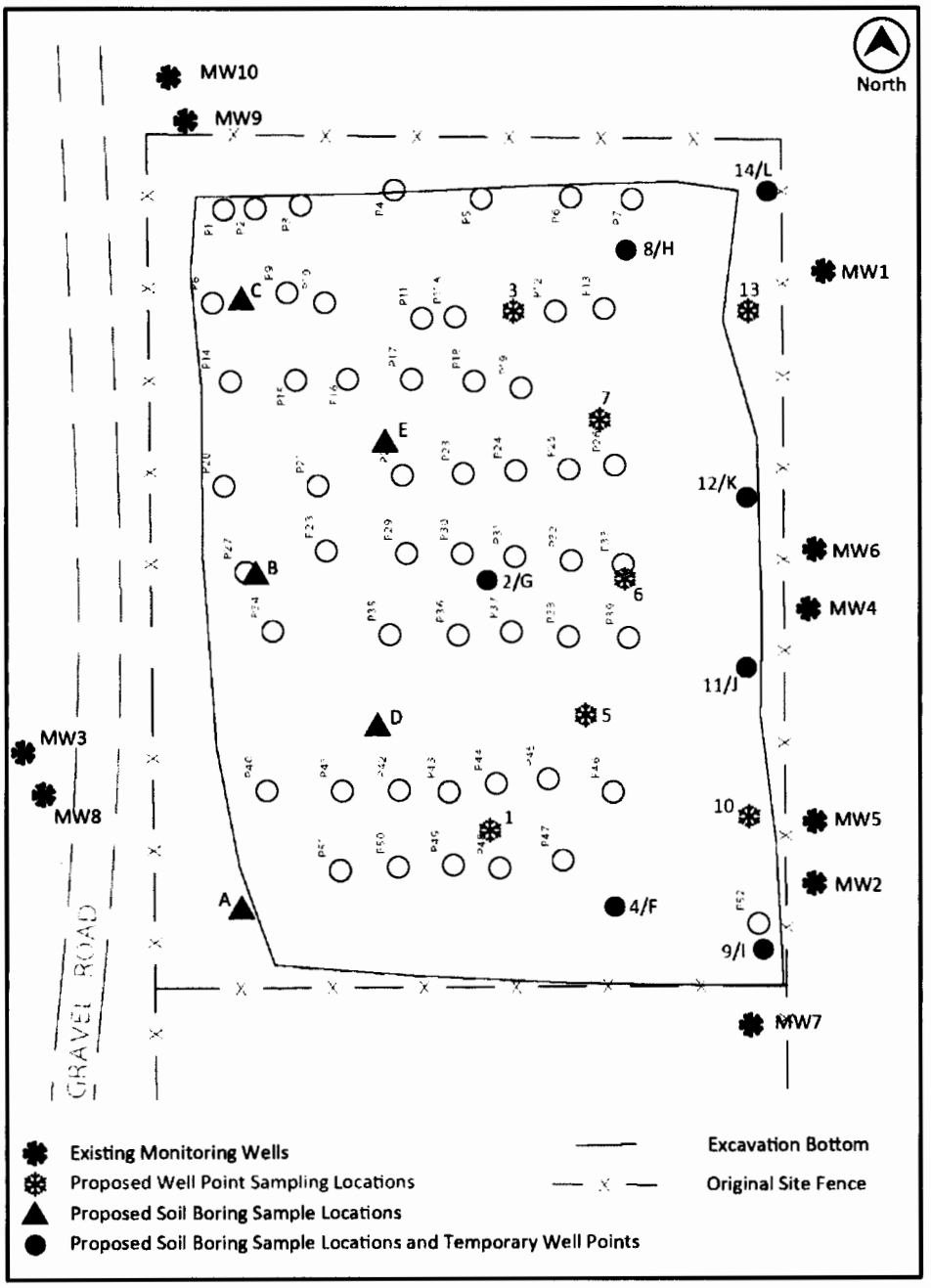
