

UNITED NUCLEAR CORPORATION

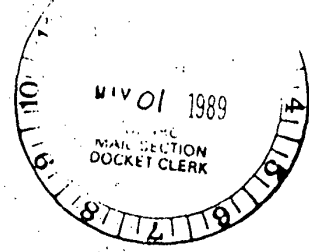
40-8907

04008907320E



6501 Americas Parkway N.E.
Suite 1040

Albuquerque, New Mexico 87110
Telephone 505/883-6901



April 27, 1989
UNC-ALO-89-230M



Mr. Edward Hawkins
Branch Chief
US Nuclear Regulatory Commission
Uranium Recovery Field Office
P. O. Box 25325
Denver, CO 80225

Dear Mr. Hawkins:

Attached herewith for your review is a document titled "Tailings Sand Backfill Cleanup Verification Report". This report is submitted in accordance with License Condition No. 33 of our license SUA-1475.

If you have any questions or comments upon review, please do not hesitate to contact me.

Sincerely,

Juan R. Velasquez
President

Attachment

cc: Chuck Johnson

JRV:nlk

OFFICIAL DOC

89-0623

8907070188 XA 12/18/85

TAILINGS SAND BACKFILL

CLEANUP VERIFICATION REPORT

NORTHEAST CHURCH ROCK MINE

UNITED NUCLEAR CORPORATION

LICENSE SUA-1475
CONDITION NO. 33

2512180198 890427
PDR ADOCK 04008907
C PDR

8/1/83 2.3

1.0 INTRODUCTION

This report has been prepared pursuant to License Condition 33 of United Nuclear Corporation's License No. SUA-1475. The purpose of this report is to provide the data for verification that the byproduct materials from the tailings sands backfill areas and associated mine water ponds at United Nuclear's Northeast Church Rock (NECR) mine site have been removed.

On January 29, 1979, the State of New Mexico Environmental Improvement Division authorized United Nuclear to use coarse tailings sands produced from the milling process for backfilling excavated mine stopes in the Northeast Church Rock mine. These sands came from the tailings disposal area after they had been separated from the slimes.

Sandfill areas 1, 2 and 3 shown on Figure 1 were established at the mine site to store the tailings sands prior to use. Runoff from these areas was routed to mine dewatering ponds 1, 2, 3 and 3A (see figure 1). Water from the ponds was treated in the NECR Ion Exchange Plant before being discharged in accordance with an NPDES permit. The ponds were periodically dredged to remove sediments. These sediments were stored at the mine site pond muck pad (see figure 1). From there, the pond muck was transported to the mill for processing. The following areas require cleanup of tailings sands byproduct residual as a result of these activities.

- Sandfill Area #1
- Sandfill Area #2
- Sandfill Area #3
- Pond #1
- Pond #2
- Pond #3
- Pond #3A
- Pond Muck Pad

2.0 CLEANUP PROCEDURES

As the initial step of cleanup in 1986 United Nuclear transported the remaining stored tailings sands from the NECR mine and deposited them back in the tailings disposal area at the location shown on Figure 1. A total of 13,593 tons of tailings sands were moved from the mine.

In 1988, the areas identified above were excavated to remove byproduct residual. Figure 1 identifies the initial depth to which each area was excavated. Soils sampling was then conducted to determine which areas should be more selectively excavated. The depth to which final selective excavation actually took place was determined using the results of the soils sampling as described later herein. A total of 58,284 dry tons of soil material was removed from the NECR mine site.

2.1 Clean Up Criteria

2.1.1 Preliminary Surveys

Preliminary surface gamma surveys were conducted in an attempt to determine the magnitude of cleanup required at the backfill sand areas. Attempts made to evaluate Backfill Area No. 1 using gamma surveys were unsuccessful because the berms of low grade ore placed along the edges of the area affected the gamma measurements to the extent that any gamma measurements from tailings materials were overshadowed. Gamma ray surveys attempted in the vicinity of Backfill Areas No. 2 and No. 3 were similarly unsuccessful as the surface gamma ray readings from stored mine water treatment pond sediment overshadowed readings from backfill sands. It became clear that gamma surveys would be useless in determining byproduct contamination because mine related sources (i.e., non-byproduct sources) of gamma radiation could not be distinguished from byproduct related sources. Mine waste and low grade ore has been distributed in various areas of the mine site as a result of development and operation of the mine. Gamma radiation could not be used as a control for determining tailings contaminated areas because of the contribution to gamma readings from the low grade ore.

In order to determine the depth to which each area would be initially excavated, boreholes were drilled in the tailings backfill sands storage areas using a truck-mounted and hand-held augers to a depth of approximately three meters (10 ft) in Backfill Areas Nos. 1 and 2 and one meter (3.3 ft) in Backfill Area No. 3. A borehole gamma probe was lowered into each hole to determine the Ra-226 concentration below the surface. Borehole logging readings of 12.8 are approximately equivalent to Ra-226 concentrations of 16 pCi/g. Area 1 showed high readings to a depth of 30 centimeters (1.0 ft). Logging in Area 2 indicated elevated readings to approximately 150 centimeters

(5.0 ft). Borehole logger readings in Backfill Storage Area 3 indicated elevated readings to approximately 15 centimeters (0.5 ft) depth. While this method could not distinguish between byproduct and non-byproduct related radium, the elevated levels were assumed to be due to piles of backfill sands and/or affected soil remaining at the perimeter of the areas for the initial purpose of excavation, even though the highest percentage of the contribution to those readings was most likely to be non-byproduct related.

Auger holes were also drilled and probed in the Ponds. Samples of pond sediment from all four ponds were also obtained using pipes forced into the sediment. A pipe was hammered to the greatest depth possible then removed carefully to retain the soil sample in the pipe. The depth to which the pipe was submerged in sediment was noted. The pipes were frozen overnight and later sawed into sections. The sections were counted using a portable gamma spectroscopy unit. The estimated depth of elevated Ra-226 activity levels in each of the ponds is reflected in the amounts excavated (shown on Figure 1). Again the elevated readings were assumed to be byproduct related for the purposes of initial excavation.

2.2 Excavation

Sandfill Areas 1, 2 and 3, and Pond 3A and the Pond Muck Pad area were excavated by ripping the soils with a dozer, then windrowing the soils with a grader. If the soils were soft, only the grader was used. A front-end loader was used to stockpile the windrowed soils and load the haul trucks. Ponds 1, 2 and 3 were wet, requiring that a track backhoe be used. The backhoe excavated and stockpiled the wet soils. A front-end loader was used to load the haul trucks.

2.3 Excavation/Controls and Verification Criteria

It became necessary to establish a procedure by which to determine if the areas excavated contained byproduct material, or if soils surveys results were indicative of non-byproduct sources, particularly for areas where mine waste or natural rock outcrops masked byproduct contamination. As indicated before, surface gamma surveys were of no use because of their inability to differentiate between byproduct and non-byproduct sources. Also, radium content alone could not be used to differentiate whether the source was non-byproduct or tailings related.

It was determined that the use of a ratio between uranium and radium would be the best indicator of the source. Uranium would be expected to be essentially absent in the tailings sands because it would have been extracted by the milling process. The milling process used by United Nuclear was over 90% efficient. The uranium to radium ratios in tailings should, therefore, show a significant bias toward radium if the soil sample was tailings contaminated. The uranium/radium ratio in ore from the mine or other non-byproduct related soils would be expected to be much closer to equilibrium. Determination of the uranium/radium ratio is discussed in Section 3.1.

After the uranium/radium ratio indicative of byproduct versus non-byproduct material was established, an excavation control was set by averaging the byproduct and non-byproduct uranium ratio. The resulting excavation control was used to identify areas of additional selective excavation.

Sampling was conducted after the initial excavation generally on a 50 to 100 foot grid spacing. Two types of soils samples were taken; surface and core samples. The surface samples were taken at the first 15 centimeters (cm). The core samples were taken at each 15 cm down to 60 cm or every 0.5 feet down to 2 feet. Section 3.0 of the report contains maps of each area cleaned with each sampling location plotted. The maps also contain the analytical results. Areas that did not meet the excavation control criteria after initial excavation were selectively excavated until analytical results were acceptable. Selective excavation took place in all directions from the location of the sampling points not meeting the excavation control criteria to the location of sampling points that did meet the criteria. Selective excavation depth was generally from one to three feet. In a few cases the excavation control criteria could not be achieved even after several episodes of selective excavation. However, as explained below, the excavation control criteria is conservative relative to the verification criteria (i.e., the tailings uranium/radium ratio). The excavation control criteria was used in conjunction with the remediation criteria in 10 CFR 40, Appendix A of 5 pCi Radium-226 above background, where possible. However, the 5 pCi/l above background criteria could not be used as the only guide because it is not possible to discriminate between radium contribution by mine waste, other natural sources, or byproduct material.

3.0 RESULTS

This section presents the results of the sampling conducted to verify that byproduct has been removed from the sand backfill areas and the ponds.

3.1 Uranium/radium Ratio Determination

In determining the uranium/radium ratio of tailings versus low grade ore and other non-byproduct materials various types of samples representing these sources were obtained. They included samples from representative areas like the Mine parking lot (made up of mineralized ore and waste rock), various low ore grade stock piles, and tailings. The results clearly indicate a significant difference in the uranium/radium ratio in tailings versus non-byproduct sources. Representative ore, other non-tailings, and tailings samples were analyzed for radium-226 and natural uranium to establish uranium to radium ratios in non-byproduct versus byproduct sources. The data is presented in Table I. The average ratios of uranium to radium-226 in the low grade ore samples is 1.44. In tailings samples the average ratio is 0.035. Therefore, uranium/radium ratios of 0.035 or less identified in soils sampled would indicate byproduct contamination. As an additional conservative measure for excavation control, United Nuclear averaged the ore and tailings uranium/radium ratios (i.e., 0.035 and 1.44) using the result (i.e., 0.75) as the excavation control criteria. Any ratios below 0.75 identified during soils sampling was used to identify areas of additional selective excavation.

3.2 Sandfill Area No.1

Sandfill area No. 1 is located on top of a mesa southeast of the Northeast Church Rock mine shaft No. 1 (see Figure 1). Figure 2 contains photographs of the area before and after cleanup. A 4 ft. to 6 ft. berm made of mine waste was placed on three sides to direct runoff to a collection pipe which diverted collected runoff to the mine water ponds. The berm and collection pipe can be seen in the photographs. The piles in the pre-cleanup photographs are tailings sands which were removed to the tailings impoundment.

As indicated on Figure 1, approximately 1.5 ft. of material was excavated initially from this area. The area sits on sandstone outcrops. The total area cleaned at this

location is approximately 171,000 square feet. Figures 3 and 4 are topographic maps which depict sandfill area No. 1. The sand storage pile occupied the area shown on the map by broken lines. Figure 3 identifies the locations and results of soils samples taken after the area was initially excavated. Additional selective excavation was conducted over the majority of the areas based on these results. As discussed before, as a conservative measure, United Nuclear used an excavation control criteria of 0.75 to determine where to conduct additional selective excavation. Figure 4 provides the uranium/radium ratios obtained soils sampling after selective excavation.

Tables III and IV contain the description of the sample location of the soils samples taken. It also contains the uranium and radium results from which the ratios were derived. The results indicate that all of the area was cleaned of byproduct material from tailings as all of the uranium/radium ratios were above the 0.035 verification criteria.

Sandfill Area No. 1 is sufficiently isolated from the remainder of the surface facilities at Northeast Church Rock mine that background radium values could be obtained. The area is located above the valley in which the surface facilities are located. A background site sufficiently upgradient from the area (as shown on Figure 3) so as to not be affected by its activity was sampled to determine radium background. Table II contains the results. Average background radium concentration at this location was 2.85 pCi/gm. The data contained in Table IV indicates that many of the locations were cleaned to below 5 pCi/g above background.

3.3 Sandfill Area No. 2

Sandfill area No. 2 is located approximately 225 feet south of Northeast Church Rock shaft No. 2 (see Figure 1). It is located at the head of the valley which contains the mine surface facilities. Its location allowed diversion of all runoff to the mine water ponds. Figure 5 contains photographs of the area prior to and after cleanup. The total area cleaned at sandfill area No. 2 was approximately 130,000 square feet. The area was excavated initially to a depth of approximately 1.5 ft as shown on Figure 1. Figure 6 contains the results of the soils analyses conducted after initial excavation. Based on these results the area was more selectively cleaned. Figure 7 provides the uranium/radium ratio analysis after additional selective cleanup. Tables V and VI contain the description of the location of the soils samples taken. It also contains the

uranium and radium results from which the ratios were derived. The results indicate that all of the area was cleaned of byproduct material from tailings as the uranium/radium ratios were above the 0.035 verification criteria.

