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CONTRACT NO. DE-AC05-86OR21548

# QUARRY BULK WASTE EXCAVATION REMEDIAL ACTION REPORT

Weldon Spring Site Remedial Action Project  
Weldon Spring, Missouri

MARCH 1997

REV. 3

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

Prepared by MK-Ferguson Company and Jacobs Engineering Group



Weldon Spring Site Remedial Action Project  
Contract No. DE-AC06-86OR21548

Rev. No. 3

PLAN TITLE: Quarry Bulk Waste Excavation Remedial Action Report

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DOE/OR/21548-642

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Prepared by

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for the

U.S. DEPARTMENT OF ENERGY  
Oak Ridge Operations Office  
Under Contract DE-AC05-86OR21548

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**ABSTRACT**

Approximately 140,000 cu yd of radiologically and chemically contaminated bulk waste in the Weldon Spring Quarry was excavated and transported to a temporary storage area at the chemical plant site in the period 1993-1995. These materials are being held under controlled conditions until they can be placed in the permanent disposal cell now under construction.

### **SUMMARY OF CHANGES**

Revision 3 of this document was changed to incorporate minor changes to Sections 1.2, 2.1.3.1, and the Abstract in response to review comments from the Missouri Department of Natural Resources (MDNR).

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## 1 PROJECT BACKGROUND

### 1.1 ROD Summary

The *Record of Decision for Management of the Bulk Wastes at the Weldon Spring Quarry* (ROD) (Ref. 1) was signed by the U.S. Environmental Protection Agency (EPA) on September 28, 1990, and the U.S. Department of Energy (DOE) on March 7, 1991. This ROD established that the scope of this operable unit would be the removal of bulk wastes, defined as materials that could be removed from the quarry using standard construction equipment and procedures. Implementation of this scope minimized the potential for further migration of contaminants from the quarry and established conditions to assess the nature and extent of residual contamination. The primary activities were to:

- Excavate and remove bulk waste (i.e., structural debris, drummed and unconfined wastes, process equipment, sludge, and soil).
- Transport the waste along a dedicated haul road to the temporary storage area (TSA), which is located within the boundary of the Chemical Plant Operable Unit.
- Place bulk wastes into the TSA.

Final disposition of the quarry and vicinity groundwater will be determined through the Quarry Residuals Operable Unit. Final disposition of the excavated bulk waste was determined by the *Record of Decision for Remedial Action at the Chemical Plant Area of the Weldon Spring Site* (Ref. 2).

### 1.2 Operable Unit Description

The Weldon Spring site is owned by the DOE and is located in St. Charles County, Missouri, near the city of Weldon Spring, about 30 mi west of St. Louis. The site consists of two noncontiguous areas: (1) the chemical plant area and (2) the quarry. The chemical plant area is about 2 mi southwest of the junction of Missouri State Route 94 and U.S. Route 40/61.

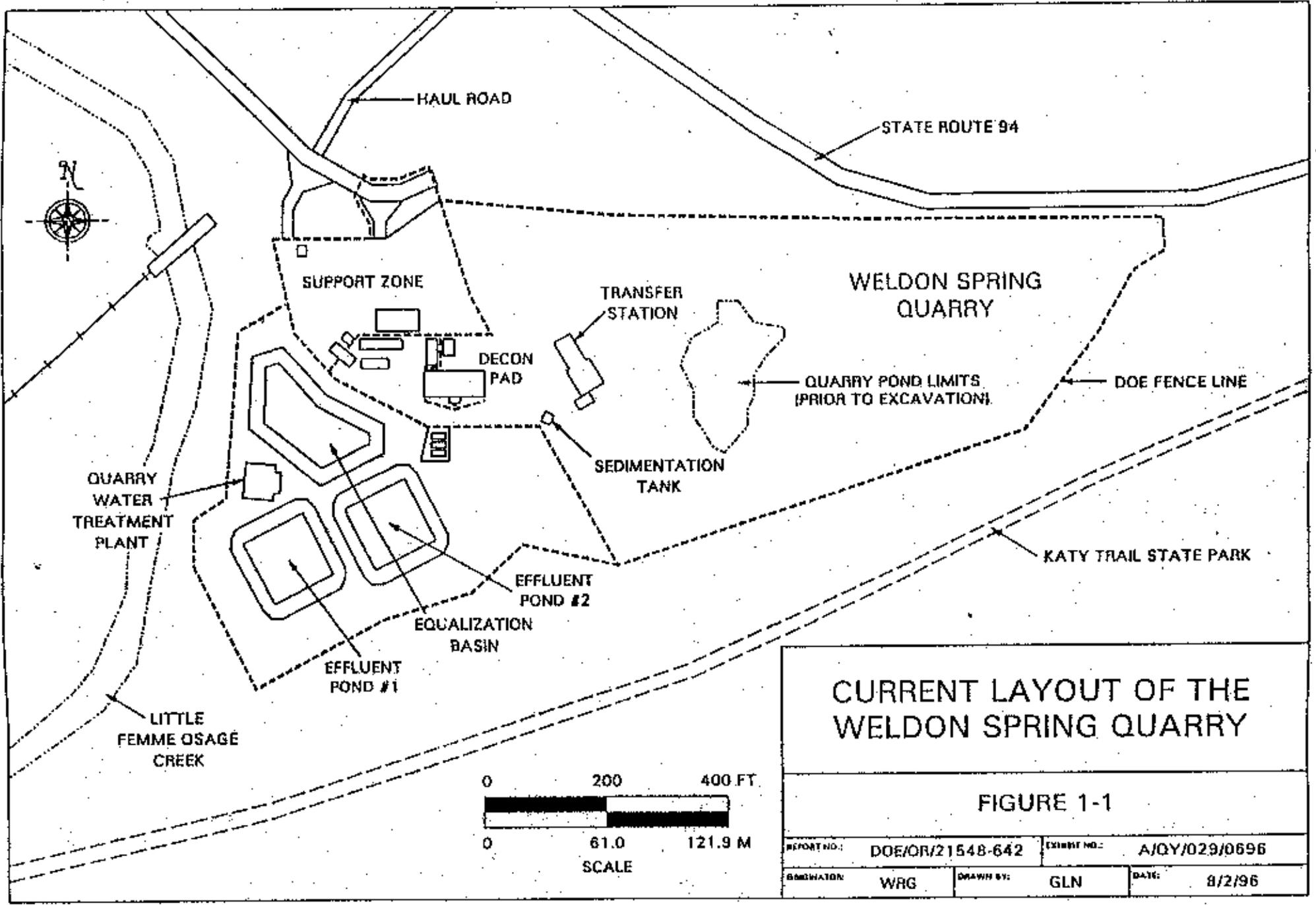
The quarry is about 4 mi south-southwest of the chemical plant area, about 5 mi southwest of the town of Weldon Spring, and is surrounded by the Weldon Spring Conservation Area. Both the chemical plant area and the quarry are accessible from Missouri State Route 94, but they are fenced and closed to the public.

