
REPORT
CHARACTERIZATION OF OVERBURDEN
MINE WASTE AND URANIUM ORE
FOR RECLAMATION CONTRACT 1
POISON BASIN MINE SITES
NEAR BAGGS, WYOMING

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INTRODUCTION

This report presents the results of the investigation and analysis of the physical and mineralogical characteristics of the overburden, mine waste and probable uranium ore which will be handled during Reclamation Contract 1 at the Poison Basin Mine sites. The location of the Poison Basin Mine sites is shown on Figure 1, Vicinity Map. The location and designation of the areas of interest for Reclamation Contract 1 is shown on Figures 2 through 5. Specifically, this report covers the areas designated as the Shawano Mill Site, the Murphy Pit, and the Teton Pit areas. The work conducted for this study is part of the State of Wyoming AML Project No. 7, Part III.

PURPOSE AND SCOPE

The purpose of this investigation was to characterize the various site materials present including probable uranium ore, mine waste and overburden dumps with respect to special material handling requirements. The results of this characterization have been utilized for development of specific design recommendations for the Reclamation Contract 1 area. In order to accomplish this purpose the following scope of work was completed:

- o A surface reconnaissance in which scintillometer measurements were obtained to delineate areas with potentially high radioactivity levels.
- o A test pit program from which samples were collected of materials at various depths in the piles for later analysis.
- o A laboratory testing program on the samples collected to determine the presence and quantity of various parameters.
- o Analysis of the test results to develop reclamation guidelines including background levels of various parameters, hazards associated with the levels measured and appropriate reclamation recommendations.

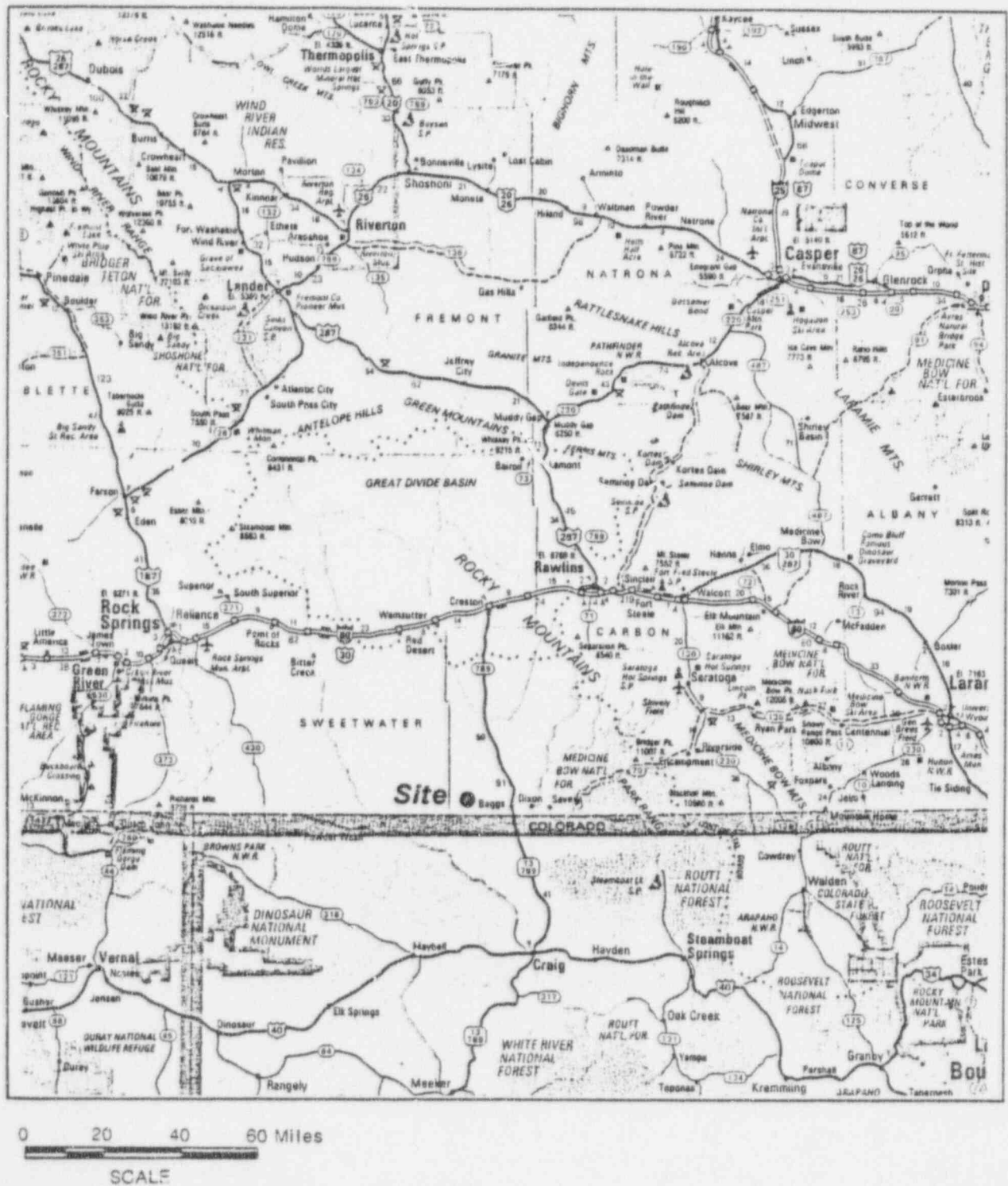
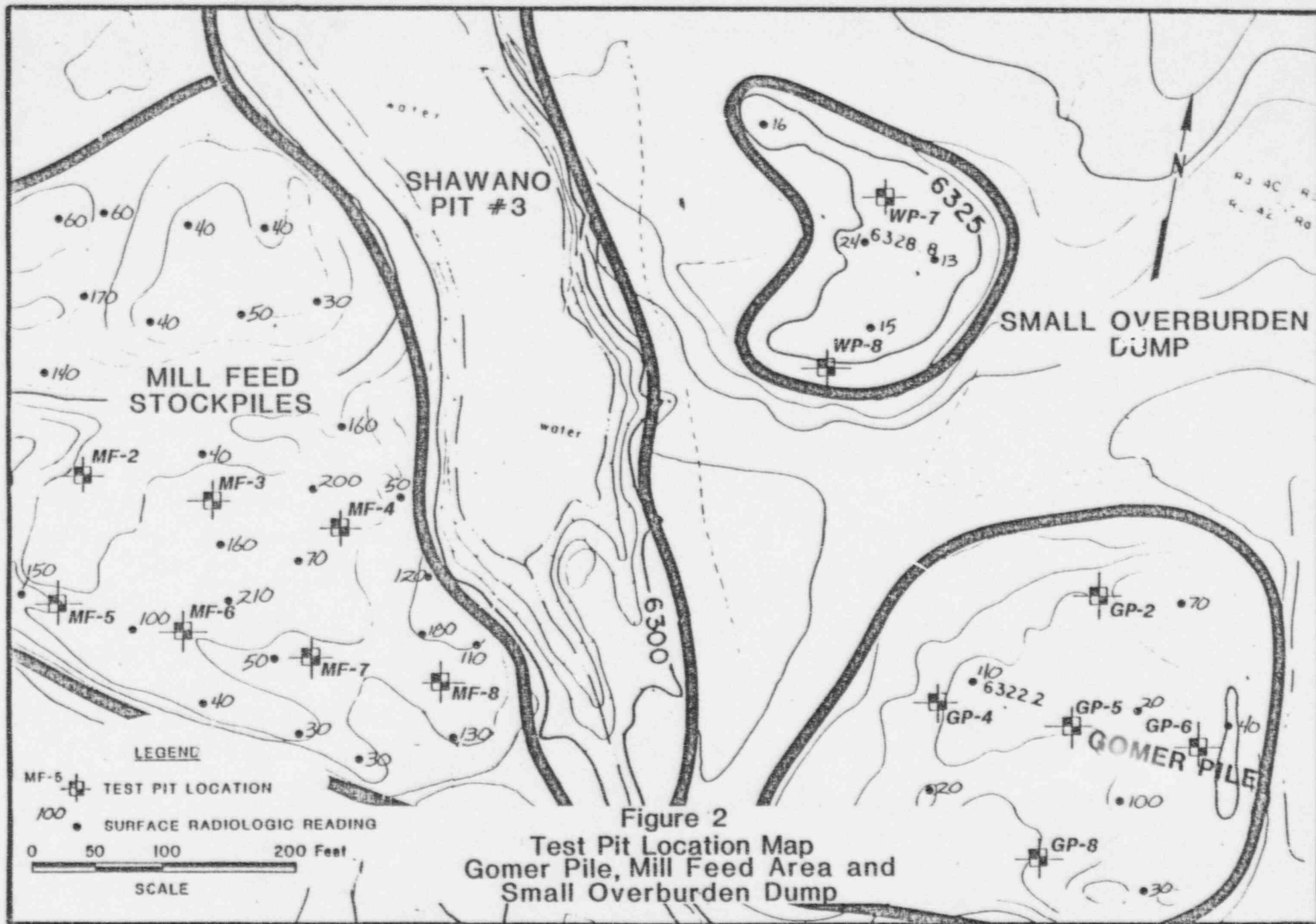
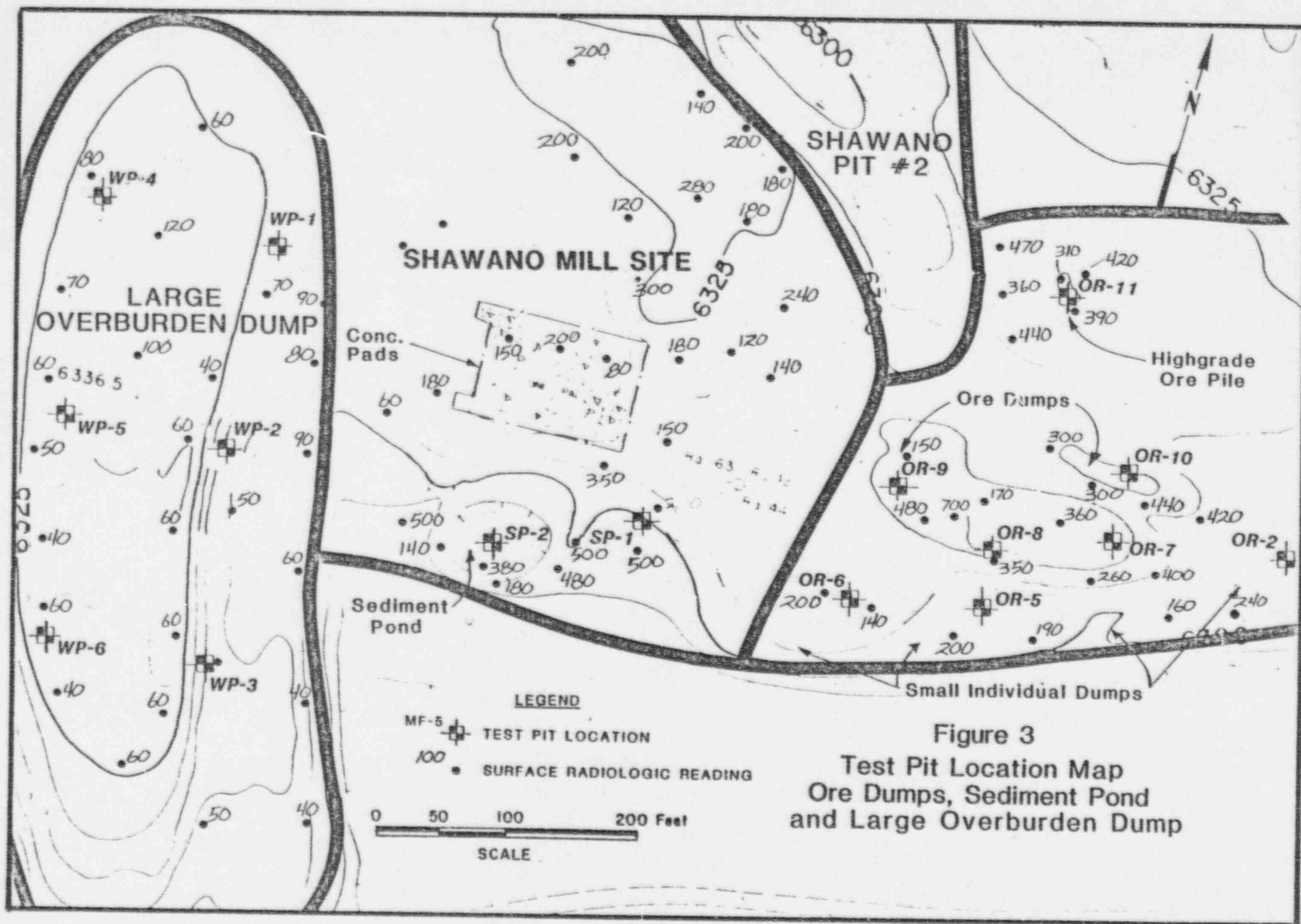


