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WM42/GNG/85/07/11

JUL 26 1985

Department of Energy
Albuquerque Operations Office
ATTN: Mr. John G. Themelis
Uranium Mill Tailings Project Office
Post Office Box 5400
Albuquerque, New Mexico 87115

Distribution:
WMLU r/f
GN Gnugnoli
DE Martin
JO Bunting
RE Browning
Region 1
VTharpe
WM s/f
NMSS s/f
WA Nixon, FCUF
WT Crow, NMSS
MJ Bell
Docket 40-6500
PDR

Dear Mr. Themelis:

Enclosed is the trip report written by the NRC staff following their visit to the Canonsburg UMTRAP site on May 16 and 17, 1985. The report provides recommendations for DOE and NRC to consider in the performance of this remedial action. We hope that our observations and perceptions of the status of construction at Canonsburg will be helpful to you.

There are three major recommendations described in the enclosed report:

1. DOE should document the handling of procedures for the chromic acid liquid waste, the corresponding sludges from the treatment facility and the solids in contact with the chromic acid waste. During the visit liquids draining from areas located near the southern boundary of the tailings stockpile were collecting in puddles and a trench. The liquids' appearance indicated chromic acid contamination. NRC had not been informed of this additional leaching/drainage process. DOE representatives at the site did not indicate how frequently the liquids were pumped from the trench to the treatment facility. NRC staff based recommendations on the last proposed RAP modification on a maximum of 50 mg/L chromic acid concentration leaching from the tailings. Should actual concentrations significantly exceed this estimate, DOE will need to consider possible neutralization of this contaminated material prior to disposal in the encapsulation cell.

2. In reviewing the geotechnical engineering records at the site, NRC staff noticed that several gradation tests on the capillary break material failed specification requirements when sampling was performed when this material was delivered. NRC was informed that a second sample was taken and tested. In the case of second failure, the soil is then either reblended on site or returned to the supplier. NRC staff recommended that a more representative procedure be used prior to acceptance of any construction material (minimum of two retests).

3. In order to facilitate records' review and to assure that frequency of testing is consistent with construction specifications, NRC staff recommended that the approximate volume of emplaced materials and the number of field and laboratory tests performed on each material should be recorded on a weekly basis.

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Other concerns which are described in the enclosed report include the excavation of contaminated material between the pond and Chartiers Creek in Area B, and the suggestion that DOE use clay mineralogy analyses at UMTRA sites using clay liners.

Although it is not discussed in the trip report, we understand that it is planned to bury tree stumps and roots from the area between the treatment pond and Chartiers Creek in the encapsulation cell. NRC has not approved addition of large pieces of organic material to the cell. We suggest consideration be given to other methods of disposing of the material; such as, chipping and disposal in other site areas or, possibly, removing the adhering contaminated soil by water washing and disposal of the cleaned material in other site areas.

We hope that the enclosed information is useful to you, and should there be any information in this trip report which is inaccurate or unclear, please contact Mr. W. A. Nixon (FTS 427-4510).

Sincerely,

Original signed by
Glenn A. Terry

for W. T. Crow, Acting Chief
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety, NMSS

Enclosure:
May 16-17, 1985 Canonsburg Trip Report

cc: J. Baublitz, DOE/HQ w/enclosure

OFC	:WMLU:rb	:FCUF	:WMLU	:WMLU	:NMSS	:	:
NAME	:GN Gnugnoli	:WA Nixon	:DE Martin	:LB Higginbotham	WT Crow	:	:
DATE	:85/07/22	:85/07/25	:85/07/25	:85/07/26	:85/07/26	:	:

CANONSBURG UMTRA ON-SITE CONSTRUCTION REVIEW - MAY 16-17, 1985

prepared by
Steve Smykowski (WMEG) and William L. Dam (WMGT)

I. INTRODUCTION

The Canonsburg Uranium Mill Tailings Remedial Action (UMTRA) site is the first of two dozen sites to begin the construction phase of remedial action. Construction activities are expected to be completed by November 1985 at Canonsburg and have progressed to a more advanced stage than at any of the other UMTRA sites.