Prior to 1942, the quarry was excavated into the bluff that forms a valley wall at the edge of the Missouri River alluvial floodplain. Limestone was extracted to support various construction activities. The quarry is approximately 1,000 ft long by 450 ft wide and covers an area of 9 acres. Before excavation of the bulk wastes it was vegetated with grasses, shrubs, and trees. The general layout is shown in Figure 1-1.

The Missouri-Kansas-Texas (KATY) Railroad line formerly ran just south of the quarry. This line has been dismantled and the right-of-way was converted to a gravel-based public trail for hiking and biking (KATY Trail State Park). A rail spur entered the quarry from the west at its lower level and extended one-third the quarry's length. The St. Charles County well field is located southeast between the quarry and the Missouri River; the nearest well is located approximately 0.5 mi from the quarry.

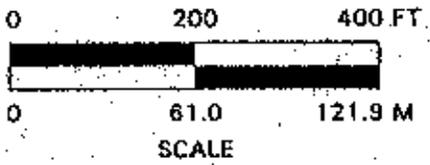
In 1958, the U.S. Atomic Energy Commission (AEC) acquired title to the Weldon Spring Quarry from the Army. The Army had used it since 1942 for burning wastes from the manufacture of trinitrotoluene (TNT) and dinitrotoluene and for disposal of TNT-contaminated soil and rubble during operation and shutdown of the ordnance works. The AEC used the quarry as a disposal area from 1960 to 1969.

The materials disposed of in the quarry consist of wastes from the chemical plant and wastes brought in from other areas, including: (1) materials associated with the processing of uranium and thorium concentrates, (2) uranium- and radium-contaminated rubble, (3) high thorium content materials (most of which were subsequently removed from the quarry for the purpose of recovering rare earth elements), and (4) 3% thorium residues. The radioactive contaminants of concern are those associated with the U-238 and Th-232 decay series. Radioactive contamination on the main floor covered an area of almost 60,000 sq ft and extended to a depth of about 40 ft. Radioactive contamination in the entire quarry covered an area of about 171,000 sq ft and extended to an average depth of about 13 ft.



# CURRENT LAYOUT OF THE WELDON SPRING QUARRY

FIGURE 1-1



REPORT NO.:	DOE/OR/21548-642	EXHIBIT NO.:	A/QY/029/0696
DESIGNATOR:	WRG	DRAWN BY:	GLN
		DATE:	8/2/96

Characterization results indicated that chemical contamination was also present throughout much of the quarry bulk waste and that the distribution of contaminants was highly heterogeneous. Nitroaromatic compounds, polychlorinated biphenyls (PCBs), and polynuclear aromatic hydrocarbons were detected in bulk waste samples. Elevated levels of some metals were also found. General locations of various waste types could be defined in some cases. For example, nitroaromatics were found in the eastern and western sections of the quarry, consistent with the known disposal history. PCBs did not show a defined pattern of distribution but were typically limited to near-surface depths.

### 1.3 Remedial Activities

The four major activities related to the Bulk Waste Remedial Action were excavation of the bulk waste; construction and use of a dedicated haul road for transporting waste to the chemical plant; construction and use of a temporary storage area (TSA) for storage of the waste; and operation of a water treatment plant. The environmental documentation for the first three activities is covered by the *Record of Decision for the Management of the Bulk Wastes at the Weldon Spring Quarry* (Ref. 1), and the latter is addressed by the *Engineering Evaluation/Cost Analysis for the Proposed Management of Contaminated Water in the Weldon Spring Quarry (EE/CA)* (Ref. 3).

The quarry haul road is a single-lane, unpaved road used to transport bulk waste from the quarry staging area to the TSA at the chemical plant area. The TSA is an engineered storage facility constructed to allow characterization and temporary storage of bulk waste excavated from the quarry. The stored materials are monitored through an air monitoring program and through visual inspections used to detect deterioration in dikes or liners of the TSA, signs of slope failure, problems with the erosion control systems, and wind dispersal of materials. The leachate collection system is also checked to ensure proper functioning. Surveillance and inspections will continue until final disposition.

Because of concern about contaminated water in the quarry pond, the EE/CA (Ref. 3) was prepared in January 1989. The primary purpose of the removal action was to limit the release of contaminants from the quarry pond, thereby minimizing the potential for associated impacts to the public and the environment. The EE/CA called for the removal of ponded water

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from the quarry, collection and removal of storm water and groundwater inflow, and treatment of the water to remove radioactive and chemical contaminants. As of May 1996, nearly 38 million gallons had been treated by the quarry water treatment plant, and 45 batches had been released to the Missouri River without exceeding the National Pollutant Discharge Elimination System permit.