Figure 1
Vicinity Map





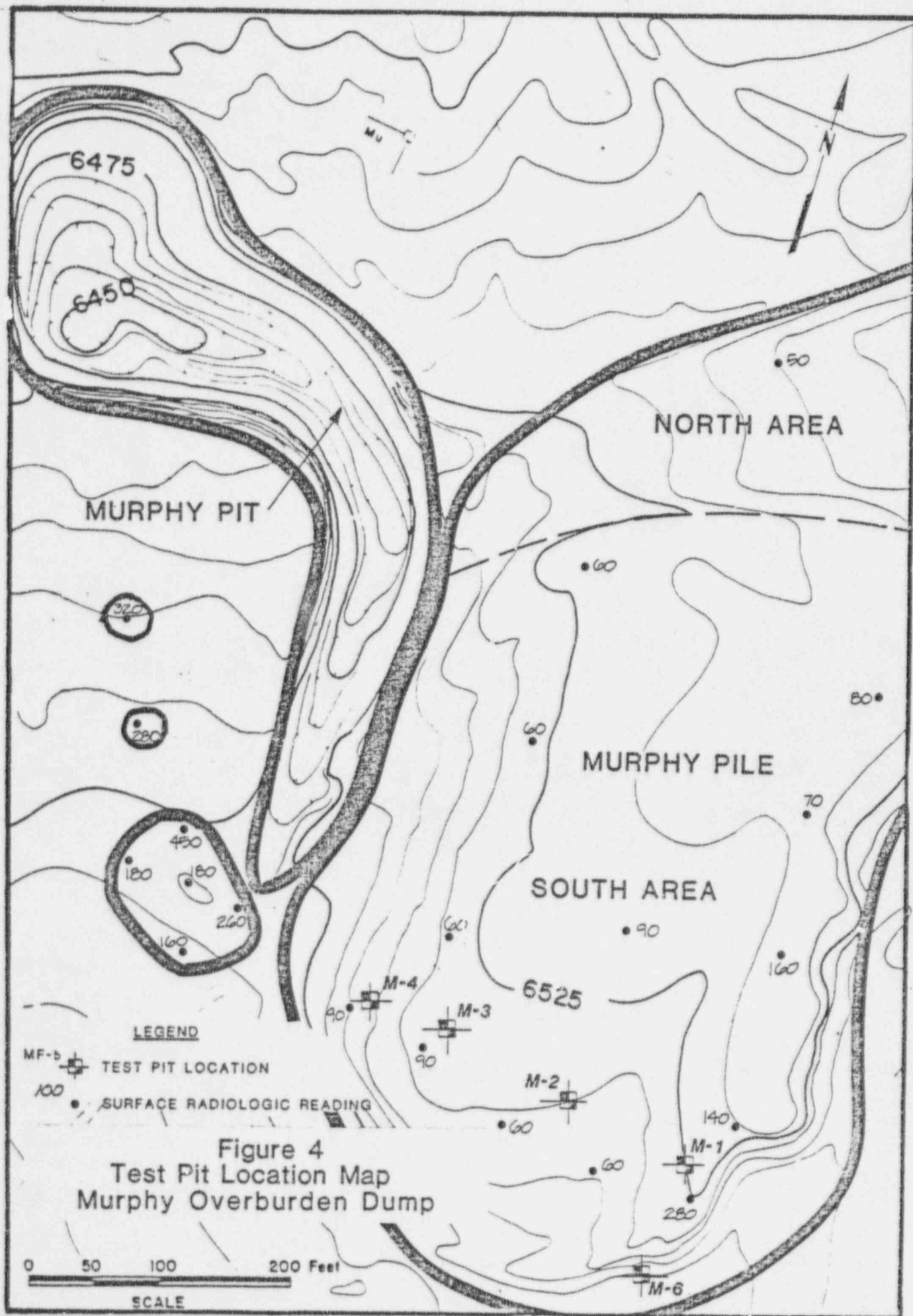
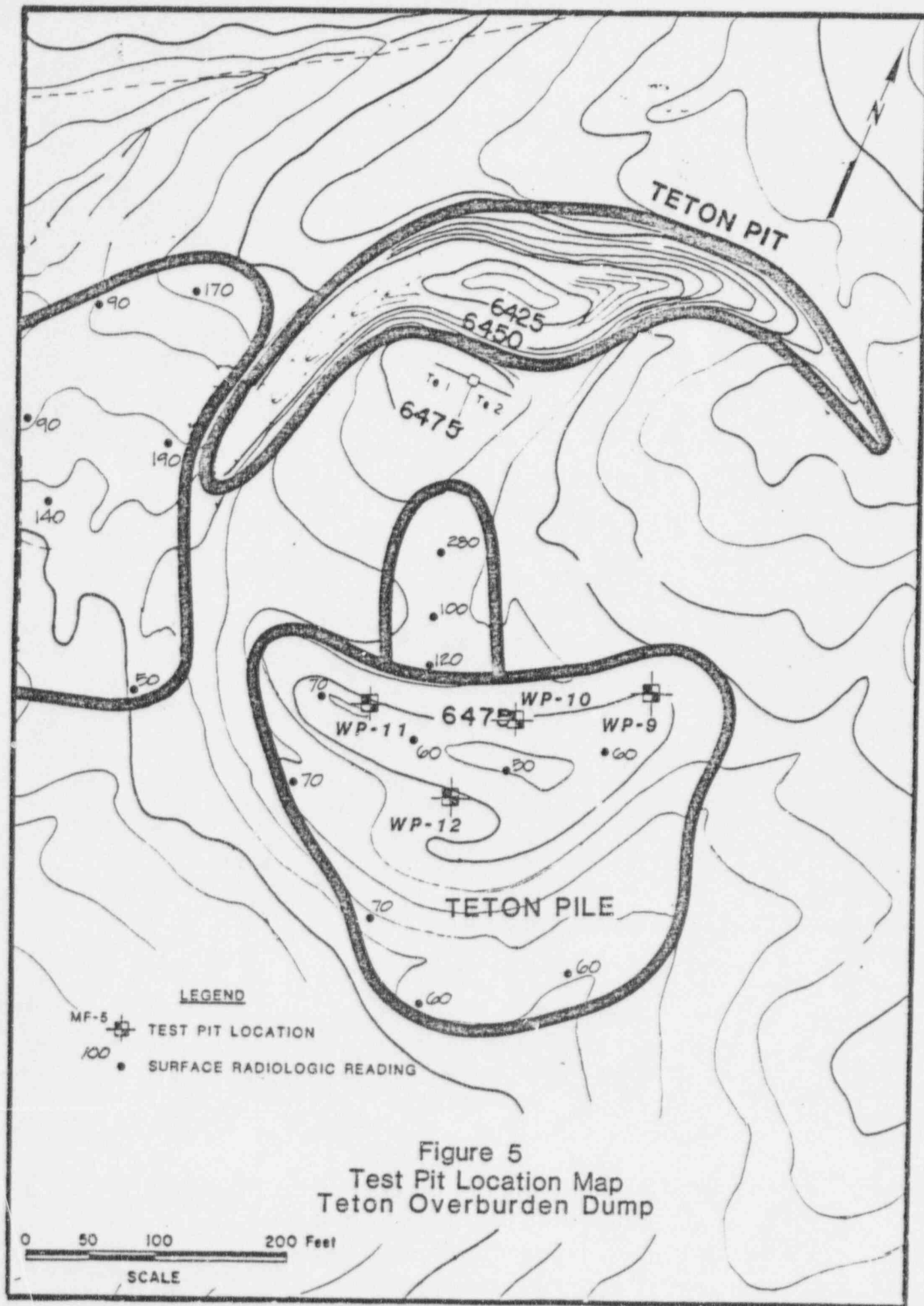


Figure 4
Test Pit Location Map
Murphy Overburden Dump



- o Preparation of this report which summarizes the findings and presents reclamation design recommendations and criteria.

SITE DESCRIPTION

The approximate surface topography in the areas under investigation is shown in Figures 2 through 5. In general, the Shawano Mill site area consists of an irregular ground surface characterized by small piles formed from the dumping of potential ore material and mine waste. Most of the area is sparsely vegetated with several other nearly barren areas. The barren areas are primarily located on the Gomer Pile and the Mill Feed stockpile. An abandoned ore upgrader site is located in the western portion of the area. This consists of two approximately 50-foot by 75-foot concrete pads with approximately 5 foot high vertical concrete walls. A small sediment pond is located south of these pads which was apparently utilized to dispose of mill waste and recycling of water. To the west of the mill site is a large overburden stockpile. The locations of these areas are shown on Figures 2 and 3.

In the Murphy and Teton areas the surface features are dominated by the Murphy and Teton pits and piles as shown in Figures 4 and 5. The pits are large excavations into the ground which have near vertical side slopes. The excavations cover several tens of acres and are up to 100 feet in depth. The Murphy and Teton piles are located adjacent to the pits and consist of piled up overburden and mine waste material. Portions of the Murphy and Teton piles are well vegetated while other areas are sparsely vegetated. The sparsely vegetated areas correspond to the tops of piles which are exposed to significant wind erosion.

FIELD EXPLORATION PROGRAM

A field exploration program was conducted to evaluate the physical and mineralogical characteristic of materials which would be handled during the site reclamation. This exploration consisted of a two-phased investigation. The first phase consisted of conducting a field reconnaissance during which scintillometer measurements were completed. The scintillometer measurements

were performed utilizing an Eberline, Model PRM-7, portable micro "R" meter. This instrument measures gamma radiation which provides a general indication of radioactivity. The measurements, however, do not provide a direct correlation with uranium or radium content. The readings obtained during the reconnaissance in the areas of interest are shown on Figures 2 through 5.

The second phase of the exploration program consisted of the excavation of test pits to visually examine pile materials and to collect samples for laboratory testing. The test pits were excavated with a backhoe to a maximum depth of approximately 28 feet. A log of each test pit was maintained by an engineer and representative samples of the materials exposed in the pits were collected from various horizons. The locations of the test pits are shown on Figures 2 through 5. The logs of the test pits are presented in Appendix A.

LABORATORY TESTING

A laboratory testing program was conducted to evaluate the physical and mineralogical characteristics of the materials collected in the test pits. The parameters which were evaluated are shown in Table 1. This testing included the parameters specified in the Wyoming Department of Environmental Quality guidelines for overburden and topsoil materials, additional testing for various metals and testing for uranium (U_3O_8) and radium (Ra_{226}). The uranium testing was conducted to distinguish probable ore grade material in which the mineral owner would have interest. The radium testing was conducted to be utilized as the basis for establishing overburden cover depths in accordance with EPA guidelines. The testing of various metals was performed to identify areas with high heavy metal content which might be adsorbed by plant life or affect ground water. The naturally occurring levels of these metals in overburden material were also used to establish approximate cover material standards. The laboratory results for the samples tested during this program are presented in Appendix B. The concentration of certain constituents and their location with respect to the test pits are noted on the test pit logs in Appendix A.

TABLE 1
PARAMETERS ANALYZED DURING LABORATORY TESTING*

<u>Parameter</u>	<u>Purpose</u>
Moisture content	WDEQ Overburden Suitability Guidelines
%U ₃ O ₈ by Weight	Identification of Potential Ore Materials
pH	WDEQ Overburden Suitability Guidelines
Conductivity	WDEQ Overburden Suitability Guidelines
Saturation %	WDEQ Overburden Suitability Guidelines
Sodium Adsorption Ratio	WDEQ Overburden Suitability Guidelines
Selenium (ppm)	WDEQ Overburden Suitability Guidelines Identification of Heavy Metals
Boron (ppm)	WDEQ Overburden Suitability Guidelines
%TOC/Acid Base Potential	WDEQ Overburden Suitability Guidelines
Molybdenum (ppm)	WDEQ Overburden Suitability Guidelines Identification of Heavy Metals
Vanadium (ppm)	EPA Requested
Soil Texture (includes %Sand, %Silt and %Clay)	WDEQ Overburden Suitability Guidelines
Soil Classification	WDEQ Overburden Suitability Guidelines
Radium-226 (pCi/gm)	EPA Guideline to Estimate Overburden Requirements
Arsenic	WDEQ Overburden Suitability Guidelines
Organic Carbon	WDEQ Overburden Suitability Guidelines

* Not all samples were tested for all parameters

Additional mechanical sieve analysis testing was completed on overburden materials which would be utilized to cover the by-product materials at the site. The results of this testing are to be utilized for evaluation of erosion potential of these cover materials. These test results are also presented in Appendix B.

RESULTS OF ANALYSIS

GENERAL CONCLUSIONS

Based on the field observation and laboratory test results, the pertinent characteristics of the various site materials have been evaluated. In addition, the background or what is considered the best available average material for surface cover has been established. Table 2 presents a summary of the background levels of various parameters in the Poison Basin compared with the maximum allowable levels according to WDEQ criteria for overburden suitability. The background levels of two other parameters important for the development of reclamation recommendations are also presented, but there are no corresponding WDEQ suitability criteria.

The test results indicate that the levels of conductivity, saturation, texture, acid base potential, arsenic and boron all appear to be within suitable levels of WDEQ overburden criteria. As a result, they will not be discussed further.

