**APPENDIX**

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 70-925/95-01

License: SNM-928

Licensee: Kerr-McGee Corporation

Inspection At: Cimarron Facility, Crescent, Oklahoma

Inspection Conducted: January 30 and February 1, 1995

Inspectors: R. J. Evans, Health Physicist
Fuel Cycle and Decommissioning Branch

Approved: Charles L. Cain — 2/16/95
Charles L. Cain, Chief — Date
Fuel Cycle and Decommissioning Branch

Inspection Summary

Areas Inspected: Non-routine, announced inspection of facility status and radioactive waste management program.

Results:

- The licensee began moving soil contaminated with low levels of radioactive material from stockpiles to an onsite disposal cell during January 1995. The movement of the soil was determined to be a well planned, controlled, and executed activity that placed a high emphasis on safety (Section 2).

- Excellent radiological controls were in place to monitor the workers' occupational exposures and potential exposures to the environment. The controls included air sampling, personnel monitoring, and equipment surveying. The work activity appeared to have little impact on the environment (Section 2).

- Procedural guidance was determined to be adequate for the work in progress. Records of the activities were thorough and were maintained in one location (Section 2).

Attachments:

- Attachment 1 - Persons Contacted and Exit Meeting

- Attachment 2 - Photographs Taken at Cimarron Facility

## DETAILS

### 1 FACILITY STATUS

On September 4, 1987, the licensee submitted a request to the NRC to amend License SNM-928 to allow for disposal of soil contaminated with low concentrations of enriched uranium at the Cimarron facility. Amendment No. 10 to the license was issued on November 4, 1994, authorizing the disposal of 500,000 cubic yards of soil contaminated with low levels of uranium in an onsite disposal cell.

During the decommissioning of the site, soil was sorted according to the contamination concentration (measured in picocuries per gram) in the soil. The soil with elevated uranium concentrations was placed in two large piles, referred to as the north (Pile No. 1) and east (Pile No. 2) stockpiles. The material in the two piles had come from Burial Ground 1, sanitary lagoons, north field area, plant yard, and in-plant subsurface areas. Material with contamination concentrations below 30 pCi/g was left in place. The licensee estimated that the two piles contained 250,000 to 300,000 cubic feet of material. The licensee began moving Pile No. 2 to the onsite disposal trench in early January 1995. At the end of the inspection period, the licensee had almost completed movement of Pile No. 2. Movement of Pile No. 1 was planned to begin afterwards.

The licensee recently consolidated several other piles of dirt into one (Pile No. 3) for radioactive contamination sampling (the pile movement also promoted mixing of the soil for homogenization). This pile, located adjacent to the north Pile No. 1, was a consolidation of soil material that had been excavated from the north field area and the south side of the uranium building. The soil in the pile was surveyed and sampled for radioactive content in mid-December 1994. At the end of the inspection period, the licensee was compiling the information into a report for submittal to the NRC. The licensee plans to bury this material in the onsite disposal cell. Remaining in-situ material will not be stockpiled but will be transported directly to the disposal area following soil sampling.

The areas of the facility that were toured included the onsite soil disposal cell (also referred to by the licensee as Burial Ground No. 4). The disposal area consisted of an "L" shaped trench with a rain water collection pit at one end. The disposal pit was sloped so that all drainage would flow to the collection pit, which was lower in elevation than the disposal pit. Very little water was observed in the collection pit. The current disposal trench was about 59 feet wide, 443 feet long, and up to 10 feet deep. The licensee planned to place 6 feet of soil into the trench. At the end of the inspection period, enough material had been transferred to the disposal cell to occupy about two-thirds of the volume allowed in the disposal cell.

When the trench level reaches 6 feet, the licensee plans to perform a final topographical survey to accurately determine the volume of material that had been placed in the trench. When the survey is completed, an additional 4 feet of cover material will be placed on top of the contaminated material to raise the trench level up to grade level. The licensee plans to dig a second trench

adjacent to the first one for disposal of the remainder of the contaminated soil. While excavating the second trench, soil will be transferred to the first trench as cover material. Following completion of the project, a final topographical survey will be performed as well as installation of disposal cell location markers.