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## 2 REMEDIAL ACTION

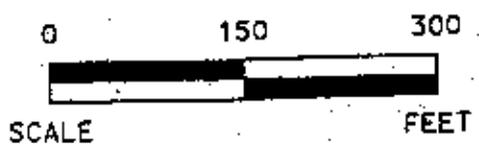
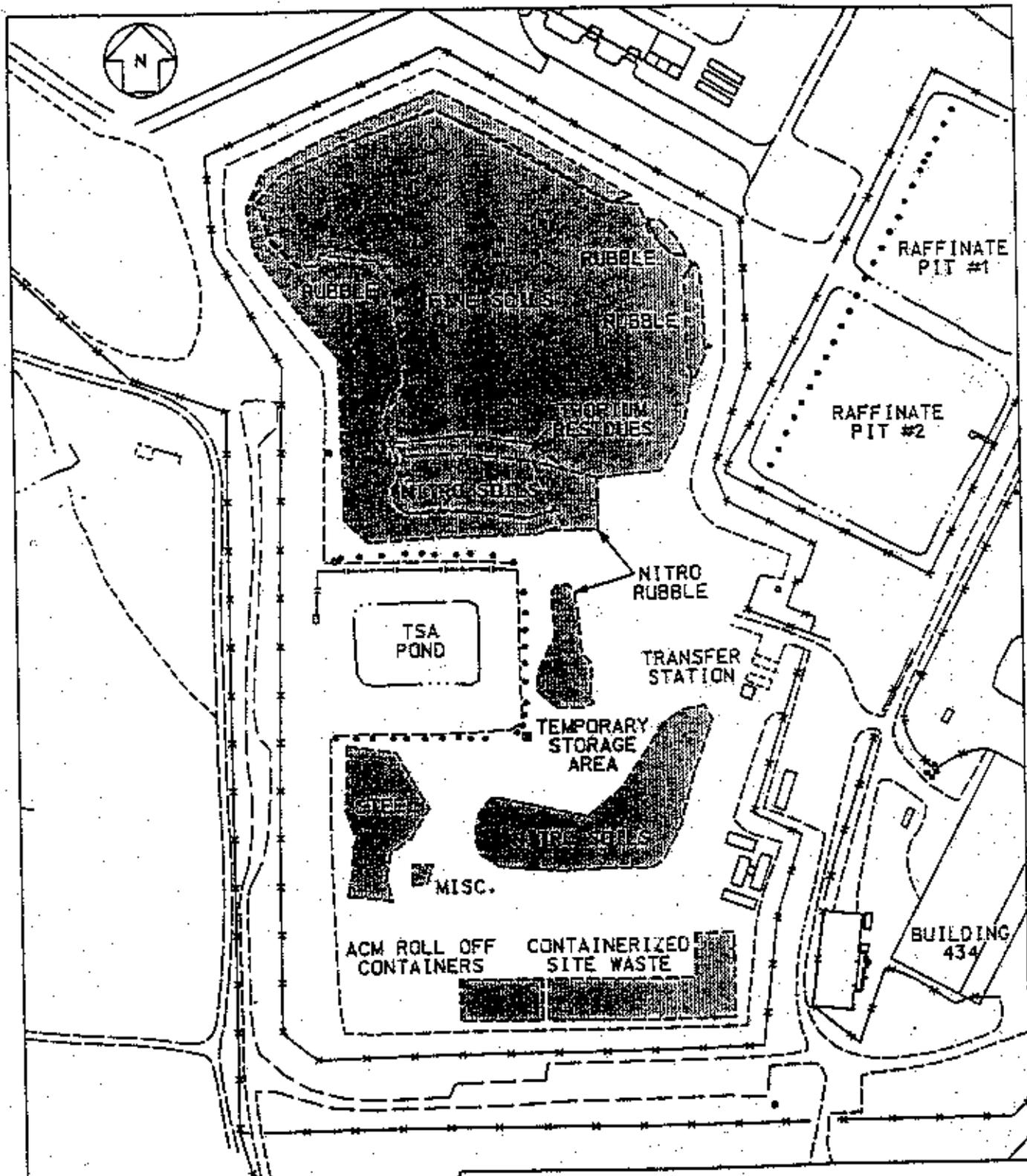
### 2.1 Description of Completed Activities

The actions described below are those performed to accomplish the remedial action as described in the *Record of Decision for the Management of the Bulk Wastes at the Weldon Spring Quarry* (ROD) (Ref. 1). A temporary storage area (TSA) for excavated materials, described in the ROD as a temporary storage facility, was required pending construction of the final engineered disposal cell as determined in the chemical plant operable unit decision documents. Actions described in the ROD are complete. Actual excavation and transportation of bulk wastes began in May 1993 and was completed in May 1996.

Planning strategies for the work to be performed during implementation of the remedy prescribed in the ROD are described in the *Remedial Design Work Plan for the Quarry Bulk Waste Management Program* (RDWP) (Ref. 4) and the *Remedial Action Work Plan for the Quarry Bulk Waste Management Program* (RAWP) (Ref. 5). The RDWP (Ref. 4) described the contracting strategies and schedules; the RAWP (Ref. 5) provided the description, status, and work schedule for the actions performed during implementation of the remedy.

#### 2.1.1 Temporary Storage Area Construction

The TSA is an engineered storage facility for sorting, characterizing, and temporarily storing bulk waste excavated from the quarry. Separate subareas have been constructed at the TSA to store segregated wastes, and a double-lined surface impoundment collects rainfall runoff and leachate generated from the stored wastes. This water is treated by the site water treatment plant (Figure 2-1). The capacity of the surface impoundment is 1.1 million gallons. To control wind and surface water erosion, a dust suppression coating was sprayed over exposed areas of the working face daily as needed during operations. After the bulk waste removal action was completed, these stored materials were covered with a cover coating and seeding and are being monitored pending final disposition.



**CURRENT LAYOUT OF THE  
TEMPORARY STORAGE AREA**

**FIGURE 2-1**

REPORT NO. 1	DOE/OR/21548-642	EXHIBIT NO. 1	A/DC/028/0696
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 - - - - - BERM & MATERIALS LIMITS

The TSA is an 11-acre structure surrounded by a 4 ft to 6 ft dike. It is located near the southwest corner of the chemical plant area. It is designed and constructed to meet the substantive requirements for a *Resource Conservation Recovery Act (RCRA)* waste pile. To prevent the migration of contaminants, the compacted clay bottom is covered by a high density polyethylene geomembrane to form a composite liner. Drainage over this liner is ensured by a layer of coarse sand and a surface layer of gravel, separated by a geotextile. Fine grain soils make up the main pile on the northern half of the TSA; the pile is mostly surrounded by rubble, and there is a smaller nitroaromatic soil pile adjacent to the south. The TSA pond is half way down on the west side, and there are also nitroaromatic soils and rubble in the center. Structural debris and equipment have been placed at the southwest corner of the TSA. The TSA duration and schedule are summarized in Table 2-1.