PRESENCE OF BY-PRODUCT MATERIALS

According to historical records, the Shawano Mill Site was an upgrading facility from about November 1956 to July, 1957 at which point a simple acid leach facility was added. The upgrader consisted of an ore bin, crusher, rotating mill and a rotary conveyor where water was introduced. The uranium went back into solution and the slimes were diverted by gravity into the concrete settling basins 30 x 60 feet long and 6 feet deep. The upgrader waste materials were elevated by conveyor to a dump. When the concentrate dried, a front-end loader was used to scoop up the dried slimes from the settling basins and loaded into trucks (Hough, 1956).

Selected Parameters						
Criteria	%U ₃ O ₈	Ra ₂₂₆ (pCi/gm)	Molybdenum (ppm)	Selenium (ppm)	pH	SAR
WDEQ Overburden Maximum	NC	NC	<1.0	<.1	>5.0 <9.0	<12
Background in Poison Basin	.001	2.2	0.88	0.64	7.6	5.2

NC=No criteria

Table 2
Summary of Background Levels
of Selected Parameters

The acid leach process added a series of filters to remove impurities from the pregnant liquor produced by the upgrader. The final series of filters precipitated the uranium at a concentration just above 50% purity so that it could be sold directly to the Atomic Energy Commission in Grand Junction. The process used at Shawano was a sodium bisulfate leach (Hough, 1957).

This information leads to the conclusion that the by-products generated by the processing operations would have only minor fine fractions. The gradation curves from the Shawano overburden dumps indicates unprocessed site material contains 70 to 80 percent sand. After reviewing the texture analysis results, it is evident that most of the materials in the mill site area have not been processed.

As a result of this information, it has been concluded that the only materials which will be defined as upgrader facility by-products are the materials present at the location of Test Pits SP-1 and SP-2. All other materials appear to have more fine grained materials than would be left after the milling process and appear to be low to high grade ore stockpiles.

CONCENTRATION OF METALS

The background levels of metals determined during this investigation indicates that all criteria of the WDEQ for overburden suitability could be met with the exception of molybdenum and selenium.

The presence of molybdenum in the soil is not easily correlated with the amount of molybdenum that could be absorbed by plants. In general, molybdenum becomes more available at high pH levels. There have been no recorded instances of molybdenum toxicity to plants, however, high levels may be accumulated in the plants (Gough, 1979). In instances where high levels of molybdenum are present in the soil, recommendations are made to place a barrier of suitable overburden between the molybdenum rich materials and the plant root zone.

Selenium was known to exist in excessive amounts in the Poison Basin and was verified by the testing program. A wide variety of reactions may be exhibited by plants ranging from indicator species which grow only on seleniferous soils, to species which absorb selenium and grow on other soils as well, and finally, plants that develop toxic reactions to selenium in the soil. The danger of selenium posed to grazing animals can be minimized by providing an overburden cover and the proper selection of plant species.

The concentration of radium-226 on some of the waste dumps is in excess of 5 pCi/gm above background which is the EPA standard for reclamation efforts. In general, where this is found, materials will be transported to a deep burial site and reclaimed along with the other mill by-product materials.

A general overview of waste dumps tested during this investigation shows that the piles which are generally devoid of significant vegetation have a high Sodium Adsorption Ratio (SAR) which would make plant growth difficult. It appears that it is the SAR, rather than the concentration of either heavy metals or radioactive materials, which is causing sparse vegetation on these piles.

GROUND WATER CONDITIONS

A confidential report provided by AGIP Mining Co. indicates that the approximate elevation of ground water in the vicinity of the mill site is 6265 feet with a slight gradient downward to the west southwest. The surface elevations of disturbed areas range from about 6300 to 6335 feet providing 35 to 70 feet between the existing surface and the ground water level. Reclamation efforts will generally increase the surface elevations by recontouring and depositing additional cover materials. For these reasons it is felt that the potential for ground water contamination is minimal.

In addition, the average pH in all areas except the sediment pond and ore piles which will be relocated for the mineral owner, falls between 6.1 and 8.0. These are relatively neutral pHs and indicate that the heavy metals will be particularly mobile. As a result, ground water contamination from heavy metal transport should not pose a significant problem.

In the vicinity of the Murphy and Teton Pits and underground mines, the ground water table is approximately 30 feet below the mined level. Here again, the limited mobility of the metals should not pose a significant ground water contamination problem.

SITE SPECIFIC CONCLUSIONS

The results of the testing program are summarized in Table 3. The implications of these results related to reclamation design for each of the individual areas are described in the following sections.

GOMER PILE

A summary of the laboratory test results on the materials from the Gomer Pile are shown in Table 3 for surface materials and below surface materials. These results show the potential ore reserve in this pile appears to be negligible. Of particular importance are the presence of high levels of radium-226 on the ground surface, high levels of selenium and a high SAR. The high radium-226 on the surface could be either wind blown material from the mill feed stockpile (the mill feed stockpile will be discussed subsequently) or material from within the Gomer pile that has migrated to the surface from capillary leaching. The high selenium and vanadium indicate that the pile should not be used as a plant growth medium.

Based on the above it is recommended that the top six inches of the Gomer Pile be excavated and removed to the mill site area for deep burial (the mill site will be discussed subsequently). The purpose of excavating this material is to remove the near surface presence of potentially high radium-226. Once the top six inches is removed, the pile should be flattened to 5 to 1 (horizon-

Table 3
Summary of Results of Soil Sample Testing Program

Measurement Area	U ₃ O ₈ (%)	Ra ₂₂₆ (pCi/gm)	Molybdenum (ppm)	Selenium (ppm)	pH	SAR
Area Background	.001	2.2	0.88	0.54	7.6	5.2
Gomer Pile Surface	.007	22.5	0.92	1.45	8.0	16.2
Gomer Pile Below Surface	.001	2.8	0.40	1.83	7.8	9.6
Mill Feed Area Surface (ore)	.048	118.0	4.60	6.40	7.8	15.5
Mill Feed Area Below Surface	.004	13.2	0.41	2.96	7.7	11.6
Ore Dumps Ore Grade (to be moved)	.043	1.1	27.15	1.39	7.3	1.3
Ore Dumps Non-Ore Grade (to be moved)	.017	7.6	3.63	0.59	6.1	1.2
Fill Below Ore Dumps	.002	1.2	2.20	0.21	7.4	3.0
Sediment Pond (ore)	.082	1.67	36.40	16.45	8.5	41.1
Sediment Pond (non-ore)	.014	5.2	7.0	0.82	8.6	6.8
Large Overburden Pile	.003	0.8	0.26	1.54	7.6	1.6
Small Overburden Pile	<.001	1.7	0.60	0.26	7.4	2.8
Murphy Dump (Southend)	.014	0.9	11.73	1.36	7.1	1.2
Teton Pile	.004	15.0	4.67	1.03	7.2	1.6

tal to vertical) slopes and covered with approximately one foot of suitable overburden material. The overburden material should have average properties similar to the respective background levels shown in Table 2.

MILL FEED STOCKPILE AREA

An analysis of the laboratory test results on the mill feed stockpiles provided the delineation of surface and below surface areas as shown in Table 3. The surface material is potential ore grade material which generally lies on the northern portion of the pile. The remaining mill feed stockpile materials are not judged to be potential ore.

Assuming that the mineral owners will be interested in the potential ore material, the reclamation plan calls for the controlled excavation of 2 to 4 feet of potential ore. This ore will be removed to a location designated by the mineral owner in the Shawano Pit #2. By removing the potential ore materials to the Shawano Pit #2, the material with the highest concentration of radium-226, molybdenum and selenium will also be removed and hence will not be handled in the reclamation efforts.

The non-ore material in the mill feed stockpiles contains an upper layer of relatively high radium-226 which will be excavated and removed to the mill site area for deep burial. Here again, the procedure is intended to remove materials with excessively high radium-226. After removal of the high radium-226 and non-ore materials, the mill feed stockpiles will still contain higher than normal concentrations of selenium. As a result, it is recommended that this area be regraded to a 5:1 slope and covered with about one foot of suitable overburden material.

Prior to regrading and covering, some of the other mill site materials, such as present in the ore dump area, will be deposited in an effort to consolidate the wastes in one location. The specifics concerning these materials are discussed subsequently.

ORE DUMP AREA

A summary of the laboratory test results for the area designated as the ore dumps is presented in Table 3. As shown, the materials have been categorized into potential ore grade and non-ore grade materials. In addition, test pits OR-11 and OR-10, shown on Figure 3, indicated these individual piles contain high grade ore. These piles have been specifically excluded from the reclamation work and are not to be disturbed during the reclamation contract unless they cannot be avoided during construction. If they cannot be avoided they should be removed to the ore stockpile area in the Shawano Pit #2.

The ore grade material summarized in Table 3 is located in the small dumps along the southern edge of the mill site as shown in Figure 3. It is recommended that the reclamation plans call for the controlled excavation of the ore grade materials in the top 2 feet of these dumps. This material would be removed to a location designated by the mineral owner in Shawano Pit #2. The controlled excavation of this material, which is designed to prevent dilution, will require leaving some of the ore grade material in place.

After ore removal, the remaining dumps designated on Figure 3 should be excavated and removed to the mill feed stockpile area prior to its regrading and covering. This operation will expose suitable overburden quality material in the ore dump areas and consolidate the higher radium-226 and metals in one area.

Once the materials requiring special handling are removed from this area, it is recommended that the embankment slope on the edge of the drainage should be regraded to a slope of 5:1. This final slope should reduce erosion potential and allow for stable plant growth.

SEDIMENT POND

The sediment pond and surrounding area shown on Figure 3 are the only areas classified as by-product materials for the purpose of this reclamation contract. A summary of the laboratory test results is presented in Table 3. As shown, the sediment pond itself contains ore grade material and will be excavated and stockpiled at a location designated by the mineral owner within Shawano #2 pit. This material will be placed in an area protected from wind and water erosion as much as possible. The surrounding by-product materials generally meet suitable overburden limits with the exception of molybdenum concentration. EPA guidelines for abandoned mill sites require sufficient cover on the by-product materials to prevent erosion and provide for long-term stability. In accordance with these guidelines, and irrespective of the acceptable concentration of radium-226, it is recommended that the reclamation contract call for the following:

- o The areas surrounding the sediment pond and other designated areas will be excavated and removed to the concrete pads shown on Figure 3.
- o Other materials discussed previously from the Mill Feed area and Gomer Pile with high radium-226 levels should also be placed in the area of the concrete pads.
- o The deposited materials will be covered with 10 feet of suitable overburden materials from the overburden dump shown on Figure 3. This material will then be contoured to a 10:1 slope in such a way that the 10 foot depth of cover over the by-product material is maintained.

OVERBURDEN DUMPS AT SHAWANO MILL SITE

The overburden dumps at the mill site, shown on Figures 2 and 3, are recommended for use as a source of suitable cover material in the mill site area. The laboratory test results for these dumps are summarized in Table 3. As shown, the levels of all significant parameters are similar to that of the average background levels. The only exception to this is the level of selenium in the large overburden pile which is somewhat higher than the background. Vegetation selection should consider the higher selenium concentration.

MURPHY OVERBURDEN DUMP

The material present in the Murphy Dump, shown on Figure 4, is recommended for use in backfilling the Murphy pit and underground mine shafts elsewhere on the property. Limited sampling has been performed on the Murphy Dump. The results of the tests on the samples collected are shown on Table 3. As indicated on this table, the Murphy Dump, in the locations sampled, has high molybdenum and selenium concentrations. This is generally consistent with field observation. Based on field observation, the Murphy Dump can be segregated into a north and south area. The south area was the location of the sampling and was probably the last material to be removed from the pit. Since this material was close to the ore horizons it would not be unexpected to find high metal concentrations. Although the levels of the metals are high, the pH of the material is approximately neutral. As a result, if the materials are placed at a location above the ground water table the metals should have a low mobility and should not significantly influence ground water quality. Since the static ground water table is more than 30 feet below both the bottom of the Murphy Pit and the underground mine shafts, ground water contamination from utilization of these materials for backfill of shafts and the pit should be negligible.

Based on the laboratory test data available it is recommended that the Murphy Pit be backfilled with the Murphy Dump. It is further recommended that the materials from the southern dump area (which contain high molybdenum and selenium levels) be placed into the Murphy Pit first and that the northern area of the dump be used as cover materials. Additional testing will be required of the northern materials to verify the levels of various parameters and will be submitted as an addendum to this report.

TETON PILE

The material present in the Teton Pile, shown on Figure 4, is recommended for use in backfilling the Teton Pit. As shown in Table 3, limited laboratory testing has been completed on these materials. This testing indicates relatively high levels of radium-226, molybdenum and selenium. Field observation indicates that the majority of the Teton Pile appears to be composed of

overburden materials with good vegetative cover established. A small area of the pile and some small nearby dumps appear to be relatively barren of vegetation. This suggests that these materials may have a high SAR.

Based on field observations, it is recommended that the material in the barren areas of the pile and small dumps be utilized as initial pit backfill. The remaining material would then be utilized for the remaining backfill and cover. Suitable topsoil and appropriate vegetation are necessary to inhibit the heavy metal concentrations. Since the pH of the Teton Pile materials is close to neutral, and the bottom of the Teton Pit is in excess of 30 feet above the ground water table, the potential for ground water contamination is considered negligible.