The purpose of the site visit was to observe: i) the current construction progress; ii) the site features related to the Remedial Action Plan (RAP) modifications; and iii) the geotechnical engineering records that are being kept on site. Actual operations were shut down during the visit because of inclement weather. However, we were able to note the present condition of various aspects of the work including the compacted subgrade material, the capillary break material, the clay liner, the geotextile fabric, and the contaminated tailings. In addition, we visited the borrow site where the radon barrier materials and liner materials are being excavated. We examined the geotechnical engineering records that are being kept on site and observed areas of the site where modifications to the Remedial Action Plan (RAP) have been proposed (disposal of chromic acid contaminated tailings, organic material, and the contaminated soil lens in Area B).

II. RECOMMENDATIONS

We have identified the following recommendations that should be made to the DOE:

1. Liquid chromium wastes should be treated or removed from the site in accordance with RCRA requirements if further analyses determine that the wastes are hazardous. Material from evaporated puddles should also be analyzed to determine the potential health hazard to workers from inhalation of airborne chromium particulates. In addition, the DOE should document the handling procedures for: i) the chromic acid liquid waste; ii) the corresponding sludges from the treatment facility; and iii) the solid material on site in contact with the chromic acid waste. This documentation should be provided to the NRC in response to the June 10, 1985 letter from Mr. W. T. Crow (NRC) to Mr. J. G. Themelis (DOE).

2. If a soils test for a construction material fails to meet the specifications and the same material is retested, representative sampling and testing should be accomplished (minimum of two retests) before the material is accepted. This recommended procedure is intended to assure that the testing is representative of the volume of material that will be accepted.

3. The approximate volume of emplaced materials and the number of field and laboratory tests performed on each material should be recorded on a weekly basis. This information will aid inspection of the records and assure that the frequency of testing is consistent with the construction specifications.

III. SITE TOUR

A plan view of the site is shown in Figure 1. The site is bounded by Chartiers Creek on three of its boundaries. For remedial action purposes, the site has been divided into five areas. The encapsulation cell is being placed in Area A and Area B as shown in Figure 1. Figure 2 shows a typical cross-section of the design through the encapsulation area.

Area A

In Area A we noted the compaction of the subgrade soil, and the placement of the capillary break material, liner, geotextile fabric, and contaminated fill. We also observed the chromic acid that is visible along the southern side of the stockpile. At the time of our visit, the DOE, the Technical Assistance Contractor (TAC), and the Remedial Action Contractor (RAC) personnel were unable to explain the procedures that are being used to properly handle the liquid chromic acid waste.

The area of chromic acid contamination is located along the southern boundary of the tailings stockpile adjacent to the drainage diversion ditch. Chromium contaminated liquids have been identified by the RAC in several small puddles and in a large pool at the base of the stockpile. The liquid is bright greenish-yellow and turbid. The puddles appear to be evaporating in-place as seen by evaporation rings around several puddles. The large pool, with dimensions approximately six feet long by four feet wide, was dug to collect the chromium liquid waste. At the time of the site visit, the pool was nearly full and contained a large volume of the liquid waste.

The source and composition of liquid chromium wastes have not yet been determined. Dried yellow material, indicating chromium, is evident below concrete foundation slabs in the contaminated stockpile. Bright yellow-liquids

