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QUARRY PROPER CONFIRMATION PLAN

WELDON SPRING SITE REMEDIAL ACTION PROJECT
WELDON SPRING, MISSOURI

JULY 2000 **REV. 0**

U.S. Department of Energy
Oak Ridge Operations Office
Weldon Spring Site Remedial Action Project

Prepared by MK-Ferguson Company and Jacobs Engineering Group

MORRISON KNUDSEN CORPORATION MK-FERGUSON GROUP Weldon Spring Site Remedial Action Project Contract No. DE-AC05-86OR21548	
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APPROVALS

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Weldon Spring Site Remedial Action Project

Quarry Proper Confirmation Plan

Revision 0

July 2000

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ABSTRACT

The Quarry Residual Operable Unit (QROU) is one of four operable units comprising the Weldon Spring Site Remedial Action Project (WSSRAP). The *Remedial Design/Remedial Action Work Plan for the QROU* outlines the removal of residually contaminated soils at three locations within the quarry proper. This confirmation plan describes the sampling strategy for collecting samples after excavation has been completed to design limits. The purpose of the sampling is to confirm that remaining soil concentrations meet the applicable excavation design goals for each radiological contaminant. The sampling approach and evaluation of associated data will be based on the *Chemical Plant Area Cleanup Attainment Confirmation Plan*.

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1. INTRODUCTION

This plan outlines the sampling program to be performed after excavation of radiologically contaminated soils from three specific areas in the quarry proper. Sampling is being performed to confirm that remaining soil concentrations meet the applicable excavation design goals as outlined in the *Remedial Design/Remedial Action Work Plan for the Quarry Residuals Operable Unit* (Ref. 1).

Excavation limits have been established using characterization data and the radiological cleanup criteria presented in the *Record of Decision for Remedial Action at the Chemical Plant Area of the Weldon Spring Site* (Ref. 2). Application of these levels was discussed in the *Record of Decision for the Quarry Residuals Operable Unit* (Ref. 3).

The sampling approach and evaluation of associated data will be based on the *Chemical Plant Area Cleanup Attainment Confirmation Plan* (*Attainment Plan*) (Ref. 4) because:

- The data quality objectives for this sampling will be the same as those for the chemical plant area.
- The excavation design goals are based on cleanup criteria presented in the *Record of Decision for Remedial Action at the Chemical Plant Area*.
- Confirmation of each area will be conservative due to the use of smaller confirmation units than those specified in the *Attainment Plan*.

1.1 Purpose

The purpose of this plan is to provide a detailed sampling strategy for performing and documenting confirmation sampling in three areas in the quarry proper. This plan designates the sampling frequency, specific locations, associated sample identifications, coordinates, analytical parameters, field radiological scanning, and the sampling protocol. This information will ensure successful removal of soils exceeding excavation design goals.

1.2 Scope

The scope of this plan addresses the following areas:

- The snake pit area in the northwestern portion of the quarry proper.
- The northeast slope area of the quarry proper.
- The ditch area adjacent to the transfer station in the quarry staging area.

2. BACKGROUND

The *Record of Decision for Remedial Action for the Quarry Residuals Operable Unit* (Ref. 3) identified a need to define the extent of radiological soil contamination at the northeast slope and in the ditch area near the transfer station. Soils will be removed from these two areas, as well as from the snake pit area, during the first phase of the quarry restoration project. Selection of soils to be removed were based on review of the existing characterization data and results of recent characterization activities (Refs 5, 6, and 7). Remediation of the northeast slope area and the ditch area is not required based on the requirements outlined in the *Record of Decision*. However, removal of these soils has been included in the quarry restoration project for the following reasons (see Ref. 1):

1. To further reduce the already acceptable risk levels in the quarry proper.
2. The on-site cell for disposal is currently available for disposal.
3. The potential to release the property as surplus.