## 2 RADIOACTIVE WASTE MANAGEMENT (88035)

An inspection of the radioactive waste management program was performed to determine whether the licensee was complying with license and regulatory requirements related to the release and disposal of liquid, airborne, and solid waste.

### 2.1 License Compliance Inspection

A major focus of the inspection was ensuring that the licensee was in compliance with Condition 23 of License SNM-928, Amendment 10. This condition permits the licensee to bury up to 500,000 cubic feet of soil contaminated with low levels of enriched uranium. The soil contamination limits established by License Conditions 23.a and 23.b are 100 picocuries/gram (pCi/g) for soluble uranium, 250 pCi/g for insoluble uranium, 10 pCi/g for thorium, and 1 pCi/g for plutonium. Licensee data indicated that Piles No. 1 and 2 had average concentrations of about 45 pCi/g uranium, 1 pCi/g thorium, and no observable levels of plutonium. The soil in Pile No. 3 was recently sampled for contamination. Preliminary results indicate that the soil in the third pile has similar concentration levels. The licensee plans to submit the characterization report for the third pile to the NRC in the near future.

License Condition 23.d requires the licensee to compact the soil in the disposal cell in lifts not to exceed one foot to 95 percent of maximum dry density. Also, density testing shall be performed over the entire lift thickness. Although soil density testing did not occur during the inspection, the licensee produced records that confirmed that each 1-foot lift met the specified requirements prior to installation of the subsequent lift.

License Condition 23.f requires the licensee to maintain and implement procedures and engineering controls to ensure that occupational doses and doses to the members of the public are as low as reasonably achievable. Nothing was identified during the inspection that suggested that the licensee was not complying with this license condition.

License Conditions 23.c, "Installation of an Impermeable Barrier," and 23.e, "Land Title and Marker Requirements," are applicable at project completion and were not inspected at this time.

### 2.2 Radioactive Waste Management Program and Procedures

Procedure KM-DP-01, Revision 1, "On-Site Disposal Plan," was developed to control the disposal of the contaminated soil in the onsite trench. This procedure listed personnel responsibilities, work precautions, quality control requirements, soil characterization requirements, transportation instructions, and disposal requirements. Also, the actual work was performed using the

guidance provided in a special work permit. This document clearly specified the industrial and radiological hazards present as well as protective equipment required because of the hazards. The procedural guidance that was developed to control the work was determine to be concise and comprehensive. Licensee workers complied with the procedural requirements during the soil movement activities.

The earth moving work was performed using three dump trucks, one road grader, one "sheeps foot" (compactor tool pulled by a tractor), one front end loader, and a bobcat outfitted with a compacting tool for use on the edges of the trench. The loader was used to scoop up dirt from the Dirt Pile No. 2 (east stockpile) and load the dirt into a dump truck. The dump truck then transferred the soil to the disposal cell. The grader was used to spread the soil around in the cell while the compactors were used to compact the soil.

When a 1-foot lift was completed, a contractor was used to verify that the soil was compacted to at least 95 percent of the maximum dry density for this type of soil. Testing was performed at eight locations for Lifts 1 and 2 while four tests were performed for Lift 3. Four tests per lift will be performed for subsequent lifts. Following confirmation that the soil was properly compacted, the next lift would commence. Airborne particulates were sampled using a portable aerosol detection meter. A water truck was available to spray water on the work areas as necessary to control dust. The licensee was keeping daily records of the number of dump truck loads of soil being transferred to the disposal cell.

Records of the work were being maintained by the licensee. The records included daily and weekly radiological survey results, the number of dump trucks filled and unloaded on a daily basis, compaction tests, and Pile No. 3 characterization results. The records appeared to be thorough, complete, and well organized.

2.3 Radiation Protection Program

During the NRC's safety evaluation of the licensee's proposal to bury contaminated soil onsite, the NRC concluded that the major potential radiological impact to the workers would be from the inhalation of dust. The NRC also concluded that the licensee could reduce the worker's radiological exposure by using respiratory protection and by implementing dust control measures such as watering the soil to keep it moist. The licensee conservatively estimated that the total exposure would be 932 millirems, assuming the work took 9400 man-hours. The actual radiological exposure rates are expected to be well below 932 millirems.

