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REMOVAL SITE EVALUATION CONTAMINATED SOILS - EAST OF LABORATORY BUILDING #15 AUGUST 22, 1990

08-22-1990

DOE/WMCO
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ENCLOSURE

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REMOVAL SITE EVALUATION

CONTAMINATED SOILS - EAST OF LABORATORY BUILDING #15

Feed Materials Production Center

U. S. Department of Energy

August 22, 1990

INTRODUCTION

The FMPC Laboratory building was first occupied in October 1952. Analytical capabilities were originally established to support uranium metal production, and historically the facility has been a process control laboratory.

A soil pile containing approximately 10 cubic yards of materials (and the resulting open excavation) is located east of the Laboratory building at the FMPC. Contamination levels of total uranium above background were identified in this localized area of soil during surveillance of maintenance work being performed on the sidewalk east of the Laboratory building. The subject area consists of an open excavation and a pile of loose soil, both of which are potential sources of contamination through surface water run-off or fugitive emissions. Through established site policies and procedures, as well as following specific requirements noted herein, the contaminated soils in the area shall be dispositioned to remove the potential spread of contamination as well as to support continued sidewalk maintenance.

This Removal Site Evaluation (RSE) has been completed by the DOE under authorities delegated by Executive Order 12580 under Section 104 of CERCLA and is consistent with Section 300.410 of the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). This RSE addresses an open excavation and a pile of soil containing above background levels of total uranium and has been completed to support the decision as to whether the conditions warrant a removal action.

SOURCE TERM

The subject contaminated soils located east of the Laboratory building at the FMPC were identified during surveillance of maintenance work being performed on a nearby sidewalk. A localized area of soil related to the maintenance activity was identified to have levels of total uranium contamination above background. The soils are located on the "clean side" of the facility and were promptly roped off to limit access, and covered to avoid the spread of contamination and contact with run-off water.

The figure included as Attachment 1 identifies the location and results of a surface radiologic survey of the soil east of the Laboratory building area - monitoring for contamination. The surface contamination survey was conducted utilizing a thin window "pancake" Geiger-Meuller detector. While background levels were monitored at 180 dpm, levels on the soil ranged from <1000 to 10,000 dpm as shown in Attachment 1.

The table included as Attachment 2 summarizes the analytical results of four soil samples taken from the excavated area. Uranium is the identified principle contaminant. Concentrations of total uranium in discrete samples collected ranged from 86 to 291 ppm (activity concentration range of 57 to 194 pCi/g). The soil pile is currently covered and the complete area involved in the excavation has been located within a restricted area.

The pancake probe G-M survey instrument used for these measurements has a response sensitivity to alpha and beta particles as well as gamma radiation. The radionuclides identified and the daughter products that are potentially present emit all three types of radiation. While the instrument is sensitive, it is not specific in terms of contamination limits. Gross gamma is only a screening method as there may be additional gamma emitters present which were not part of the specific radiochemistry analyses.

SOURCE TERM (con't)

Use of the measurements obtained by the pancake probe G-M survey instrument for absolute comparison to contamination limits/guidelines is not recommended. However, a worse-case scenario can be presented by assuming that all measured activity was due only to alpha particle emissions.

To convert the count rates from the G-M survey to dpm/100 cm^2 of potential alpha contamination, the following information must be applied. The alpha counting efficiency (10 percent) has already been applied, therefore the data represents the maximum credible alpha contamination in dpm. The surface area of the probe face is 15.5 cm^2, so the extrapolation to a 100 cm^2 surface area is accomplished by multiplying by 6.5 . On this basis, any measurements detectable above background will exceed contamination limits/guidelines.

Sampling information available from an ongoing construction project located in the vicinity of the excavated area of contaminated soils east of the Laboratory building has also been reviewed (Attachment 4) for comparison value. The soils analysis for the area affected by the construction project along the northern perimeter of the Laboratory building exhibited similar magnitude radiologic contamination as that found in the subject contaminated soils east of the Laboratory building. The analysis also concluded that the soils located to the north of the laboratory building were not classified as a RCRA hazardous waste. No information was discovered indicating that the area of contaminated soils east of the Laboratory building received any different contamination scenarios (historically speaking) than the soils located to the north of the Laboratory building.

Organic contamination of the soils in the subject area has been determined to not be a concern based upon the fact that this particular area is not located within the process area, there has been no known usage of organics at this location, nor is there any record of a spill event occurring that could have affected this area.

Analytic results (unofficially released at this time) for EP-Toxicity constituents to support a RCRA determination were performed on the four soil samples of the contaminated soils east of the Laboratory building, and are provided as Attachment 3. However, five of the eight metals tested for exhibited 'Total Metals' concentrations exceeding regulatory limits, eventhough the EP-Toxicity testing indicated below concern concentrations. Therefore, in order to definitely ascertain RCRA status of the soil, TCLP analysis shall be performed and final soils dispositioning shall be pending these results.

Management of the excavation and the soils pile shall be in accordance with radiologic characterizations consistent with site zoning procedures and FMPC site policy #720. All soils being relocated from this area shall be placed into metal waste boxes and located at an interim storage location pending RCRA determination analysis. The material shall be segregated by categories as defined in FMPC Site Policy # 720 as it is placed into the metal waste boxes to facilitate proper dispositioning upon receipt of the RCRA determination.