Excavation limits for the three subject areas are documented in Work Package 505X, *Quarry Restoration Contaminated Materials Removal*. Excavation limits for the ditch area and the snake pit area have been established using subsurface criteria. Limits for the northeast slope area are based on surface criteria. Subsurface criteria have been selected for the ditch area and the snake pit area because these areas will be backfilled with more than 2 ft of clean fill material at the completion of restoration activities. Surface criteria have been selected for the northeast slope area because of the greater potential for erosion that could cause these soils to be exposed after restoration is complete.

3. SAMPLING

Each excavation area will be managed as a separate confirmation unit. Chemical plant confirmation units are typically 2,000 m^2 in size; however, the units at the quarry will be smaller because of the discrete locations of soil being removed.

3.1 Sampling Frequency

Section 4 of the *Attainment Plan* (Ref. 4) describes the statistical analysis that was used to determine the appropriate sampling frequency for each confirmation unit. Using the same approach at the quarry, it will be necessary to collect 25 samples from each confirmation unit. This value is used since the only contaminants of interest are radiological.

3.2 Field Survey

Prior to sample collection, each confirmation unit will be field surveyed for 1.5 times above background levels of gamma-emitting radioactivity with a 2-in. by 2-in. sodium iodide (NaI) scintillation detector. The field meter readings will consist of "walk-over" profiles spaced on 1 m centers extending across the entire unit. Results of the field survey will be noted on the Radiological Survey Form and/or logbook. Locations of elevated radiological activity ("hot spots") will be evaluated as detailed in the *Attainment Plan*.

3.3 Sampling Locations

In order to attain at least 25 samples in each excavation area, a 10-ft by 10-ft grid will be used (Figures 3-1 through 3-3). In the three areas, data indicate that the bottom of the excavation will extend to the top of bedrock. If a sample location is sited on the bedrock surface, another sample will be collected in a soil area in order to collect 25 samples in each unit. A summary of the proposed sampling locations with respective sample IDs and coordinates is provided in Table 3-1.

Table 3-1 Summary of Confirmation Sampling Locations

SAMPLE ID	NORTHING	EASTING
Northeast Slope Area (RU 027 CU 411)		
SC-41101-S	1028970	748490
SC-41102-S	1028970	748500
SC-41103-S	1028970	748510
SC-41104-S	1028960	748490
SC-41105-S	1028960	748500
SC-41106-S	1028960	748510
SC-41107-S	1028950	748490

Table 3-1 Summary of Confirmation Sampling Locations (Continued)