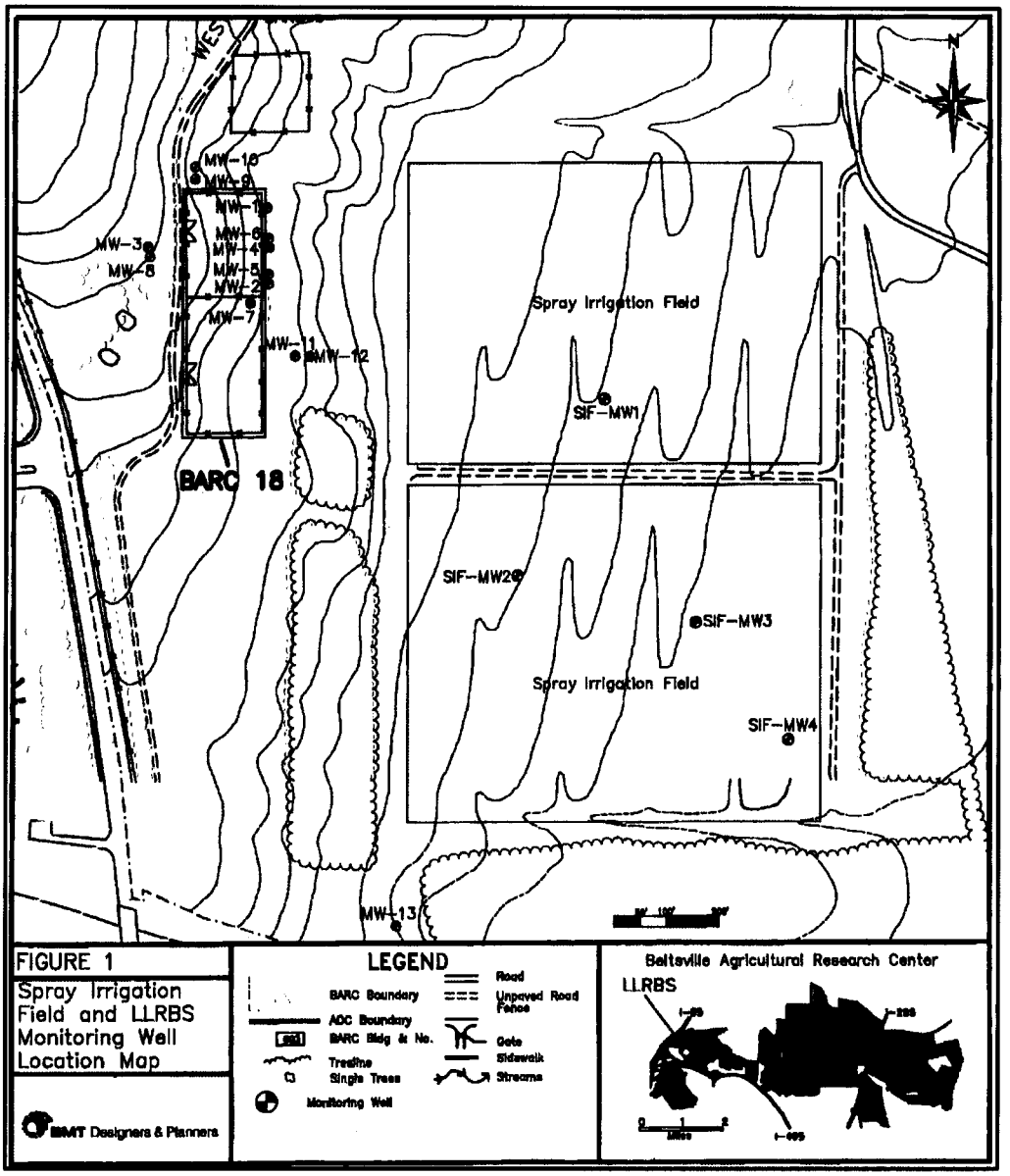