TABLE 2-1 TSA Duration/Schedule

WORK PACKAGE NO.	DESCRIPTION	START	FINISH	SCOPE
WP-307	TSA Construction - Phase I	11/8/91	1/9/92	Demolition and removal of buildings; removal of underground storage tanks; removal and containerization of contaminated soils/materials; backfilling and grading area.
WP-244	TSA Construction	10/11/90	11/30/93	Remove foundations, slabs, USTs, and contaminated soil in TSA footprint; perform site grading; excavate pond, place liner, and collect leachate; construct loading/sorting station; pave pad; and construct liner.
WP-434	TSA Electrical Work	8/10/93	12/94	Provide 120/240V power to access control trailer, TSA decon pad, power washer
WP-186	Quarry Bulk Waste Removal and TSA Operations	01/15/93	12/5/95	Excavate and sort quarry bulk waste; load rolloff boxes and deliver to transfer station; decontaminate rolloff boxes; transport waste to TSA; place waste in storage at TSA
WP-488	Northeast Corner Remediation	05/13/96	06/07/96	Excavate radiologically contaminated soils from the northeast slope of the quarry, place in TSA, backfill, and seed.

**2.1.2 Quarry Haul Road Construction**

The quarry haul road is a single lane unpaved road dedicated to transport of bulk waste from the quarry staging area to the TSA. It has eight turnouts to allow two-way traffic. Loaded trucks from the quarry have precedence over empty trucks returning from the TSA. The road is equipped with traffic safety features and controls such as gates and signs. Culverts and drainage and erosion control measures have been installed. Quarry haul road duration and schedule are summarized in Table 2-2

**TABLE 2-2 Haul Road Duration/Schedule**

WORK PACKAGE NO.	DESCRIPTION	START	FINISH	SCOPE
WP-213	Construction of Quarry Haul Road	8/25/91	1/17/92	Remove contaminated soils and old railroad tracks; construct single lane unpaved road with turnouts from quarry staging area to TSA.
WP-289	Quarry Site Preparation	4/11/92	6/10/93	Clear and grub area; construct transfer stations at quarry and TSA, and parking areas and haul road into quarry.
WP-361	Quarry Haul Road Enhancement	6/3/93	7/30/93	Construct haul road fencing; install signs and gates.

**2.1.3 Quarry Bulk Waste**

**2.1.3.1 Quarry Bulk Waste Excavation.** General activities prior to transporting waste to the TSA included: (1) removing bulk waste, (2) sorting and segregating material for specific placement at the TSA, (3) loading of bulk waste for transportation, and (4) decontaminating the trucks. After being released from the quarry controlled area, the trucks traveled back along the haul road and entered the south end of the chemical plant at the TSA. At the TSA, the trucks were unloaded, wastes placed into designated locations, and the empty trucks returned to the quarry.

Bulk waste excavation included the removal of approximately 116,200 bank cu yd of soils and rubble and included 3,510 cu yd of steel. The materials were heterogeneously mixed and

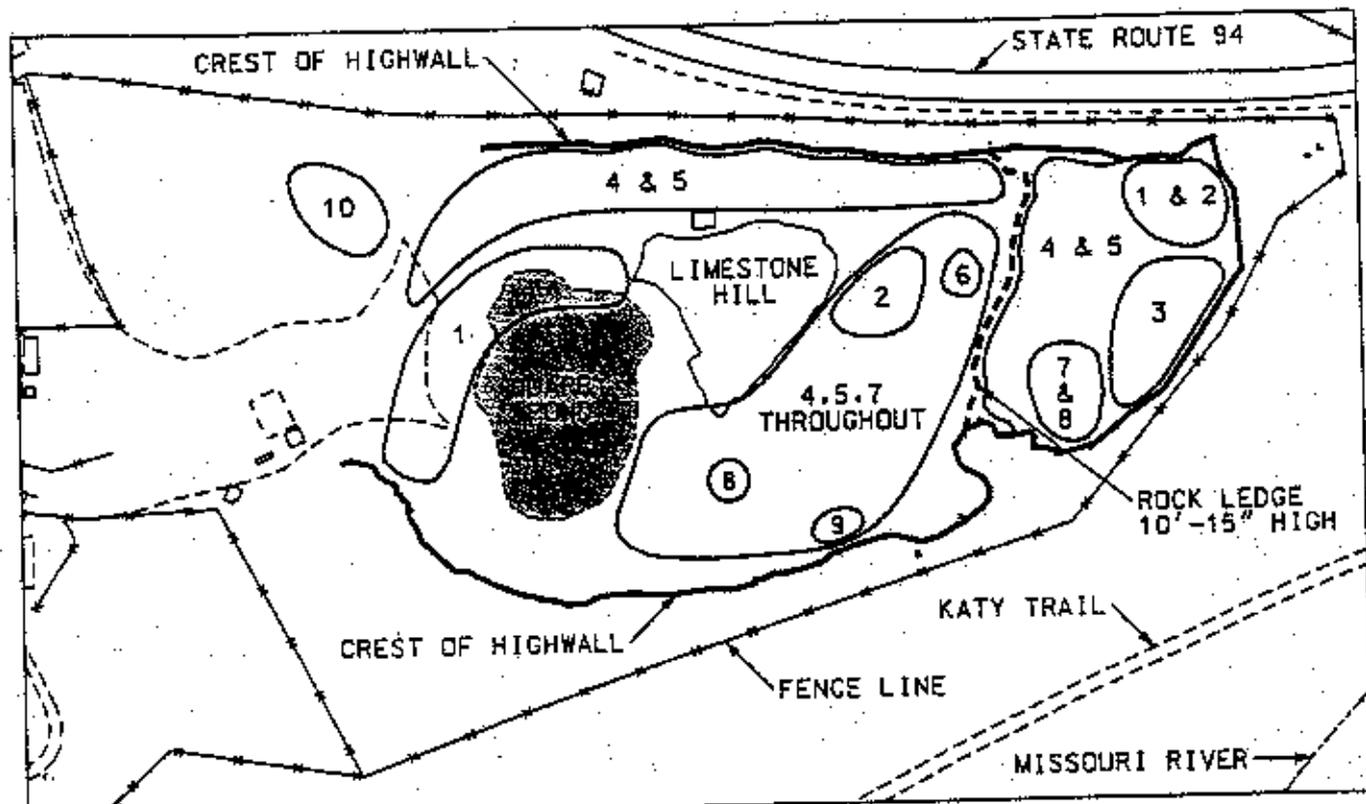
included rubble, drummed waste, sludge, and soil contaminated with radionuclides and chemicals. The entire volume, approximately 144,000 loose cu yds, was transported to the TSA. The quarry sump was dewatered before and during excavation. Figure 2-2 shows the general areas where waste was situated in the quarry.