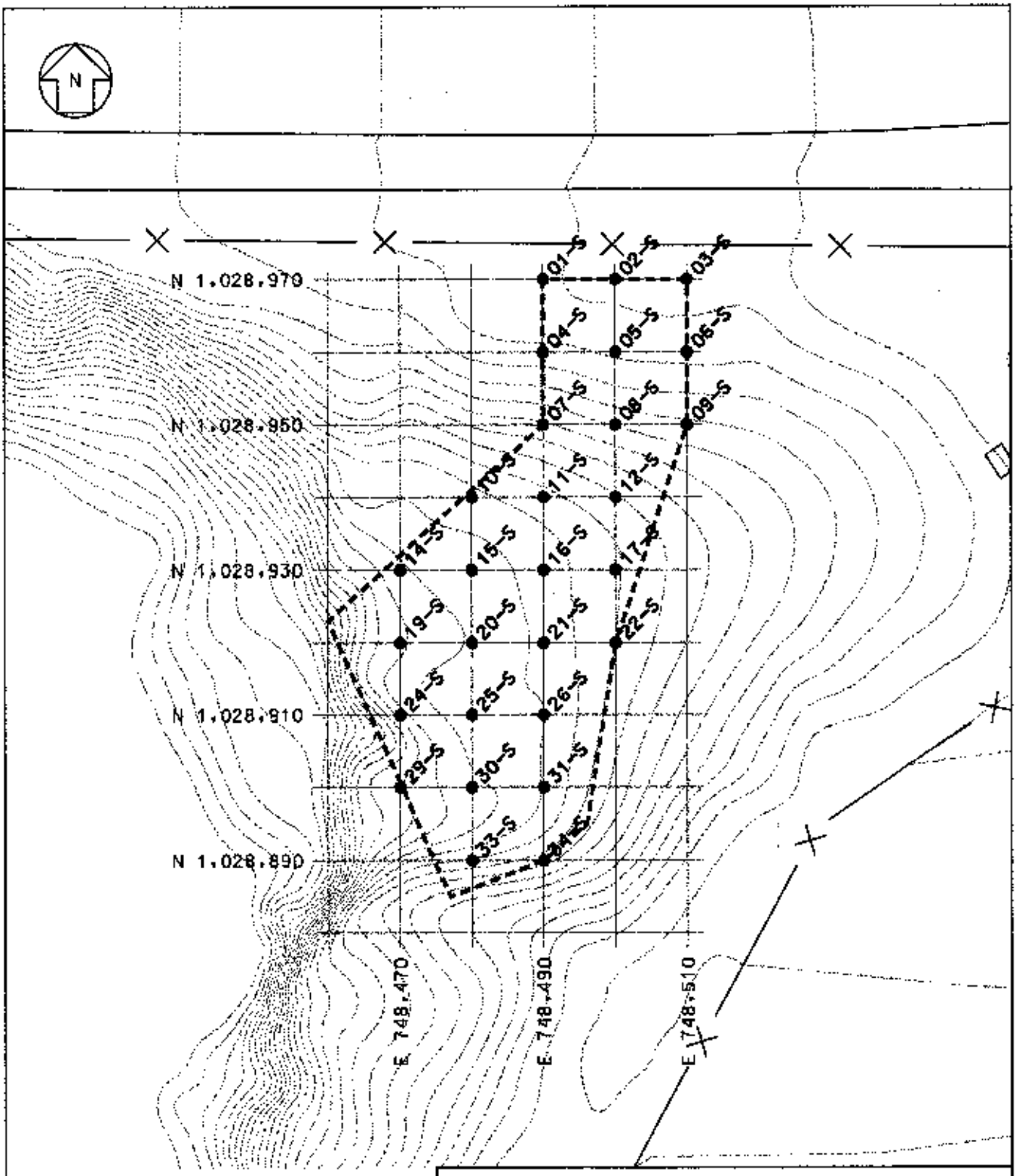
SAMPLE ID	NORTHING	EASTING
Northeast Slope Area (RU 027 CU 411) (Continued)		
SC-41108-S	1028950	748500
SC-41109-S	1028950	748510
SC-41110-S	1028940	748480
SC-41111-S	1028940	748490
SC-41112-S	1028940	748500
SC-41114-S	1028930	748470
SC-41115-S	1028930	748480
SC-41116-S	1028930	748490
SC-41117-S	1028930	748500
SC-41119-S	1028920	748470
SC-41120-S	1028920	748480
SC-41121-S	1028920	748490
SC-41122-S	1028920	748500
SC-41124-S	1028910	748470
SC-41125-S	1028910	748480
SC-41126-S	1028910	748490
SC-41129-S	1028900	748470
SC-41130-S	1028900	748480
SC-41131-S	1028900	748490
SC-41133-S	1028890	748480
SC-41134-S	1028890	748490
Ditch Area (RU 027 CU 412)		
SC-41202-S	1028745	747720
SC-41203-S	1028745	747730
SC-41204-S	1028745	747740
SC-41205-S	1028745	747750
SC-41206-S	1028745	747760
SC-41207-S	1028745	747770
SC-41209-S	1028735	747720
SC-41210-S	1028735	747730
SC-41211-S	1028735	747740
SC-41212-S	1028735	747750
SC-41213-S	1028735	747760
SC-41214-S	1028735	747770
SC-41215-S	1028735	747780
SC-41216-S	1028735	747790
SC-41218-S	1028725	747720
SC-41219-S	1028725	747730
SC-41220-S	1028725	747740
SC-41220-C	1028730	747745
SC-41221-S	1028725	747750
SC-41221-C	1028730	747755
SC-41222-C	1028730	747765
SC-41226-S	1028715	747710
SC-41226-C	1028720	747715
SC-41227-S	1028715	747720
SC-41227-C	1028720	747725
Snake Pit Area (RU 027 CU 413)		
SC-41301-S	1028960	747800
SC-41302-S	1028960	747810
SC-41303-S	1028960	747820