Sandfill area No. 2 is located upgradient of all other Northeast Church Rock mine surface facilities. It was, therefore, possible to obtain a background radium sample for this area. Table II contains the results of background radium analysis for sandfill area No. 2. The average background is 1.3 pCi/g. The results indicate that many of the locations were cleaned to below 5 pCi/gm above background.

3.4 Sandfill Area No. 3 And Pond Muck Area

Sandfill area No. 3 and the Pond Muck Area are adjacent to each other as depicted in Figure 1. Figures 8 and 9 are photographs of these areas prior to and after cleanup. As shown on Figure 1, sandfill area No. 3 is located upgradient from the pond muck pile and mine water ponds 3A and 3. Runoff from both of these areas was captured in the mine water ponds.

Sandfill area No. 3 was used to store tailings sands, as well as, low grade ore. The pond muck pile was used to store all materials dredged from the mine water ponds. Therefore, there would be expected to be a mixture of byproduct and non-byproduct materials in this area. The larger volume by far, however, would have been non-byproduct material because of the larger volume of sediments produced from dewatering the mine versus the much smaller volume of sediments contributed by runoff through the sandfill areas.

Figure 1 shows that approximately 1.5 feet and 3.75 feet of material was excavated initially from sandfill area No. 3 and the pond muck area, respectively. The total area cleaned in these areas was 50,000 square feet at the sandfill area and 110,000 square feet at the pond muck area.

Figures 10 and 11 provide the results of the uranium/radium ratio results of soil sampling conducted in these areas after initial and selective excavation. Tables VII, VIII, IX, and X contain the description of the location of the soils samples taken. They also contain the uranium and radium results from which the ratios were derived. The results indicate that these areas were cleaned of byproduct material from tailings as all

of the uranium/radium ratios were above the 0.035 verification criteria. Because of the location of these areas it was not possible to produce representative radium background values of this area.

3.5 Pond 1 And Pond 2

Ponds 1 and 2 are located on top of a mesa southeast of NECR mine shaft No. 1 and west of sandfill area No. 1, as shown on Figure 1. Pond No. 1 was the first pond to receive the mine water as it was pumped from the mine. Pond No. 1 also received the runoff from sandfill area No. 1. Pond No. 2 was the second in the series to receive the water as it flowed through the ditch leading from pond No. 1. Figures 12 and 13 contain photographs of these two ponds before and after cleanup.

The largest volume of materials contained in the ponds was non-byproduct related. However, some small quantity of tailings byproduct material gathered in these ponds as a result of runoff. Figure 1 indicates that over seven feet of material was excavated initially from some areas of pond No. 1. Three feet was excavated initially from other areas of the pond. Approximately 2.5 feet was excavated initially from the ditch leading to Pond No. 2. The total area cleaned at these ponds was 125,000 square feet. The majority of this material was sediment from mine dewatering.

Figure 14 contains the uranium/radium ratios derived from samples taken in Ponds No. 1 and No. 2 after initial excavation. Figure 15 contains the uranium/radium ratios for soils analysis after selective excavation. Tables XI, XII, XIII and XIV contain the description of the location of the soils samples taken and the uranium and radium results from which the uranium/radium ratios were derived. The data indicate that the ponds were cleaned of byproduct material as all of the uranium radium ratios were above the 0.035 verification criteria. Because the ponds were used for the purpose of retaining mine water and collecting sandfill runoff and are located in the midst of the NECR mining activity that it was not possible to obtain representative background radium values.

3.6 Pond 3 And Pond 3A

Ponds 3 and 3A are located in the valley in a position downgradient from the pond muck pad and sandfill areas No. 2 and No. 3 (see Figure 1). They are the last in the

series of ponds to receive mine water and any sandfill area runoff. Figures 16 and 17 are photographs of these ponds prior to and after cleanup.

As with the other ponds, the largest volume of materials contained in these ponds was non-byproduct related. Figure 1 indicates that approximately 4.3 feet of material was excavated initially from pond 3. Approximately 1.25 to 4.4 feet were excavated initially from pond 3A. Figure 18 shows the uranium/radium ratios at sampling locations in these ponds after initial excavation. Figure 19 shows the results of additional verification sampling. Tables XV, XVI, XVII and XVIII contain the description of the location of soils samples taken and the uranium and radium results from which the uranium/radium ratios were obtained. The data indicate that all byproduct related materials have been removed from the ponds as all the uranium/radium ratios were above the 0.035 verification criteria.

TABLE I

URANIUM/RADIUM RATIO
BYPRODUCT VERSUS NON-BYPRODUCT MATERIALS

| <u>SAMPLE TYPE</u> | <u>Radium-226 pCi/gm</u> | <u>Uranium pCi/gm</u> | <u>U/Ra Ratio</u> |
|-----------------------------------|------------------------------|---------------------------|-----------------------|
| Mine Parking Lot | 101.9±2.3 | 153.7 | 1.51 |
| Ore Stock Pile Near Vent #7 | 83.1±2.2 | 112.7 | 1.36 |
| Ore Stockpile #1 - Scale House | 242.1±3.8 | 304 | 1.26 |
| Ore Stockpile #2 - Scale House | 376.8±4.8 | 502 | 1.33 |
| Ore Pad Composite | 191.0±4.80 | 323 | 1.69 |
| Ore Lot #22 | 807.7±7.0 | 1246.6 | 1.54 |
| Tailings Sample #1 | 104.0±2.8 | 3.90 | 0.04 |
| Tailings Sample #2 | 120.0±3.0 | 4.17 | 0.03 |

TABLE II
BACKGROUND RADIUM IN SOIL

| Sandfill No. 1 Background Sample | Radium-226 pCi/gm |
|-------------------------------------|----------------------|
| @ 0.5 ft. | 4.00±0.50 |
| @ 1.0 ft. | 1.70±0.30 |
| @ 1.5 ft. | 3.30±0.50 |
| @ 2.0 ft. | <u>2.40±0.40</u> |
| Average | 2.85 |

| Sandfill No. 2 Background Sample | |
|-------------------------------------|------------------|
| @ 0.5 ft. | 1.80±0.10 |
| @ 1.0 ft. | 1.30±0.10 |
| @ 1.5 ft. | <u>0.80±0.10</u> |
| Average | 1.30 |

TABLE III

Sandfill No. 1 Uranium/Radium Ratios
Soils Analysis After Initial Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|-------------------|------------------------|---------------------|---------------|
| <u>Centerline</u> | | | |
| 0.00' | 14.2±1.00 | 2.40 | 0.17 |
| 100' | 51.6±2.10 | 10.20 | 0.17 |
| 125' | 56.2±0.84 | 17.60 | 0.31 |
| 200' | 36.6±1.60 | 6.30 | 0.17 |
| 300' | 17.4±1.10 | 3.70 | 0.21 |
| 400' | 3.7±0.50 | 1.60 | 0.43 |
| 500' @ 0.5' | 77.4±2.40 | 5.60 | 0.07 |
| 500' @ 1.0' | 70.1±1.10 | 12.40 | 0.18 |
| 500' @ 1.5' | 63.9±1.18 | 12.10 | 0.19 |
| 500' @ 2.0' | 58.1±0.91 | 27.60 | 0.48 |
| <u>East Line</u> | | | |
| 100'-100' | 29.1±1.50 | 10.3 | 0.35 |
| 100'-242' | 71.3±2.60 | 11.3 | 0.16 |
| 133'-228' | 57.9±2.10 | 7.5 | 0.13 |
| 166'-218' | 95.4±2.60 | 4.9 | 0.05 |
| 199'-205' | 77.0±2.60 | 135.0 | 1.75 |
| 200'-100' | 57.6±1.90 | 10.0 | 0.17 |
| 233'-185' | 166.0±3.80 | 6.3 | 0.04 |
| 300'-50' | 36.2±1.50 | 6.9 | 0.19 |
| 300'-100' | 15.9±1.10 | 0.8 | 0.05 |
| 400'-50' | 56.9±2.10 | 11.5 | 0.20 |
| 500'-50' | 18.4±1.20 | 3.9 | 0.21 |
| 570'-32' | 5.72±0.36 | 7.91 | 1.38 |

TABLE III (continued)

Sandfill No. 1 Uranium/Radium Ratios
Soils Analysis After Initial Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|------------------|------------------------|---------------------|---------------|
| <u>West Line</u> | | | |
| 0.00'-50' | 79.9±2.20 | 17.1 | 0.21 |
| 200'-50' | 13.0±1.00 | 3.2 | 0.25 |
| 300'-50' | 7.2±0.70 | 2.6 | 0.36 |
| 400'-50' | 9.8±0.90 | 3.9 | 0.40 |
| 500'-50' | 152.4±3.10 | 16.5 | 0.11 |

TABLE IV
Sandfill No. 1 Soils Analysis Uranium/Radium Ratios
After Final Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|-------------------|------------------------|---------------------|---------------|
| <u>Centerline</u> | | | |
| 000'@0.5' | 0.97±0.16 | 36.2 | 37.32 |
| 0.00'@1.0' | 0.98±0.16 | 17.2 | 17.55 |
| 0.00'@1.5' | 1.13±0.15 | 9.33 | 8.26 |
| 0.00'@2.0' | 0.83±0.15 | 17.9 | 21.57 |
| 125'* | 1.70±0.20 | 0.7 | 0.41 |
| 375'* | 1.32±0.18 | 1.69 | 1.28 |
| 500'@0.5' | 68.7±0.90 | 40.4 | 0.59 |
| 500'@1.0' | 64.4±0.90 | 46.4 | 0.72 |
| <u>East Line</u> | | | |
| 100'-242' | 4.99±0.33 | 1.74 | 0.35 |
| 125'-100'* | 7.74±0.38 | 2.60 | 0.34 |
| 125'-200' | 1.99±0.21 | 1.10 | 0.55 |
| 133'-228' | 9.80±0.10 | 2.37 | 0.24 |
| 166'-218' | 15.70±0.57 | 4.31 | 0.27 |
| 199'-205' | 20.90±0.20 | 3.47 | 0.17 |
| 200'-100' | 13.1±1.00 | 9.90 | 0.76 |
| 233'-185' | 8.70±0.10 | 1.87 | 0.21 |
| 250'-100'@0.5'* | 1.25±0.14 | 0.66 | 0.53 |
| 250'-100'@1.0' | 1.13±0.15 | 0.45 | 0.40 |
| 250'-100'@1.5' | 0.77±0.11 | 0.55 | 0.71 |
| 250'-100'@2.0' | 0.95±0.13 | 0.68 | 0.72 |
| 375'-50'* | 1.05±0.18 | 0.76 | 0.72 |
| 500'-50'@0.5' | 98.8±1.00 | 40.40 | 0.41 |
| 500'-50'@1.0' | 77.8±0.90 | 46.10 | 0.59 |
| 570'-32'** | 5.72±0.36 | 7.91 | 1.38 |

TABLE IV (continued)
 Sandfill No. 1 Soils Analysis Uranium/Radium Ratios
 After Final Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|------------------|------------------------|---------------------|---------------|
| <u>West Line</u> | | | |
| 125'-50'* | 5.84±0.33 | 3.10 | 0.53 |
| 250'-50'@0.5'* | 0.64±0.12 | 0.48 | 0.75 |
| 250'-50'@1.0' | 0.61±0.10 | 0.46 | 0.75 |
| 250'-50'@1.5' | 0.54±0.11 | 0.59 | 1.09 |
| 250'-50'@2.0' | 0.67±0.14 | 0.38 | 0.57 |
| 300'-50' | 1.8±0.40 | 1.83 | 1.02 |
| 375'-50'* | 2.63±0.23 | 13.60 | 5.17 |
| 500'-50'@0.5' | 98.1±1.0 | 14.80 | 0.15 |
| 500'-50'@1.0' | 90.7±1.0 | 12.60 | 0.14 |

*These samples were taken at locations after cleanup generally within 75 ft. of the initial excavation sample locations they replace.

**This data is the same as that shown on Table III, indicating that additional excavation was not conducted at this location.