The general operating plan consisted of using a crawler mounted hydraulic excavator on the working bench to excavate waste from a working face below the equipment. Approximately 90% of the excavation was performed in cuts varying from 5 ft to 15 ft in depth. Spotters, located at safe distances from the working face, assisted the excavator and other standard equipment operators in identifying items to be excavated and warning the operator of any materials that required special handling. The spotters maintained two-way communication with the excavator operator.

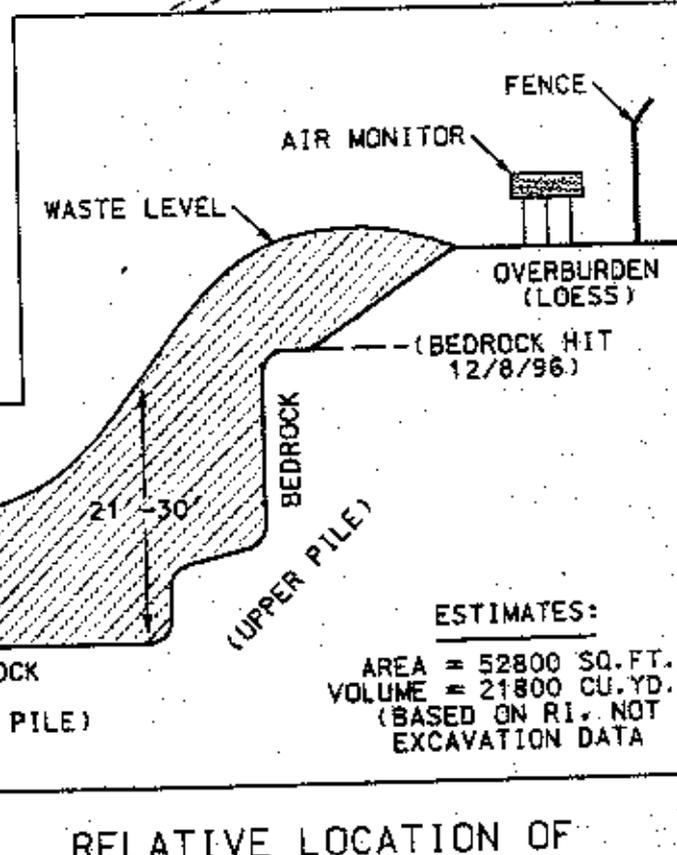
The excavated waste was placed in a sort pile, in the laydown area, or directly into containers, depending on the type of waste. Initially, after the large materials and selected hazardous materials were removed from the sort pile, the remaining debris was put through a 6-in. mesh screen to separate the material into soil (6 in. minus) and debris. Because the screening proved to be inappropriate, it was abandoned and the waste was sorted using the excavation equipment to a limit of approximately 12 in. Most of the materials were sorted using equipment; however, some limited manual operations, such as rigging, were occasionally required. The waste was then loaded onto separate roll-off containers until January 1995, when a direct haul system was implemented to increase productivity and accelerate completion of the bulk waste removal.

Some wastes were handled differently because of safety or regulatory issues. These wastes were generally placed in a laydown area or directly into a roll-off container. These wastes included pressurized cylinders, drums, and equipment and required field sampling prior to transporting them to the TSA. Also, materials requiring additional sizing were transported to the laydown area and sized.

During excavation, three cylinders were found. All three were approximately 3 ft long and 1 ft in diameter and were removed by a specialty subcontractor who complied with



1. NITRO SOIL & RUBBLE
2. THORIUM RESIDUES (2000 DRUMS)
3. ACM, DEBRIS, PROD./BYPRODUCT DRUMS (800-1000)
4. SOIL
5. RUBBLE
6. YELLOWCAKE DRUMS (15)
7. METAL
8. TANKS, VESSELS, PIPING
9. PCB & DEBRIS DRUMS
10. PROCESS EQUIPMENT & GAS CYLINDERS



WP-186 - QUARRY NORTHEAST CORNER:  
VIEW, ESTIMATES CROSS SECTION  
(UPPER, MIDDLE, LOWER PILES -  
SEE QUARRY RI)

**ESTIMATES:**

AREA = 52800 SQ. FT.  
VOLUME = 21800 CU. YD.  
(BASED ON RI, NOT  
EXCAVATION DATA)

RELATIVE LOCATION OF  
MAJOR WASTE TYPES WITHIN  
THE WELDON SPRING QUARRY

FIGURE 2-2

NOT TO SCALE

REPORT NO.:	DOE/OR/21548-642	IDENTIFY NO.:	A/QY/038/1296
ORIGINATOR:	WRG	DRAWN BY:	GLN
		DATE:	12/19/96

established WSSRAP procedures. The cylinders are presently stored at the chemical plant awaiting final disposal.

Except when specified to the contrary, gross mud and debris were hosed off most large waste (e.g., equipment, steel, concrete) prior to placement in the trucks. This was done to reduce the particulates that could become airborne at the TSA during placement and storage of the wastes.

All waste capable of fitting into roll-off containers or into the beds of the trucks was transported in these containers with covers meeting DOT strong, tight container requirements. Wastes too large for the roll-off containers were tightly covered or wrapped, placed in secondary containment, and transported on flat-bed trucks or by other approved methods.

Before leaving the quarry, the containers and trucks were inspected and residual contamination was washed off the containers and trucks. If required, the containers underwent a final decontamination at the decontamination pad prior to exiting the controlled area.

The loaded containers and wrapped, oversized waste from the quarry transfer station were hauled over the dedicated haul road to the TSA where they were delivered to the TSA transfer station. The waste was placed in specified areas of the TSA, and the exteriors of the containers were cleaned and decontaminated to within the requirements for release. The decontaminated empty containers were hauled, and the trucks were driven, from the TSA transfer station back down the dedicated haul road to the quarry transfer station.