Table 3-1 Summary of Confirmation Sampling Locations (Continued)

SAMPLE ID	NORTHING	EASTING
Snake Pit Area (RU 027 CU 413) (Continued)		
SC-41304-S	1028950	747790
SC-41305-S	1028950	747800
SC-41306-S	1028950	747810
SC-41307-S	1028950	747820
SC-41308-S	1028940	747780
SC-41309-S	1028940	747790
SC-41310-S	1028940	747800
SC-41311-S	1028940	747810
SC-41312-S	1028940	747820
SC-41313-S	1028930	747780
SC-41314-S	1028930	747790
SC-41315-S	1028930	747800
SC-41316-S	1028930	747810
SC-41317-S	1028920	747780
SC-41318-S	1028920	747790
SC-41319-S	1028920	747800
SC-41320-S	1028920	747810
SC-41321-S	1028910	747780
SC-41322-S	1028910	747790
SC-41323-S	1028910	747800
SC-41324-S	1028900	747780
SC-41325-S	1028900	747790
SC-41326-S	1028900	747800
SC-41327-S	1028890	747770
SC-41328-S	1028890	747780
SC-41329-S	1028890	747790
SC-41330-S	1028880	747760
SC-41331-S	1028880	747770
SC-41332-S	1028880	747780
SC-41333-S	1028870	747760
SC-41334-S	1028870	747770
SC-41335-S	1028860	747760

3.4 Sample Identification

All containers will be labeled in accordance with procedure *ES&H 4.1.1, Numbering System for Environmental Samples and Sampling Locations*. Sample numbers will be as designated in Table 3-1. Sample locations, samples collected, and related data will be recorded in the field logbook at the time of collection in accordance with Procedure *ES&H 1.1.4, Logbook Procedure*.



CONFIRMATION SAMPLING LOCATIONS
AT THE NORTHEAST SLOPE
(RU027CU411)