ECONOMIC IMPACT TO MINERAL OWNER

An evaluation has been completed of the economic impact on the mineral owner as a result of the reclamation program. The reclamation plan calls for the transfer of ore grade material from the surface of selected dumps at the mill site to a location designated by the mineral owner in the Shawano #2 Pit. The reclamation plan calls for controlled excavation of these materials in order to prevent dilution. This will only require removal of these areas to a limited depth.

In view of the condition and location of the ore dumps at the present time, it has been concluded that no significant economic benefit will result to the mineral owner.

In the area of the Murphy Pit the presence of ore reserves has been indicated by the mineral owner. In backfilling the Murphy Pit, the mineral owner will be required to re-excavate backfilled material in order to provide access to the ore body in the event mining is undertaken. As a result, this will have a negative impact on the mineral owner's interest in the area and will increase the cost of any future mining. Since we have no knowledge of the

exact location of the ore or the specific mining plans, an estimation of additional cost which could potentially be incurred by the mineral owner is not possible.

REFERENCES

1. Hough, Henry W., ed., "Shawano's New Upgrader Working", Uranium and Modern Mining, November, 1956, pages 4+.
2. Hough, Henry W., "Yellowcake Produced at Shawano Mill with Inexpensive Acid Leach Circuit", Uranium Magazine, July, 1957, pages 10+.
3. Gough, L.P. et al., Element Concentrations Toxic to Plants, Animals, and Man, USGS Bulletin 1466, 1979, pages 36-38 and 40-44.

APPENDIX A

TEST PIT LOGS

This Appendix presents the logs of test pits completed for this project. The locations of the test pits are shown on Figures 2 through 5 in the report text. The results of laboratory testing on critical parameters of test pit soil samples is presented on the logs. Many of the logs are incomplete, however, with respect to laboratory test data. The laboratory testing required to complete these logs was in progress when this preliminary report was prepared.

Log of Test Pit

Pit Number GP-2

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Brown to tan, fine to medium grained sand with cemented sand rock fragments, moist	.006	12.	2.8	.46
5		.001	3.2	.40	.50
10					
13.5	Grades to reddish brown at 13.5 feet	.001	2.7	.27	1.3
15	Test pit completed to depth of 14.5 feet on 8/22/84				
20					
25					
30					

* Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

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PLATE A1

Log of Test Pit

Pit Number GP-4

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Brown to tan, fine to medium grained silty sand, moist	.003	7.0	.49	.20
	Former ground surface at 3.5 feet				
5	Dark brown silty sand with roots and organic debris, moist from 3.5 to 7.5 feet				
	Grades to light brown without organic material at 7.5 feet				
10					
15	Test pit completed to depth of 14.0 feet on 8/22/84				
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

Log of Test Pit

Pit Number GP-5

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Brown to tan fine to medium grained silty sand with cemented sand rock fragments, moist	.002	7.3	2.7	.20
5		.001	5.0	5.4	.10
10	Grades to reddish brown at 10.5 feet	.001	3.1	1.4	.36
15	Test pit completed to a depth of 13.0 feet on 8/22/84				
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

Log of Test Pit

Pit Number 6P-6

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ ^m	Se (ppm)	Mo (ppm)
0	Light brown fine to medium grained silty sand with cemented sand rock fragments, moist Grade to tan at 2.0 feet	.012	56.	.25	3.4
5	Grades to dark brown with trace of organics at 5.5 feet Grades to light brown to tan at 7.5 feet				
10		.001	3.0	.46	.19
15					
20	Test pit completed to 18.0 feet on 8/22/84	.001	2.0	.60	.21
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

^m pCi/gm

Log of Test Pit

Pit Number GP-8

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Brown to tan fine to medium grained silty sand with cemented sand rock fragments, moist	.010	30.	1.0	.36
	4" dark brown silty sand layers from 2.5 to 4.5 feet				
5	Grades dark brown at 5.5 feet	.001	2.0	5.8	.36
	Grades light brown at 9.0 feet				
10	Grades dark brown at 11.0 feet. Former ground surface at 12.5 feet	.001	1.6	.35	.19
15	Test pit completed to total depth of 13.0 feet on 8/22/84				
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

DAMES & MOORE

PLATE A5

Log of Test Pit

Pit Number MF-2

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Tan to brown fine to medium grained silty sand with cemented sand rock fragments, moist	.077	180.	8.5	15.0
	Grades to brown silty sand with roots between 3 to 4 feet	.012	18.	.75	1.4
5	Grades to light brown silty sand at 4 feet				
	Roots present between 6.5 to 7.5 feet	.006	35.	2.6	.40
10		.003	5.8	1.9	.70
	Roots present at 13.0 to 13.5 feet				
15	Test pit completed to depth of 13.5 feet on 8/22/84				
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

Log of Test Pit

Pit Number MF-3

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Light brown fine to medium grained silty sand with cemented sand rock fragments, moist	.042	120.	.26	.71
5		.045	100.	.37	1.4
10		.001	3.8	.34	.40
15	Test pit completed to total depth of 13.5 feet on 8/23/84				
20					
25					
30					

* Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

Log of Test Pit

Pit Number MF-4

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Tan to light brown fine to medium grained silty sand with cemented sand rock fragments, moist	.029	72.	24.0	1.4
5	Former ground surface at 4.0 feet, grades to reddish brown silty sand	.004	12.	2.5	.24
10					
15	Test pit completed to depth of 14.5 feet on 8/22/84	.002	4.5	.90	.24
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

Log of Test Pit

Pit Number MF-5

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Tan to light brown fine to medium grained silty sand with cemented sand rock fragments, moist 0.3 feet thick reddish brown layer at 2.0 feet	.005	7.8	21.0	.46
5	Grades more cemented sand rock fragments at 4.0 feet	.007	25.	18.0	.48
10					
15		.001	2.7	.60	.052
	Test pit completed to depth of 16.0 feet on 8/23/84				
20					
25					
30					

* Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

Log of Test Pit

Pit Number MF-6

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Tan to light brown fine to medium grained silty sand, moist	.011	20.	2.9	.22
	Pink color present between 3 to 4 feet	.012	49.	1.7	.40
5	Numerous cemented sand rock fragments present between 5 to 9 feet	.002	3.9	.85	.084
10	Grades to reddish brown at 9.0 feet				
		.001	1.7	.070	.21
15	Test pit completed to depth of 14.0 feet on 8/22/84				
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

DAMES & MOORE

PLATE A10

Log of Test Pit

Pit Number MF-7

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Brown to tan fine to medium grained silty sand, moist with roots and occasional darker orange zones	.002	7.6	.035	.12
5		.001	2.5	.055	.13
10		.001	1.0	.12	.70
15	Test pit completed to depth of 13.0 feet on 8/23/84				
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

Log of Test Pit

Pit Number MF-8

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Tan to light gray fine to medium grained silty sand, moist	.009	41.	.90	1.1
5	Grades to reddish brown silty sand at 2.5 feet	.006	8.0	.14	.30
10		.001	1.4	.85	.14
15	Test pit completed to depth of 13.0 feet on 8/22/84				
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

Log of Test Pit

Pit Number OR-2

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ ^m	Se (ppm)	Th (ppm)
0	Light brown fine to medium grained silty sand with cemented sand rock fragments, moist	.045	1.6	2.64	38.6
	Original ground surface at 3.0 feet				
5	Grades to reddish brown sandy clay	.004	1.6	.06	2.0
	Test pit completed to depth of 5.5 feet on 8/23/84				
10					
15					
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

^m pCi/gm

Log of Test Pit

Pit Number OR-5

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Light brown to tan fine to medium grained silty sand with cemented sand rock ments Grades to red sandy clay at 3.0 feet	.040	1.7	1.2	20.4
		.042	.8	.29	19.8
5	Test pit completed to depth of 3.5 feet on 8/23/84				
10					
15					
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

Log of Test Pit

Pit Number OR-6

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ ^m	Se (ppm)	Mo (ppm)
0	Light brown to tan fine to medium grained silty sand with cemented sand rock fragments, moist	.044	.3	1.44	29.8
	Grades to red clayey sand at 2.5 feet				
5	Grades to white silty sand at 3.5 feet				
	Grades to reddish brown sandy clay at 5.0 feet				
	Test pit completed to depth of 6.0 feet on 8/23/84				
10					
15					
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

^m pCi/gm

DAMES & MOORE

PLATE A15

Log of Test Pit

Pit Number OR-7

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ "	Se (ppm)	Mo (ppm)
0	Light brown to tan fine to medium grained silty sand with yellow, orange, gray and dark brown color variations throughout, moist	.020	1.0	.72	3.7
5	Grades to red fine to medium grained sandy clay at 4.5 feet				
	Test pit completed to depth of 6.5 feet on 8/23/84				
10					
15					
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

" pCi/gm

Log of Test Pit

Pit Number OR-8

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ ^{**}	Se (ppm)	Mo (ppm)
0	Light brown to tan fine to medium grained silty sand with occasional light gray layers, moist				
5		.021	29.0	.20	6.5
	Grades to reddish brown silty sand with cemented sand rock fragments at 7.0 feet				
10	Grades to verigated red and brown silty sand at 9.5 feet				
	Grades to light brown silty sand at 13.5 feet	.016	.3	.48	2.2
15	Grades to reddish brown sandy clay at 16.0 feet	.001	.3	.16	.70
	Test pit completed to depth of 17.0 feet on 8/23/84				
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

Log of Test Pit

Pit Number OR-9

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Light brown to tan fine to medium grained silty sand with cemented sand rock fragments, moist				
5	Gray layer with roots at 6.5 to 7.0 feet	.012	.1	.96	2.1
	Grades to red sandy clay at 8.5 feet	.003	2.6	.52	1.0
10	Test pit completed to depth of 9.0 feet on 8/23/84				
15					
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

Log of Test Pit

Pit Number OR-10

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ ^m	Se (ppm)	Mo (ppm)
0	Light brown to tan fine to medium grained silty sand with numerous cemented sand rock fragments, moist	.044			
5	Various color zones ranging from yellow to orange to gray to 5.5 feet				
5	Grades to reddish brown clayey sand with cemented sand rock fragments, moist at 5.5 feet	.001	.30	.10	5.1
10	Test pit completed to depth of 8.0 feet on 8/23/84				
15					
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

^m pCi/gm

DAMES & MOORE

Log of Test Pit

Pit Number OR-11

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ ^m	Se (ppm)	Mo (ppm)
0	Light brown to reddish brown silty sand with numerous cemented sand rock fragments, moist				
5					
10					
15		.150			
20	Grades to reddish brown silty sand with no rock fragments at 18.0 feet				
25	Test pit completed to depth of 25.0 feet on 8/23/84	.002	.40	.08	1.9
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

^m pCi/gm

Log of Test Pit

Pit Number SP-1

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Gray fine to medium grained sand, moist	.014	9.9	.96	4.7
	Grades to red sandy clay at 3.0 feet (original ground surface)	.014	.4	.68	9.2
5	Test pit completed to depth of 4.0 feet on 8/23/84				
10					
15					
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

Log of Test Pit

Pit Number SP-2

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ ^{***}	Se (ppm)	Mo (ppm)
0	Brown fine to medium grained silty sand, wet				
	5" brown sandy clay layer at 1.5 feet	.118	3.4	9.60	32.0
	2" of gray fine to medium sand at 2.2 feet				
5	Brown silty sand and sandy clay from 2.5 to 5.0 feet	.095	1.3	39.2	56.6
	Gray clayey silt with fine sand from 5.0 to 6.0 feet				
	Dark brown silty sand with roots from 6.0 to 8.0 feet (original ground surface)	.033	.3	0.56	20.6
10	Test pit completed to a depth of 8.0 on 8/23/84				
15					
20					
25					
30					

* Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

*** pCi/gm

Log of Test Pit

Pit Number M-1

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Brown and gray fine to medium grained silty sand with cemented sand rock fragments, moist	.082	1.0	7.6	4.8
	Grades to gray silty sand at 1.5 feet				
5	Grades to brown silty sand at 4.0 feet				
	Grades to interbedded gray and brown silty sand at 6.0 feet	.043	0.4	0.19	61.0
10	Grades to dark brown silty sand with more cemented sand rock fragments at 8.0 feet				
	Grades to gray silty sand between 10.0 to 11.0 feet				
	Grades to brown silty sand at 11.0 feet	.002	0.4	0.29	1.0
15	Test pit completed to depth of 14.5 feet on 8/23/84				
20					
25					
30					

* Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

Log of Test Pit

Pit Number M-2

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ ^{**}	Se (ppm)	Mo (ppm)
0	Gray fine to medium grained silty sand, moist	.002	0.3	1.00	.7
	Grades to light brown silty sand with some dark brown and gray seams from 1.0 to 3.0 feet				
5	Grades to dark brown silty sand with light brown silty sand seams and cemented sand rock fragments at 3.0 feet.	.005	0.5	3.56	1.6
	Grades with additional gray silty sand at 8.0 feet				
10					
		.001	1.8	0.08	0.6
15	Test pit completed to depth of 13.0 feet on 8/23/84				
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