Dust and other emissions were controlled at the TSA, the quarry, and along the haul road, and all facilities, equipment, and roadways were maintained. Water was used at the TSA, quarry, and haul road, and dust suppression coating was sprayed at the quarry and TSA to control particulates.

**2.1.3.2 Northeast Slope Remediation.** The extent of bulk waste excavation was determined by visually identifying areas of contamination indicated by discoloration of soils or drum remnants and presence of debris or otherwise unnatural materials. No bulk materials were

left in areas that appeared contaminated. Bulk waste excavation duration and schedule are summarized in Table 2-3.

TABLE 2-3 Bulk Waste Excavation Duration/Schedule

WORK PACKAGE NO.	DESCRIPTION	START	FINISH	SCOPE
WP-269	Quarry Bulk Waste Site Preparation	4/15/91	6/10/93	Clean and grub quarry area; stabilize high wall; chip and pile vegetation; construct transfer station; prepare roadway to quarry.
WP-186	Quarry Bulk Waste Removal and TSA Operations	01/15/93	12/05/95	Excavate and sort quarry bulk waste; load roll-off boxes and deliver to transfer station; decontaminate roll-off boxes; transport waste to TSA; place waste in storage at TSA.

Characterization activities conducted in the summer of 1995 indicated that radiologically contaminated soils were present in the northeast slope area of the quarry. In order to take advantage of equipment and trained personnel available at the site, it was decided to remove soils from the area using the WP-186 contract. The soils were removed between September 26 and November 1, 1995. Approximately 1,570 cu yd of soil was excavated and transported to the TSA for storage. At the end of this period, excavation was discontinued because the amount of soil removed was more than three times what was originally estimated, and additional engineering analysis of slope stability was needed. The slope then was further characterized by additional drilling and sampling.

It was determined that removal of contaminants would not impact the stability of the adjacent Highway 94 and would provide a final slope that would minimize the risk of failure in the future. Removal of the remaining contaminated soils began on May 13 and was completed May 21, 1996. In this campaign 561 cu yd were excavated. Reclamation activities were completed on June 7, 1996. The excavated materials were transported via the haul road to the TSA. The work package is summarized in Table 2-4.

TABLE 2-4 Northeast Slope Duration/Schedule

WORK PACKAGE NO.	DESCRIPTION	START	FINISH	SCOPE
WP-468	Northeast Corner Remediation	5/13/96	6/7/96	Excavate radiologically contaminated soils from the northeast slope of the quarry, place in TSA, backfill, grade, and seed

Any remaining remediation of the Northeast Slope will be addressed by the Quarry Residuals Operable Unit.

## 2.2 Changes Affecting ROD Compliance

There were five non-significant changes to the ROD during remedial action. No other category of change was needed. Notification of the first three non-significant changes was made through transmittal letters. The final two notifications were made using a form developed by the Weldon Spring Site Remedial Action Project (WSSRAP) for notifications of change. The changes are detailed in Table 2-5.

## 2.3 Emergency Responses

As described in the *Remedial Action Work Plan for the Quarry Bulk Waste* (Ref. 5), the WSSRAP has a series of plans addressing potential emergency situations and establishing the necessary emergency management, resources, and plans of action to ensure the protection of workers, members of the public, and the environment during the lifetime of the project. The plans also describe emergency management operations, on-site response capabilities, and coordination with off-site emergency organizations for potential emergencies.

During the bulk waste excavation, there was only one minor emergency situation. On November 22, 1994, a small fire started in a high-pressure washing system at the TSA. The fire was initially extinguished with a fire extinguisher by the person performing maintenance on

TABLE 2-5 ROD Changes

CATEGORY OF CHANGE	DATE	DESCRIPTION OF CHANGE
Non-Significant	5/25/93	Wood materials from the quarry would be stored at the chemical plant wood storage area rather than at the TSA.
Non-Significant	5/27/94	Compliance with asbestos and Radon-222 standards contained in 40 CFR 61 would not be met during operations at the quarry and TSA. They would be met when bulk wastes have been placed in controlled storage.
Non-Significant	10/14/94	Direct loading of trucks would replace roll-off box transfer system for transport of bulk wastes.
Non-Significant	9/29/95	A short distance of Mo. Highway 94 would be used to transport a limited amount of soil from the northeast corner of the quarry to the haul road.
Non-Significant	06/11/96	Non-RCRA rubble would be washed and moved from TSA to other on-site storage.

the washing systems, and the Cottleville Fire Department arrived on the scene and declared the fire to be out less than 45 minutes after it was first reported. The only damage was to the washing system, and there was no danger to personnel or other equipment.

### 3 RESULTS

#### 3.1 Cleanup Confirmation

The Quarry Bulk Waste Final Inspection took place beginning at approximately 4:00 p.m. on November 13, 1995. Present were Dan Wall, U.S. Environmental Protection Agency (EPA); Karen Reed, U.S. Department of Energy (DOE); Yvonne Deyo, Professional Analysis Incorporated (PAI); and Gene Valett, Earl Dowell, and Bill Goldkamp of the Project Management Contractor (PMC). All participants donned the required personal protective equipment before entering the quarry. No construction activities were being performed during the inspection. An additional inspection was performed on April 25, 1996, with MDNR representatives Gale Carlson and Larry Erickson present.

The areas inspected were the haulway zone, the limestone knoll, and the sump and south wall, which were inspected from the haulway zone since there was no practical access because of a large volume of water in the sump. The northeast shelf was not inspected because of safety concerns.

The work had been completed to the satisfaction of the EPA.

#### 3.2 Design Specification Certification

As prescribed in the *Remedial Action Work Plan for the Quarry Bulk Waste Management Program* (Ref. 5), completion of excavation of bulk waste was visually verified during the final inspection. Final cleanup criteria will be established by the quarry residuals team.

#### 3.3 QA/QC Results

The Quarry Bulk Waste Excavation activities were governed by the *Project Management Contractor Quality Assurance Program (QAP)* (Ref. 8), which incorporates the requirements of DOE Order 5700.6C, *Quality Assurance*. For environmental compliance or environmental data acquisition activities, EPA QAMS-005/80 guidance was followed.