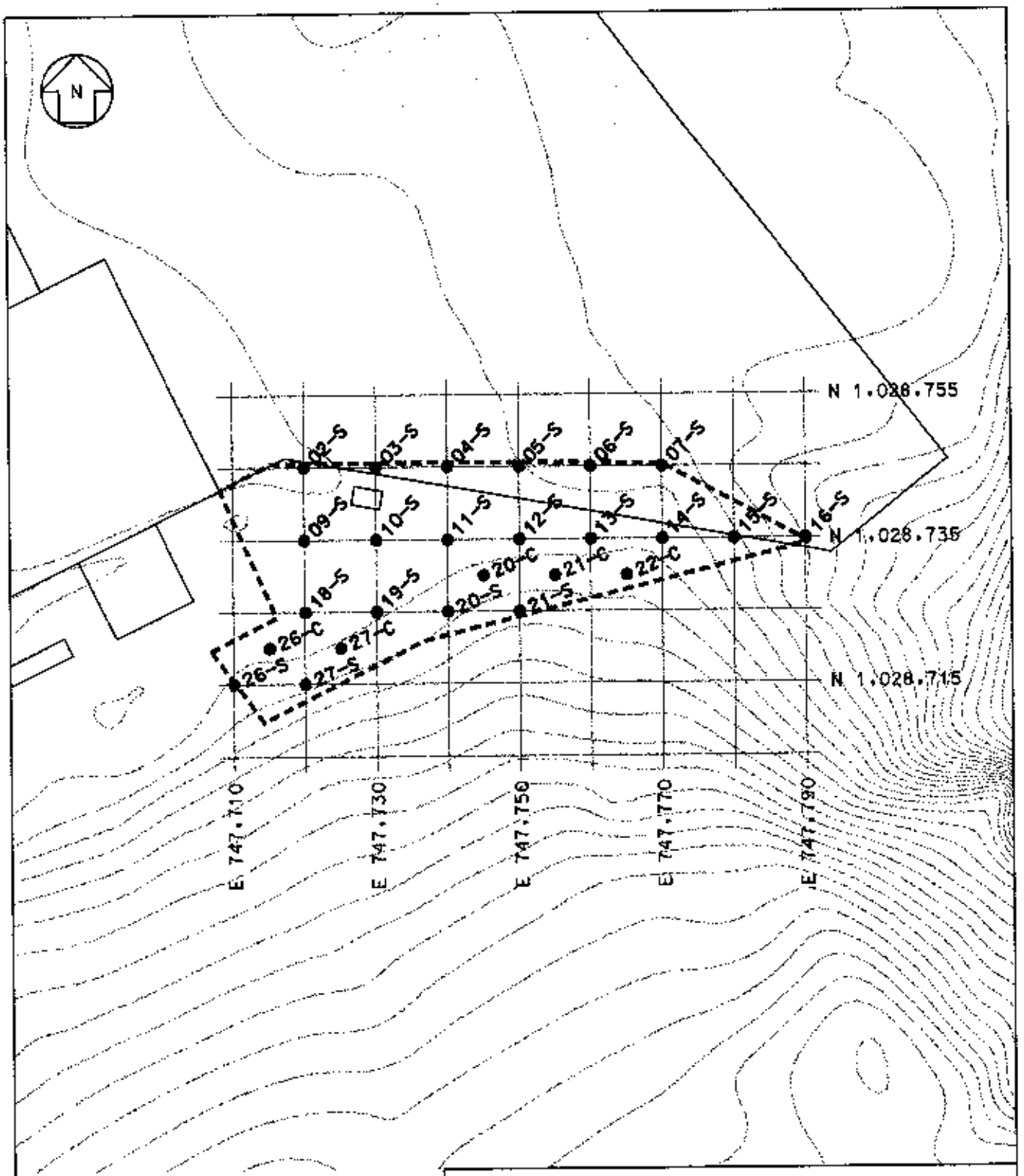
● - SAMPLE POINT

0 20 40

SCALE FEET

FIGURE 3-1

REPORT NO.: DOE/OR/21548-866		EXHIBIT NO.: A/QY/026/0700	
ORIGINATOR: RC	DRAWN BY: GLN	DATE: 7/12/00	



CONFIRMATION SAMPLING LOCATIONS
AT THE DITCH AREA
(RU027CU412)