The licensee's control of the radiological hazards was inspected in detail. The licensee utilized air samplers, routine surveys, personnel film badges and thermoluminescent detectors (TLDs) to monitor occupational and environmental doses during the work.

Portable continuous air samplers were in operation during work at both the soil loading point and the disposal cell. Each sample station consisted of a 5 cubic feet per minute environmental sampler and a 2 cubic feet per minute

occupational sampler. In accordance with procedural requirements, lapel air samplers were used on half of the workers in the field. Sample results indicated 1 percent or less of the 10 CFR Part 20 derived air concentrations for the continuous air samplers while the lapel air sampler results were 2 percent or less of the limits.

Radiological surveys were conducted within the restricted area to determine exposure rates and contamination levels. Surveys for radioactive materials included weekly surveys of the road used for the transfer of the contaminated soil, daily surveys of the radioactive exposure at the work locations using a microRoentgen per hour ($\mu$R/hr) meter, and daily equipment swipes/smears for contamination. With a background exposure rate of about 7 $\mu$R/hr, the soil being moved measured about 12 to 14 $\mu$R/hr. A weekly composite of soil samples from each dump truck's load was being collected for analysis. These sample results will be used to estimate the total activity of the contamination in the disposal pit. Split samples are being sent offsite for analysis for independent determination of the uranium, radium, plutonium, thorium, and their daughter product concentrations in the soil.

Monitoring of personnel included the use of film badges and bioassays. The film badges are normally changed out on a monthly basis. Additionally, bioassay samples are routinely taken for detection of uranium in urine and uranium and thorium by in-vivo counting (the January 1995 results were not available during the inspection).

Fourteen environmental monitoring sample locations with TLDs have been provided at the site. Four of the TLDs have been located around the disposal cell. The environmental monitoring TLDs have been changed out quarterly; therefore, the environmental impact of the earth moving work will not be available until the second quarter of 1995. The radiological impact to the environment is expected to be minimal.

## 2.4 Conclusions

No noncompliances were identified during the inspection. Additionally, the soil movement was observed to be a well controlled and executed activity with a high emphasis being placed on safety. Excellent radiological controls were in place to monitor the occupational exposures to workers and potential exposures to the environment. Procedural guidance was determined to be adequate for the work in progress. Records of the activities were thorough and were being maintained in one location. The work activity appeared to have little impact on the environment.

**ATTACHMENT 1**

## 1 PERSONS CONTACTED

1.1 Cimarron/Kerr-McGee Corporation

J. Kegin, Site Manager
K. Morgan, Supervisor, Health Physics
J. Stauter, Vice President

In addition to the personnel listed above, the inspectors contacted other personnel during this inspection period.

## 2 EXIT MEETING

An exit meeting was conducted on February 1, 1995, at the Cimarron facility in Crescent, Oklahoma. During this meeting, the inspectors reviewed the scope and findings of the report to the site manager and health physics supervisor. The participants did not identify as proprietary any information provided to, or reviewed by, the inspector.