SOURCE TERM (con't)

Review of site available data indicates that the contamination found in this localized area related to the recent maintenance excavation may actually be a part of a more far reaching area that extends from the Laboratory building several hundred yards along the sidewalk to the east. Routine radiation surveys, which are conducted periodically over the FMPC, have identified a number of areas along the sidewalk with relatively fixed and sub-surface contamination. An overall plan is in development to address the quantities and locations of this more global area of contamination, and the most effective means to remove the activity. However the need remains for prompt handling of the subject contaminated area discussed herein.

The contamination associated with the subject excavation and resulting soils pile is likely to be an accumulation that has taken place over the years of operations at the FMPC. There does not appear to be a single contaminating event that would assist in the definition of the source term.

EVALUATION OF THE MAGNITUDE OF THE POTENTIAL THREAT

The nature of work typically performed at the FMPC, the surface radiation survey measurements, and the analytical results from the soil samples, all suggest that the principle contaminants are uranium -234 and uranium -238. While there is limited radiation exposure associated with these uranium isotopes, the greater concern is for internal radiation dose due to inhalation or ingestion. The potential threat posed by the above background levels of total uranium found in the subject contaminated soil located east of the Laboratory Building is the potential exposure as a result of suspension of the soil particles in the atmosphere and the potential migration of the contaminants through wind and water erosion.

The concentrations of uranium present in the soils are low level. However, these concentrations may be in excess of possible final remediation soil cleanup standards for the FMPC. Several recent remedial programs have adopted residual soil activity concentrations for final cleanup actions consistent with the 1981 NRC Branch Technical Position Paper ("Disposal vs. On-Site Storage of Thorium and Uranium Wastes from Past Operations" Federal Register, Vol. 46, No. 205, Friday, October 23, 1981, p.52061f.) of 35 pCi/g (approx. 50 ppm) for depleted uranium in soils. The migration of contaminants to previously clean areas could result in more extensive soil cleanup as part of final remedial actions.

In the present condition there is little threat to public health. Soils dispositioning activities could increase the risk, however, proper controls and protection during those activities will be directed to keep occupational and environmental exposure to a minimum.

In order to significantly reduce the potential threat of contamination releases during relocation of the soil, additional control measures will be administered as follows:

1. In the event that soils have dried to the point where dusting is possible, manual re-wetting of the soils will be performed.

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REMOVAL SITE EVALUATION
CONTAMINATED SOILS - EAST OF LABORATORY BUILDING #15

EVALUATION OF THE MAGNITUDE OF THE POTENTIAL THREAT (con't)

2. Final soil disposition shall be in accordance with: radiologic guidelines specified in Site Policy and Procedure #FMPC-720, "Control of Construction Waste;" and per the specific requirements noted within this RSE document; as well as consistent with site zoning procedures.

3. The management of excavated soils shall be in accordance with field radiological monitoring for specific activity as the final determining factor for radiological categorization of the soil.

4. All soils being relocated from this area shall be placed into metal waste boxes and located at an interim storage location pending RCRA determination analysis. The material shall be segregated by categories as defined in FMPC Site Policy # 720 as it is placed into the metal waste boxes to facilitate proper dispositioning upon receipt of the RCRA determination.

5. Dispositioning/handling of the contaminated soils shall be performed during non-peak personnel traffic times, and/or by using an appropriate personnel detour route away from the area.

6. Good housekeeping rules and appropriate Health & Safety measures will be maintained at the excavation site.

ASSESSMENT OF THE NEED FOR REMOVAL ACTION

Consistent with Section 40 CFR 300.410 of the National Contingency Plan, the Department of Energy (DOE) shall determine the appropriateness of a removal action. Eight factors to be considered in this determination are listed in 40 CFR 300.415 (b)(2). The following apply specifically to the concentrations of total uranium occurring in the contaminated soils - east of the Laboratory Building #15:

40 CFR 300.415 (b)(2)(i)
Actual or potential exposure to hazardous substances or pollutants or contaminants to nearby populations, animals, or food chain.

40 CFR 300.415 (b)(2)(iv)
High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate.

40 CFR 300.415 (b)(2)(v)
Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released.

These factors are considered appropriate as a result of the concentration of uranium in the contaminated soils pile and excavation. Operational activities or significant storm events have a potential to cause these concentrations to migrate or be carried to areas which are uncontaminated.