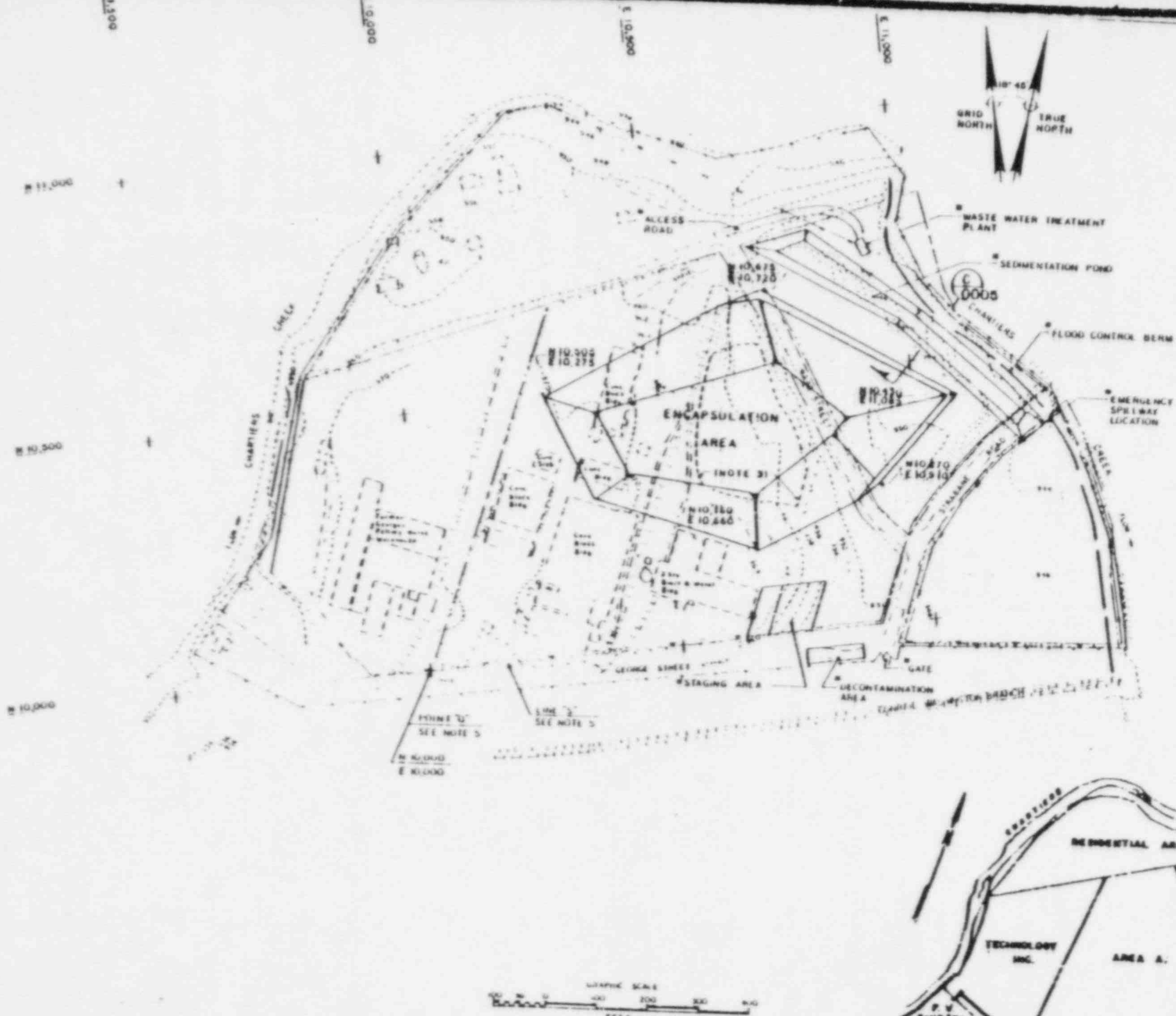
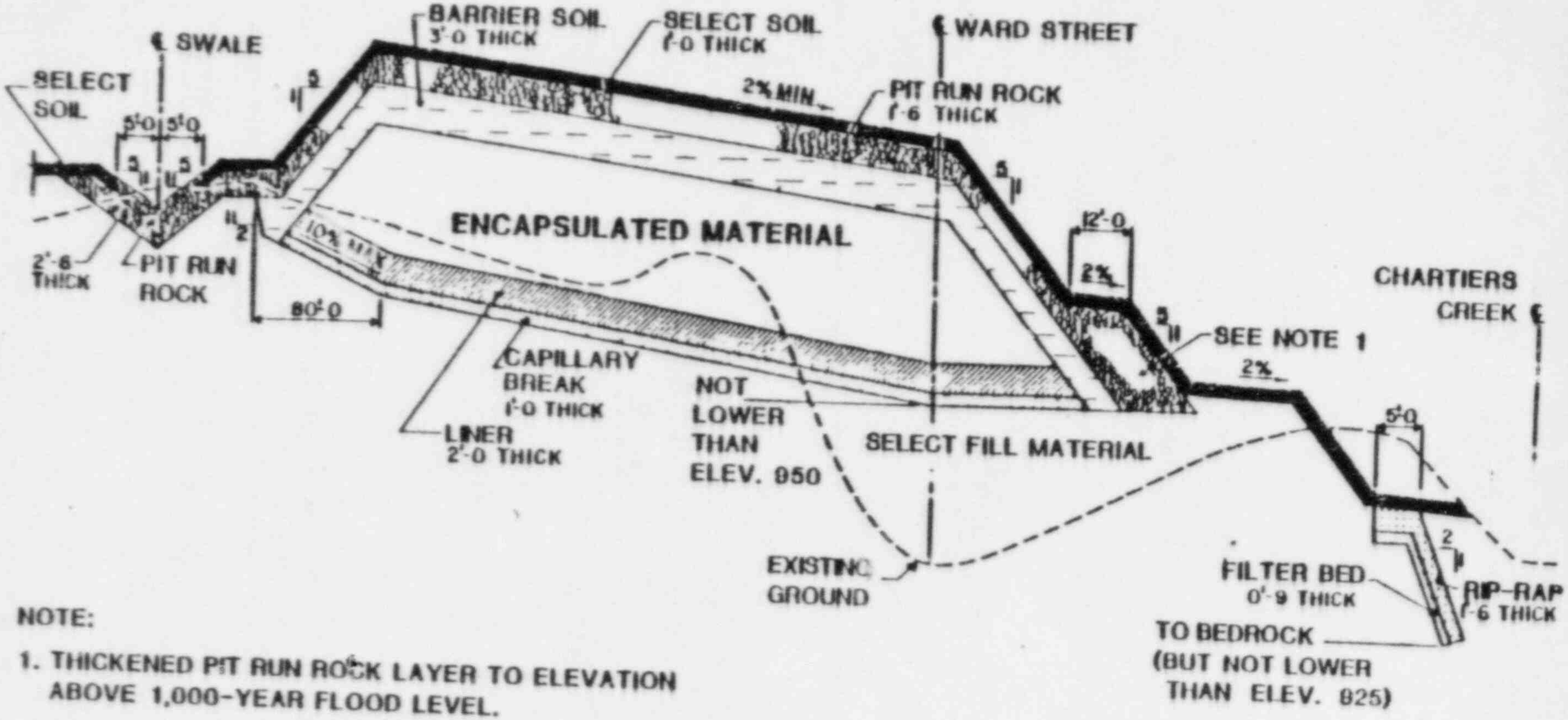