TABLE V
Sandfill No. 2 Soils Analysis Uranium/Radium Ratios
After Initial Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|-------------------|------------------------|---------------------|---------------|
| <u>Centerline</u> | | | |
| 0.00'@0.5' | 105.7±2.7 | 13.8 | 0.13 |
| 0.00'@1.0' | 124.0±2.5 | 12.9 | 0.10 |
| 0.00'@1.5' | 136.0±3.1 | 15.6 | 0.11 |
| 0.00'@2.0' | 100.0±2.8 | 21.9 | 0.22 |
| 100' | 95.9±2.4 | 55.5 | 0.58 |
| 200' | 109.7±2.8 | 29.8 | 1.18 |
| 300'@0.5' | 6.3±0.6 | 22.9 | 3.63 |
| 300'@1.0' | 18.6±1.1 | 29.3 | 1.58 |
| 300'@1.5' | 2.9±0.5 | 23.2 | 8.00 |
| 300'@2.0' | 3.3±0.5 | 19.5 | 5.91 |
| 400' | 41.4±1.7 | 21.7 | 0.52 |
| 500' | 68.4±2.1 | 18.8 | 0.27 |
| 600' | 143.8±2.9 | 49.5 | 0.34 |
| 640' | 196.1±3.4 | 20.1 | 0.10 |
| <u>East Line</u> | | | |
| 0.00'-50' | 35.7±1.6 | 80.3 | 2.25 |
| 0.00'-100' | 27.6±1.3 | 30.7 | 1.11 |
| 100'-50'@0.5' | 149.3±3.1 | 133.2 | 0.89 |
| 100'-50'@1.0' | 58.9±2.1 | 48.8 | 0.83 |
| 100'-50'@1.5' | 40.8±1.7 | 46.3 | 1.13 |
| 100'-50'@2.0' | 69.0±2.2 | 46.3 | 0.67 |
| 100'-75' | 419.1±4.1 | 140.0 | 0.33 |
| 200'-50' | 164.4±3.1 | 218.5 | 1.33 |
| 200'-75' | 154.9±3.2 | 232.2 | 1.50 |

TABLE V (continued)
 Sandfill No. 2 Soils Analysis Uranium/Radium Ratios
 After Initial Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|------------------|------------------------|---------------------|---------------|
| <u>East Line</u> | | | |
| 300'-50' | 63.3±2.1 | 32.4 | 0.51 |
| 300'-75' | 160.4±3.4 | 97.3 | 0.61 |
| 400'-50' | 9.7±0.8 | 9.2 | 0.95 |
| 400'-75' | 106.7±2.7 | 12.8 | 0.12 |
| 500'-50' | 57.4±2.1 | 25.5 | 0.44 |
| 500'-75' | 28.9±1.4 | 23.5 | 0.81 |
| 500'-100'@0.5' | 52.6±3.1 | 8.49 | 0.16 |
| 500'-100'@1.0' | 1.3±0.3 | 1.01 | 0.78 |
| 500'-100'@1.5' | 1.5±0.3 | 1.16 | 0.77 |
| 500'-100'@2.0' | 1.7±0.3 | 1.19 | 0.70 |
| 600'-1.5' | 104.2±2.7 | 16.2 | 0.16 |
| <u>West Line</u> | | | |
| 0.00'-50' | 35.8±1.6 | 54.7 | 1.53 |
| 0.00'-100' | 109.5±2.6 | 58.1 | 0.53 |
| 100'-50'@0.5' | 74.5±2.3 | 87.1 | 1.17 |
| 100'-50'@1.0' | 47.6±1.9 | 10.7 | 0.22 |
| 100'-50'@1.5' | 62.8±2.1 | 19.5 | 0.31 |
| 100'-75' | 180.1±3.9 | 20.1 | 0.11 |
| 200'-50' | 294.6±4.7 | 529.4 | 1.80 |
| 200'-75' | 50.5±2.1 | 34.2 | 0.68 |
| 300'-75' | 41.7±1.9 | 11.9 | 0.29 |
| 400'-50' | 40.2±1.8 | 22.0 | 0.55 |
| 400'-75' | 74.0±2.3 | 34.2 | 0.46 |
| 500'-50' | 23.1±1.4 | 10.4 | 0.45 |
| 500'-75' | 233.2±4.3 | 29.0 | 0.12 |
| 600'-50' | 106.7±2.7 | 34.2 | 0.32 |
| 600'-75' | 158.1±3.2 | 19.5 | 0.12 |

TABLE VI
Sandfill No. 2 Soils Analysis Uranium/Radium Ratios
After Final Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|-------------------|------------------------|---------------------|---------------|
| <u>Centerline</u> | | | |
| 0.00'@0.5' | 9.0±0.30 | 33.1 | 3.68 |
| 0.00'@1.0' | 14.2±0.46 | 33.1 | 2.33 |
| 0.00'@1.5' | 7.44±0.30 | 23.8 | 3.20 |
| 0.00'@2.0' | 4.83±0.24 | 23.1 | 4.78 |
| 100'*** | 95.9±2.4 | 55.5 | 0.58 |
| 200'*** | 109.7±2.8 | 129.8 | 1.18 |
| 300'@0.5'*** | 6.3±0.6 | 22.9 | 3.63 |
| 300'@1.0'*** | 18.6±1.1 | 29.3 | 1.58 |
| 300'@1.5'*** | 2.9±0.5 | 23.2 | 8.00 |
| 300'@2.0'*** | 3.3±0.5 | 19.5 | 5.91 |
| 375' | 43.5±0.8 | 42.7 | 0.98 |
| 400'@0.5' | 1.1±0.11 | 2.19 | 1.99 |
| 400'@1.0' | 1.08±0.11 | 1.81 | 1.68 |
| 400'@1.5' | 0.77±0.09 | 1.43 | 1.86 |
| 400'@2.0' | 0.85±0.09 | 2.00 | 2.35 |
| 540'* | 4.30±0.2 | 25.8 | 6.00 |
| 640' | 12.4±0.7 | 5.15 | 0.42 |
| <u>East Line</u> | | | |
| 0.00'-50'*** | 35.7±1.6 | 80.3 | 2.25 |
| 0.00'-100'*** | 27.6±1.3 | 30.7 | 1.11 |
| 75'-50'* | 6.21±0.24 | 35.7 | 5.75 |
| 100'-75' | 26.4±2.00 | 26.4 | 1.00 |
| 200'-50'*** | 164.4±3.10 | 218.5 | 1.33 |
| 200'-75'*** | 154.9±3.2 | 232.2 | 1.50 |

*These samples were taken at locations after cleanup generally with 75 ft. of the initial excavation samples locations they replace.

**This data is the same as that shown on Table V, indicating that additional excavation was not conducted at this location.

TABLE VI (continued)
 Sandfill No. 2 Soils Analysis Uranium/Radium Ratios
 After Final Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|------------------|------------------------|---------------------|---------------|
| <u>East Line</u> | | | |
| 375'-50'* | 1.3±0.11 | 4.94 | 3.80 |
| 400'-75' | 2.7±0.40 | 6.50 | 2.41 |
| 450'-50'@0.5'* | 1.8±0.3 | 5.81 | 3.23 |
| 450'-50'@1.0' | 0.9±0.2 | 5.28 | 5.87 |
| 450'-50'@1.5' | 1.1±0.2 | 2.24 | 2.04 |
| 450'-50'@2.0' | 0.8±0.2 | 3.57 | 4.46 |
| 500'-50' | 25.6±0.6 | 9.5 | 0.37 |
| 500'-100'@0.5'** | 52.6±3.1 | 8.49 | 0.16 |
| 500'-100'@1.0'** | 1.3±0.3 | 1.01 | 0.78 |
| 500'-100'@1.5'** | 1.5±0.3 | 1.16 | 0.77 |
| 500'-100'@2.0'** | 1.7±0.3 | 1.19 | 0.70 |
| <u>West Line</u> | | | |
| 0.00'-50'** | 35.8±1.6 | 54.7 | 1.53 |
| 0.00'-100'** | 109.5±2.6 | 58.1 | 0.53 |
| 75'-50'* | 298.0±1.6 | 1,177.0 | 3.95 |
| 100'-75'@0.5' | 66.0±1.9 | 84.6 | 1.28 |
| 100'-75'@1.0' | 72.6±3.7 | 79.3 | 1.09 |
| 100'-75'@1.5' | 36.0±2.4 | 38.3 | 1.06 |
| 100'-75'@2.0' | 62.2±3.4 | 75.7 | 1.22 |
| 200'-50' | 294.6±4.7 | 529.4 | 1.80 |
| 200'-75' | 50.5±2.1 | 34.2 | 0.68 |
| 375'-50'* | 4.22±0.2 | 12.4 | 2.94 |
| 500'-75' | 19.3±0.2 | 19.6 | 1.02 |

*These samples were taken at locations after cleanup generally with 75 ft. of the initial excavation samples locations they replace.

**This data is the same as that shown on Table V, indicating that additional excavation was not conducted at this location.

TABLE VII
Sandfill No. 3 Soils Analysis Uranium/Radium Ratios
After Initial Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|-------------------|------------------------|---------------------|---------------|
| <u>Centerline</u> | | | |
| -50'@0.5' | 121.0±1.1 | 84.0 | 0.69 |
| -50'@1.0' | 101.0±1.0 | 99.6 | 0.99 |
| -50'@1.5' | 51.1±0.75 | 99.6 | 1.95 |
| -50'@2.0' | 63.4±1.6 | 86.0 | 1.36 |
| 0.00' | 50.4±1.6 | 58.1 | 1.15 |
| 100'@0.5' | 61.7±3.1 | 46.3 | 0.75 |
| 100'@1.0' | 52.8±3.1 | 31.7 | 0.60 |
| 100'@1.5' | 58.3±3.3 | 39.6 | 0.68 |
| 100'@2.0' | 53.6±2.9 | 54.2 | 1.01 |
| 125' | 51.2±1.8 | 26.4 | 0.52 |
| <u>East Line</u> | | | |
| 0.00'-50' | 29.5±1.4 | 20.1 | 0.68 |
| 0.00'-100' | 118.8±3.0 | 39.6 | 0.33 |
| 75'-50' | 52.9±2.5 | 48.4 | 0.91 |
| 100'-50' | 71.0±2.1 | 37.0 | 0.52 |
| 100'-100' | 199.6±3.6 | 27.8 | 0.14 |
| <u>West Line</u> | | | |
| 0.00'-50' | 77.9±1.9 | 52.9 | 0.68 |
| 75'-50' | 50.9±2.5 | 45.7 | 0.90 |
| 100'-40' | 23.6±1.3 | 15.6 | 0.66 |

TABLE VIII
Sandfill No. 3 Soils Analysis Uranium/Radium Ratios
After Final Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|-------------------|------------------------|---------------------|---------------|
| <u>Centerline</u> | | | |
| -50'@0.5'** | 121.0±1.1 | 84.0 | 0.69 |
| -50'@1.0'** | 101.0±1.0 | 99.6 | 0.99 |
| -50'@1.5'** | 51.1±0.75 | 99.6 | 1.95 |
| -50'@2.0'** | 63.4±0.88 | 86.0 | 1.36 |
| 0.00' | 105.0±3.5 | 102.0 | 0.97 |
| 100' | 61.7±2.7 | 108.0 | 1.75 |
| 125'@0.5' | 73.6±0.88 | 137.5 | 1.87 |
| 125'@1.0' | 39.7±0.62 | 145.1 | 3.65 |
| 125'@1.5' | 24.4±0.5 | 188.4 | 7.72 |
| 125'@2.0' | 18.3±0.44 | 66.2 | 3.62 |
| <u>East Line</u> | | | |
| -100'-50' | 72.3±2.9 | 121.0 | 1.67 |
| 0.00'-50'* | 19.7±0.49 | 248.9 | 12.63 |
| 75'-50' | 28.9±0.52 | 211.6 | 7.32 |
| 100'-100' | 35.0±2.10 | 12.6 | 0.42 |
| <u>West Line</u> | | | |
| -100'-50' | 116.0±3.4 | 109.0 | 0.94 |
| 0.00'-50' | 129.0±1.3 | 167.5 | 1.30 |
| 75'-50' | 44.8±0.67 | 52.1 | 1.16 |
| 100'-40' | 37.2±1.9 | 29.6 | 0.80 |

*These samples were taken at locations after cleanup generally within 75 ft. of the initial excavation samples locations they replace.