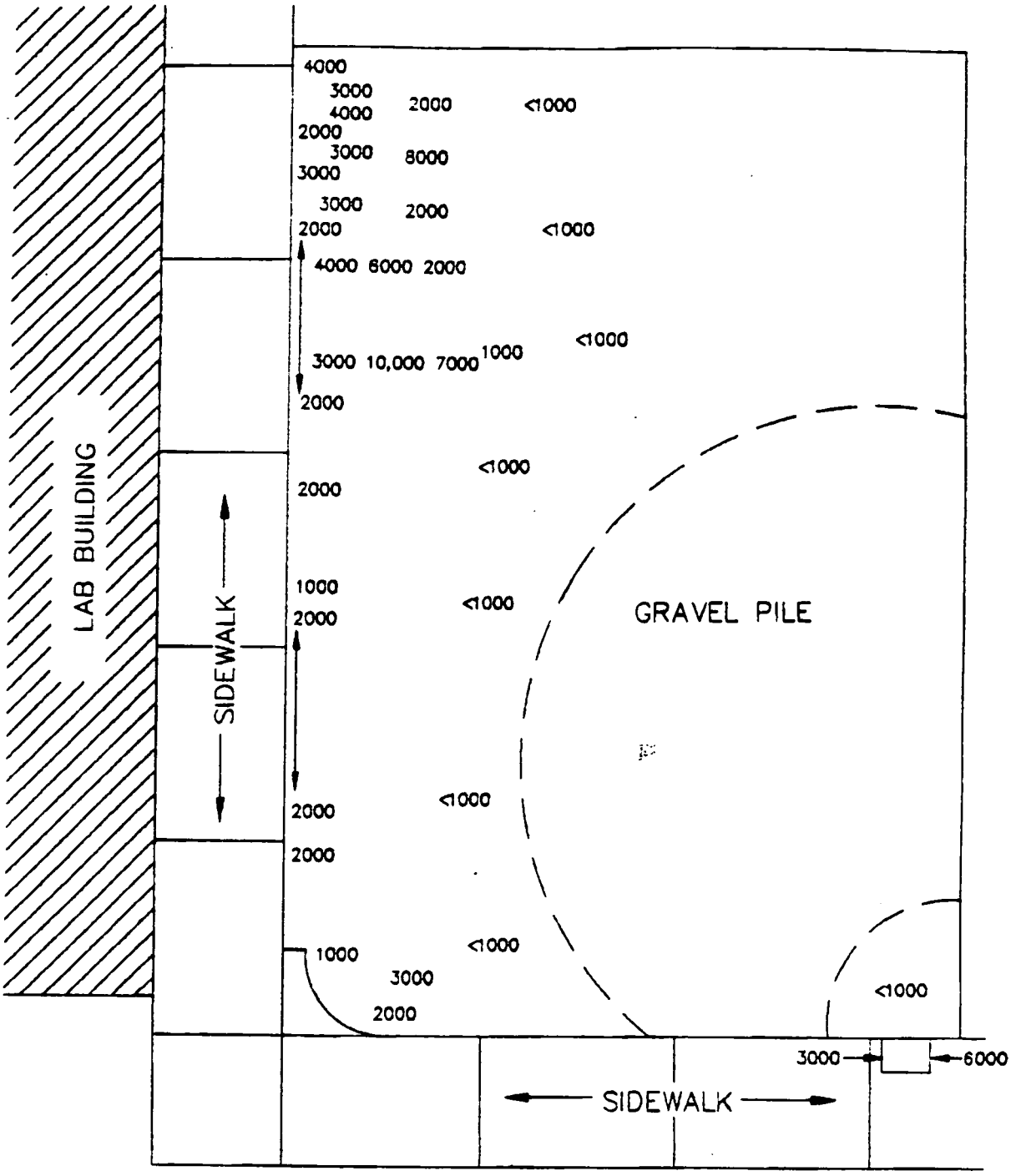
APPROPRIATENESS OF A RESPONSE

If a planning period of less than six months exists prior to initiation of a response action, DOE will issue an Action Memorandum. The Action Memorandum will describe the selected response and provide supporting documentation for the decision.

If it is determined that there is a planning period greater than six months before a response is initiated, DOE will issue an Engineering Evaluation/Cost Analysis (EE/CA) Approval Memorandum. This memorandum is to be used to document the threat of public health and the environment and to evaluate viable alternative response actions. It will also serve as a decision document to be included in the Administrative Record.

ATTACHMENT 1

EXCAVATION EAST OF LAB



NOTES: ALL READINGS IN DPM
BACKGROUND 180 DPM
FOUR SOIL SAMPLES TAKEN FROM EXCAVATION (DATA IN ATTACHMENT 2)

Attachment 2

Total Uranium and Analysis of Contaminated Soils East of Laboratory Building #15

	Sample Numbers			
Concentrations	009	010	011	012
Uranium, ppm	251	86	91	291
U-238, pCi/gm	167	57	61	194
U-234, pCi/gm	167	57	61	194
Thorium-232, ppm	22	<18	<18	18
Pu-238, pCi/gm	0.5	0.45	0.33	0.47
Pu-239 & 240, pCi/gm	0.26	<0.16	<0.18	0.29
Gross: Alpha, pCi/gm	180	35	65	190
Beta, pCi/gm	120	65	69	160
Gamma, pCi/gm*	3100	<39	<34	1900

* Sum of the Gamma Spectrum. Provides only a gross comparison.

Attachment 3

Unofficial Analytical Results:

Soils East of Laboratory Building # 15

	Sample Numbers			
	009	010	011	012
TOTAL METALS:	mg/kg	mg/kg	mg/kg	mg/kg
Arsenic	5.11	5.04	4.70	4.02
Barium	92.4	64.7	86.5	97.1
Cadmium	0.860	1.61	1.7	0.641
Chromium	19.4	16.6	17.0	18.7
Lead	40.9	54.8	31.3	43.5
Mercury	0.312	1.41	0.309	0.825
Selenium	<0.439	<0.43	<0.394	<0.427
Silver	1.22	<0.500	<0.394	<0.500
E.P. TOXICITY:	mg/l	mg/l	mg/l	mg/l
Arsenic	<0.100	<0.100	<0.100	<0.100
Barium	0.368	0.395	0.659	0.259
Cadmium	<0.005	0.019	0.006	<0.005
Chromium	<0.008	<0.008	<0.008	<0.008
Lead	<0.030	<0.030	0.034	<0.030
Mercury	<0.002	<0.002	<0.002	<0.002
Selenium	<0.010	<0.010	<0.010	<0.010
Silver	<0.005	<0.005	<0.005	<0.005

ATTACHMENT 4

979

From: S. G. Schneider

WMCO:R(SW):90-012

JAN 11 1990

Date: November 28, 1989

Subject: RADIOLOGICAL/RCRA CHARACTERIZATION OF THE NORTH LAB EXPANSION, PHASE 1, PROJECT 0087502-1.1.4.1.03

To : J. R. Hughes

REFERENCE: Feed Materials Production Center Site Procedure, FMPC-720, "Control of Construction Waste," issued November 10, 1988.