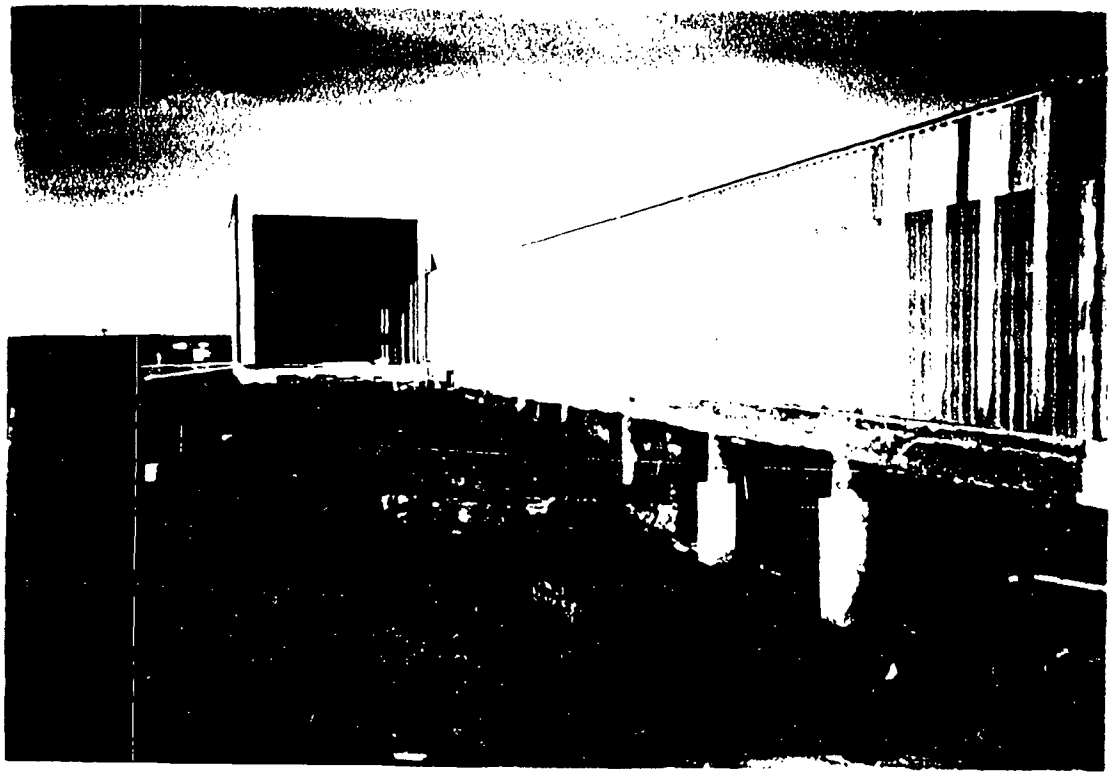
Three photographs (copies attached) were provided to the inspector at the exit meeting. The original photographs were added to the Region's docket files for the Cimarron facility.

ATTACHMENT 2

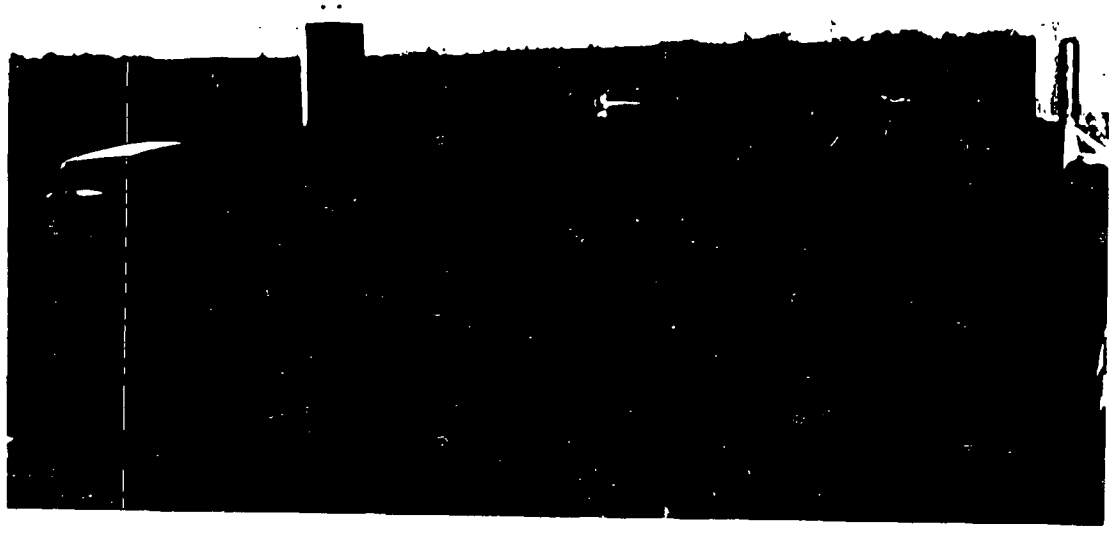
Photograph 1: Soil removal from stockpiles began on January 4, 1995 (licensee supplied photograph)