Figure 1: Canonsburg, PA - UMTRA Site



NOTE:

1. THICKENED PIT RUN ROCK LAYER TO ELEVATION ABOVE 1,000-YEAR FLOOD LEVEL.

NOT TO SCALE

FIGURE 2
TYPICAL SECTION THROUGH ENCAPSULATION AREA
CANONSBURG SITE

appear to be seeping from the tailings stockpile. This may indicate that infiltrating rain water is leaching chromium from tailings within the stockpile. However, it is possible that liquid wastes mixed in the tailings are also seeping out of the tailings. Chromium concentrations vary significantly depending on whether the solid tailings are leaching from rain water or if residual liquid wastes are seeping out of the tailings. Larry Farnes (RAC) estimated that the average liquid chromium concentration was on the order of 15-20 mg/l and that sample analyses were contained in NUS reports prepared for the DOE. However, the analyses reported by NUS do not support this estimate. The NUS report showed a maximum concentration of 460,000 mg/l chromium for the liquid wastes that were removed from the site and a maximum of 50 mg/l leachable chromium from the solid tailings based on EP toxicity tests.

Prior to the site visit, NRC staff performed dilution calculations of adding chromium directly into Chartiers Creek to determine compliance with water quality standards (see previous memo dated May 15, 1985 from Knapp to Higginbotham). A seemingly conservative value of 50 mg/l chromium was used in the dilution calculations because the chromium wastes were reported to be leaching from chromium that was mixed in with the tailings. Based on these calculations, the NRC staff concluded that leaching of chromium from tailings contaminated with chromic acid would not adversely affect the surface water quality of Chartiers Creek provided that the source concentration is 50 mg/l. However, if the source of chromium is liquid waste seeping out of the tailings then the concentration of chromium may be as high as 460,000 mg/l. This would greatly exceed the water quality standards and would adversely affect the creek.

The pool of chromium-bearing water was not being pumped to the surface water treatment facility for treatment. We recommend that the DOE treat or remove the liquid wastes contaminated with chromium by pumping the wastes to the water treatment facility or by transporting the wastes to off-site disposal. Additional analyses should be performed to determine chromium and cadmium concentrations in the large pool of liquid. If the liquid chromium wastes are determined to be hazardous, the liquids should be removed in accordance with RCRA requirements. Further, the solid chromium waste from evaporated puddles could present a health hazard to workers who may inhale airborne particulates released during relocation of the stockpile.

Construction of the encapsulation cell began at its western boundary and is progressing eastward. The first lifts of contaminated fill are presently being placed in the cell. The subgrade soil that was still visible appeared to be evenly graded and well compacted. Visual inspection of the clay liner showed no evidence of rutting or areas of subsidence. Based on our observations of those areas where both materials were exposed, we found no evidence of damage

to the capillary break zone resulting from placement of the overlying clay liner.