This memo provides radiological characterization and RCRA determination for the north lab expansion in the vicinity of Building 15 (Reference Attachment 1 for site location). Laboratory samples were obtained concurrently with the structural soil borings. Each sample was analyzed at one-foot intervals for total uranium activity and EP toxicity. A second set of samples were obtained in a related project; the Old Argon Facility, and the analysis results are incorporated into this report. The results were reviewed for radiological activity by WMCO Procedure, FMPC-720 (Reference 1) and EP toxicity by 40 C.F.R. 261.

RADIOLOGICAL CHARACTERIZATION

The radiological results for total uranium are summarized in Table I (Attachment 2) and are depicted in a depth profile drawing listed in Figure 2 (Attachment 3). Field radiological monitoring for specific activity will be the final determinative factor for classification of the soil.

The results are variant and are summarized as follows:

1. Samples A1 & A2: The first 12 inches of soil exceed or are near the limits of 100 pCi/g for Category II materials. This should be considered as a low level radioactive waste and must be boxed for disposal.

   The values for samples between one foot and three feet appear to exceed Category I values, and thus, can be used as backfill in the controlled area, but not as uncontrolled fill.

   The soil in depth of greater than three feet can be considered as non-radioactively contaminated soil.

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2. Sample A3: The entire sample profile appears to be below the maximum limit for Category I soil. This may be considered as non-radioactively contaminated soil.

3. Samples A4, A5, A6: The first 12 to 18 inches of soil exceed the guideline values as established by procedure for Category II soil and should be considered for disposal. The remaining sample should be considered as a borderline Category I waste.

4. Samples A7, A8: The top 6 to 12 inches of soil should be considered as being contaminated in excess of Category II values and should be disposed of as a low level waste. The samples in the depth of one foot to three feet, appear to exceed Category I but are less than Category II and could be used for backfill in the process area.

5. Argon Pad Samples: The pad Samples S1 through S4 confirm that the surface soil in the area of Borings A7 and A8 are excessively contaminated above Category II materials and must be disposed of as a low level waste. The composite Samples ESP-A and B also indicate that the contamination is not localized at the surface and extends into the lower depths of soil.

As indicated above, the results are not uniform; however, they provide a general indication of the areal radiological categorization. As such, the final radiological contamination determinations should be made with the use of field measurement during excavation to assist in defining the categorical boundaries identified above.

RCRA CHARACTERIZATION

The boring samples taken were evaluation for hazard characteristics by EP toxicity methods (40 C.F.R. 261) as depicted by Table II (Attachment 3). All values are below levels as stated by EPA regulation and thus do not pose a problem for this project.

CONCLUSION

Based upon the information discussed above, it appears that the soil is not a RCRA hazardous waste but is radiologically contaminated. The management of excavated soil should be conducted in accordance with the discussion contained in the Radiological Characterization section of this letter.

S. G. Schneider, Manager
Solid Waste Compliance

PT:gs

Attachments (4)

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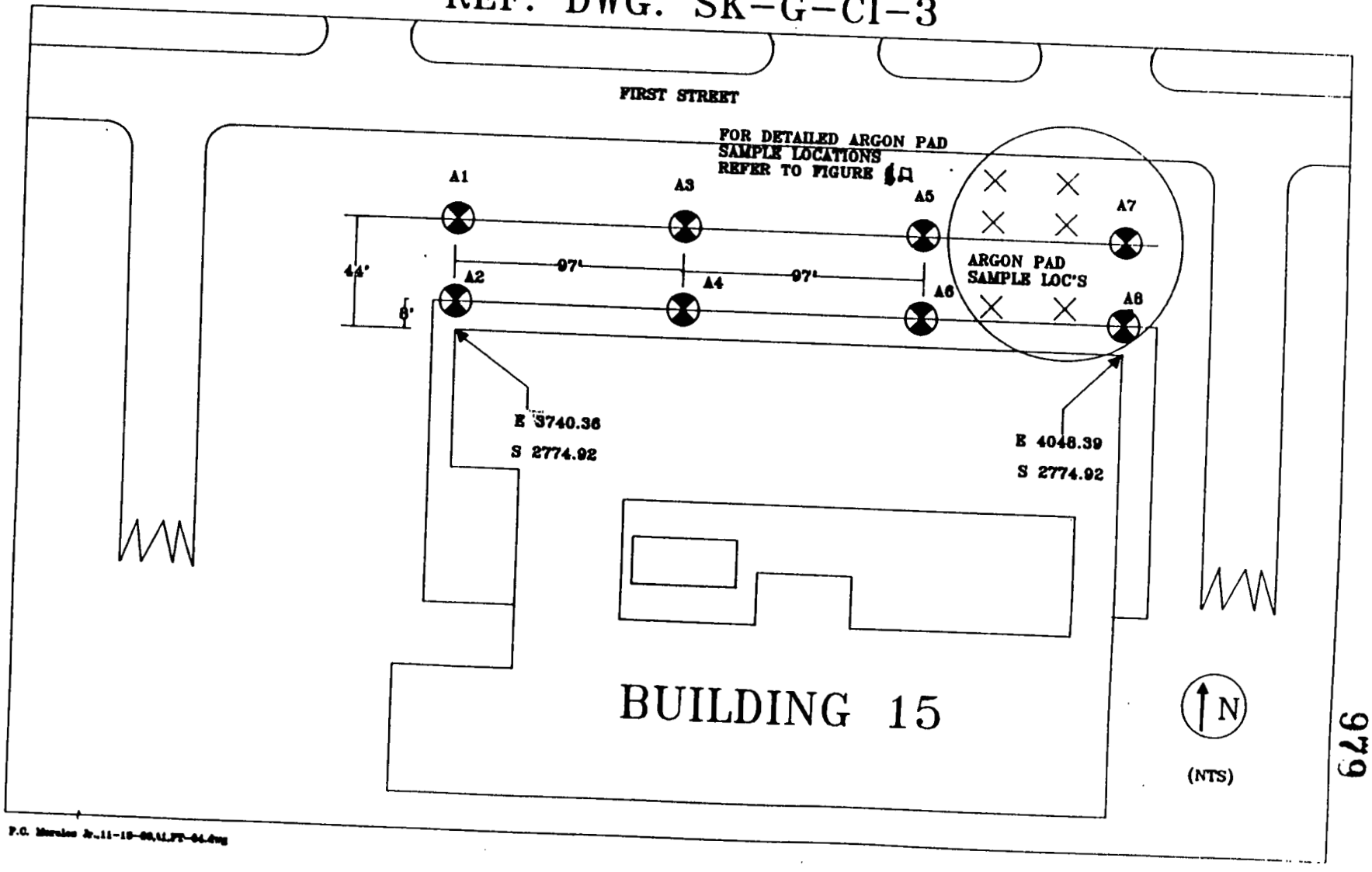
cc: S. L. Bradley, J. E. Clements, S. M. Ferguson, M. J. Galper, J. A. Grumski, J. T. Grumski, S. C. Hoskins, T. A. Poff, R. J. Skalka, J. L. Trujillo, P. C. Weddle, W. A. Weinreich, Central Files, SWC File