Photograph 2: Soil density testing in disposal cell (licensee supplied photograph)

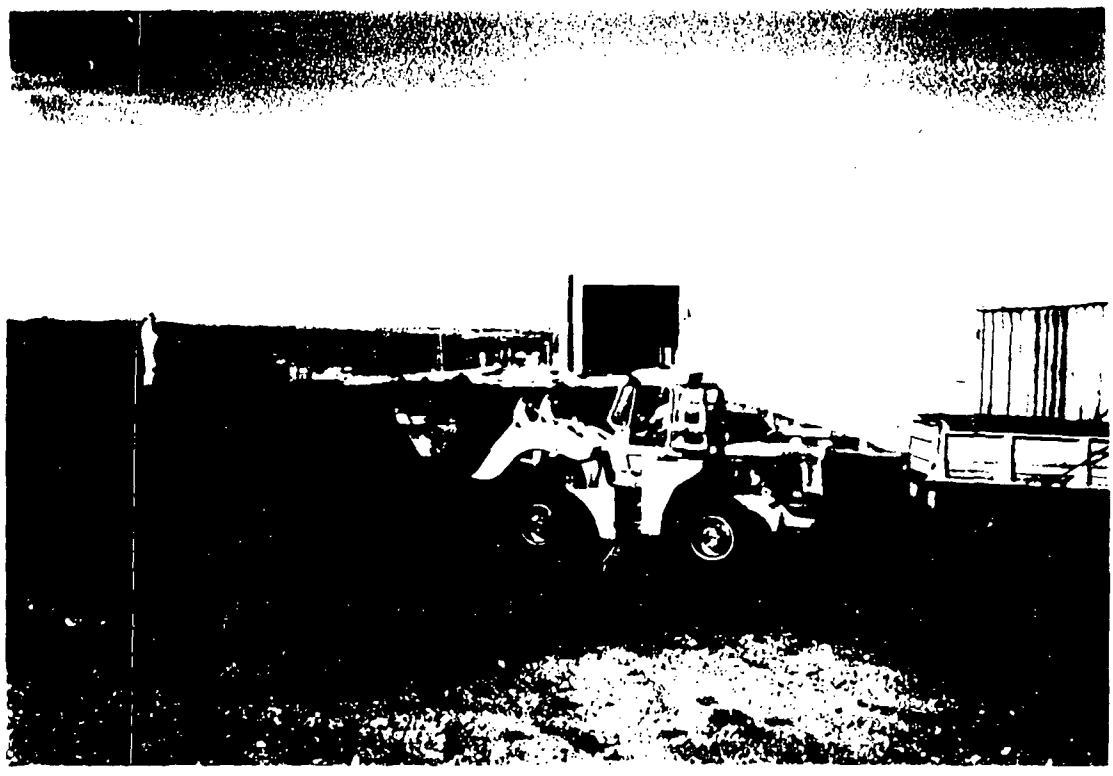
Photograph 3: Weekly survey of the road (licensee supplied photograph)