OHM, the construction subcontractor, prepared a quality assurance/quality control program plan that served as the construction quality assurance plan (CQAP) for WP-186. This plan provided for the planning and accomplishment of quality affecting activities under controlled conditions and with sufficient independent oversight. Key components of the program included documented controls, processes, tools, skills, and test/monitoring equipment that were used to attain and verify required quality. The CQAP complied with the guidelines contained in the *Project Management Contractor Quality Assurance Program (QAP)* (Ref. 8). During implementation of WP-186, a PMC representative provided daily quality control oversight to ensure compliance with the PMC QAP. Discrepant conditions and nonconformances were identified and reported to management. Verification was made that problems were resolved and nonconformances closed and logged. Quality records are maintained in the PMC quality assurance records vault or approved off-site storage. No outstanding deficient items remain open for WP-186.

For WP-213, *Quarry Haul Road Construction*, the Subcontractor performed its own QC with oversight and complete QC surveillance by the PMC.

For WP-244, *Temporary Storage Area Construction*, the Subcontractor performed two basic activities. For earth work, the Subcontractor prepared and followed a quality assurance plan meeting PMC requirements. Soil sample results were verified by an independent laboratory. The PMC provided surveillance of documentation and daily QC oversight. A recognized liner authority was contracted to provide independent oversight for the high density polyethylene (HDPE) liner installation. All performed field tests were observed, and when appropriate, samples were split. The PMC provided additional QC on a daily basis.

During WP-468, as part of a readiness assessment, QC personnel verified the leak tests for the haul trucks and the bearing weight of the soil anchors used during operations. The subcontractor performed all work under a PMC approved program.

### 3.4 Environmental Monitoring Results

Environmental monitoring during bulk waste excavation was performed under the environmental monitoring program, which is further discussed in Section 4.1.

Inside the quarry, sampling included bulk soil, soil in fractures, surface water, and gamma radiation. Contaminated soil was removed to reduce risk and to enhance the possibility of a no-action quarry residuals ROD.

Air monitoring at the quarry perimeter has shown that all contaminants of concern have trended to background since bulk waste excavation was completed. Radon gas has been reduced to background concentrations based on Fourth Quarter 1995 alpha track monitoring. Based on TLD results, gamma radiation is also at background levels. Asbestos monitors were removed after no indication of asbestos was found above acceptable exposure limits during or following the excavation, and radioactive airborne particulates have also trended to normal background concentrations.

Air monitoring results at the TSA have shown elevated levels of radon, thoron, and particulates at the fence line during activities, but they have trended back towards background as activities were completed. Action level concentrations have never been exceeded at the TSA.

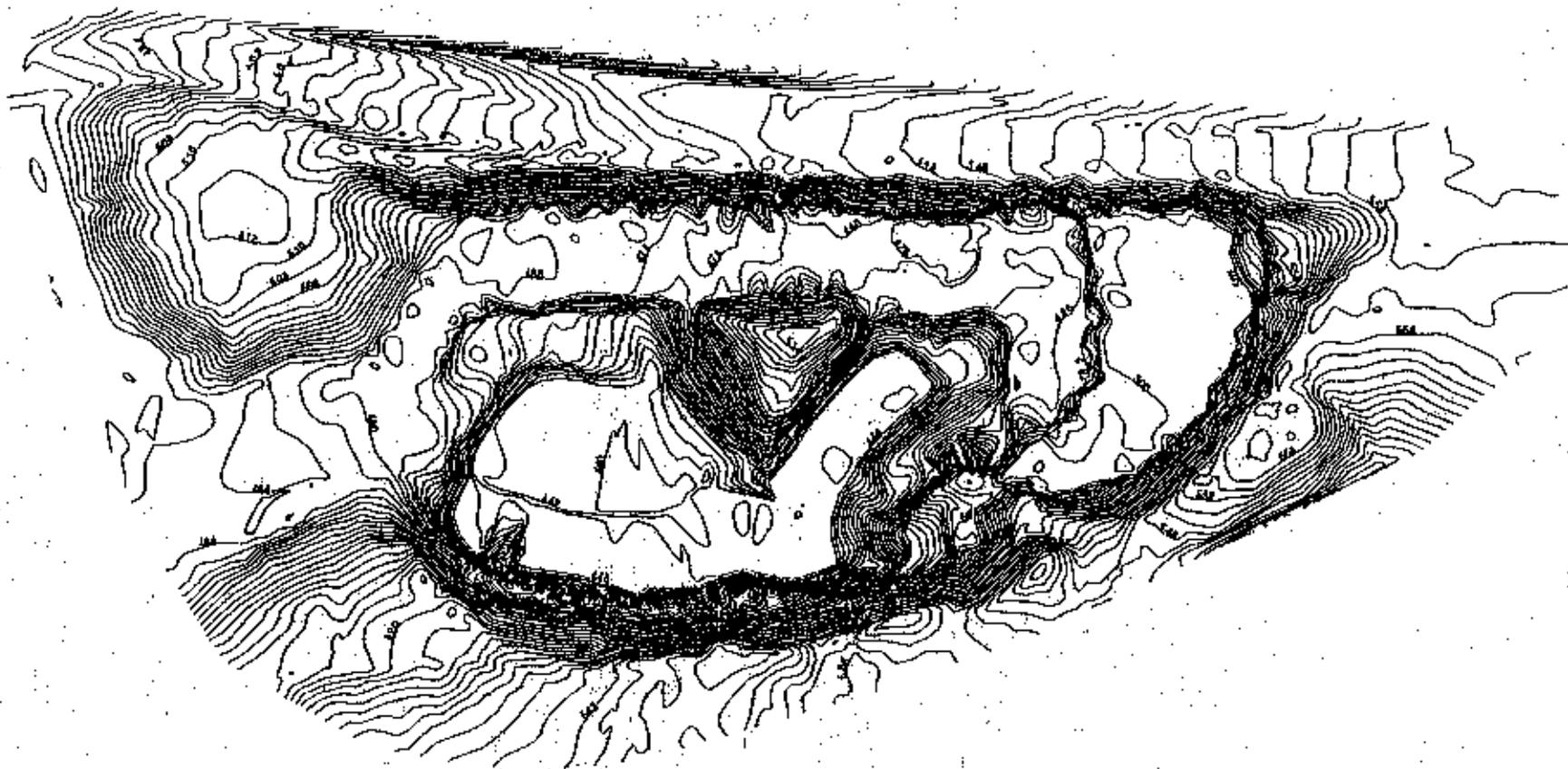
### 3.5 Final OU Conditions

All Bulk Waste has been removed from the quarry and the walls and floors have been washed. Where waste has been excavated, any remaining uncontaminated soil or unconsolidated materials have been graded to stabilize them, and appropriate areas have been seeded and mulched. A clay slope that was determined to be uncontaminated by quarry residuals characterization was left in place in the southeast corner for possible use as fill in the quarry restoration.