The RAC uses a methods specification of six passes with a heavy tamping foot compactor to achieve 95% of the maximum dry density. The in-situ density of the liner is checked by comparing the in-situ moisture content with the compaction curve that has been predetermined for the soil type. The sand-cone method (ASTM D-1556) for determining densities was not used to avoid damaging the integrity of the liner.

Significant amounts of organic material or debris were not visible in the stockpile of contaminated material located at the south end of Area A. However, tall grass was growing on the sides of the stockpile. As indicated in previous staff reviews, the volume of the tall grass is small in comparison to the amount of contaminated tailings and should not affect pile stability if the emplaced vegetation is uniformly distributed in the cell.

Building materials made with asbestos have been covered with site cover material in Area A where Ward Street, Strabane Avenue, and George Street coincide (Figure 1). A discussion on the necessary permits for disposing of this material is included in the Special Conditions Document prepared by the DOE.

Area B

Area B is contiguous to Area A and is located east of its boundary (Figure 1). The major portion of the highly contaminated soil lens (estimated average radium concentration of 505 pCi/g) that the DOE has proposed to stabilize-in-place outside the encapsulation cell is located in this area. Although this lens also extends into the eastern portion of Area A where it will be covered by the encapsulation cell, a large portion of the lens in Area B will not be covered by the cell.

By letter dated April 3, 1985 from Themelis (DOE) to Nixon (NRC), the DOE and RAC indicated that the contaminated soil lens extends from the eastern edge of the encapsulation cell to the surface water collection pond. However, during the site visit, we learned that the lens is more extensive than what was originally communicated to the NRC. Larry Farnes (RAC) indicated that a portion of the lens can also be found between the collection pond and Chartiers Creek (Figure 1).

The RAC described the proposed remedial action for disposing of the contaminated soil lens. The proposed action is as follows:

a) Lens Between Cell and Pond - The proposed modification to the RAP dated April 3, 1985, specified covering portions of the lens in this area with site cover material. However, the NRC review of the support calculations for determining radon flux showed that the DOE had used a diffusion coefficient value representative of radon barrier material. Therefore, it appeared that the design was based on covering the lens with radon barrier material rather than site cover material. To clarify this point, a conference call was placed during the site visit on May 17, 1985 from Steve Smykowski and Larry Farnes (RAC) to Mr. T. R. Wathen (RAC) and Dr. Gerald Thiers (RAC). As a result of the conference call, the RAC has agreed to change the specifications so that radon barrier material will be used to cover the lens rather than the site cover material.

The RAC indicated that if any of the lens material in this area is exposed during construction, it will be covered by a minimum of 3 feet of clean radon barrier material overlain by 2 feet of riprap and 1 foot of topsoil. If the lens is not exposed during construction, it will be covered by a minimum thickness of 4 feet of the in-place low-level contaminated soil (less than 100 pCi/g) overlain by 2 feet of riprap and 1 foot of topsoil. This area will be protected from fluvial erosion by the buried riprap wall.

b. Lens Below the Pond - The portion of the contaminated soil lens that extended below the surface water collection pond was excavated and removed when the pond was constructed. The soil underlying the pond is not contaminated.

c. Lens Between Pond and Creek - The RAC indicated that the contaminated lens material between the collection pond and Chartiers Creek will be removed and placed in the encapsulation cell. This area is located outside the buried riprap wall. Soil removal may be particularly difficult in this area because a cut bank of the creek is in the proximity of the contaminated soil lens. The stream may further erode the contaminated soil during excavation and result in mixing of soil and water. Precautions should be taken to avoid deposition of contaminated material in the creek because the material could become a long-term source of heavy metal and radioactive contamination. The resulting impact would depend on the concentration of the material and the amount deposited in the creek.

The proposed modification to the RAP for disposal of the contaminated soil in this Area now includes removing trees and vegetation from the floodplain and river bank and placing the stumps and roots inside the

cell and burying the upper parts of vegetation on the site outside the cell. The vegetative material will be placed in the top lifts of the cell because clean-up of this area will occur when construction of the cell nears completion. It is important that the vegetative material be uniformly placed to assure that differential settlement will not adversely affect the integrity of the cover.