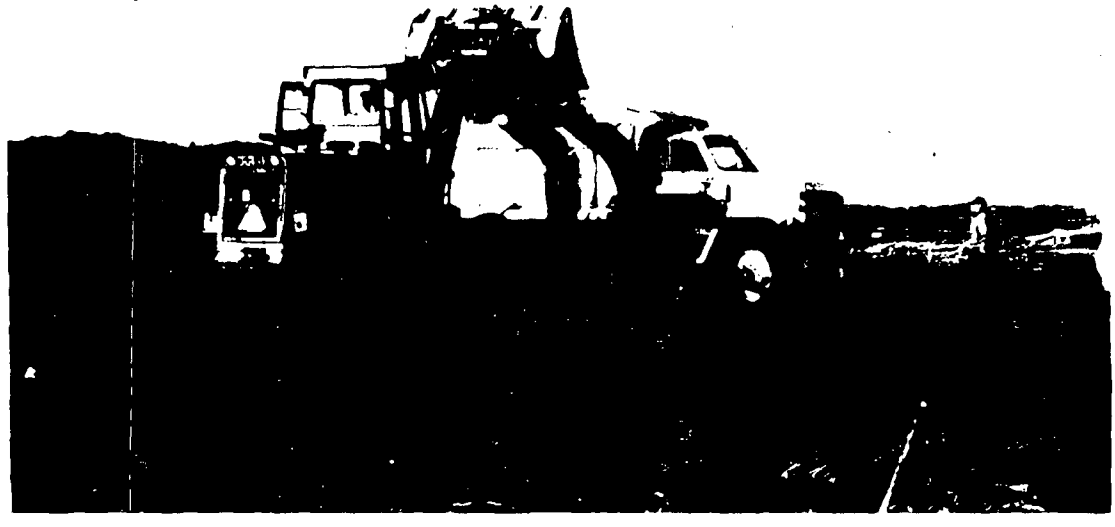
Photograph 4: Area behind Uranium Building where soil was excavated



Photograph 5: Remains of Pile No. 2 (east stockpile)



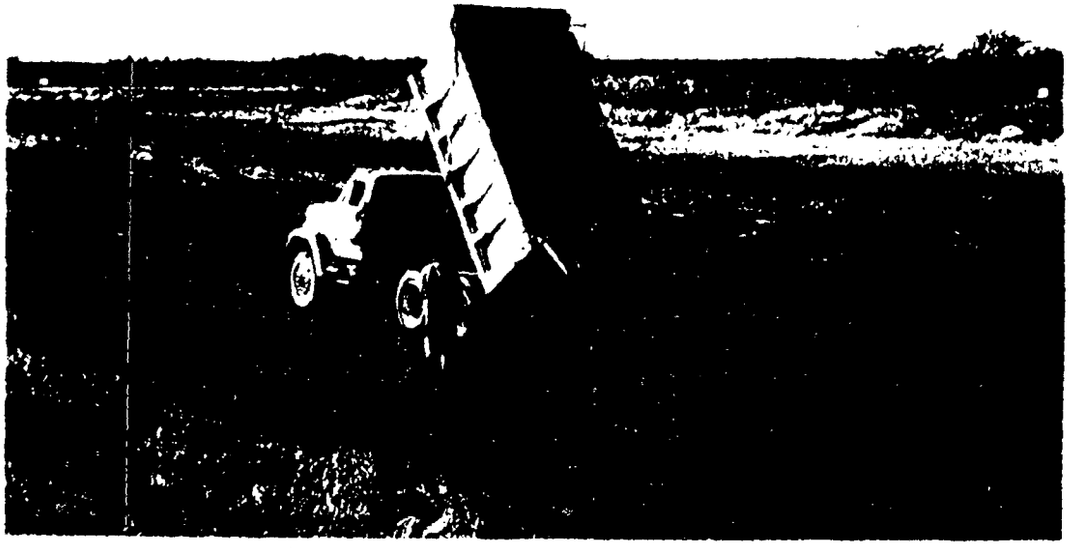
Photograph 6: Excavation of Pile No. 2 by front end loader