**This data is the same as that shown on Table VII, indicating that additional excavation was not conducted at this location.

TABLE IX
 Pond Muck Pad Soils Analysis Uranium/Radium Ratios
 After Initial Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|-------------------|------------------------|---------------------|---------------|
| <u>Centerline</u> | | | |
| 250' | 479.0±5.7 | 785.5 | 1.64 |
| 300'@0.5' | 146.9±3.2 | 3927.0 | 26.73 |
| 300'@1.0' | 138.0±3.3 | 185.0 | 1.34 |
| 300'@1.5' | 165.0±3.3 | 146.0 | 0.88 |
| 300'@2.0' | 150.0±3.1 | 158.0 | 1.05 |
| 400' | 213.4±3.8 | 136.6 | 0.64 |
| 500'@0.5' | 249.0±4.2 | 273.2 | 1.10 |
| 500'@1.0' | 225.0±3.9 | 197.0 | 0.87 |
| 500'@1.5' | 158.0±3.6 | 143.0 | 0.91 |
| 600' | 25.1±1.3 | 12.5 | 0.50 |
| 700' | 32.9±1.5 | 15.2 | 0.46 |
| 750' | 44.1±1.7 | 18.6 | 0.42 |
| <u>East Line</u> | | | |
| 250'-50' | 18.1±1.1 | 37.6 | 2.09 |
| 300'-50' | 167.5±3.4 | 478.1 | 2.85 |
| 400'-50'@0.5' | 163.7±3.3 | 341.5 | 2.09 |
| 400'-50'@1.0' | 86.0±2.4 | 70.7 | 0.82 |
| 400'-50'@1.5' | 142.0±3.3 | 85.3 | 0.60 |
| 400'-50'@2.0' | 34.2±1.7 | 58.5 | 1.71 |
| 500'-30' | 66.5±2.2 | 99.0 | 1.49 |
| 500'-50' | 26.5±1.4 | 24.9 | 0.94 |
| 600'-50' | 19.6±1.2 | 22.5 | 1.15 |

TABLE IX (continued)
 Pond Muck Pad Soils Analysis Uranium/Radium Ratios
 After Initial Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|------------------|------------------------|---------------------|---------------|
| <u>West Line</u> | | | |
| 250'-50' | 335.7±4.8 | 307.4 | 0.92 |
| 250'-100' | 191.1±3.5 | 251.1 | 1.31 |
| 300'-50' | 140.3±2.9 | 204.9 | 1.46 |
| 300'-100' | 219.6±4.0 | 251.0 | 1.14 |
| 400'-50' | 150.7±3.3 | 211.7 | 1.40 |
| 400'-100'@0.5' | 106.2±2.8 | 100.7 | 0.95 |
| 400'-100'@1.0' | 29.1±1.6 | 117.0 | 4.02 |
| 400'-100'@1.5' | 13.6±1.1 | 73.1 | 5.38 |
| 400'-100'@2.0' | 4.6±0.7 | 87.7 | 19.07 |
| 500'-50' | 79.7±2.3 | 53.4 | 0.67 |
| 500'-100' | 105.9±2.7 | 71.7 | 0.68 |
| 600'-50' | 155.9±3.2 | 56.3 | 0.36 |
| 600'-100'@0.5' | 205.8±3.9 | 88.8 | 0.43 |
| 600'-100'@1.0' | 221.0±3.7 | 256.0 | 1.16 |
| 600'-100'@1.5' | 217.0±3.1 | 317.0 | 1.46 |
| 600'-100'@2.0' | 231.0±3.9 | 329.0 | 1.42 |
| 600'-150' | 61.9±2.1 | 129.8 | 2.1 |
| 700'-50' | 27.0±1.4 | 15.4 | 0.57 |
| 700'-100' | 90.9±2.5 | 73.4 | 0.81 |
| 700'-150' | 107.3±2.8 | 109.3 | 1.02 |
| 750'-150' | 158.3±3.4 | 187.9 | 1.19 |

TABLE X
 Pond Muck Pad Soils Analysis Uranium/Radium Ratios
 After Final Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|--------------------|------------------------|---------------------|---------------|
| <u>Centerline:</u> | | | |
| 250' | 479.0±5.7 | 785.5 | 1.64 |
| 300'@0.5' | 146.9±3.2 | 3927.0 | 26.73 |
| 300'@1.0' | 138.0±3.3 | 185.0 | 1.34 |
| 300'@1.5' | 165.0±3.3 | 146.0 | 0.88 |
| 300'@2.0' | 150.0±3.1 | 158.0 | 1.05 |
| 400'@0.5'* | 126.0±2.8 | 177.0 | 1.40 |
| 400'@1.0' | 78.0±2.5 | 113.0 | 1.45 |
| 400'@1.5' | 80.5±2.5 | 110.0 | 1.37 |
| 400'@2.0' | 96.1±2.7 | 140.0 | 1.46 |
| 500'@0.5' | 249.0±4.2 | 273.2 | 1.10 |
| 500'@1.0' | 227.0±3.9 | 197.0 | 0.87 |
| 500'@1.5' | 158.0±3.6 | 143.0 | 0.91 |
| <u>East Line</u> | | | |
| 250'-50' | 18.1±1.1 | 37.6 | 2.09 |
| 300'-50' | 219.0±4.3 | 377.0 | 1.72 |
| 400'-50'@0.5' | 163.7±3.3 | 341.5 | 2.09 |
| 400'-50'@1.0' | 86.0±2.4 | 70.7 | 0.82 |
| 400'-50'@1.5' | 142.0±3.3 | 85.3 | 0.60 |
| 400'-50'@2.0' | 34.2±1.7 | 58.5 | 1.71 |
| 500'-30' | 66.0±2.2 | 99.0 | 1.49 |
| 500'-50' | 26.5±1.4 | 24.9 | 0.94 |
| 600'-50' | 19.6±1.2 | 22.5 | 1.15 |

TABLE X (continued)
 Pond Muck Pad Soils Analysis Uranium/Radium Ratios
 After Final Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|------------------|------------------------|---------------------|---------------|
| <u>West Line</u> | | | |
| 250'-50'** | 34.7±2.3 | 67.4 | 1.94 |
| 250'-100' | 191.1±3.5 | 251.1 | 1.31 |
| 300'-50** | 106.0±3.0 | 223.0 | 2.10 |
| 300'-100** | 219.6±4.0 | 251.0 | 1.14 |
| 400'-50' | 150.7±3.3 | 211.7 | 1.40 |
| 400'-100'@0.5' | 106.2±2.8 | 100.7 | 0.95 |
| 400'-100'@1.0' | 29.1±1.6 | 117.0 | 4.02 |
| 400'-100'@1.5' | 13.6±1.1 | 73.1 | 5.38 |
| 400'-100'@2.0 | 4.6±0.7 | 87.7 | 19.07 |
| 500'-50** | 58.2±2.0 | 63.2 | 1.09 |
| 550'-100' | 103.0±2.7 | 171.0 | 1.66 |
| 600'-50** | 183.0±5.0 | 182.0 | 0.99 |
| 600'-100'@0.5** | 121.0±3.1 | 323.0 | 2.67 |
| 600'-100'@1.0' | 107.0±3.0 | 456.0 | 4.26 |
| 600'-100'@1.5' | 104.0±3.0 | 283.0 | 2.72 |
| 600'-100'@2.0' | 109.0±3.1 | 377.0 | 3.46 |
| 600'-150' | 61.9±2.1 | 129.8 | 2.1 |
| 700'-50' | 27.0±1.4 | 15.4 | 0.57 |
| 700'-100' | 90.9±2.5 | 73.4 | 0.81 |
| 700'-150' | 107.3±2.8 | 109.3 | 1.02 |
| 750'-150' | 158.3±3.4 | 187.9 | 1.19 |

*Only area(s) requiring selective excavation.

**This sample was taken after cleanup to replace location 500'-50' east.

TABLE XI
Pond No. 1 Soils Analysis Uranium/Radium Ratios
After Initial Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|-------------------|------------------------|---------------------|---------------|
| <u>Centerline</u> | | | |
| 25' | 90.5±2.6 | 41.0 | 0.45 |
| 100' | 433.3±6.0 | 263.0 | 0.61 |
| 200' | 713.3±7.7 | 644.0 | 0.90 |
| 400'@0.5' | 273.3±4.9 | 417.0 | 1.53 |
| 400'@1.0' | 129.0±3.6 | 145.0 | 1.12 |
| 400'@1.5' | 33.5±1.8 | 18.5 | 0.55 |
| 400'@2.0' | 129.0±3.6 | 92.7 | 0.72 |
| <u>East Line</u> | | | |
| 100'-50' | 414.6±5.8 | 658.0 | 1.59 |
| 200'-50' | 68.1±2.4 | 43.9 | 0.65 |
| 300'-50' | 367.1±5.2 | 424.0 | 1.16 |
| 300'-85' | 303.2±5.1 | 395.0 | 1.30 |
| 400'-50' | 219.6±4.4 | 468.0 | 2.13 |
| <u>West Line</u> | | | |
| 100'-50' | 65.9±2.4 | 129.0 | 1.96 |
| 100'-100' | 163.2±3.7 | 170.0 | 1.04 |
| 100'-150' | 24.9±1.4 | 26.4 | 1.06 |
| 100'-200' | 107.4±3.1 | 263.0 | 2.45 |
| 200'-50' | 381.2±5.9 | 541.0 | 1.42 |
| 200'-85' | 55.1±2.1 | 49.8 | 0.90 |
| 200'-100' | 378.5±5.8 | 629.0 | 1.66 |
| 300'-50' | 177.3±3.5 | 196.0 | 1.11 |
| 300'-80' | 69.7±2.2 | 71.7 | 1.03 |
| 400'-50' | 107.7±3.0 | 99.5 | 0.92 |
| 125'-226' | 677.6±7.1 | 476.0 | 0.70 |
| 125'-340' | 51.5±1.8 | 63.4 | 1.23 |

TABLE XII

Pond No. 1 Soils Analysis Uranium/Radium Ratios
After Final Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|-------------------|------------------------|---------------------|---------------|
| <u>Centerline</u> | | | |
| 50'* | 27.0±2.3 | 1322.0 | 48.96 |
| 100' | 42.8±2.9 | 383.0 | 8.95 |
| 125'@0.5'*** | 717.0±2.2 | 1092.0 | 1.52 |
| 125'@1.0' | 799.0±2.3 | 1265.0 | 1.58 |
| 125'@1.5' | 549.0±2.1 | 1064.0 | 1.94 |
| 125'@2.0' | 581.0±2.0 | 1380.0 | 2.38 |
| 200' | 46.1±2.9 | 264.0 | 5.73 |
| 400'@0.5' | 307.0±5.3 | 409.0 | 1.33 |
| 400'@1.0' | 108.0±3.1 | 121.0 | 1.12 |
| 400'@1.5' | 289.0±5.2 | 377.0 | 1.30 |
| 400'@2.0' | 206.0±4.2 | 239.0 | 1.16 |
| <u>East Line</u> | | | |
| 100'-50'** | 414.6±5.8 | 658.0 | 1.59 |
| 100'-75'@0.5'*** | 464.0±6.8 | 672.0 | 1.45 |
| 100'-75'@1.0' | 208.0±4.5 | 336.0 | 1.62 |
| 100'-75'@1.5 | 231.0±4.8 | 376.0 | 1.63 |
| 100'-75'@2.0' | 10.5±1.0 | 14.9 | 1.42 |
| 200'-50'@0.5' | 379.0±6.2 | 403.0 | 1.06 |
| 200'-50'@1.0' | 399.0±6.4 | 457.0 | 1.15 |
| 200'-50'@1.5' | 406.0±6.4 | 591.0 | 1.46 |
| 200'-50'@2.0' | 377.0±6.2 | 565.0 | 1.50 |
| 300'-50'** | 367.1±5.2 | 424.0 | 1.16 |
| 300'-85'** | 303.2±5.1 | 395.0 | 1.30 |
| 400'-50'** | 291.6±4.4 | 468.0 | 2.13 |

*This sample was taken after cleanup to replace Center Line-25'.

**This data is the same as that shown on Table XI, indicating that additional excavation was not conducted at this location.