FIGURE 1
SAMPLING PLAN LOCATION
NORTH LAB ADDITION
WMCO PROJECT NO. 00-87502
REF. DWG. SK-G-CI-3



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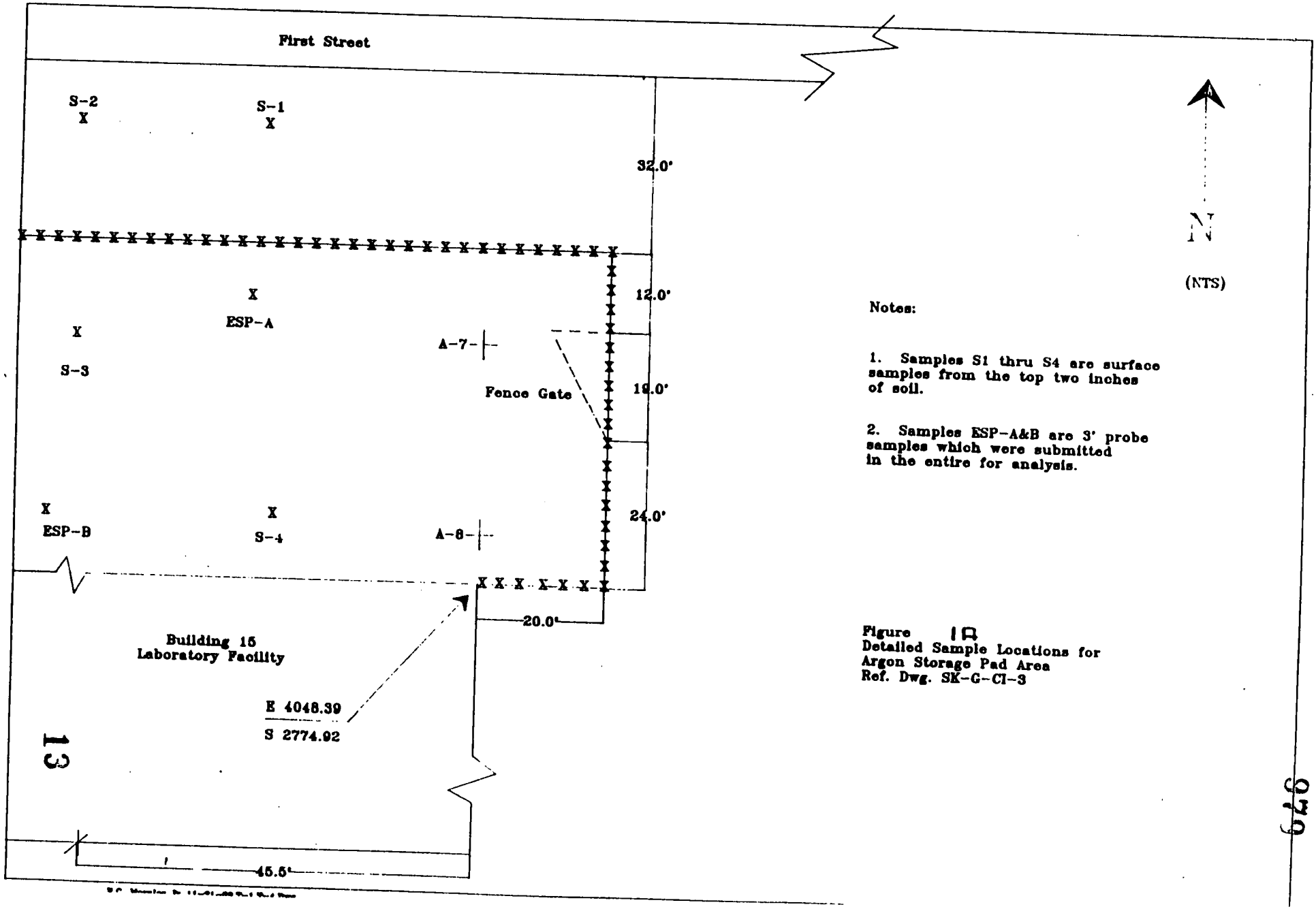