Photograph 7: Contaminated soil transferred to dump truck

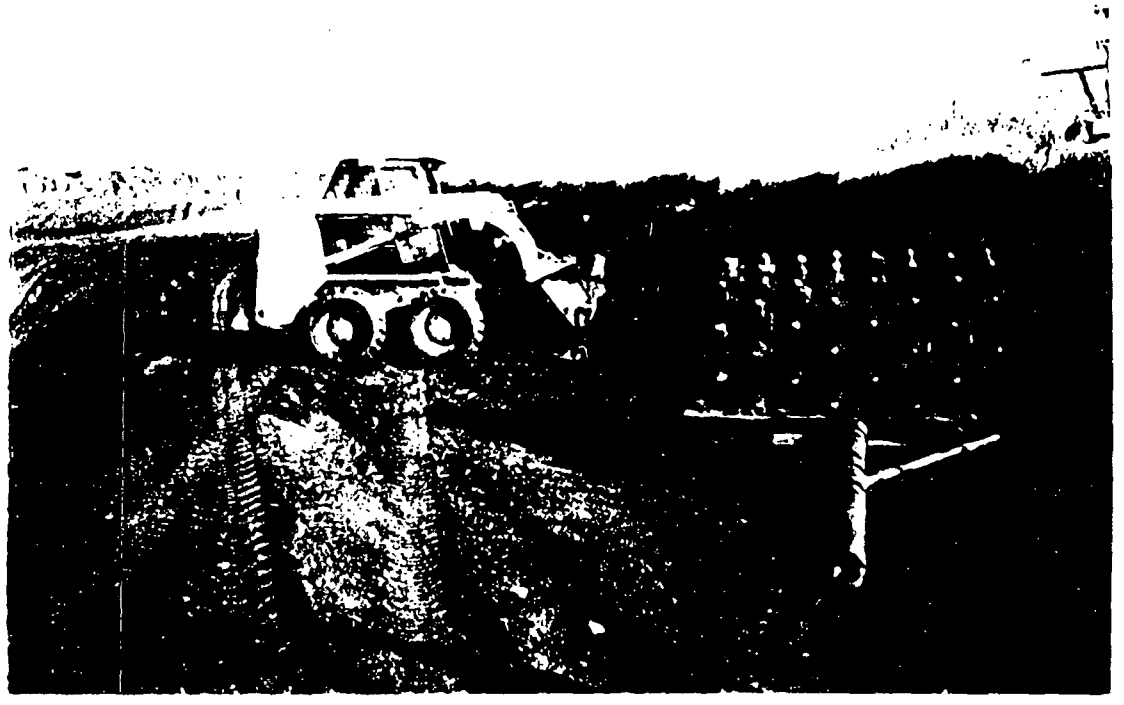
Photograph 8: Disposal cell, looking north

Photograph 9: Disposal cell, looking south



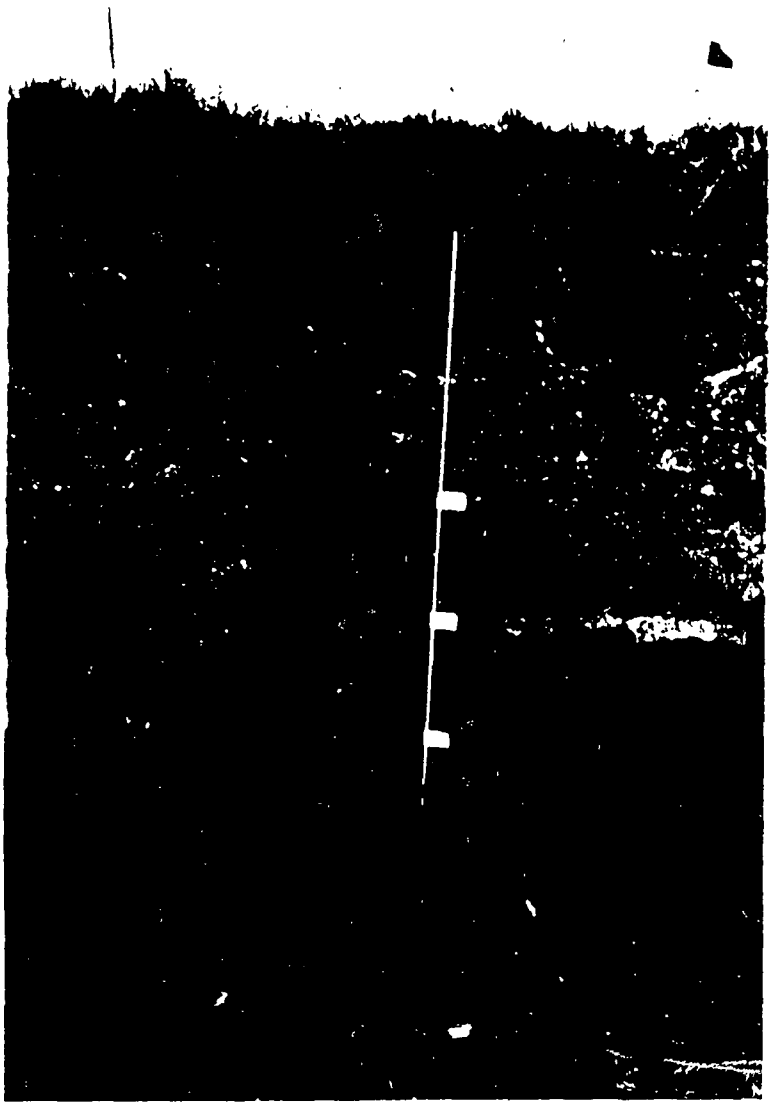
Photograph 10: Contaminated soil being unloaded into disposal cell