***Extra samples at same or new location.

TABLE XII (continued)
 Pond No. 1 Soils Analysis Uranium/Radium Ratios
 After Final Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|-------------------|------------------------|---------------------|---------------|
| <u>West Line</u> | | | |
| 100'-50'** | 65.9±2.4 | 129.0 | 1.96 |
| 100'-100'** | 163.2±3.7 | 170.0 | 1.04 |
| 100'-150'*** | 24.9±1.4 | 26.4 | 1.06 |
| 100'-200'** | 107.4±3.1 | 263.0 | 2.45 |
| 200'-50'** | 381.2±5.9 | 541.0 | 1.42 |
| 200'-85'** | 55.1±2.1 | 49.8 | 0.90 |
| 200'-100'@0.5'*** | 107.0±3.4 | 538.0 | 5.03 |
| 200'-100'@1.0' | 439.0±6.9 | 780.0 | 1.78 |
| 200'-100'@1.5' | 511.0±7.2 | 968.0 | 1.89 |
| 200'-100'@2.0' | 550.0±6.9 | 780.0 | 1.42 |
| 300'-50'** | 177.3±3.5 | 196.0 | 1.11 |
| 300'-80'** | 69.7±2.2 | 71.7 | 1.03 |
| 400'-50'** | 107.7±3.0 | 99.5 | 0.92 |
| 125'-226' | 125.0±0.9 | 172.5 | 1.38 |
| 125'-340' | 7.2±0.1 | 70.4 | 10.06 |

*This sample was taken after cleanup to replace Center Line-25'.

**This data is the same as that shown on Table XI, indicating that additional excavation was not conducted at this location.

***Extra samples at same or new location.

TABLE XIII
 Pond No. 2 Soils Analysis Uranium/Radium Ratios
 After Initial Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|-------------------|------------------------|---------------------|---------------|
| <u>Centerline</u> | | | |
| 30' | 2.7±0.5 | 4.1 | 1.52 |
| 50' | 165.7±3.7 | 235.7 | 1.42 |
| 100'@0.5' | 69.2±2.3 | 107.6 | 1.55 |
| 100'@1.0' | 19.4±1.4 | 37.6 | 1.94 |
| 100'@1.5' | 41.7±7.0 | 18.1 | 0.45 |
| 100'@2.0' | 7.0±0.8 | 10.0 | 1.43 |
| 150' | 114.1±2.9 | 288.6 | 2.53 |
| 200' | 216.7±3.3 | 341.5 | 1.58 |
| 240' | 388.6±4.7 | 836.7 | 2.27 |
| <u>East Line</u> | | | |
| 30'-50' | 102.3±2.6 | 46.1 | 0.45 |
| 30'-75' | 20.3±1.0 | 26.9 | 1.33 |
| 100'-40' | 72.3±1.9 | 196.4 | 2.72 |
| 150'-25' | 414.9±5.1 | 734.2 | 1.77 |
| 200'-15' | 53.9±1.8 | 112.7 | 2.09 |
| <u>West Line</u> | | | |
| 30'-50' | 5.0±0.5 | 3.8 | 0.76 |
| 30'-75' | 2.7±0.4 | 2.4 | 0.89 |
| 100'-50' | 261.1±4.2 | 1263.6 | 4.84 |
| 150'-30' | 347.7±4.8 | 546.4 | 1.57 |
| 200'-15' | 85.0±2.1 | 199.8 | 2.35 |

TABLE XIV
 Pond No. 2 Soils Analysis Uranium/Radium Ratios
 After Final Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|-------------------|------------------------|---------------------|---------------|
| <u>Centerline</u> | | | |
| 30' | 2.7±0.5 | 4.1 | 1.52 |
| 50' | 165.7±3.7 | 235.7 | 1.42 |
| 100'@0.5'* | 10.1±0.4 | 26.4 | 2.61 |
| 100'@1.0' | 1.0±0.1 | 9.4 | 9.09 |
| 100'@1.5' | 0.9±0.1 | 12.7 | 13.66 |
| 100'@2.0' | 0.6±0.1 | 6.9 | 11.86 |
| 150' | 114.1±2.9 | 288.6 | 2.53 |
| 200'@0.5'** | 143.0±3.7 | 255.0 | 1.78 |
| 200'@1.0' | 74.6±2.5 | 108.0 | 1.45 |
| 200'@1.5' | 27.6±1.5 | 34.9 | 1.26 |
| 200'@2.0' | 12.5±1.1 | 18.0 | 1.44 |
| 240' | 368.6±4.7 | 836.7 | 2.27 |
| <u>East Line</u> | | | |
| 30'-50'* | 141.0±5.6 | 193.7 | 1.37 |
| 30'-75' | 20.3±1.0 | 26.9 | 1.33 |
| 100'-40'** | 69.8±0.9 | 106.8 | 1.53 |
| 150'-25' | 414.9±5.1 | 734.2 | 1.77 |
| 200'-15' | 53.9±1.8 | 112.7 | 2.09 |
| <u>West Line</u> | | | |
| 30'-50'* | 195.0±5.9 | 317.0 | 1.63 |
| 30'-75' | 2.7±0.4 | 2.4 | 0.89 |
| 100'-20'@0.5'*** | 120.0±3.4 | 215.0 | 1.79 |
| 100'-20'@1.0' | 138.0±3.7 | 229.0 | 1.66 |
| 100'-20'@1.5' | 59.9±2.5 | 116.0 | 1.94 |

*Only area(s) requiring additional excavation.

**Extra sample at the same or new location.

TABLE XIV (continued)
 Pond No. 2 Soils Analysis Uranium/Radium Ratios:
 After Final Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|------------------|------------------------|---------------------|---------------|
| <u>West Line</u> | | | |
| 100'-20'@2.0' | 73.2±2.7 | 112.0 | 1.53 |
| 100'-30'** | 14.1±0.4 | 34.5 | 2.45 |
| 150'-30' | 347.7±4.8 | 546.4 | 1.57 |
| 200'-15' | 85.0±2.1 | 199.8 | 2.35 |

*Only area(s) requiring additional excavation.

**Extra sample at the same or new location.

TABLE XV
 Pond No. 3 Soils Analysis Uranium/Radium Ratios
 After Initial Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|-------------------|------------------------|---------------------|---------------|
| <u>Centerline</u> | | | |
| 50' | 52.5±2.1 | 1887.0 | 35.94 |
| 100' | 54.1±2.0 | 4045.0 | 74.77 |
| 100'@0.5' | 932.0±8.8 | 968.0 | 1.04 |
| 100'@1.0' | 405.0±5.8 | 430.0 | 1.06 |
| 100'@1.5' | 314.0±5.6 | 169.0 | 0.54 |
| 100'@2.0' | 118.0±3.6 | 145.0 | 1.23 |
| 150' | 677.2±7.2 | 687.3 | 1.01 |
| <u>East Line</u> | | | |
| 50'-25' | 21.9±1.3 | 38.3 | 1.75 |
| 75'-25'@0.5' | 52.7±2.4 | 3226.0 | 61.21 |
| 75'-25'@1.0' | 88.9±3.1 | 2070.0 | 23.28 |
| 75'-25'@1.5' | 132.0±3.2 | 597.0 | 4.52 |
| 75'-25'@2.0' | 106.0±2.9 | 2823.0 | 26.63 |
| 100'-25' | 384.3±5.0 | 422.9 | 1.10 |
| 150'-25' | 831.8±8.0 | 1110.2 | 1.33 |
| <u>West Line</u> | | | |
| 50'-50' | 151.9±3.6 | 1401.0 | 9.22 |
| 50'-75' | 52.6±2.1 | 370.0 | 7.04 |
| 100'-50' | 918.0±7.7 | 1136.6 | 1.24 |
| 100'-75' | 24.8±1.3 | 89.8 | 3.62 |
| 150'-25' | 44.2±1.9 | 195.6 | 4.43 |

TABLE XVI
 Pond No. 3 Soils Analysis Uranium/Radium Ratios
 After Final Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|-------------------|------------------------|---------------------|---------------|
| <u>Centerline</u> | | | |
| 50'@0.5' | 35.0±1.9 | 80.7 | 2.31 |
| 50'@1.0' | 91.3±3.0 | 171.0 | 1.87 |
| 50'@1.5' | 101.0±3.3 | 121.0 | 1.20 |
| 50'@2.0' | 2.8±0.5 | 39.0 | 13.93 |
| 100'@0.5'* | 879.0±7.9 | 1163.0 | 1.32 |
| 100'@1.0' | 452.0±6.4 | 503.0 | 1.11 |
| 100'@1.5' | 315.0±5.4 | 487.0 | 1.55 |
| 100'@2.0' | 421.0±6.2 | 754.0 | 1.79 |
| 150' | 677.2±7.2 | 687.3 | 1.01 |
| <u>East Line</u> | | | |
| 50'-10'*** | 56.1±.74 | 741.0 | 13.21 |
| 50'-25' | 21.9±1.3 | 38.3 | 1.75 |
| 65'-20'@0.5'*** | 44.7±0.67 | 2413.0 | 53.98 |
| 65'-20'@1.0' | 33.6±0.58 | 2275.0 | 67.71 |
| 65'-20'@1.5' | 68.7±0.83 | 689.0 | 10.03 |
| 65'-20'@2.0' | 110.7±1.05 | 310.0 | 2.80 |
| 75'-25'@0.5'*** | 52.7±2.4 | 3226.0 | 61.21 |
| 75'-25'@1.0' | 88.9±3.1 | 2070.0 | 23.28 |
| 75'-25'@1.5' | 132.0±3.2 | 597.0 | 4.52 |
| 75'25'@2.0' | 106.0±2.9 | 2823.0 | 26.63 |
| 95'-15'*** | 130.9±1.13 | 827.0 | 6.32 |

TABLE XVI (continued)
 Pond No. 3 Soils Analysis Uranium/Radium Ratios
 After Final Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|------------------|------------------------|---------------------|---------------|
| <u>West Line</u> | | | |
| 50'-50' | 151.9±3.6 | 1401.0 | 9.22 |
| 50'-75' | 52.6±2.1 | 370.1 | 7.04 |
| 75'-30'@0.5'** | 102.0±2.8 | 101.0 | 0.99 |
| 75'-30'@1.0' | 1.1±0.3 | 13.7 | 12.45 |
| 75'-30'@1.5' | 1.7±0.3 | 5.11 | 3.01 |
| 75'-30'@2.0' | 2.4±0.4 | 6.69 | 2.79 |
| 100'-50' | 918.0±7.7 | 1136.6 | 1.24 |
| 100'-75' | 24.8±1.3 | 89.8 | 3.62 |
| 150'-25' | 44.2±1.9 | 195.6 | 4.43 |

*Only area(s) requiring additional excavation.

**Extra sample at the same or new location.

TABLE XVII

Pond No. 3A Soils Analysis Uranium/Radium Ratios
After Initial Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|------------------|------------------------|---------------------|---------------|
| 50' | 43.9±2.3 | 2965.0 | 67.54 |
| 100' | 42.5±2.2 | 872.0 | 20.52 |
| 200'@0.5' | 46.2±2.3 | 1352.0 | 29.26 |
| 200'@1.0' | 31.2±1.7 | 232.0 | 7.44 |
| 200'@1.5' | 17.2±1.3 | 117.0 | 6.80 |
| 200'@2.0' | 42.0±4.2 | 244.0 | 5.81 |
| 300' | 11.9±1.2 | 39.2 | 3.29 |
| 400'@0.5' | 1.3±0.4 | 52.4 | 40.31 |
| 400'@1.0' | 1.2±0.3 | 48.8 | 40.67 |
| 400'@1.5' | 0.9±0.3 | 54.1 | 50.11 |
| 400'@2.0' | 0.8±0.2 | 45.1 | 56.38 |
| 500' | 63.8±2.7 | 260.0 | 5.82 |
| 600'@0.5' | 76.4±3.0 | 480.0 | 6.28 |
| 600'@1.0' | 46.3±2.1 | 134.0 | 2.89 |
| 600'@1.5' | 21.9±1.5 | 31.7 | 1.45 |
| 600'@2.0' | 20.9±1.3 | 28.0 | 1.34 |
| 700' | 18.9±1.8 | 85.0 | 4.50 |
| <u>East Line</u> | | | |
| 100'-50' | 41.5±2.3 | 25.7 | 0.62 |
| 200'-50' | 20.5±1.6 | 153.0 | 7.46 |
| 300'-50' | 16.7±1.5 | 91.6 | 5.49 |
| 300'-75' | 19.6±1.6 | 157.0 | 8.01 |
| 400'-50' | 17.3±1.5 | 54.5 | 3.15 |
| 500'-50' | 53.9±2.6 | 447.0 | 8.29 |