The quarry pond water is being managed according to the *Quarry Residuals Sampling Plan Addendum 2: Phase 2 Sampling* (Ref. 6) until final disposition is determined.

All permanent facilities used during the bulk waste excavation (e.g., water treatment plant, decontamination station, piping) remain intact pending quarry restoration.

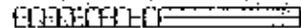
Final contours are shown in Figure 3-1.



30 15 0 30 METERS



100 50 0 100 FEET



## CURRENT QUARRY TOPOGRAPHY

Figure 3-1

REPORT NO.: DOE/OR/21548-642

EXHIBIT NO.: A/QY/030/0696

ORIGINATOR: WRG

DRAWN BY: WSSRAP GIS

DATE: 06/96

## 4 OPERATIONS AND MAINTENANCE

### 4.1 Long-Term Monitoring

Long-term monitoring at the Weldon Spring Site Remedial Action Project (WSSRAP) is addressed by the *Environmental Protection Program Implementation Plan* (Ref. 7) which describes the overall framework, and the Environmental Monitoring Plan (EMP), which details the applicable monitoring requirements, schedules, analytical methods, and quality assurance measures for effluent monitoring and environmental surveillance activities. The EMP is reviewed annually and reissued at least every 3 years in accordance with DOE Orders.

The WSSRAP environmental protection program involves radiological and chemical sampling of surface water and groundwater, and radon, gamma exposure, air particulates, polychlorinated biphenyl (PCB), biological, and meteorological conditions are also monitored. Radiological elements of concern are primarily the radionuclides of the U-238 and Th-232 decay series. The non-radiological compounds included in the routine 1995 monitoring program are metals, inorganic ions (nitrate and sulfate), and nitroaromatic compounds.

Effluent monitoring assesses the quantities of contaminants at the facility boundaries, in migration pathways, which include pathways subject to compliance with applicable regulations (e.g., *National Emission Standards for Hazardous Air Pollutants*) or permit levels and requirements (e.g., *National Pollutant Discharge Elimination System*).

Environmental surveillance consists of sampling effluents within and outside the quarry in order to detect and/or track the migration of contaminants. Surveillance data are used to assess the radiological and chemical exposures to workers and the public and the potential effects on the environment.

Results from the environmental monitoring program are reported yearly in the WSSRAP Annual Site Environmental Report. The environmental monitoring program will continue to address the quarry area until the Quarry Residuals ROD establishes the long-range monitoring requirements.

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## 4.2 Ongoing Maintenance

Until quarry restoration and the quarry residuals ROD, the Weldon Spring Quarry will primarily be under a caretaker status. Ongoing maintenance will involve routine mowing, repair of perimeter fencing, and any required maintenance of the remaining facilities. A security guard will continue to remain at the quarry.

The only exception to the caretaker status will be the quarry water treatment plant, which will continue to operate as necessary until a final direction is given in the quarry residuals ROD.

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## 5 REFERENCES

1. Argonne National Laboratory. *Record of Decision for the Management of the Bulk Wastes at the Weldon Spring Quarry, Rev. 0*. DOE/OR/21548-317. St. Charles, MO. September 1990.
2. U.S. Department of Energy. *Record of Decision for Remedial Action at the Chemical Plant Area of the Weldon Spring Site*. DOE/OR/21548-376. Oak Ridge Field Office. St. Charles, MO. September 1993.
3. MacDonell, M.M., J.M. Peterson, and I.E. Joya. *Engineering Evaluation/Cost Analysis for the Proposed Management of Contaminated Water in the Weldon Spring Quarry*. DOE/OR/21548-039. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office, Weldon Spring Site Remedial Action Project. January 1989.
4. MK-Ferguson Company and Jacobs Engineering Group. *Draft Remedial Design Work Plan for the Quarry Bulk Waste Management Program*. DOE/OR/21548-191. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, Missouri. April 1991.
5. MK-Ferguson Company and Jacobs Engineering Group. *Remedial Action Work Plan for the Quarry Bulk Waste Management Program, Rev. 2*. DOE/OR/21548-419. Prepared for the U.S. Department of Energy, Oak Ridge Field Office. St. Charles, MO. August 1994.
6. MK-Ferguson Company and Jacobs Engineering Group. *Quarry Residuals Sampling Plan Addendum 2: Phase 2 Sampling, Rev. 0*. DOE/OR/21548-382. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, MO. November 1995.
7. MK-Ferguson Company and Jacobs Engineering Group. *Environmental Protection Program Implementation Plan, Rev. 5*. DOE/OR/21548-095. Prepared for the U.S. Department of Energy, Oak Ridge Field Office. Weldon Spring, MO. December 1993.

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8. MK-Ferguson Company and Jacobs Engineering Group. *Project Management Contractor Quality Assurance Program*, Rev. 2. DOE/OR/21548-333. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, MO. December 1995.

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**MK-Ferguson Company**  
**Weldon Spring Site Remedial Action Project**

**TRANSMITTAL OF CONTRACT DELIVERABLE**

Date: 17 Mar 97 Transmittal No.: CD-123-03

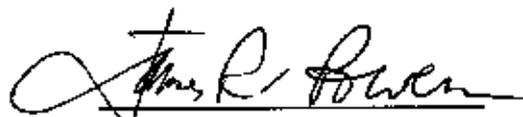
Title of Document: Quarry Bulk Waste Excavation Remedial Action Report

Doc. Num.: 642 Rev. No.: 3 Date of Document: March 1997

Purpose of Transmittal: Request for Department of Energy acceptance of contract deliverable.

In compliance with the Project Management Contract, MK-Ferguson Company hereby delivers the attached document to the U.S. Department of Energy, Weldon Spring Site Office. The document has been reviewed and approved by Project Management Contractor management.

The document will be considered accepted unless we receive written notification to the contrary within 30 days of the date of this transmittal.



James R. Powers  
Project Director