Area C

A highly contaminated soil layer was exposed in a trench in the northern section of Area C. Approximately 4 to 6 feet of red fill material overlies this contaminated layer. According to the RAC, the average radium concentration of the layer is approximately 20,000 pCi/g. The RAC indicated that all the contaminated material in Area C will be excavated and placed in the encapsulation cell.

Abandoned Technology Inc. Area

The area west of Area A identified as Technology Inc. in Figure 1 contains buried contaminated material (average radium concentration not exceeding 100 pCi/g) covered with 2 feet of site cover material. The contaminated material consists of construction materials from buildings that were demolished on the site. Don Summers (RAC) indicated that no organic material was buried in this area. The site cover material was placed and compacted last fall. No signs of rutting or differential settlement were evident.

Abandoned Residential Area

The northern portion of the site is an abandoned residential area. The structures in this area have been demolished and the ground has been stripped clean. The debris predominantly consists of organic material including wood, trees, and vegetation from vicinity properties. The material has been buried in this area and covered with 2 feet of site cover material.

A test hole was dug north of the cell to measure the depth to the water table. The water table appeared to be high and may present difficulties during construction of the buried riprap wall. The riprap wall is expected to extend approximately 8 feet below the water table. In addition to the test hole, we saw a trench that was excavated north of the cell. The RAC mentioned that additional vicinity property material will be placed in this trench and covered with 2 feet of site cover material.

IV. STRABANE BORROW SITE

In addition to the Canonsburg site visit, we toured the Strabane borrow area located approximately 1 mile from the site. The borrow material from this area is being used for the encapsulation cell liner and radon barrier. A large area of the site has been stripped clean of vegetation. The clay mineralogy of the borrow material was not known and it was not possible to determine the clay mineralogy from visual inspection. Bill Dam mentioned to the RAC that clay mineralogy analyses provide useful information for identifying the type and sorptive properties of clay minerals. Generally, these analyses (e.g., x-ray diffraction) are inexpensive. For example, if clay in the liner is predominantly a smectite then the cation exchange capacity may be an order of magnitude higher than if the clay liner is predominantly illite, kaolinite, or chlorite. High cation exchange capacities are favorable for adsorption since ion exchange may attenuate the migration of radionuclides and other constituents away from the cell. Although this does not factor directly into the NRC's evaluation of the liner's performance (NRC assumed no attenuation), these analyses should be performed at sites where the liner's performance is integral to meeting EPA standards.

V. SITE RECORDS

On May 17, Steve Smykowski met with the RAC to examine the geotechnical engineering records at the site. All geotechnical engineering construction activities are recorded in the daily inspection reports. The records indicated that construction materials delivered to the site were tested and were found to meet the construction specifications. Nick Wytiaz, an inspector for the RAC, mentioned that visual inspections of the geotextile fabric are conducted to assure proper placement of the material, and to verify a fabric overlap of at least 12 inches.

The staff had difficulty determining the frequency of soil testing because the volume of material placed between each test was not recorded with the test. To aid in the inspection of the records, we recommend that the inspector summarize the volume of emplaced materials and the number of field and laboratory tests performed on each material on a weekly basis.

The staff noticed that several gradation tests on capillary break material did not meet the specification for the amount passing the U.S. Standard No. 8 sieve. In these cases, a second sample was obtained and tested. If the second sample passed the specifications, then the material was accepted as capillary break material. If the second sample did not pass the specifications, then either the material would be reblended at the site and then retested or else the material was returned to the shipper. In reviewing this procedure, we recommend that if the RAC retests a material because a test fails to meet the

specifications, representative sampling and testing should be accomplished (minimum of two retests) before the material is accepted.

VI. CONCLUDING REMARKS

The DOE representatives at the site were very cooperative and helpful in conducting the site tour and answering our questions. NRC's involvement through on-site construction reviews of this type will help form the basis for NRC concurrence with performance of remedial action, as well as help to prepare the determination of certification of completion of the remedial action.

The NRC should continue to observe ongoing activities during the various phases of construction. Since placement of the fill and radon barrier material is expected to be completed by mid-July, it is prudent to plan our next site visit before completion of these activities. Specific activities that should receive NRC attention include:

a) the excavation of the contaminated soil lens and vegetation in Area B and the placement of this vegetation in the encapsulation cell;

b) the excavation of tailings that are contaminated with chromic acid to observe the quantity and extent of the contamination;

c) the placement of the radon barrier and riprap cover materials;

d) the construction of the buried ripap wall.