Log of Test Pit

Pit Number M-3

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Pa ²²⁶	Se (ppm)	Mo (ppm)
0	Gray to light brown fine to medium grained silty sand with cemented sand rock fragments	.009	0.8	0.32	31.4
	Brown silty sand seam from 2.5 to 3.0 feet				
5					
	Grades with interbedded gray and dark brown silty sand seams at 8.0 feet	.019	0.6	2.04	3.0
10	Grades more cemented sand rock fragments at 10.0 feet				
		.006	0.3	2.52	2.0
15	Test pit completed to depth of 14.0 feet on 8/23/84				
20					
25					
30					

* Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

Log of Test Pit

Pit Number M-4

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ ^{**}	Se (ppm)	Mo (ppm)
0	Light brown fine to medium grained silty sand, moist	.004	0.5	0.44	3.3
	Dark brown silty sand layer between 1.75 to 2.5 feet				
	Grades to light brown fine to medium grained silty sand with occasional thin seams of dark brown-red silty sand and cemented sand rock fragments	.015	0.2	0.40	3.3
5					
	Brown and orange silty sand seam from 9.5 to 10.0 feet	.001	0.1	0.08	0.5
10	Light brown sandy silt at 10.0 feet				
	Dark brown silty sand with roots at 11.0 feet				
	(original ground surface)				
15	Test pit completed to depth of 13.0 feet on 8/23/84				
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

Log of Test Pit

Pit Number M-6

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Brown and gray mottled, fine to medium grained silty sand with cemented sand rock fragments, moist	0.17	0.2	1.04	32.6
5					
10		.008	5.6	0.36	29.6
15	Dark brown silty sand with roots at 13.0 to 13.5 feet (original ground surface) Gray and brown silty sand below 13.5 feet	.001	0.2	0.46	0.5
20	Test pit completed to depth of 14.5 feet on 8/23/84				
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

Log of Test Pit

Pit Number WF-1

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ ^m	Se (ppm)	Mo (ppm)
0	Light brown to tan fine to medium grained silty sand with cemented sand rock fragments, moist	.002	0.3	.016	2.2
5	Mottled coloration of red, brown and yellow between 2.5 to 7.5 feet				
10					
15		.001	0.0	.016	0.3
20	Grades to dark brown silty sand between 23.5 to 25.0 feet Grades to tan sand at 25.0 feet	.002	0.0	.016	1.1
25	Test pit completed to depth of 24.5 feet on 9/4/84				
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

^m pCi/gm

DAMES & MOORE

Log of Test Pit

Pit Number WP-2

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ²²⁶ pCi/gm	Se (ppm)	Mo (ppm)
0	Light brown to gray fine to medium grained silty sand with cemented sand rock fragments, moist	.002	0.1	.016	1.1
	Grades reddish brown between 3.5 to 4.5 feet				
5	Grades to light brown at 4.5 feet				
10	Grades to light brown to tan at 12.0 feet				
15	Grades to light brown to gray at 16.0 feet	.001	0.2	.016	0.6
20					
		.001	0.0	.136	0.7
25	Dark brown layer between 24.5 to 25.5 feet				
30	Test pit completed to depth of 29.0 feet on 9/5/84				

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

DANES & MOORE

Log of Test Pit

Pit Number WP-3

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ ^m	Se (ppm)	Mo (ppm)
0	Light brown to tan fine to medium grained silty sand with cemented sand rock fragments, moist				
5	White silty sand layer from 5.0 to 5.5 feet	.001	0.0	.016	1.0
	Grades to brown at 8.5 feet				
10					
	Grades to light brown to gray at 13.5 feet				
15	..	.004	0.1	0.56	1.3
	Interbedded gray and brown silty sand layers from 17.0 to 28.0 feet				
20					
25					
		.009	0.8	0.52	1.3
30	Test pit completed to depth of 29.0 feet on 9/4/84				

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

^mpCi/gm

DAMES & MOORE

PLATE A30

Log of Test Pit

Pit Number WP-4

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ ^{**}	Se (ppm)	Mo (ppm)
0	Gray to light brown fine to medium grained silty sand with cemented sand rock fragments, moist				
5	Layer of brown silty sand from 7.0 to 8.0 feet	.005	0.3	.016	0.7
	Light brown to tan silty sand from 8.0 to 13.2 feet	.002	2.1	0.92	1.6
10		.004	0.0	1.64	1.2
15	Test pit completed to depth of 13.2 feet on 9/5/84				
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

DAMES & MOORE

PLATE A31

Log of Test Pit

Pit Number WP-5

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ ^m	Se (ppm)	Mo (ppm)
0	Tan fine to medium grained silty sand with cemented sand rock fragments, moist Grades to brown at 2.0 feet	.003	0.0	.016	1.0
5		.016	0.0	.296	7.6
10					
15	Test pit completed to 13.0 feet on 9/5/84				
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

^m pCi/gm

DAMES & MOORE

PLATE A31

Log of Test Pit

Pit Number WP-6

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Tan to red brown fine to medium grained silty sand with cemented sand rock fragments, moist				
5	Fewer cemented sand rock fragments between 2.0 to 6.0 feet More cemented sand rock fragments with scattered roots between 6.0 and 13.0 feet	.002	0.2	.016	1.1
10		.003	2.4	.016	NA
15	Test pit completed to depth of 13.0 feet on 9/5/84				
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

DAMES & MOORE

Log of Test Pit

Pit Number WP-7

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ ^m	Se (ppm)	Mo (ppm)
0	Light brown to tan fine to medium grained silty sand with cemented sand rock fragments, moist	.0005	0.9	.02	.28
5					
10	Grades brown sand silt at 10.5 feet (original ground surface)	.0006	2.4	.53	.52
	Test pit completed to depth of 11.5 feet on 9/5/84				
15					
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

^m pCi/gm

DAMES & MOORE

PLATE A34

Log of Test Pit

Pit Number WP-8

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Tan fine to medium grained silty sand with cemented sand rock fragments, moist	.0005	1.0	.02	.86
5		.0007	2.6	.47	.76
10					
15	Test pit completed to depth of 13.0 feet on 9/5/84				
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

DAMES & MOORE

PLATF. A35

Log of Test Pit

Pit Number WP-9

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ ^{**}	Se (ppm)	Mo (ppm)
0	Light brown to tan fine to medium grained silty sand with cemented sand rock fragments, moist	.0055	27.0	.85	10.0
5					
10		.0032	12.0	1.3	4.0
	Test pit completed to 12.0 feet on 9/5/84				
15					
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

DAMES & MOORE

PLATE A36

Log of Test Pit

Pit Number WP-10

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ **	Se (ppm)	Mo (ppm)
0	Light brown to tan fine to medium grained silty sand with cemented sand rock fragments, moist	.009	21.0	.42	5.20
5		.002	6.0	.40	3.6
10	Test pit completed to depth of 10.0 feet on 9/5/84				
15					
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

DAMES & MOORE

Log of Test Pit

Pit Number WP-11

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ ^{**}	Se (ppm)	Mo (ppm)
0	Light gray to tan fine to medium grained silty sand with cemented sand rock fragments, moist				
5		.008	27.0	1.1	7.4
10		.005	16.0	2.9	2.2
12	Test pit completed to depth of 12.0 feet on 9/5/84				
15					
20					
25					
30					

* Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data.

** pCi/gm

DAMES & MOORE

PLATE A38

Log of Test Pit

Pit Number WP-12

Depth (ft)	Material Description	Laboratory Test Results*			
		%U ₃ O ₈	Ra ₂₂₆ ^{**}	Se (ppm)	Mo (ppm)
0	Tan fine to medium grained silty sand with cement sand rock fragments, moist Scattered roots throughout pit				
5		.001	5.7	.55	3.0
10	Test pit completed to depth of 10.0 feet on 9/5/84	.0007	2.7	1.4	2.0
15					
20					
25					
30					

*Results shown are for materials with potentially hazardous levels see Appendix B for complete laboratory test data

** pCi/gm

DAMES & MOORE

PLATE A39

APPENDIX B

LABORATORY TEST DATA

This Appendix presents the laboratory test results available on the date this preliminary report was prepared. Additional laboratory test data will be presented in the final version of this report.



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October 5, 1984
Page 1 of 9

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RE: 9103-18587-37
Date Samples Rec'd 9-5-84
Job No. 08987-003-14
ADDITIONAL ANALYSIS

REPORT OF ANALYSIS

ALR Designation	9103-18587-37-1	9103-18587-37-2	9103-18587-37-3	9103-18587-37-4	9103-18587-37-5
Sponsor Designation	OD1 No. 1	GP2 No. 1	GP2 No. 2	GP2 No. 3	GP4 No. 1
	Surface	14 feet	7 feet	Surface	Surface
Saturation %	39	47	48	47	47
pH	7.4	7.6	8.1	8.1	8.1
Conductivity, mmhos/cm	2.4	2.8	1.0	1.6	1.2
Sodium, meq/L	0.19	14	8.9	13	10
Calcium, meq/L	28	14	0.42	0.91	0.57
Magnesium, meq/L	2.7	3.5	0.09	0.21	0.14
SAR	0.05	4.7	18	17	17
Selenium - Hot Water Extraction, ppm	0.90	0.27	0.40	2.8	0.49
Boron - Hot Water Extraction, ppm	<0.2	0.2	<0.2	<0.2	<0.2
Organic Carbon, %	<0.05	0.05	<0.05	<0.05	<0.05
Molybdenum (NH ₄) ₂ CO ₃ , ppm	12	1.3	0.50	0.46	0.20
Vanadium, ppm	36	7.0	25	47	24
Neutralization Potential (as CaCO ₃), %	3.2	3.8	4.9	6.1	7.2
Acid Potential, %	0.44	0.06	0.03	0.24	0.06
Acid Base Potential, ± tons of CaCO ₃ /1000 tons	18	36	48	54	70
Sand, %	84	82	77	80	77
Silt, %	8	11	16	19	16
Clay, %	8	7	7	1	7
Texture, USDA	LS	LS	SL	LS	SL
Arsenic - Hot Water Extraction, ppm	<0.02	<0.02	<0.02	0.06	<0.02

Determination ug/g (dry)

Uranium (as U ₃ O ₈), % (dry)	0.0069	0.00050	0.0011	0.0060	0.0030
Uranium (as U)	58	4.3	9.5	51	26
Air Dry Loss, %	6.4	8.2	9.5	5.3	4.4
Radium-226, ± counting error*, pCi/g (dry)	36 ± 1	2.7 ± 0.3	3.2 ± 0.3	12 ± 1	7.0 ± 0.4

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Dames and Moore

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ADDITIONAL ANALYSIS

REPORT OF ANALYSIS

ALR Designation	9103-18587-37-6	9103-18587-37-7	9103-18587-37-8	9103-18587-37-9	9103-18587-37-10
Sponsor Designation	GP5 No. 1	GP5 No. 2	GP5 No. 3	GP5 No. 1	GP5 No. 2
	13 feet depth	6-7 feet	Surface		
Saturation %	46	46	48	50	50
pH	7.6	8.2	7.9	7.6	7.8
Conductivity, mmhos/cm	3.3	1.1	2.4	3.1	2.2
Sodium, meq/L	22	9.8	20	20	16
Calcium, meq/L	12	0.54	0.41	11	4.9
Magnesium, meq/L	3.2	0.11	1.1	3.5	1.6
SAR	8.0	17	23	7.4	8.9
Selenium - Hot Water Extraction, ppm	1.4	5.4	2.7	0.60	0.46
Boron - Hot Water Extraction, ppm	<0.2	<0.2	<0.2	<0.2	<0.2
Organic Carbon, %	0.09	<0.05	<0.05	<0.05	<0.05
Molybdenum (NH ₄) ₂ CO ₃ , ppm	0.36	0.10	0.20	0.21	0.19
Vanadium, ppm	17	27	21	17	16
Neutralization Potential (as CaCO ₃), %	6.7	4.4	7.4	3.5	3.4
Acid Potential, %	0.04	<0.01	<0.01	0.07	0.05
Acid Base Potential, ± tons of CaCO ₃ /1000 tons	66	44	74	33	32
Sand, %	81	82	78	77	78
Silt, %	12	16	16	10	12
Clay, %	7	2	6	13	10
Texture, USDA	LS	LS	LS	SL	SL
Arsenic - Hot Water Extraction, ppm	<0.02	<0.02	<0.02	<0.02	<0.02

Determination ug/g (dry)

Uranium (as U ₃ O ₈), % (dry)	0.0014	0.0012	0.0020	0.0010	0.0013
Uranium (as U)	12	10	17	8.9	11
Air Dry Loss, %	7.5	9.3	7.9	10.4	10.1
Radium-226, ± counting error*, pCi/g (dry)	3.1 ± 0.3	5.0 ± 0.5	7.3 ± 0.5	2.0 ± 0.3	3.0 ± 0.3