TABLE XVII. (continued)
 Pond No. 3A Soils Analysis Uranium/Radium Ratios
 After Initial Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|------------------|------------------------|---------------------|---------------|
| <u>East Line</u> | | | |
| 500'-75' | 61.0±2.8 | 266.0 | 4.36 |
| 600'-50' | 35.2±2.5 | 25.1 | 0.71 |
| 700'-50' | 12.4±0.9 | 30.2 | 2.44 |
| <u>West Line</u> | | | |
| 50'-75' | 37.2±2.1 | 994.0 | 26.72 |
| 100'-75' | 6.2±0.8 | 45.8 | 7.39 |
| 200'-75' | 7.4±0.9 | 25.3 | 3.42 |
| 300'-75' | 17.9±1.5 | 131.0 | 7.32 |
| 400'-75' | 2.1±0.5 | 17.0 | 8.10 |
| 500'-100' | 40.2±2.2 | 414.0 | 10.30 |
| 600'-100'@0.5' | 17.2±1.4 | 192.0 | 11.16 |
| 600'-100'@1.0' | 22.9±1.5 | 87.7 | 3.83 |
| 600'-100'@1.5' | 2.8±0.4 | 26.8 | 9.57 |
| 600'-100'@2.0' | 2.9±0.5 | 26.8 | 9.24 |
| 600'-200' | 54.5±2.6 | 1262.0 | 23.16 |
| 700'-100' | 19.3±1.6 | 255.0 | 5.18 |
| 700'-200' | 40.3±2.2 | 414.0 | 10.27 |

TABLE XVIII
 Pond No. 3A Soils Analysis Uranium/Radium Ratios
 After Final Excavation

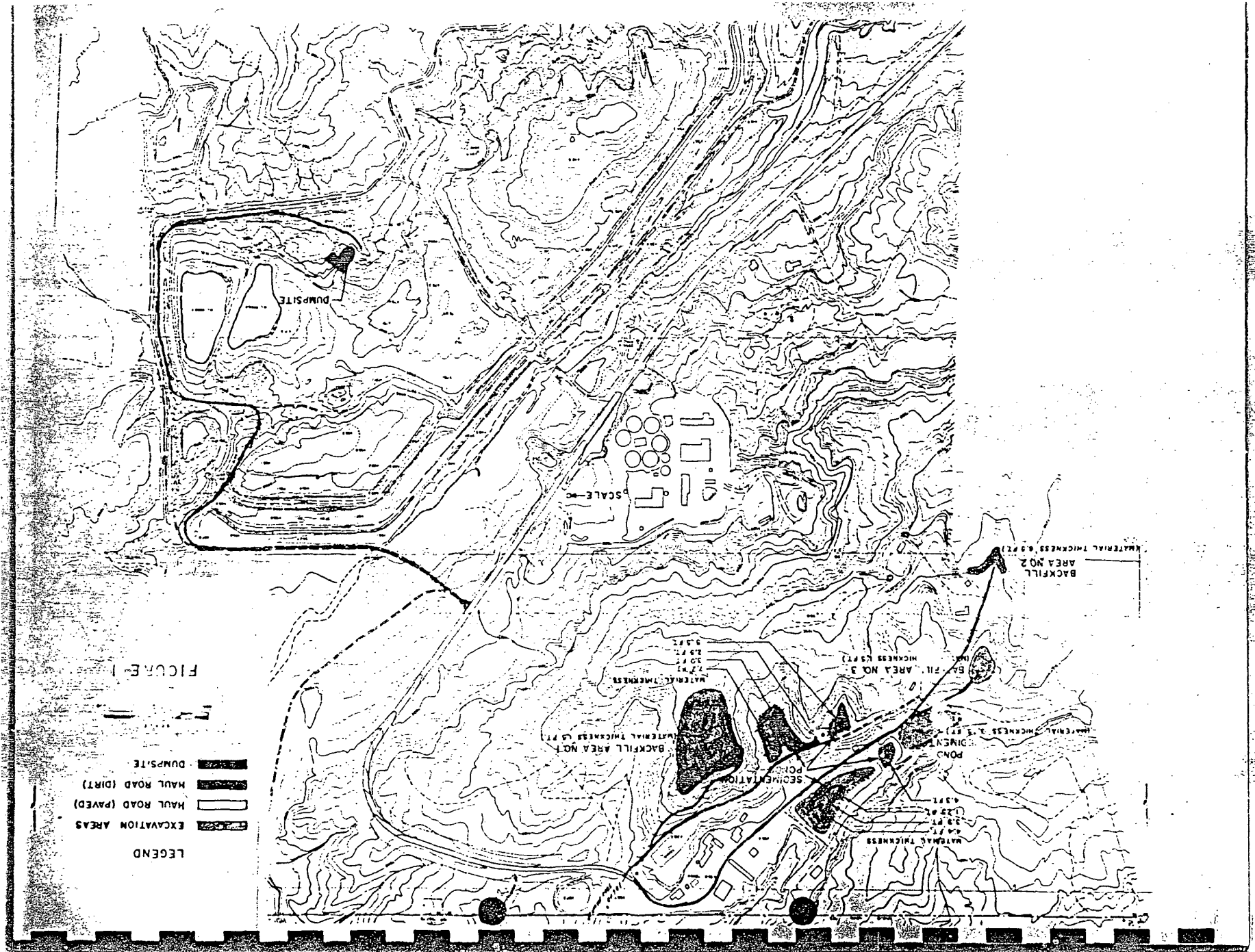
| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|-------------------|------------------------|---------------------|---------------|
| <u>Centerline</u> | | | |
| 20'* | 28.9±1.6 | 151.0 | 5.22 |
| 50'*** | 10.7±0.9 | 50.4 | 4.71 |
| 100'*** | 7.6±0.8 | 37.6 | 4.95 |
| 200'@0.5' | 46.2±2.3 | 1352.0 | 29.26 |
| 200'@1.0' | 31.2±1.7 | 232.0 | 7.44 |
| 200'@1.5' | 17.2±1.3 | 117.0 | 6.80 |
| 200'@2.0' | 42.0±4.2 | 244.0 | 5.81 |
| 300' | 11.9±1.2 | 39.2 | 3.29 |
| 400'@0.5' | 1.3±0.4 | 52.4 | 40.31 |
| 400'@1.0' | 1.2±0.3 | 48.8 | 40.67 |
| 400'@1.5' | 0.9±0.3 | 45.1 | 50.11 |
| 400'@2.0' | 0.8±0.2 | 45.1 | 56.38 |
| 500' | 63.8±2.7 | 260.0 | 5.82 |
| 600'@0.5' | 76.4±3.0 | 480.0 | 6.28 |
| 600'@1.0' | 46.3±2.1 | 134.0 | 2.89 |
| 600'@1.5' | 21.9±1.5 | 31.7 | 1.45 |
| 600'@2.0' | 20.9±1.3 | 28.0 | 1.34 |
| 700' | 18.9±1.8 | 85.0 | 4.50 |
| <u>East Line</u> | | | |
| 100'-50' | 41.5±2.3 | 25.7 | 0.62 |
| 200'-50' | 20.5±1.6 | 153.0 | 7.46 |
| 300'-50' | 16.7±1.5 | 91.6 | 5.49 |
| 300'-75' | 19.6±1.6 | 159.0 | 8.01 |
| 400'-50' | 17.3±1.5 | 54.5 | 3.15 |
| 500'-50' | 53.9±2.6 | 447.0 | 8.29 |

TABLE XVIII (continued)
 Pond No. 3A Soils Analysis Uranium/Radium Ratios
 After Final Excavation

| Sample Location | Radium-226 (pCi/gm) | Uranium (pCi/gm) | U/Ra Ratio |
|------------------|------------------------|---------------------|---------------|
| <u>East Line</u> | | | |
| 500'-75' | 61.0±2.8 | 266.0 | 4.36 |
| 600'-50' | 35.2±2.5 | 25.1 | 0.71 |
| 700'-50' | 12.4±0.9 | 30.2 | 2.44 |
| <u>West Line</u> | | | |
| 50'-75' | 37.2±2.1 | 994.0 | 26.72 |
| 100'-75' | 6.2±0.8 | 45.8 | 7.39 |
| 200'-75' | 7.4±0.9 | 25.3 | 3.42 |
| 300'-75' | 17.9±1.5 | 131.0 | 7.32 |
| 400'-75' | 2.1±0.5 | 17.0 | 8.10 |
| 500'-100' | 40.2±2.2 | 414.0 | 10.30 |
| 600'-100'@0.5' | 17.2±1.4 | 192.0 | 11.16 |
| 600'-100'@1.0' | 22.9±1.5 | 87.7 | 3.83 |
| 600'-100'@1.5' | 2.8±0.4 | 26.8 | 9.57 |
| 600'-100'@2.0' | 2.9±0.5 | 26.8 | 9.24 |
| 600'-200' | 54.5±2.6 | 1262.0 | 23.16 |
| 700'-100' | 19.3±1.6 | 255.0 | 5.18 |
| 700'-200' | 40.3±2.2 | 414.0 | 10.27 |

*Only area(s) requiring additional excavation.

**Extra sample at the same or new location.



LEGEND

- EXCAVATION AREAS
- HAUL ROAD (PAVED)
- HAUL ROAD (DIRT)
- DUMP SITE

FIGURE 1

FIGURE 3
INITIAL SAMPLE POINTS
WITH U/Ra RATIOS:

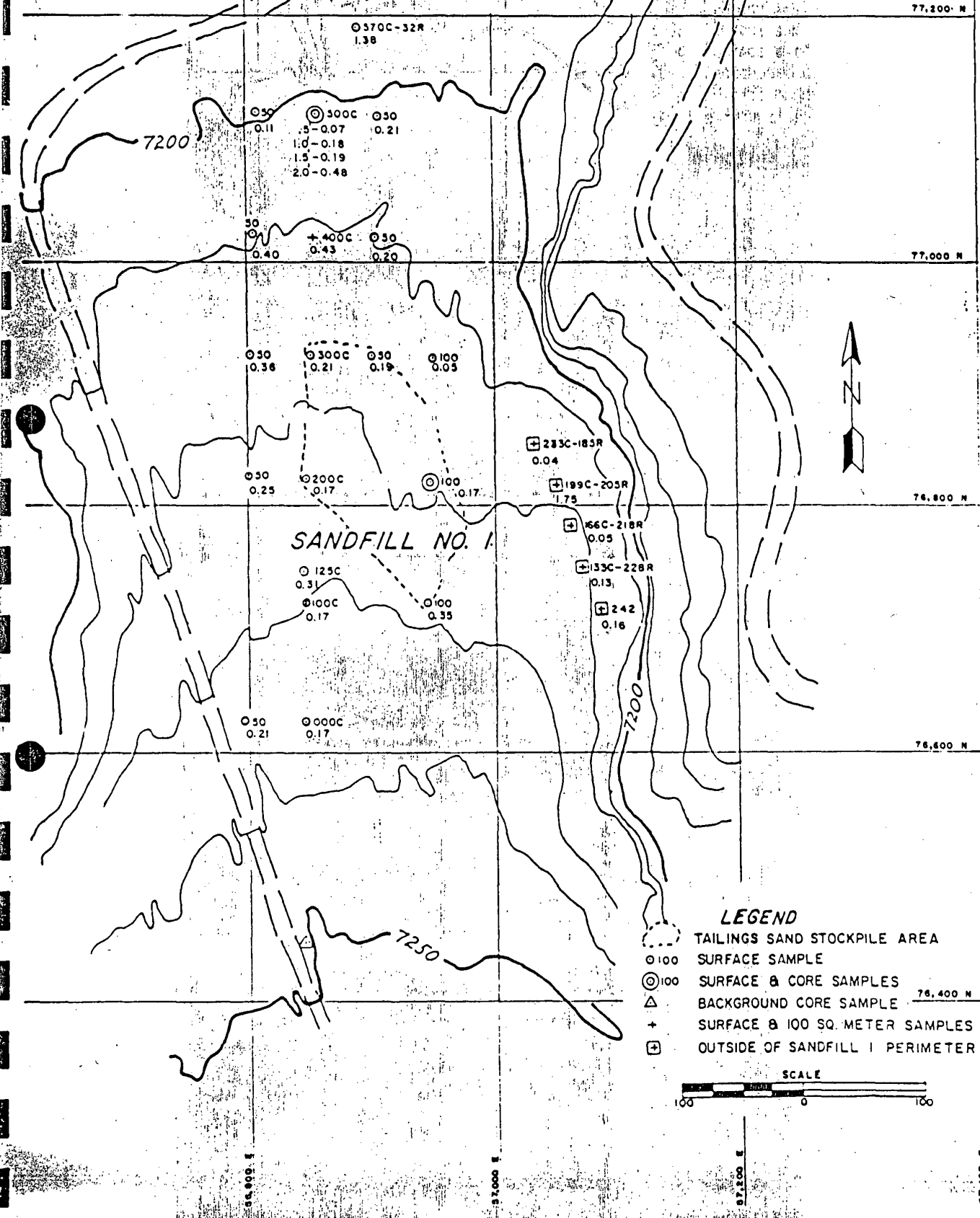


FIGURE 4
FINAL SAMPLE POINTS
WITH U/Ra RATIOS

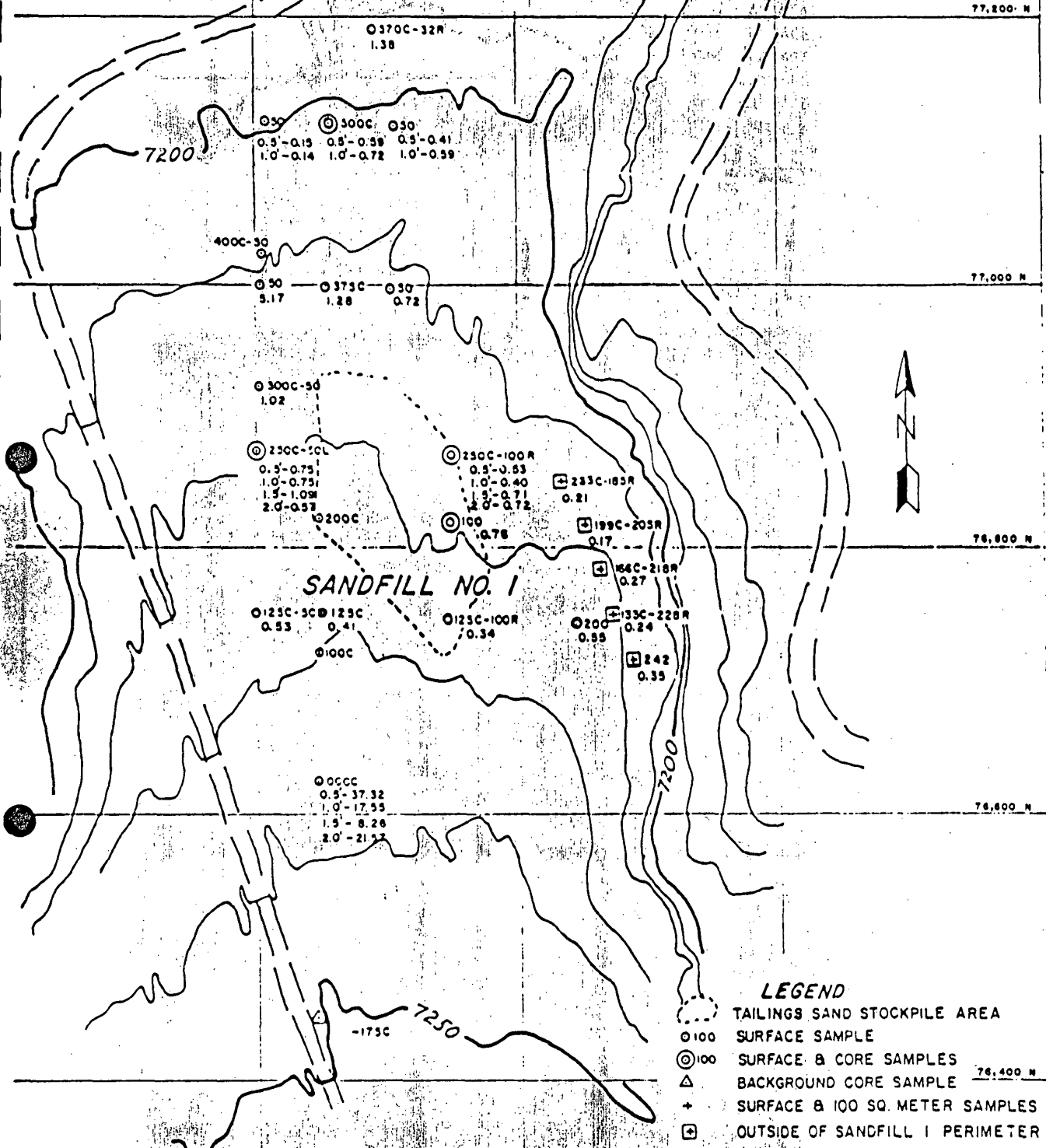
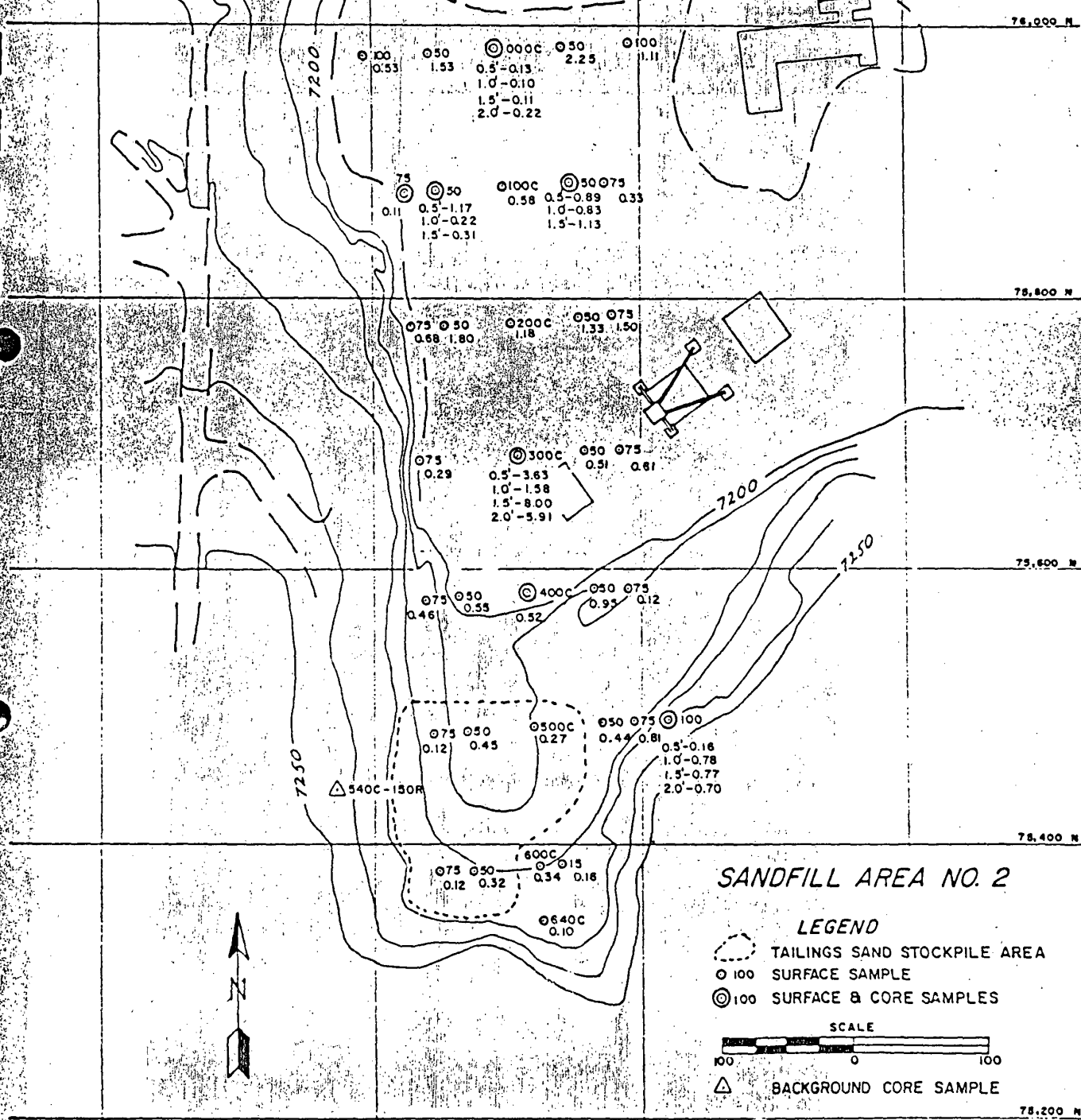