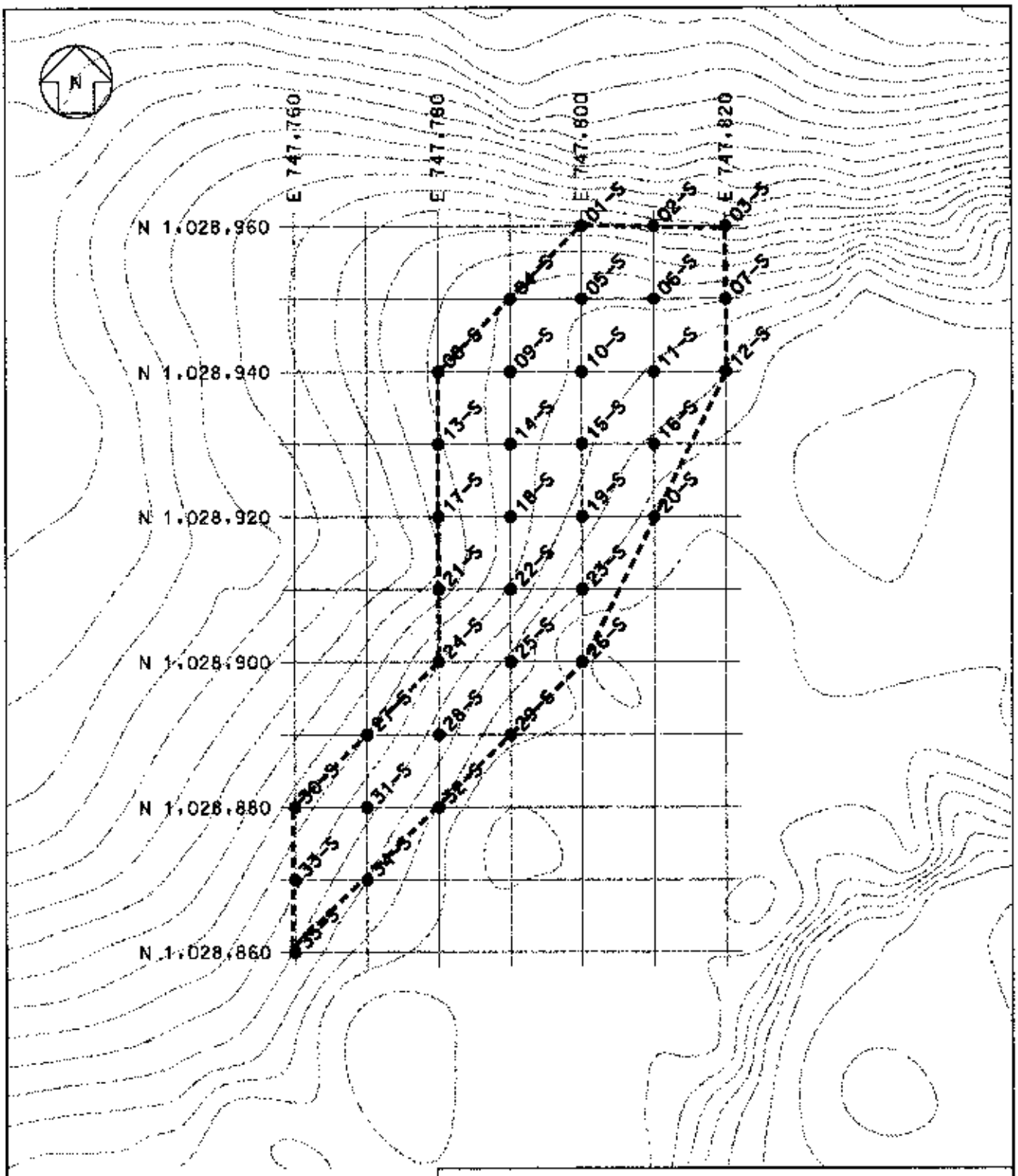
● - SAMPLE POINT

0 20 40

SCALE FEET

FIGURE 3-2

REPORT NO.: DOE/OR/21548-860		EXHIBIT NO.: A/QY/027/0700	
ORIGINATOR: RC	DRAWN BY: GLN	DATE: 7/12/00	



CONFIRMATION SAMPLING LOCATIONS
AT THE SNAKE PIT AREA
(RU027CU413)

● - SAMPLE POINT

0 20 40

SCALE FEET

FIGURE 3-3

REPORT NO.: DOE/OR/21548-866		EXHIBIT NO.: A/QY/028/0700	
ORIGINATOR: RC	DRAWN BY: GLN	DATE: 7/12/00	

3.5 Sample Collection

Samples will be collected from the upper 6 in. of the excavation surface. Samples may be collected using a trowel or equivalent. All sample collection will be performed in accordance with procedure *ES&H 4.4.5, Soil/Sediment Sampling*. As necessary, large rocks, gravel, roots, and other debris will be removed from the samples before they are placed in sample containers.

3.6 Sample Containers and Preservation Methods

Efforts will be made to have the radiological samples analyzed at the on-site laboratory. If the samples cannot be analyzed there due to other project priorities, they will be sent to an off-site contract laboratory. Table 3-2 summarizes the appropriate containers and preservation methods for radiological samples.

Table 3-2 Radiological Sample Containers and Preservation – Soil

LABORATORY	CONTAINERS	PRESERVATION
On-site	1 gal plastic bag (minimum of 500 g of soil)	Not applicable
Off-site	250 ml plastic jar	Not applicable

3.5 Equipment Decontamination

Tools used to collect and transfer samples will be decontaminated between each sample. All decontamination will be performed in accordance with procedure *ES&H 4.1.3, Sampling Equipment Decontamination*.