Notes:

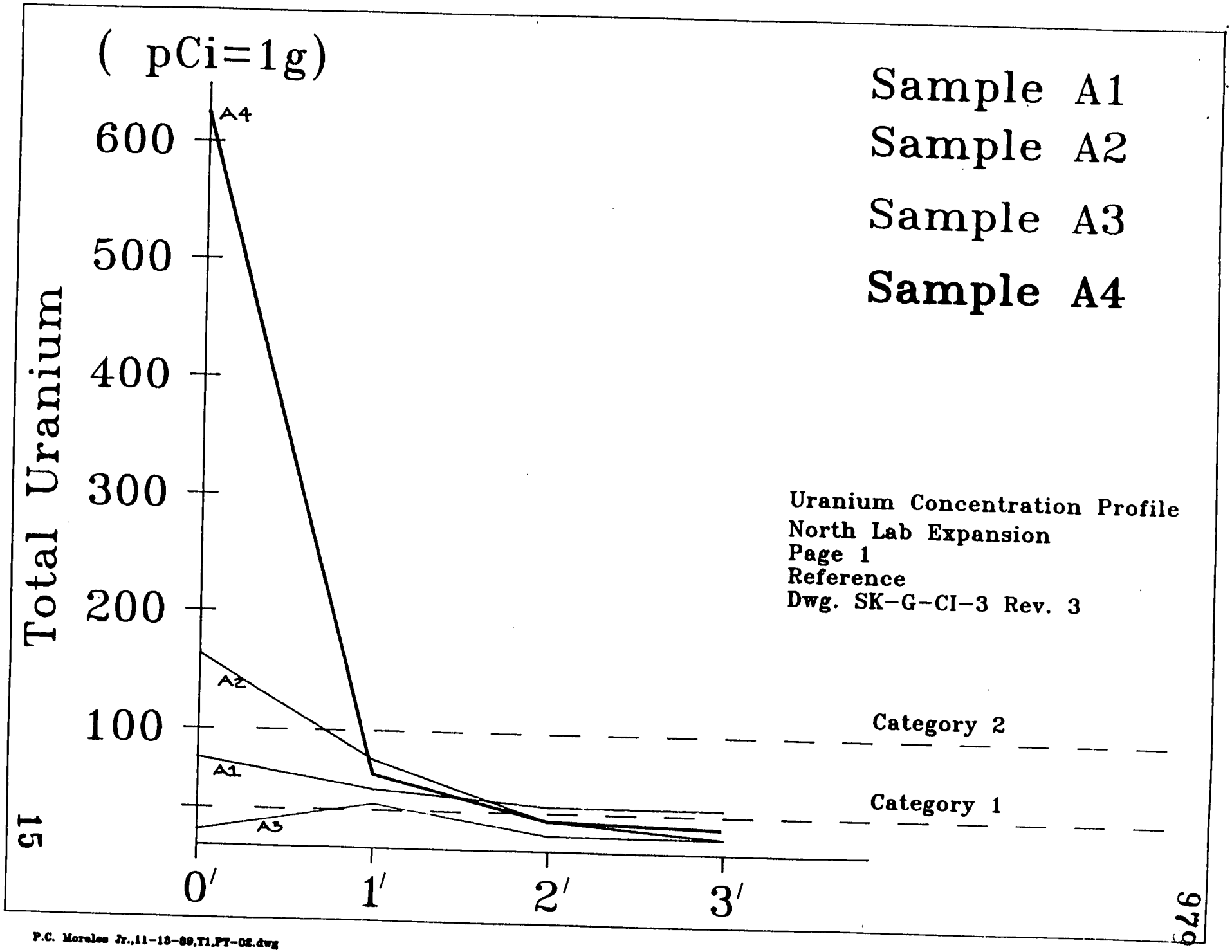
1. Samples S1 thru S4 are surface samples from the top two inches of soil.

2. Samples ESP-A&B are 3' probe samples which were submitted in the entire for analysis.

Figure 1B
Detailed Sample Locations for
Argon Storage Pad Area
Ref. Dwg. SK-G-CI-3

TABLE I
URANIUM ANALYSIS
NORTH LAB EXPANSION

SAMPLE NUMBER	TOTAL URANIUM (pCi/g)	SAMPLE NUMBER	TOTAL URANIUM (pCi/g)
A1-0'	85.3	A5-0'	251.2
A1-1'	48.7	A5-1'	145.6
A1-2'	32.8	A5-2'	41.3
A1-3'	31.1	A5-3'	14.9
A2-0'	166.5	A6-0'	407.6
A2-1'	73.8	A6-1'	59.6
A2-2'	25.7	A6-2'	16.2
A2-3'	4.7	A6-3'	3.4
A3-0'	21.0	A7-0'	146.9
A3-1'	33.2	A7-1'	54.8
A3-2'	12.2	A7-2'	65.7
A3-3'	7.4	A7-3'	15.6
A4-0'	647.2	A8-0'	462.4
A4-1'	63.6	A8-1'	51.4
A4-2'	24.4	A8-2'	35.2
A4-3'	6.1	A8-3'	40.6
S-1	1128.6	ESP-A	53.5
S-2	1499.6	ESP-B	44.7
S-3	264.0	-	-
S-4	148.3	-	-