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ALR Designation	9103-18587-37-11	9103-18587-37-12	9103-18587-37-13	9103-18587-37-14	9103-18587-37-15
Sponsor Designation	GP6 No. 3	GP8 No. 1	GP8 No. 2	GP8 No. 3	MF2 No. 1
Saturation %	47	48	42	50	62
pH	7.8	7.6	7.7	7.9	7.8
Conductivity, mmhos/cm	2.6	2.5	2.4	2.8	7.2
Sodium, meq/L	21	16	14	23	65
Calcium, meq/L	6.1	8.2	9.7	5.1	22
Magnesium, meq/L	1.2	2.5	2.0	1.3	5.5
SAR	11	6.9	5.8	13	17
Selenium - Hot Water Extraction, ppm	0.25	0.35	5.8	1.0	1.9
Boron - Hot Water Extraction, ppm	<0.2	<0.2	<0.2	<0.2	<0.2
Organic Carbon, %	<0.05	<0.05	<0.05	<0.05	<0.05
Molybdenum (NH ₄) ₂ CO ₃ , ppm	3.4	0.19	0.36	0.36	0.70
Vanadium, ppm	15	7.5	11	19	24
Neutralization Potential (as CaCO ₃), %	9.6	2.4	8.7	5.4	6.9
Acid Potential, %	0.61	<0.01	<0.01	0.12	0.21
Acid Base Potential, ± tons of CaCO ₃ /1000 tons	77	24	87	50	62
Sand, %	75	79	84	77	81
Silt, %	15	7	7	16	6
Clay, %	10	14	9	7	13
Texture, USDA	SL	SL	LS	SL	SL
Arsenic - Hot Water Extraction, ppm	0.03	<0.02	<0.02	<0.02	<0.02

Determination ug/g (dry)

Uranium (as U ₃ O ₈), % (dry)	0.012	0.00076	0.00075	0.010	0.0025
Uranium (as U)	100	6.5	6.4	87	21
Air Dry Loss, %	5.4	9.8	6.7	6.3	9.3
Radium-226, ± counting error*, pCi/g (dry)	56 ± 1	1.6 ± 0.3	2.0 ± 0.3	30 ± 1	5.8 ± 0.4

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ALR Designation	9103-18587-37-16	9103-18587-37-17	9103-18587-37-18	9103-18587-37-19	9103-18587-37-20
Sponsor Designation	MF2 No. 2	MF2 No. 3	MF2 No. 4 Surface	MF3 No. 1	MF3 No. 2
Saturation %	66	67	67	55	50
pH	7.7	7.8	8.1	7.6	7.8
Conductivity, mmhos/cm	6.7	4.2	7.8	5.6	3.3
Sodium, meq/L	63	38	74	45	27
Calcium, meq/L	15	8.0	21	21	7.2
Magnesium, meq/L	3.9	2.2	4.2	5.0	2.0
SAR	20	17	21	12	13
Selenium - Hot Water Extraction, ppm	2.6	0.75	8.5	0.26	0.37
Boron - Hot Water Extraction, ppm	<0.2	<0.2	0.3	<0.2	<0.2
Organic Carbon, %	<0.05	<0.05	<0.05	<0.05	<0.05
Molybdenum (NH ₄) ₂ CO ₃ , ppm	0.40	1.4	15	0.71	1.4
Vanadium, ppm	34	45	15	9.5	8.3
Neutralization Potential (as CaCO ₃), %	13	3.9	2.8	2.3	5.5
Acid Potential, %	0.19	0.13	0.70	0.51	0.23
Acid Base Potential, ± tons of CaCO ₃ /1000 tons	120	35	6.1	7.1	48
Sand, %	72	74	69	77	75
Silt, %	17	17	17	17	19
Clay, %	11	9	14	6	6
Texture, USDA	SL	SL	SL	LS	SL
Arsenic - Hot Water Extraction, ppm	<0.02	<0.02	0.98	2.7	<0.02

Determination ug/g (dry)

Uranium (as U ₃ O ₈), % (dry)	0.0063	0.012	0.077	0.042	0.045
Uranium (as U)	53	98	650	360	380
Air Dry Loss, %	14.1	15.1	1.8	12.6	12.2
Radium-226, ± counting error*, pCi/g (dry)	35 ± 1	18 ± 1	180 ± 10	120 ± 10	100 ± 10

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ALR Designation	9103-18587-37-21	9103-18587-37-22	9103-18587-37-23	9103-18587-37-24	9103-18587-37-25
Sponsor Designation	MF3 No. 3	MF4 No. 1	MF4 No. 2	MF4 No. 3	MF5 No. 1
			Surface	Bottom	
Saturation %	47	55	55	47	43
pH	7.8	8.0	7.7	7.8	8.0
Conductivity, mmos/cm	2.1	2.2	7.0	2.0	1.3
Sodium, meq/L	15	18	58	16	11
Calcium, meq/L	3.3	2.3	21	2.6	0.80
Magnesium, meq/L	1.1	0.72	4.6	1.0	0.19
SAR	10	15	16	12	16
Selenium - Hot Water Extraction, ppm	0.34	2.5	24	0.90	21
Boron - Hot Water Extraction, ppm	<0.2	<0.2	0.2	<0.2	<0.2
Organic Carbon, %	<0.05	<0.05	<0.05	<0.05	<0.05
Molybdenum (NH ₄) ₂ CO ₃ , ppm	0.40	0.24	1.4	0.24	0.46
Vanadium, ppm	8.5	19	29	15	7.5
Neutralization Potential (as CaCO ₃), %	4.0	2.2	9.1	5.7	3.5
Acid Potential, %	0.05	0.08	0.30	0.01	<0.01
Acid Base Potential, ± tons of CaCO ₃ /1000 tons	38	20	82	57	35
Sand, %	76	72	74	82	80
Silt, %	12	18	16	10	9
Clay, %	12	10	10	8	11
Texture, USDA	SL	SL	SL	SL	SL
Arsenic - Hot Water Extraction, ppm	<0.02	<0.02	<0.02	<0.02	<0.02

Determination ug/g (dry)

Uranium (as U ₃ O ₈), % (dry)	0.0013	0.0039	0.029	0.0016	0.0047
Uranium (as U)	11	33	240	14	40
Air Dry Loss, %	10.0	11.1	10.6	8.9	7.5
Radium-226, ± counting error*, pCi/g (dry)	3.8 ± 0.3	12 ± 1	72 ± 1	4.5 ± 0.4	7.8 ± 0.5

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ALR Designation	9103-18587-37-26	9103-18587-37-27	9103-18587-37-28	9103-18587-37-29	9103-18587-37-30
Sponsor Designation	MF5 No. 2	MF5 No. 3	MF6 No. 1	MF6 No. 2	MF6 No. 3
Saturation %	50	49	55	53	48
pH	8.0	7.8	6.8	7.4	7.8
Conductivity, mmhos/cm	1.4	1.8	1.8	3.5	2.4
Sodium, meq/L	12	14	12	21	20
Calcium, meq/L	0.84	2.0	4.3	16	3.2
Magnesium, meq/L	0.19	0.91	1.0	4.1	1.0
SAR	17	12	7.4	6.6	14
Selenium - Hot Water Extraction, ppm	18	0.60	2.9	1.7	0.85
Boron - Hot Water Extraction, ppm	0.2	<0.2	<0.2	<0.2	<0.2
Organic Carbon, %	<0.05	<0.05	<0.05	<0.05	<0.05
Molybdenum (NH ₄) ₂ CO ₃ , ppm	0.48	0.052	0.22	0.40	0.084
Vanadium, ppm	17	5.5	8.5	7.0	6.8
Neutralization Potential (as CaCO ₃), %	2.9	3.1	1.1	3.8	2.3
Acid Potential, %	<0.01	0.04	0.38	0.08	0.05
Acid Base Potential, ± tons of CaCO ₃ /1000 tons	29	30	-0.88	36	21
Sand, %	75	77	78	75	80
Silt, %	18	13	17	17	13
Clay, %	7	10	5	8	7
Texture, USDA	SL	SL	LS	SL	LS
Arsenic - Hot Water Extraction, ppm	<0.02	<0.02	0.02	<0.02	<0.02

Determination ug/g (dry)

Uranium (as U ₃ O ₈), % (dry)	0.0065	0.0012	0.011	0.012	0.0020
Uranium (as U)	55	10	94	100	17
Air Dry Loss, %	11.5	10.4	14.7	12.1	13.6
Radium-226, ± counting error*, pCi/g (dry)	25 ± 1	2.7 ± 0.3	20 ± 1	49 ± 1	3.9 ± 0.3

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ADDITIONAL ANALYSIS

REPORT OF ANALYSIS

ALR Designation	9103-18587-37-31	9103-18587-37-32	9103-18587-37-33	9103-18587-37-34	9103-18587-37-35
Sponsor Designation	MF6 No. 4	MF7 No. 1	MF7 No. 2	MF7 No. 3	MF8 No. 1
	Bottom				
Saturation %	42	43	41	43	41
pH	7.5	7.8	7.7	7.4	7.9
Conductivity, mmhos/cm	2.3	0.7	1.2	3.5	0.68
Sodium, meq/L	13	6.4	8.5	13	5.7
Calcium, meq/L	8.1	0.56	1.5	23	0.46
Magnesium, meq/L	2.5	0.23	0.57	6.3	0.12
SAR	5.6	10	8.4	3.4	11
Selenium - Hot Water Extraction, ppm	0.070	0.035	0.055	0.12	0.14
Boron - Hot Water Extraction, ppm	<0.2	<0.2	<0.2	<0.2	<0.2
Organic Carbon, %	<0.05	<0.05	<0.05	<0.05	<0.05
Molybdenum (NH ₄) ₂ CO ₃ , ppm	0.21	0.12	0.13	0.70	0.30
Vanadium, ppm	11	8.0	4.1	7.5	7.5
Neutralization Potential (as CaCO ₃), %	11	8.5	1.2	8.0	29
Acid Potential, %	0.02	0.03	0.02	0.04	0.02
Acid Base Potential, ± tons of CaCO ₃ /1000 tons	110	84	11	79	290
Sand, %	82	80	84	79	80
Silt, %	7	8	7	11	8
Clay, %	11	12	9	10	12
Texture, USDA	SL	SL	LS	SL	SL
Arsenic - Hot Water Extraction, ppm	<0.02	<0.02	<0.02	<0.02	<0.02

Determination ug/g (dry)

Uranium (as U ₃ O ₈), % (dry)	0.00074	0.0015	0.0011	0.00081	0.0055
Uranium (as U)	6.2	13	9.5	6.9	47
Air Dry Loss, %	9.3	10.5	11.8	11.3	10.9
Radium-226, ± counting error*, pCi/g (dry)	1.7 ± 0.2	7.6 ± 0.6	2.5 ± 0.4	1.0 ± 0.2	8.0 ± 0.6

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REPORT OF ANALYSIS

ALR Designation
Sponsor Designation

9103-18587-37-36
MFB No. 2
Upper Zone

9103-18587-37-37
MFB No. 3
Bottom 13'

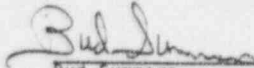
Saturation %	48	43
pH	8.0	7.6
Conductivity, mmhos/cm	0.86	1.3
Sodium, meq/L	8.1	6.9
Calcium, meq/L	0.60	4.5
Magnesium, meq/L	0.09	1.9
SAR	14	3.9
Selenium - Hot Water Extraction, ppm	0.90	0.85
Boron - Hot Water Extraction, ppm	<0.2	<0.2
Organic Carbon, %	<0.05	<0.05
Molybdenum (NH ₄) ₂ CO ₃ , ppm	1.1	0.14
Vanadium, ppm	41	7.0
Neutralization Potential (as CaCO ₃), %	7.5	6.7
Acid Potential, %	0.12	0.02
Acid Base Potential, ± tons of CaCO ₃ /1000 tons	71	66
Sand, %	76	79
Silt, %	14	9
Clay, %	10	12
Texture, USDA	SL	SL
Arsenic - Hot Water Extraction, ppm	<0.02	<0.02

Determination µg/g (dry)

Uranium (as U ₃ O ₈), % (dry)	0.0087	0.00066
Uranium (as U)	74	5.6
Air Dry Loss, %	13.6	10.6
Radium-226, ± counting error*, pCi/g (dry)	41 ± 1	1.4 ± 0.3

These samples are scheduled to be disposed of 45 days after the date of this report.