Photograph 11: Road grader spreading soil in disposal cell

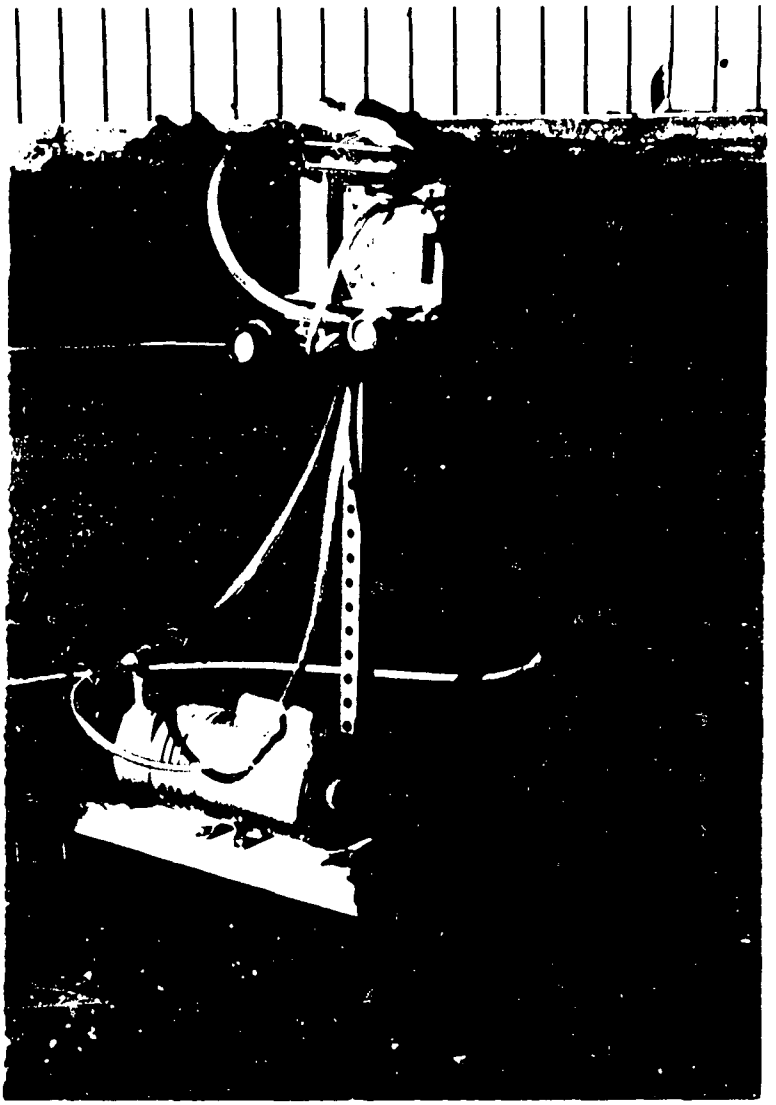


Photograph 12: Compactors, bobcat (left) and sheep's foot (right)

Photograph 13: Area where second disposal cell will be located (left/west of current disposal cell)



Photograph 14: Soil depth marker; soil level currently between lifts 3 and 4 of 6 lifts (white markers are one foot apart)



Photograph 15: Portable continuous air sampler