Figure 2
Excavation Sample Locations with Satellite Background Image

Groundwater samples will be collected from 13 existing monitoring wells (see Figure 3);

Groundwater samples will be collected from 4 new monitoring wells in the spray irrigation fields (see Figure 3);

Figure 3
Monitoring Well Sample Locations



Three surface water samples will be collected from the Little Paint Branch Creek.

Figure 4
BARC LLRBS Excavation and Little Paint Branch Creek

3.4.2 CERCLA Closure Sampling Method for Soil

Samples will be collected from each designated soil sample location in the following manner:

The borings will be collected using the direct push method. A soil sample, of sufficient quantity to support the specified laboratory analyses, will be collected from the top 6 inches of the first soil core comprised of undisturbed soil. This will include the collection of three 5-gram En Core® samples for Volatile Organic Chemical (VOC) analysis.

3.4.3 CERCLA Closure Sampling Method for Vadose Zone Groundwater.

Each designated boring/monitoring well will be sampled for groundwater. A filtered water sample, of sufficient quantity to support the specified laboratory analyses, will be collected in a manner that is consistent with EPA's low flow groundwater sampling protocol (EQASOP-GW 001 dated January 19, 2010). When performing low flow groundwater sampling, water quality parameters including dissolved oxygen, temperature, salinity, pH, specific conductivity, oxidation-reduction potential (ORP), and turbidity will be measured and recorded. Sampling will be performed once all parameters have stabilized per EPA guidance documents.

Three additional 40ml Volatile Organic Analysis (VOA) vials will be collected from the unfiltered groundwater sample for VOC analysis.

3.4.4 CERCLA Closure Sample Analyses

The list of analyses presented below has been developed with the cooperation of EPA and USDA for the analysis of samples collected to support CERCLA closure of the BARC LLRBS:

Chemical Contaminants of Concern:

Volatile organic compounds	Method 8260C
Semi-volatile organic compounds (including 1,4-Dioxane)	Method 8270D
Organochlorine Pesticides	Method 8081B
Polychlorinated Biphenyls (PCBs)	Method 8082A
Herbicides	Method 8151A
TAL (Target Analyte List) metals	Method 6010C
Mercury	Method 7470A

Radiological Contaminants of Concern:

Ra-226 and other gamma emitting nuclides (e.g., Cs-137, Pb-210)	EPA 901.1
Sr-90	DOE 905.0
H-3 (Tritium)	EPA 906.0

C-14	EERF C-01-1
Cl-36	TAL-STL ST-RC-0036
Ni-59/Ni-63	TAL-STL ST-RC-0055

These analyses will be performed on both soil and groundwater samples.

4.0 POST EXCAVATION SAMPLING FOR NRC LICENSE TERMINATION

The Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM, NUREG 1575) provides information on planning, conducting, evaluating, and documenting building and surface soil final status radiological surveys for demonstrating compliance with dose or risk-based regulations or standards. MARSSIM is a multi-agency consensus document that was developed collaboratively by four Federal agencies having authority and control over radioactive materials: Department of Defense (DOD), Department of Energy (DOE), EPA, and NRC. Its objective is to provide a consistent approach for building and surface soil final status surveys to meet established dose or risk-based release criteria, while at the same time encouraging an effective use of resources.

The goal of NUREG/CR-7021 is to extend MARSSIM principles (average and local checks) into the vadose zone.

The DP, which includes the Final Status Survey Plan (FSSP), is part of the USDA's radioactive material license. It provides historical information regarding the BARC LLRBS and defines the requirements for the performance of decommissioning activities. The BARC LLRBS FSSP attempts to apply MARSSIM principles, written for surface evaluations, to BARC LLRBS license termination activities, which involve subsurface evaluations.

4.1 Current Vadose Zone Final Status Survey (FSS) Sampling Requirements

The following excerpt from the FSSP details the existing vadose zone FSS sampling requirements.