4. ANALYTICAL METHODS

All post-excavation samples will be analyzed for Ra-226, Ra-228, Th-230, and U-238. These analyses will be performed by the on-site radiological laboratory using approved methodologies in accordance with procedure *ES&H 2.6.9, Instruction for Calibration and Operation of High Purity Germanium Detector* and *ES&H 2.5.8, Th-230 Determination in Soils by the UNC Method*. If the on-site laboratory is not available due to other project priorities, the samples will be analyzed by off-site providers.

5. QUALITY CONTROL

MK-Ferguson Company, the Project Management Contractor (PMC) at the Weldon Spring Site Remedial Action Project (WSSRAP), has developed the *Environmental Quality Assurance Project Plan* (EQAPjP) (Ref. 8) to guide all environmental activities conducted at the WSSRAP in accordance with the U.S. Environmental Protection Agency guidelines. The *Sample Management Guide* (Ref. 9) has been developed following the guidelines listed in the EQAPjP. This guide establishes the approach to sample planning, collection, and data analysis.

5.1 Chain-of-Custody

Chain-of-custody forms will be completed and placed in the sample coolers in accordance with procedure *ES&H 4.1.2, Initiation, Generation, and Transfer of Environmental Chain-of-Custody*. The chain-of-custody form will require, at a minimum, the following:

- Sample identification.
- Sample location.
- Sample data.
- Time of collection.
- Sample matrix.
- Sample preservation.
- Analysis required.
- Release and acceptance information (i.e., date, location, technician's signature).

Sample coolers prepared for shipment will be sealed with chain-of-custody control seals signed and dated by the shipper.

5.2 Analytical Procedures

The on-site laboratory uses approved methodologies for radiological analysis in accordance with site standard operating procedures (SOPs).

The off-site quantitative laboratories conducting radiological and chemical analyses have submitted controlled copies of their site-specific quality assurance project plans (QAPjP) and SOPs. The plans and SOPs have been reviewed and accepted by the PMC. The WSSRAP and contract laboratory SOPs comply with the accepted standards and methodologies for performing analytical processes, operations, and activities. The laboratory QAPjPs and SOPs specify quality control requirements to demonstrate the precision, representativeness, and accuracy of the analytical data.

5.3 Quality Control Samples

Quality control samples will be collected to ensure consistent and accurate performance of sample collection and laboratory analysis. Table 5-1 provides a summary list of the quality control samples that will be collected to support this effort.

Table 5-1 Field Quality Control Sample Summary

QC SAMPLE TYPE	FREQUENCY	PURPOSE
Field replicate/duplicate	1 per 20 samples	Assess matrix, interlaboratory, and field operations variability
Equipment blank	1 per 20 samples	Assess effectiveness of decontamination process

5.4 Data Evaluation

Data packages received from the off-site contract and on-site laboratories will undergo several processes to evaluate the quality of the data. When data are first received, copies will be distributed to the Verification/Validation Group and data users for review as described in the following sections.

5.4.1 Data Verification

Analytical results received from the laboratory will be reviewed in accordance with procedure *ES&H 4.9.1, Environmental Monitoring Data Verification*. The following factors will be evaluated to verify if a sample has been properly handled according to WSSRAP protocol:

- Chain-of-custody
- Holding times
- Sample preservation requirements
- Sample analysis request form
- Quality control samples
- Laboratory receipt forms

5.4.2 Data Review

The data package will be distributed to the data users for review. The data will be reviewed to identify discrepancies in the field quality control samples, inconsistencies with characterization data, and apparent abnormalities. Deficiencies identified by data users will be reported to the Verification Group. Data users may request validation of any data that appear to be of questionable quality. This review will be done in accordance with procedure *ES&H 1.1.7, Data Review and Above-Normal Data Reporting*.

5.4.3 Data Validation

Randomly selected laboratory data and data selected by verification personnel or data users will undergo thorough review of the analytical process in accordance with procedure *ES&H 4.9.2, Environmental Monitoring Data Validation*. A minimum of 10% of the laboratory data associated with this plan will be validated. The Validation Group will conduct these reviews.