FIGURE 6
INITIAL SAMPLE POINTS
WITH U/R_d RATIOS



SANDFILL AREA NO. 2

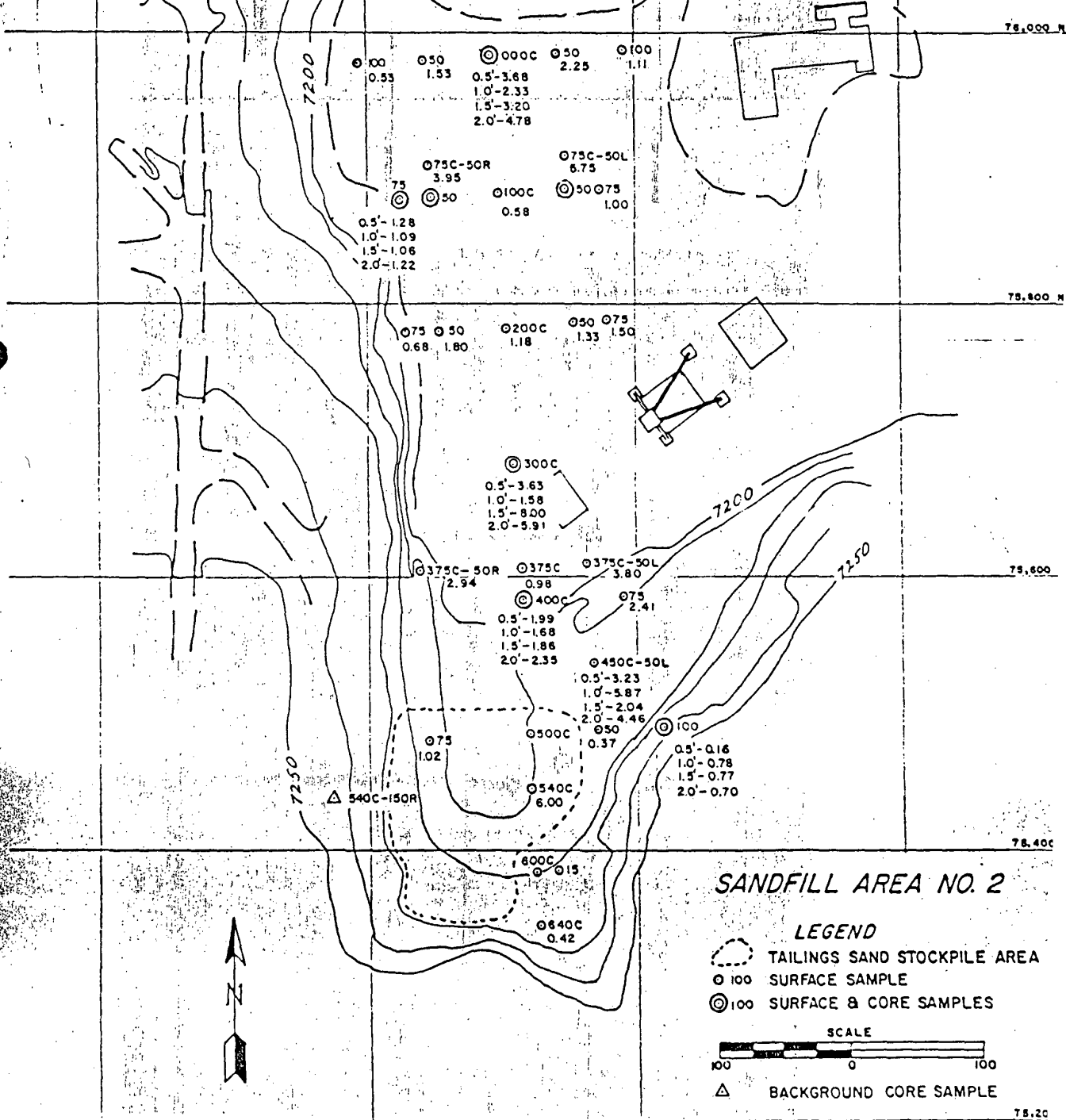
LEGEND

- 100 SURFACE SAMPLE
- ⊙ 100 SURFACE & CORE SAMPLES
- △ BACKGROUND CORE SAMPLE

SCALE

100 0 100

FIGURE 7
FINAL SAMPLE POINTS
WITH U/R₀ RATIOS



SANDFILL AREA NO. 2

FIGURE 14
INITIAL SAMPLE POINTS
WITH U/R₀ RATIOS

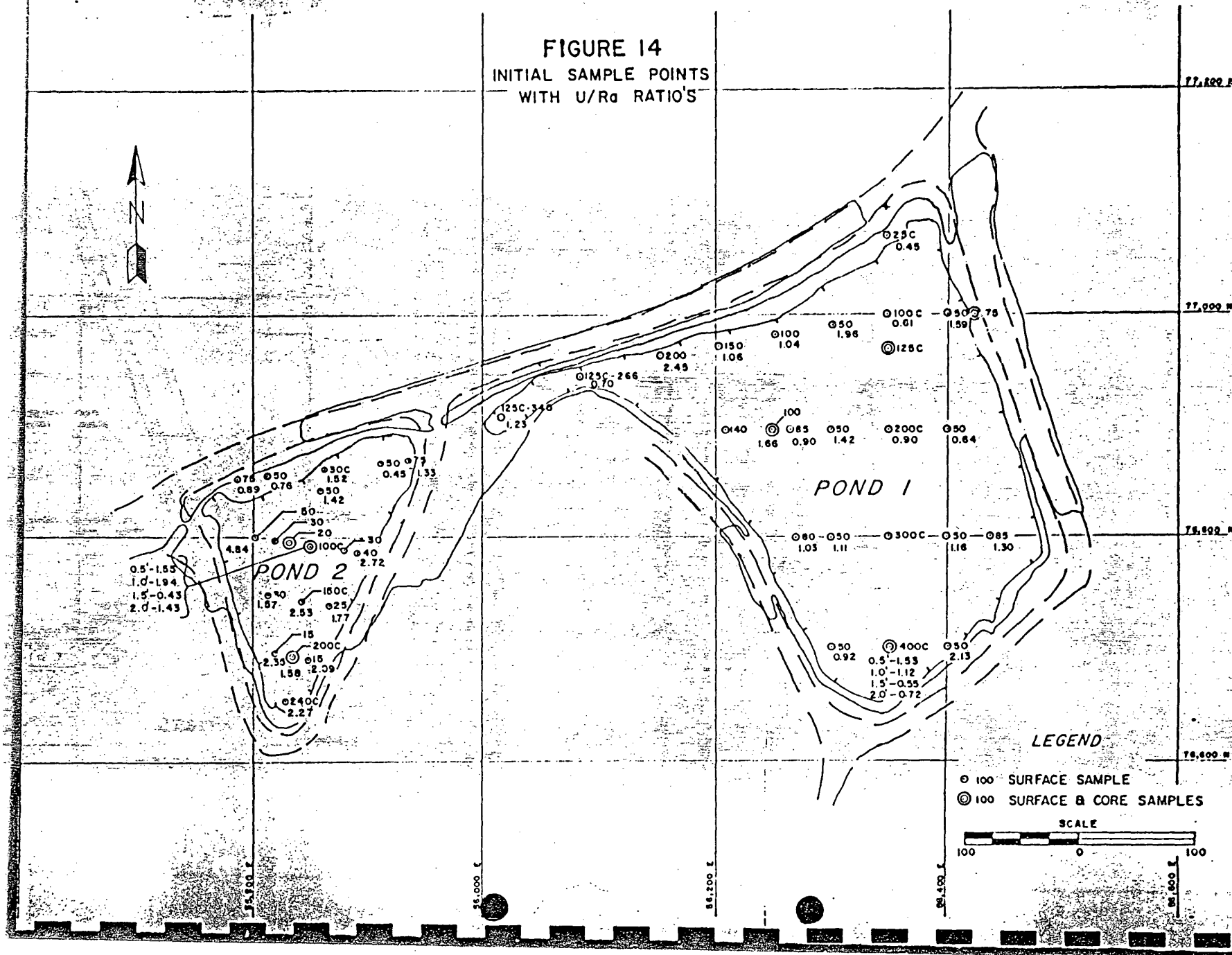


FIGURE 15
FINAL SAMPLE POINTS
WITH U/Ra RATIOS

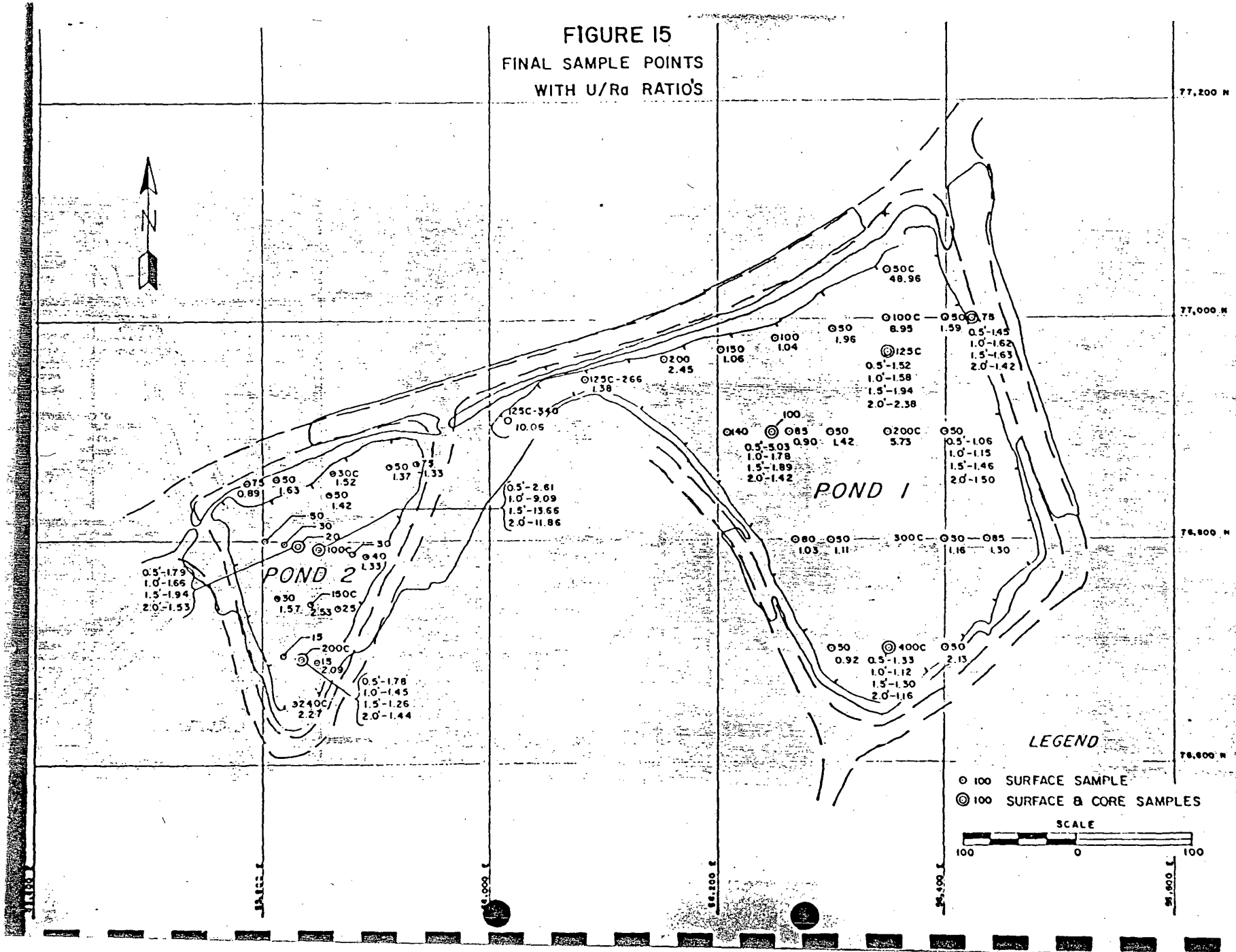


FIGURE 18
INITIAL SAMPLE POINTS
WITH U/R_a RATIOS

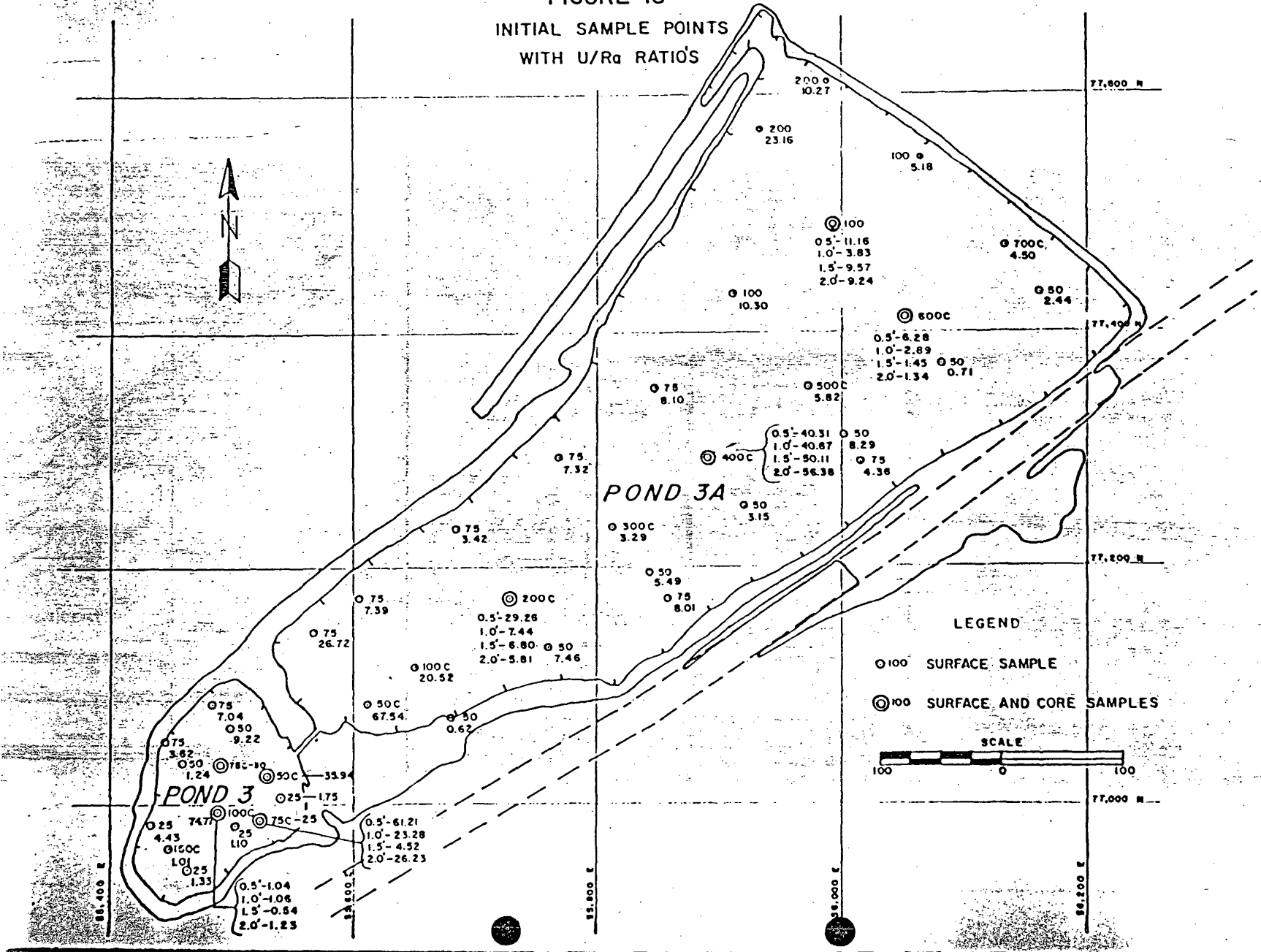


FIGURE 19

FINAL SAMPLE POINTS
WITH U/Ra RATIOS