> *Section 3.10 Direct Push Sampling*
>
> *To characterize the deeper subsurface vadose zone soils and groundwater below each disposal pit, a direct push sampling system (or equivalent) will be lowered into the disposal pit and core samples will be collected from the center of the disposal pit in four-foot lengths until groundwater is reached.*
>
> *Four-foot Geoprobe™ core sections will be advanced until the groundwater interface is reached. Each four-foot Geoprobe™ core section will be surveyed for beta and gamma radiation, and one soil sample will be collected from the location exhibiting the most elevated activity from the four soil cores. A composite sample will be collected from the top foot of the first soil core, comprising the floor of the disposal pit. Another sample will be collected at the soil interface with groundwater. Therefore it is anticipated that three subsurface soil samples from each disposal pit will be selected and submitted for laboratory analysis. It is anticipated that the water table will be encountered approximately 25 feet below original surface grade in the vicinity of LLRBS and that the floor of each disposal pit will be encountered approximately 10 feet below original surface grade.*
>
> *Filtered and unfiltered groundwater samples will be collected from a temporary well.*

Therefore, if executed as currently approved, 265 samples will be collected and analyzed to evaluate the vadose zone for the FSS.

4.2 NUREG/CR-7021, *A Subsurface Decision Model for Supporting Environmental Compliance*

The following excerpts from NUREG/CR-7021 highlight guidance that is relevant to vadose zone FSS evaluation at the BARC project.

Section 1, Introduction

...The best alternative from a conservative public health perspective is to respond to these limitations by removing the entire subsurface in the impacted region. The boundary of the impact region could be checked by MARSSIM techniques. After removal is complete, the newly revealed subterranean surface could be approached with the surface methods described in MARSSIM.

Section 3, Overview of the Subsurface Decision Framework

In a surface assessment, exposure scenarios are well defined, measurements are easily accessible, and comprehensive scans provide a safety net regarding whether a survey unit is safe or not. MARSSIM takes advantage of these factors through a well-defined set of hypothesis tests and scanning technologies to determine number and placement of samples. In the subsurface, exposure scenarios are less clear, measurements are highly inaccessible, and no comprehensive scans exist. In lieu of some technological breakthrough in subsurface measurements, there are only three broad possibilities.

1. *Continue to approach the problem in a rigid and classical manner despite the lack of comprehensive scanning data and the cost of sample collection. Accept only the highest quality measurements and use only simple, formal hypothesis tests. The number of samples is likely to be few in number, highly correlated, and poorly represent the total volume of the study area. While a MARSSIM styled hypothesis test, such as Sign Test or Wilcoxon Rank sum, can certainly be applied, its practical worth may be highly questionable without a clear exposure outcome that depends on the site average.*

2. *Dig the entire site up and sample or scan as you go. For example, scrape off a few inches to a foot or so at a time and MARSSIM is repeated on each revealed surface until a level is reached that passes.*

3. *Acknowledge the reality of the situation, including the cost of lab measurements, the severe limitations of scanning, the heterogeneity of the subsurface, and the likely presence of spatial correlation. Use a framework that can bring and use all information and knowledge available, particularly those with an emphasis on the spatial context. Such a framework should integrate and maximize various types of input, resulting in a better informed decision.*

The first option simply is not feasible, as a matter of course. The number of lab measurements is likely to be insufficient to make any kind of decision at a fine spatial granularity (i.e., local activity). In addition, the spatial context is almost completely impossible to ignore when dealing with the subsurface. The second option may be preferable from a public view but may not be affordable from a principle party's view, except for well-funded or small sites. That is, remove anything that might possibly be contaminated, including a lot of uncontaminated soil, if necessary. In lieu of remediation for the entire site, this discussion will focus on the final option.