BS/dh
dh


Bud Summers
Radiochemistry
Supervisor

CORE LABORATORIES, INC.
ANALYTICAL REPORT

September 14, 1984
Results of Soil Analysis for
DAMES AND MOORE

Core Project I.D.	W84433-1	W84433-2	W84433-3	W84433-4	W84433-5	W84433-6	W84433-7	W84433-8
Client I.D.	OR2	OR2	OR5	OR5	OR6	OR7	OR8	OR8
	Sample 1	Sample 2	Sample 1	Sample 2	Sample 1	Sample 1	Sample 1	Sample 2
%Moisture	14.2	9.5	10.3	7.2	11.4	10.6	10.3	10.7
% U ₃ O ₈ by wt.	0.045	0.004	0.040	0.042	0.044	0.020	0.001	0.016
pH	7.1	7.3	7.4	7.2	7.3	4.5	7.5	7.1
Conductivity (mmhos/cm)	3.8	2.8	2.6	2.2	2.7	2.7	2.4	3.0
Saturation %	44.2	35.7	43.1	34.7	43.4	33.3	46.1	42.4
SAR	3.1	1.7	0.7	0.3	1.2	0.2	4.3	2.1
Selenium (ppm)*	2.64	0.06	1.20	0.29	1.44	0.72	0.16	0.48
Boron (ppm)*	0.23	0.12	0.07	0.10	0.06	0.18	0.12	0.06
TOC (%)	0.29	0.25	0.25	0.16	0.21	0.37	0.27	0.29
Molybdenum (ppm)+	38.6	2.0	20.4	19.8	29.8	3.7	0.7	2.2
Vanadium (ppm)+	0.2	0.2	0.2	0.6	0.2	0.5	0.4	0.2
Acid Base Potential α	23	8.6	50	160	57	-5.7	41	12
Texture	insufficient							
% Sand	sample	78	74	84	74	80	50	80
% Silt	--	12	14	6	14	10	24	12
% Clay	--	10	12	10	12	10	26	8
Classification		Sandy Loam	Sandy Loam	Loamy Sand	Sandy Loam	Sandy Loam	Sandy Clay Loam	Loamy Sand
Radium 226 (pCi/gm)	1.6±0.1	1.6±0.1	1.7±0.1	0.8±0.1	0.3±0.1	1.0±0.1	0.3±0.1	0.3±0.1

*Water extractable

+AB-DTPA extractable

α Tons CaCO₃/1000 Tons

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CORE LABORATORIES, INC.
ANALYTICAL REPORT

September 14, 1984

Results of Soil Analysis for

DAMES AND MOORE

Core Project I.D.	W84433-9	W84433-10	W84433-11	W84433-12	W84433-13	W84433-14	W84433-15	W84433-16
Client I.D.	OR8	OR9	OR9	OR10	OR10	OR11	OR11	SP2
	Sample 3	Sample 1	Sample 2	Sample 1	Sample 2	Sample 1	Sample 2	Sample 1
%Moisture	8.3	12.2	8.7	10.8	11.1	10.9	9.6	21.4
% U ₃ O ₈ by wt.	0.021	0.012	0.003	0.044	0.001	0.150	0.002	0.118
pH	5.7	7.1	7.3	--	7.6	--	7.6	8.4
Conductivity (mmhos/cm)	2.5	2.9	5.6	--	3.4	--	1.6	11.7
Saturation %	39.4	48.4	38.9	--	36.4	--	35.2	62.9
SAR	0.1	2.3	2.1	--	3.9	--	1.3	40.5
Selenium (ppm)*	0.20	0.96	0.10	--	0.10	--	0.08	9.6
Boron (ppm)*	0.16	0.04	0.26	--	0.12	--	0.20	0.14
TDC (%)	0.32	0.25	0.24	--	0.28	--	0.54	0.09
Molybdenum (ppm)+	6.5	2.1	1.0	--	5.1	--	1.9	32.0
Vanadium (ppm)+	0.4	<0.2	0.4	--	0.3	--	0.6	0.6
Acid Base Potential α	0.4	7.7	49	--	53	--	50	76
Texture	insufficient		insufficient					
% Sand	sample	78	sample	--	62	--	78	66
% Silt	--	14	--	--	16	--	6	14
% Clay	--	8	--	--	22	--	16	20
Classification	--	Loamy Sand	--	--	Sandy Clay Loam	--	Sandy Loam	Sandy Loam
Radium 226 (pCi/gm)	29±0.1	0.1±0.1	2.6±0.1	--	0.3±0.1	--	0.4±0.1	3.4±0.1

*Water extractable

+AB-DTPA extractable

α Tons CaCO₃/1000 Tons

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CORE LABORATORIES, INC.
ANALYTICAL REPORT

September 14, 1984
Results of Soil Analysis for
DAMES AND MOORE

Core Project I.D.	W84433-17	W84433-18	W84433-19	W84433-20	W84433-21	W84433-22	W84433-23	W84433-24
Client I.D.	SP2	SP2	M1	M1	M1	M2	M2	M2
	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3
Moisture	33.3	9.0	3.3	8.3	13.3	7.3	11.0	11.0
% U ₃ O ₈ by wt.	0.095	0.033	0.043	0.082	0.002	0.002	0.005	0.001
pH	8.7	8.4	7.4	6.6	7.4	7.6	7.3	7.7
Conductivity (mmhos/cm)	7.0	3.7	2.1	2.4	1.5	2.5	2.1	1.3
Saturation %	122.3	42.5	27.9	38.1	37.5	36.9	48.6	40.9
SAR	58.4	24.5	0.4	0.4	1.0	2.7	0.2	2.3
Selenium (ppm)*	39.2	0.56	0.19	7.6	0.29	1.00	3.56	0.08
Boron (ppm)*	0.09	0.09	0.06	0.02	0.26	0.37	0.03	0.11
TOC (%)	0.41	0.26	0.21	0.22	0.32	0.51	0.29	0.40
Molybdenum (ppm)+	56.6	20.6	61.0	4.8	1.0	0.7	1.6	0.6
Vanadium (ppm)+	2.1	1.0	0.2	1.0	0.5	0.7	0.2	0.5
Acid Base Potential α	58	88	160	29	5.9	29	30	16
Texture	insufficient			insufficient				
% Sand	sample	78	88	80	82	62	sample	80
% Silt	--	8	6	10	10	8	--	10
% Clay	--	14	6	10	8	30	--	10
Classification	--	Sandy Loam	Sand	Loamy Sand	Loamy Sand	Sandy Clay Loam	--	Loamy Sand
Radium 226 (pCi/gm)	1.3±0.1	0.3±0.1	0.4±0.1	1.0±0.1	0.4±0.1	0.3±0.1	0.5±0.1	1.8±0.1

*Water extractable

+AB-DTPA extractable

α Tons CaCO₃/1000 Tons

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CORE LABORATORIES, INC.
ANALYTICAL REPORT

September 14, 1984

Results of Soil Analysis for
DAMES AND MOORE

Core Project I.D.	W84433-25	W84433-26	W84433-27	W84433-28	W84433-29	W84433-30	W84433-31	W84433-32
Client I.D.	M3	M3	M3	M4	M4	M4	M6	M6
	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2
%Moisture	11.3	13.2	14.0	5.3	10.3	9.3	12.7	12.8
% U ₃ O ₈ by wt.	0.009	0.019	0.006	0.001	0.015	0.004	0.001	0.008
pH	7.0	7.0	7.0	7.1	7.1	7.4	7.5	6.1
Conductivity (mmhos/cm)	2.2	2.5	2.7	4.1	2.2	2.5	2.5	2.5
Saturation %	47.2	55.1	50.8	33.2	48.2	46.6	46.9	54.8
SAR	0.2	1.1	1.4	0.7	0.7	1.6	3.4	0.7
Selenium (ppm)*	0.32	2.04	2.52	0.08	0.4	0.44	0.46	0.36
Boron (ppm)*	<0.01	0.05	0.01	0.07	0.13	0.09	0.50	0.18
TOC (%)	0.34	0.24	0.33	0.79	0.36	0.33	0.38	0.29
Molybdenum (ppm)+	31.4	3.0	2.0	0.5	3.3	3.3	0.5	29.6
Vanadium (ppm)+	<0.2	<0.2	<0.2	0.4	<0.2	0.3	0.4	<0.2
Acid Base Potential α	35	39	29	27	28	75	2.3	60
Texture				insufficient			insufficient	
% Sand	70	74	70	sample	86	74	sample	70
% Silt	18	16	16	--	6	20	--	18
% Clay	12	10	14	--	8	6	--	12
Classification	Sandy Loam	Sandy Loam	Sandy Loam	--	Loamy Sand	Sandy Loam	--	Sandy Loam
Radium 226 (pCi/gm)	0.8 \pm 0.1	0.6 \pm 0.1	0.5 \pm 0.1	0.1 \pm 0.1	0.2 \pm 0.1	0.5 \pm 0.1	0.2 \pm 0.1	5.6 \pm 0.1

*Water extractable

+AB-DTPA extractable

α Tons CaCO₃/1000 Tons

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CORE LABORATORIES, INC.
ANALYTICAL REPORT

September 14, 1984
Results of Soil Analysis for
DAMES AND MOORE

Core Project I.D.	W84433-33
Client I.D.	M6
	Sample 3
%Moisture	8.5
% U ₃ O ₈ by wt.	0.017
pH	6.9
Conductivity (mmhos/cm)	2.3
Saturation %	39.7
SAR	0.7
Selenium (ppm)*	1.04
Boron (ppm)*	0.04
TOC (%)	0.27
Molybdenum (ppm)+	32.6
Vanadium (ppm)+	<0.2
Acid Base Potential α	31
Texture	
% Sand	76
% Silt	12
% Clay	12
Classification	Sandy Loam
Radium 226 (pCi/gm)	0.2±0.1

*Water extractable

+AB-DTPA extractable

α Tons CaCO₃/1000 Tons

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CORE LABORATORIES, INC.
ANALYTICAL REPORT

October 2, 1984

Results of Soil Analysis for

DAMES AND MOORE

Core Project I.D.	W84433-1	W84433-2	W84433-3	W84433-4	W84433-5	W84433-6
Client I.D.	OR2-#1	OR2-#2	OR5-#1	OR5-#2	OR6-#1	OR7-#1
Arsenic (ppm)	<0.004	<0.004	<0.004	<0.004	<0.004	1.44
Core Project I.D.	W84433-7	W84433-8	W84433-9	W84433-10	W84433-11	W84433-12
Client I.D.	OR8-#1	OR8-#2	OR8-#3	OR9-#1	OR9-#2	OR10-#1
Arsenic (ppm)	<0.004	<0.004	0.46	<0.004	0.012	2.60
Core Project I.D.	W84433-13	W84433-14	W84433-15	W84433-16	W84433-17	W84433-18
Client I.D.	OR10-#2	OR11-#1	OR11-#2	SP2-#1	SP2-#2	SP2-#3
Arsenic (ppm)	<0.004	<0.004	0.012	<0.004	0.052	0.012
Core Project I.D.	W84433-19	W84433-20	W84433-21	W84433-22	W84433-23	W84433-24
Client I.D.	M1-#1	M1-#2	M1-#3	M2-#1	M2-#2	M2-#3
Arsenic (ppm)	<0.004	<0.004	<0.004	0.014	<0.004	<0.004
Core Project I.D.	W84433-25	W84433-26	W84433-27	W84433-28	W84433-29	W84433-30
Client I.D.	M3-#1	M3-#2	M3-#3	M4-#1	M4-#2	M4-#3
Arsenic (ppm)	<0.004	0.078	<0.004	0.008	<0.004	<0.004
Core Project I.D.	W84433-31	W84433-32	W84433-33			
Client I.D.	M6-#1	M6-#2	M6-#3			
Arsenic (ppm)	0.048	<0.004	<0.004			

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CORE LABORATORIES, INC.
ANALYTICAL REPORT

05-OCT-84

Results of Soil Analysis for
DAMES AND MOORE

CORE PROJECT I.D.	W84466-1	W84466-2	W84466-3	W84466-4	W84466-5	W84466-6	W84466-7
CLIENT I.D.	WP-1	WP-1	WP-1	WP-2	WP-2	WP-2	WP-3
	#1	#2	#3	#1	#2	#3	#1
ARSENIC (ppm)	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008
%U ₂ O ₈	0.002	0.001	0.002	0.002	0.001	0.005	0.001
pH	7.7	7.6	7.5	7.6	7.9	7.6	7.5
Conductivity (umhos/cm)	0.8	1.9	3.3	2.0	0.5	2.9	2.0
SAR	0.5	0.8	4.1	0.3	0.5	3.5	0.2
Selenium (ppm)*	<0.016	<0.016	0.016	<0.016	<0.016	0.136	<0.016
BORON (ppm)*	0.4	0.3	0.2	0.2	0.2	0.5	0.2
TOC (%)	0.34	0.38	0.45	0.33	0.33	0.44	0.33
MOLYBDENUM (ppm)+	2.2	0.3	1.1	1.1	0.6	0.9	1.0
VANADIUM (ppm)+	<0.2	0.3	0.3	<0.2	<0.2	<0.2	<0.2
ACID BASE POTENTIAL*	38	49	43	50	37	21	23
RADIUM 226 (pCi/gm)	0.3±0.1	0.0±0.1	0.0±0.1	0.1±0.1	6.2±0.4	0.0±0.1	0.0±0.1

* Water Extractable

+ AB-DTPA extractable

=Tons CaCO₃/1000 Tons

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CORE LABORATORIES, INC.
ANALYTICAL REPORT

05-OCT-84

Results of Soil Analysis for

DAMES AND MOORE

(page 2)