The validation procedure will provide a consistent means for reviewing and evaluating the data resulting from laboratory analyses and will provide a consistent means of documenting the evaluation and reporting the usefulness of the data to data users. This will be accomplished by a thorough review of the analytical data using laboratory records to assess laboratory conformance to quality control criteria, data quality requirements for data quality objectives, and procedural requirements.

6. DATA EVALUATION

Preliminary analytical results received from the laboratory will be evaluated immediately (prior to verification) according to the statistical methods described in the *Attainment Plan* (Section 8). These data will be used to evaluate the status of each confirmation unit per the *Attainment Plan* and ES&H 1.2.1, *Soil Remediation Disposition Process.* For areas with multiple contaminants, each contaminant will be compared to the applicable criteria. Excavation design goals will be considered met when the average contaminant concentration within a confirmation unit is less than or equal to the appropriate criteria. The maximum allowable "hot spot" is defined in the Attainment Plan (Ref. 4).

Final analytical results received from the laboratories will undergo evaluation of data quality as outlined in Section 5. The final data will be compared with preliminary data to ensure that no variations have occurred that could change the disposition of the confirmation unit.

A report detailing sample collection activities, analytical results, and quality control issues will be prepared for this activity. Any deviations from or modifications to this plan will be discussed.

7. REFERENCES

1. MK-Ferguson Company and Jacobs Engineering Group. *Remedial Design/Remedial Action Work Plan for the Quarry Residuals Operable Unit.* Rev. 0. DOE/OR/21548-787. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, MO. January 2000.

2. U.S. Department of Energy. *Record of Decision for Remedial Action at the Chemical Plant Area of the Weldon Spring Site.* Rev. 0. DOE/OR/21548-376. Oak Ridge Field Office. St. Charles, MO. September 1993.

3. Argonne National Laboratory. *Record of Decision for Remedial Action for the Quarry Residuals Operable Unit at the Weldon Spring Site, Weldon Spring, Missouri.* DOE/OR/21548-725. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, MO. September 1998.

4. MK-Ferguson Company and Jacobs Engineering Group. *Chemical Plant Area Cleanup Attainment Confirmation Plan.* Rev. 3. DOE/OR/21548-491. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, MO. December 1995.

5. MK-Ferguson Company and Jacobs Engineering Group. *Completion Report for Radiological Characterization of the Ditch Area at the Weldon Spring Quarry.* Rev. 0. DOE/OR/21548-817. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, MO. September 1999.

6. MK-Ferguson Company and Jacobs Engineering Group. *Completion Report for Radiological Characterization of the Snake Pit Area of the Quarry Proper.* DOE/OR/21548-858. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, MO. May 2000.

7. MK-Ferguson Company and Jacobs Engineering Group. *Completion Report for Radiological Characterization of the Northeast Corner of the Quarry Proper.* DOE/OR/21548-859. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, MO. May 2000.

8. MK-Ferguson Company and Jacobs Engineering Group. *Environmental Quality Assurance Project Plan.* Rev. 4. DOE/OR/21548-352. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, MO. October 1999.

9. MK-Ferguson Company and Jacobs Engineering Group. *Sample Management Guide.* Rev. 2. DOE/OR/21548-499. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, MO. June 2000.

PROCEDURES

ES&H 1.1.4 *Logbook Procedure*
ES&H 1.1.7 *Reporting Above-Normal Data Values from Environmental Monitoring Networks*
ES&H 1.2.1 *Soil Remediation Disposition Process*
ES&H 2.5.8 *Th-230 Determination in Soils by the UNC Method*
ES&H 2.6.9 *Instruction for Calibration and Operation of High Purity Germanium Detector*
ES&H 4.1.1 *Numbering System for Environmental Samples and Sampling Locations*
ES&H 4.1.2 *Initiation, Generation, and Transfer of Environmental Chain of Custody*
ES&H 4.1.3 *Sampling Equipment Decontamination*
ES&H 4.4.5 *Soil/Sediment Sampling*
ES&H 4.9.1 *Environmental Monitoring Data Verification*
ES&H 4.9.2 *Environmental Monitoring Data Validation*