Section 9, Compliance Support Phase

Sample Size (Number of Samples)

As discussed in the scoping phase, some sample designs, such as check and cover, can provide a metric based determination of the number of samples. Designs that place new samples based on minimizing or maximizing some value can report the progress as each new sample is produced. In the case of check and cover, the goal is to minimize the maximum sum of value-weighted distances. In Figure 9.10, the addition of each new sample produces a smaller minimization. Eventually, the curve will flatten out, indicating a smaller return on investment for each additional sample.

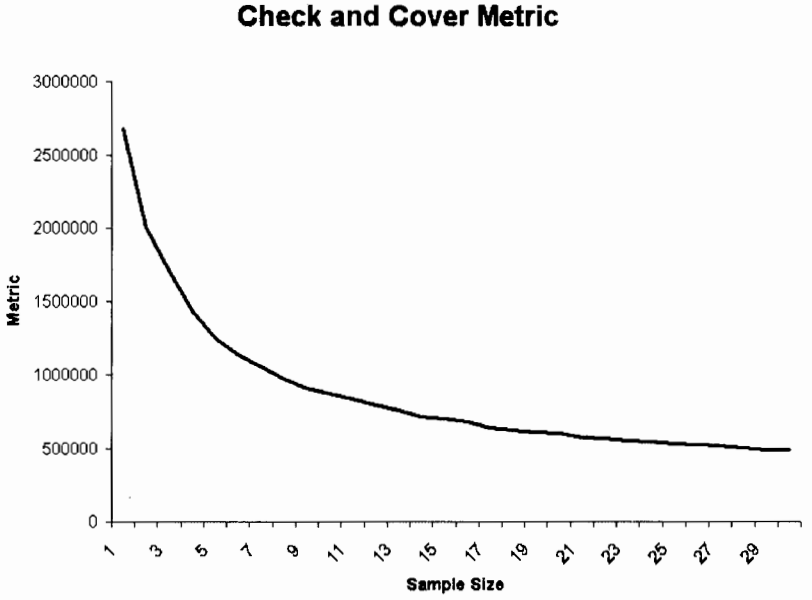
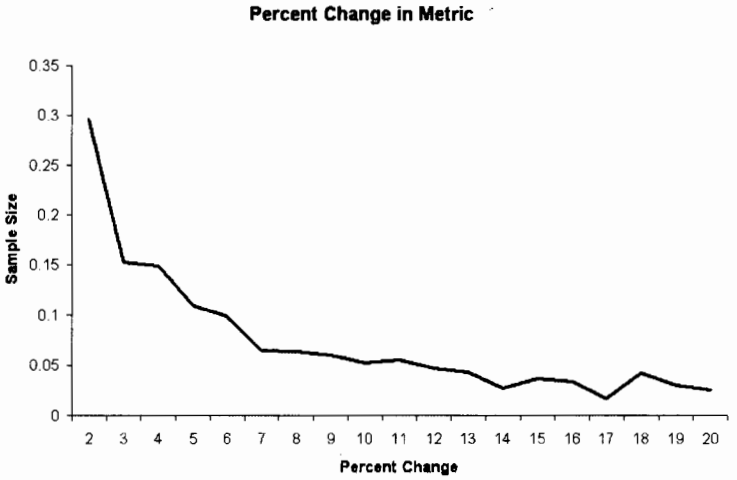


Figure 9.10 Sample design metrics can indicate when each additional sample is providing little additional information.

As the curve flattens out, the value of each sample in discovering an elevated zone is diminishing. From a compliance support view, the number of samples could be selected based on this shape while considering the cost of each new sample. The cost of each sample can be offset through the use of field detection and secondary measurement values. This approach provides a connection between the goal of sound science and the reality of financial limitations.

For the NUREG/CR-7021 Example Case, after about 11 samples, the percent change is less than 5%. Therefore 11 samples were chosen for evaluating the NUREG/CR-7021 Example Case.