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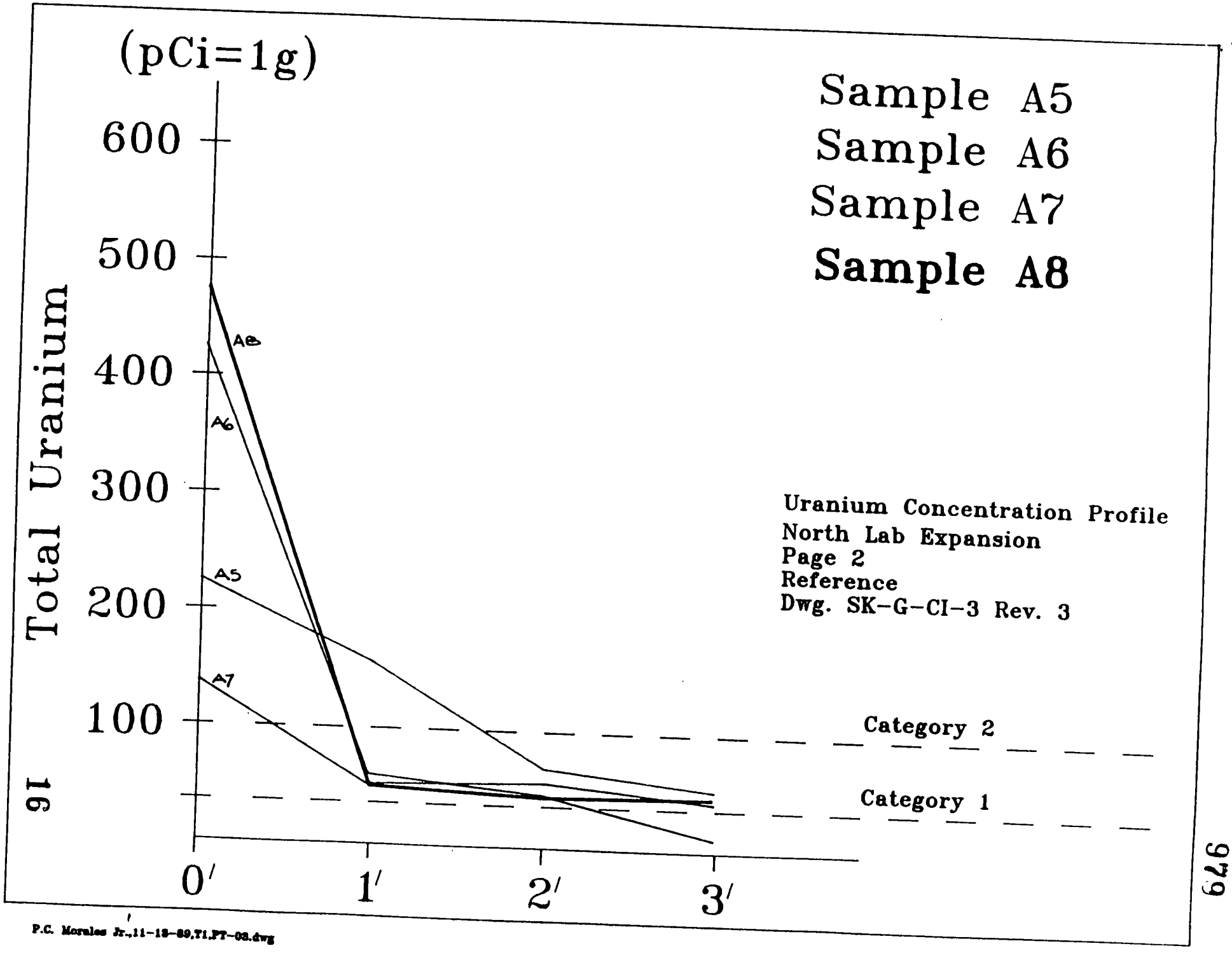

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TABLE II
RCRA TOXICITY ANALYSIS
NORTH LAB EXPANSION

SAMPLE NUMBER	As (mg/l)	Ag (mg/l)	Cd (mg/l)	Cr (mg/l)	Ba (mg/l)	Hg (mg/l)	Pb (mg/l)	Se (mg/l)
A5-0'	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1
A5-1'	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1
A5-2'	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1
A5-3'	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1
A6-0'	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1
A6-1'	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1
A6-2'	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1
A6-3'	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1
A7-0'	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1
A7-1'	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1
A7-2'	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1
A7-3'	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1
A8-0'	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1
A8-1'	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1
A8-2'	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1
A8-3'	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1

TABLE II
RCRA TOXICITY ANALYSIS
NORTH LAB EXPANSION

SAMPLE NUMBER	As (mg/l)	Ag (mg/l)	Cd (mg/l)	Cr (mg/l)	Ba (mg/l)	Hg (mg/l)	Pb (mg/l)	Se (mg/l)
ESP-A	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1
ESP-B	<1.0	<1.0	<0.2	<1.0	<25	<0.1	<1.0	<0.1

ATTACHMENT 5

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FMPC

OPERATIONS SAFETY & HEALTH - RADIOLOGICAL SAFETY

RADIOLOGICAL SURVEY REPORT

Date: 4-9-90	LOCATION: EXCAVATION EAST OF LAB	RST: D T Rich	Page 1 of 2
Time: 1300	LEVEL:		

REASON FOR SURVEY: ☐ ROUTINE ☒ SPECIAL REQUEST ☐ RWP ☐ INCIDENT

COMMENTS:

DIRECT FRISK OF EXCAVATION EAST OF LAB IN ZONE I AREA

ALL AREAS <1000 dpm DIRECT FRISK ALPHA

ALL MAP READINGS ARE IN DPM

FOLLOW-UP SURVEY ATTACHED ☐ YES ☒ NO

SURVEY MAP ATTACHED ☒ YES ☐ NO

INSTRUMENTS

MODEL	SERIAL NUMBER	CALIBRATION DATE	BKRD.	E
~~A321P~~	A321P	7-90	180	1[illegible]
BIC	A314P	8-90	–	10[illegible]

ANALYZE FOR: ☒ ALPHA ☒ BETA-GAMMA ☐ OTHER

TYPE OF SURVEY: ☒ CONTAMINATION ☐ RADIATION ☐ OTHER

ITEM NUMBER	GRID COORDINATES	DESCRIPTION	CORRECTED DOSE RATE (mRem/hr) γ CONTACT	β/γ CONTACT	γ 3 FT.	β/γ 3 FT.	DPM ALPHA 100 CM²	DPM ALPHA PROBE	DPM BETA-GAM 100 CM²	DPM BETA-GAM PR

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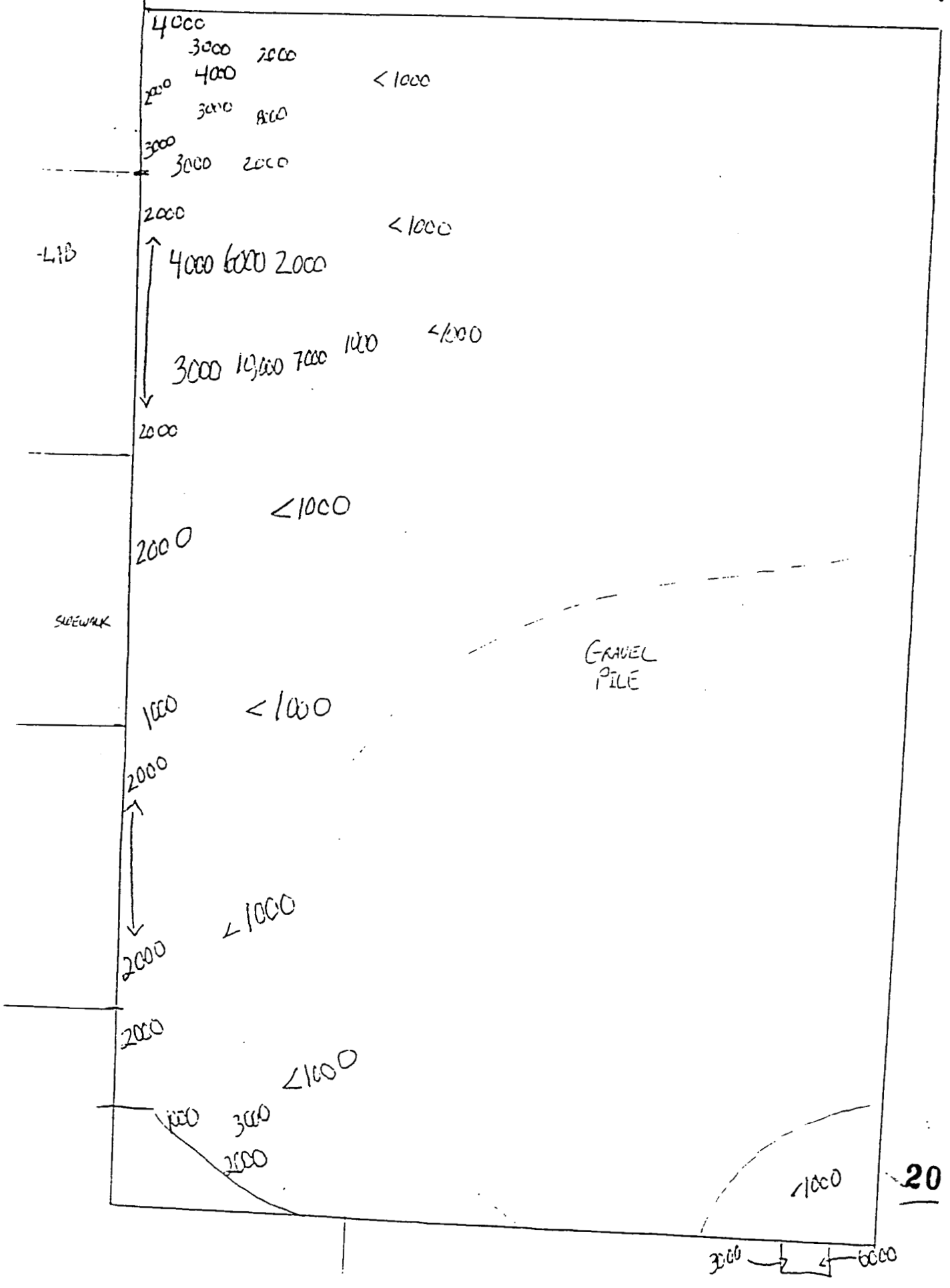
NO.	DISTRIBUTION OF COPIES
1	Radiological Safety Technician Supervisor
2	Radiological Safety Engineer
3	Facility Supervisor

NOTIFICATION OF SURVEY RESULTS

SUPERVISOR NOTIFIED	TIME	DATE	NOTIFIED BY	REVIEWED BY	DATE

FMPC-OS&H-1993-1 (REV. 11/4/88)

ATTACHMENT 5