CORE PROJECT I.D.	W84466-8	W84466-9	W84466-10	W84466-11	W84466-12	W84466-13	W84466-14
CLIENT I.D.	WP-3	WP-3	WP-4	WP-4	WP-4	WP-5	WP-5
	#2	#3	#1	#2	#3	#1	#2
ARSENIC (ppm)	0.024	0.008	<0.008	<0.008	<0.008	<0.008	<0.008
%U ₂ O ₈	0.004	0.009	0.005	0.002	0.004	0.003	0.016
pH	7.5	7.3	7.2	7.6	7.5	7.4	7.4
CONDUCTIVITY (umhos/cm)	2.0	2.8	2.3	2.7	2.3	2.0	2.7
SAR	0.3	2.2	0.7	2.8	1.7	0.3	1.8
SELENIUM (ppm)*	0.56	0.52	<0.016	0.92	1.64	<0.016	0.296
BORON (ppm)*	0.3	0.2	0.2	0.2	0.1	0.1	0.1
TOC (%)	0.48	0.47	0.38	I.S.	0.29	0.40	0.42
MOLYBDENUM (ppm)+	1.3	1.3	0.9	1.6	1.2	1.0	7.6
VANADIUM (ppm)+	<0.2	0.4	<0.2	0.4	0.3	0.7	1.2
ACID BASE POTENTIAL*	33	16	17	18	31	43	20
RADIUM 226 (pCi/gm)	0.1±0.1	0.8±0.2	0.3±0.1	2.1±0.2	0.0±0.1	0.0±0.1	0.0±0.1

* Water Extractable

+ AB-DTPA extractable

* Tons CaCO₃/1000 Tons

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CORE LABORATORIES, INC.
ANALYTICAL REPORT

05-OCT-84

Results of Soil Analysis for

DAMES AND MOORE

(page 3)

CORE PROJECT I.D.	W84466-15	W84466-16	W84466-17	W84466-18
CLIENT I.D.	WP-6	WP-6	SP-1	SP-1
	#2	#3	#1	#2
ARSENIC (ppm)	<0.008	<0.008	<0.008	<0.008
U_2O_8	0.002	0.003	0.013	0.014
pH	7.7	8.0	8.5	8.6
CONDUCTIVITY ($\mu\text{mhos/cm}$)	1.8	3.3	0.7	1.2
SAR	2.7	2.5	9.5	4.0
SELENIUM (ppm)*	<0.016	<0.016	0.96	0.68
BORON (ppm)*	0.3	0.4	0.2	0.2
TOC (%)	0.36	0.48	0.08	I.S.
MOLYBDENUM (ppm)+	1.1	I.S.	4.7	9.2
VANADIUM (ppm)+	0.7	I.S.	0.8	2.2
ACID BASE POTENTIAL*	22	30	47	160
RADIUM 226 (pCi/gm)	0.2 \pm 0.1	2.4 \pm 0.3	9.9 \pm 0.5	0.4 \pm 0.1

* Water Extractable

+ AB-DTPA extractable

* Tons CaCO_3 /1000 Tons

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Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

October 12, 1984

Page 1 of 6

Ms. Mary Pearson
Dames and Moore
1626 Cole Blvd.
Golden, CO 80401

RE: 9103-18653-12

Date Samples Rec'd 9-11-84

P.O. No. 08987-003-14

REPORT OF ANALYSIS

ALR Designation	9103-18653-12-1	9103-18653-12-2	9103-18653-12-3	9103-18653-12-4	9103-18653-12-5
Sponsor Designation	WP-7 No. 1	WP-7 No. 3	WP-8 No. 1	WP-8 No. 2	WP-9 No. 1
pH	7.4	7.3	7.5	7.4	7.2
Electrical Conductivity, mmhos/cm	0.42	4.0	0.88	4.2	2.8
Saturation, %	41	43	41	43	44
<u>Particle Size Analysis:</u>					
Sand, %	82	78	81	81	77
Silt, %	7	10	8	10	19
Clay, %	11	12	11	9	4
Texture Classification, USDA	LS	SL	SL	LS	LS
Soluble Calcium, meq/L	2.3	27	3.8	27	28
Soluble Sodium, meq/L	1.4	12	4.0	19	3.2
Soluble Magnesium, meq/L	0.56	9.2	1.1	8.0	3.8
SAR	1.2	2.8	2.6	4.5	0.80
Selenium, ppm	<0.02	0.53	<0.02	0.47	0.85
Arsenic, ppm	<0.02	<0.02	<0.02	<0.02	<0.02
Boron, ppm	0.7	0.8	<0.2	<0.2	<0.2
Organic Carbon, %	0.06	0.20	0.07	<0.05	0.08
Molybdenum, ppm	0.28	0.52	0.86	0.76	10
Vanadium, ppm	3.3	4.0	3.6	5.0	5.0
Neutralization Potential, %	9.8	5.7	10	4.8	2.9
Potential Acidity, (as Total S), %	0.03	0.05	0.02	0.05	0.52
Acid-Base Potential, \pm tons of CaCO_3 Equivalent/1000 tons of dry material	97	55	99	46	13
Determination: pCi/g dry					
Uranium (as U_3O_8), %	0.00049	0.00059	0.00048	0.00066	0.0055
Radium-226, \pm counting error*	0.9 \pm 0.2	2.4 \pm 0.3	1.0 \pm 0.2	2.6 \pm 0.3	27 \pm 1
Air Dry Loss, %	3.0	4.7	4.9	6.8	5.8
Uranium (as U), $\mu\text{g/g}$ dry	4.2	5.0	4.1	5.6	46

October 12, 1984
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Ms. Mary Pearson
Dames and Moore

RE: 9103-18653-12
Date Samples Rec'd 9-11-84
P.O. No. 08987-003-10

REPORT OF ANALYSIS

ALR Designation	9103-18653-12-6	9103-18653-12-7	9103-18653-12-8	9103-18653-12-9	9103-18653-12-10
Sponsor Designation	WP-9 No. 3	WP-10 No. 1	WP-10 No. 2	WP-11 No. 2	WP-11 No. 3
pH	7.2	7.2	7.2	7.2	7.1
Electrical Conductivity, mmhos/cm	2.9	2.6	2.6	3.0	3.0
Saturation, %	44	44	46	49	46
<u>Particle Size Analysis:</u>					
Sand, %	81	76	75	73	73
Silt, %	16	19	17	23	18
Clay, %	3	5	8	4	9
Texture Classification, USDA	LS	LS	SL	SL	SL
Soluble Calcium, meq/L	29	29	18	28	28
Soluble Sodium, meq/L	5.4	1.8	8.0	5.6	5.6
Soluble Magnesium, meq/L	1.6	3.2	1.3	3.6	2.8
SAR	1.4	0.45	2.6	1.4	1.4
Selenium, ppm	1.3	0.42	0.40	1.1	2.9
Arsenic, ppm	<0.02	<0.02	<0.02	<0.02	<0.02
Boron, ppm	<0.2	<0.2	<0.2	<0.2	<0.2
Organic Carbon, %	<0.05	0.05	0.05	0.05	0.05
Molybdenum, ppm	4.0	5.2	3.6	7.4	2.2
Vanadium, ppm	4.3	4.5	8.3	8.0	4.8
Neutralization Potential, %	7.2	3.2	2.6	4.1	3.2
Potential Acidity, (as Total S), %	0.13	0.54	0.05	0.47	0.38
Acid-Base Potential, \pm tons of CaCO_3 Equivalent/1000 tons of dry material	68	15	24	26	20
Determination: pCi/g dry					
Uranium (as U_3O_8), %	0.0032	0.0091	0.0015	0.0080	0.0047
Radium-226, \pm counting error*	12 \pm 1	21 \pm 1	6.0 \pm 0.4	27 \pm 1	16 \pm 1
Air Dry Loss, %	28.9	6.9	9.2	7.5	7.0
Uranium (as U), $\mu\text{g/g}$ dry	27	78	13	68	40

October 12, 1984
Page 5 of 6

Ms. Mary Pearson
Dames and Moore


RE: 9103-18653-12
Date Samples Rec'd 9-11-84
P.O. No. 08987-003-14

REPORT OF ANALYSIS

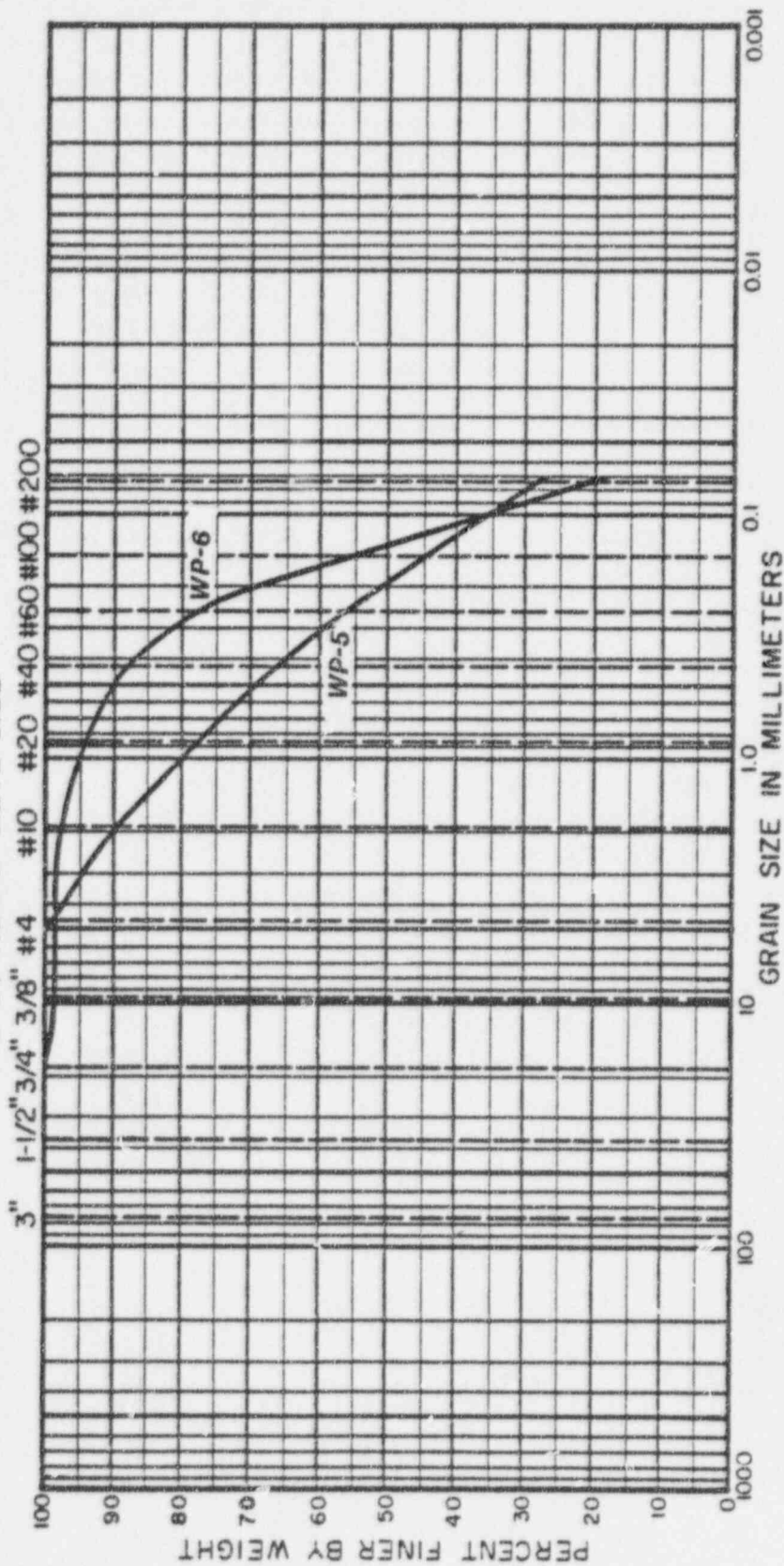
ALR Designation	9103-18653-12-11	9103-18653-12-12
Sponsor Designation	WP-12 No. 2	WP-12 No. 3
pH	7.3	7.4
Electrical Conductivity, mmhos/cm	3.1	2.7
Saturation, %	43	44
<u>Particle Size Analysis:</u>		
Sand, %	76	80
Silt, %	18	16
Clay, %	6	4
Texture Classification, USDA	SL	LS
Soluble Calcium, meq/L	27	19
Soluble Sodium, meq/L	8.9	8.3
Soluble Magnesium, meq/L	3.0	3.1
SAR	2.3	2.5
Selenium, ppm	0.55	1.4
Arsenic, ppm	<0.02	<0.02
Boron, ppm	<0.2	<0.2
Organic Carbon, %	0.05	0.08
Molybdenum, ppm	3.0	2.0
Vanadium, ppm	1.1	6.6
Neutralization Potential, %	4.7	2.4
Potential Acidity, (as Total S), %	0.10	0.06
Acid-Base Potential, \pm tons of CaCO_3 Equivalent/1000 tons of dry material	44	22
Determinati. pCi/g dry		
Uranium (as U_{308}), %	0.0012	0.00074
Radium-226, \pm counting error*	5.7 \pm 0.4	2.7 \pm 0.3
Air Dry Loss, %	7.5	6.6
Uranium (as U), $\mu\text{g/g}$ dry	9.8	6.3

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96 σ .
These samples are scheduled to be disposed of 45 days after the date of this report.

BS/dh *dh*


Bud Summers
Radiochemistry
Supervisor

U.S. STANDARD SIEVE SIZE



LOCATION	GRAVEL		SAND		SILT OR CLAY	
	COARSE	FINE	COARSE	FINE	COARSE	FINE
WP-6						
WP-5						

CLASSIFICATION	
WP-6	Fine to medium grained silty sand, light brown (SM)
WP-5	Fine to medium grained silty sand, light brown (SM)

Gradation Curves