4.3 Comparison of NUREG/CR-7021 Guidance to FSSP Requirements

The preferred method identified in NUREG/CR-7021 (ignoring cost) is to dig up the entire site and sample and/or scan as you go. This method provides high confidence that residual radioactivity is within prescribed limits and eliminates access limitations normally associated with vadose zone evaluation. When this method is employed geo-probe sampling is not normally required as the lower physical boundary of the impacted zone is evaluated using normal MARSSIM protocols.

One could argue that this method has been employed at the BARC project and that no further vadose zone FSS sampling is required. However a more conservative solution is to further evaluate the remaining vadose zone of the LLRBS excavation in the manner previously described in Section 3.4 for CERCLA sampling. The number of vadose zone sample locations inside the excavation is more conservative than the recommendations presented in NUREG/CR-7021. Therefore the proposed methodology is consistent with the NUREG/CR-7021 interpretation of the MARSSIM guidance. The 26 sample locations that have been identified inside the excavation area for CERCLA sampling will serve as vadose zone FSS sample locations, consisting of 12 soil samples and 14 water samples.

5.0 SUMMARY

The observations presented in this technical memo are summarized below:

1. CERCLA closure sampling will consist of the following:
    a. Soil samples will be collected from the 0-6 inch interval of undisturbed soil at 12 locations within the excavation;
    b. Groundwater samples will be collected from 14 locations within the excavation;
    c. Groundwater samples will be collected from 13 existing monitoring wells;

d. Groundwater samples will be collected from 4 new monitoring wells in the spray irrigation fields;

e. Three surface water samples will be collected from the Little Paint Branch Creek.

2. Vadose zone FSS sampling will consist of the following:

   a. Soil samples will be collected from the 0-6 inch interval of undisturbed soil at 12 locations within the excavation;

   b. Groundwater samples will be collected from 14 locations within the excavation;

3. The soil borings will be collected using the direct push method. A soil sample, of sufficient quantity to support the specified laboratory analyses, will be collected from the top 6 inches of the first soil core comprised of undisturbed soil. This will include the collection of three 5-gram En Core® samples for VOC analysis.

4. Each designated boring/monitoring well will be sampled for groundwater. A filtered water sample, of sufficient quantity to support the specified laboratory analyses, will be collected in a manner that is consistent with EPA's low flow groundwater sampling protocol (EQASOP-GW 001 dated January 19, 2010). When performing low flow groundwater sampling, water quality parameters including dissolved oxygen, temperature, salinity, pH, specific conductivity, ORP, and turbidity will be measured and recorded. Sampling will be performed once all parameters have stabilized per EPA guidance documents.

   a. Three additional 40ml VOA vials will be collected from the unfiltered groundwater sample for VOC analysis.

6.0 REFERENCES

Correspondence; Dana Jackson (USDA) to Sarah Kloss (EPA) dated Tuesday, February 03, 2015 5:04 PM. Subject: FW: Sampling Parameters

DoD, DOE, NRC, and EPA; Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), NUREG-1575, Rev. 1, August 2000.

A Subsurface Decision Model for Supporting Environmental Compliance, NUREG/CR-7021, January 2012

CABRERA SERVICES, Decommissioning Plan, BARC LLRWS. Revised Final. January 2012.

This is to acknowledge the receipt of your letter/application dated November 24, 2015, and to inform you that the initial processing which includes an administrative review has been performed.

Amendment (19-00915-03)

☒ There were no administrative omissions. Your application was assigned to a technical reviewer. Please note that the technical review may identify additional omissions or require additional information.

☐ Please provide to this office within 30 days of your receipt of this card

_____.

A copy of your action has been forwarded to our License Fee & Accounts Receivable Branch, who will contact you separately if there is a fee issue involved.

Your action has been assigned **Mail Control Number** 589450.
When calling to inquire about this action, please refer to this control number.
You may call us on (610) 337-5398, or 337-5260.

NRC FORM 532 (RI)
(6-96)

Sincerely,
Licensing Assistance Team Leader