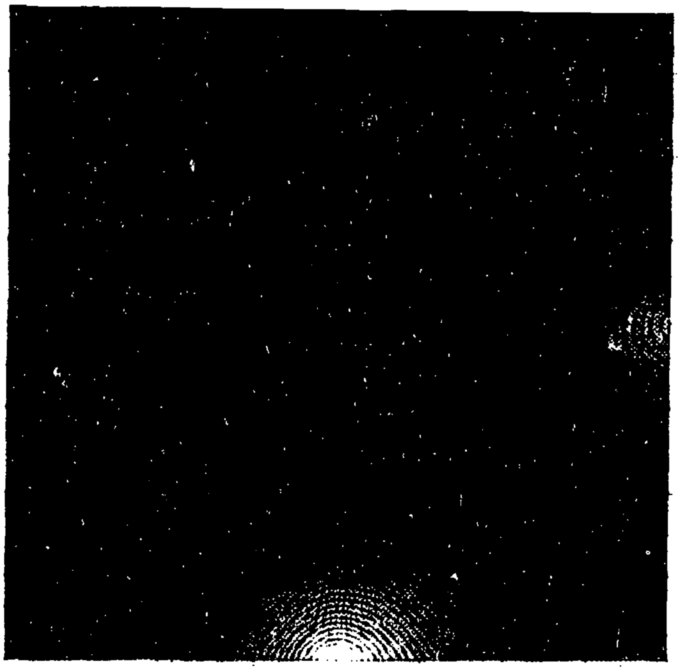
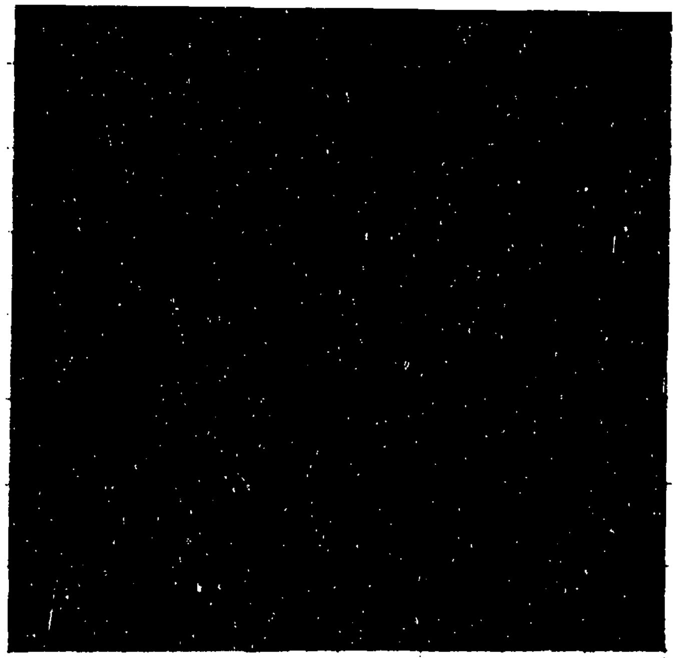
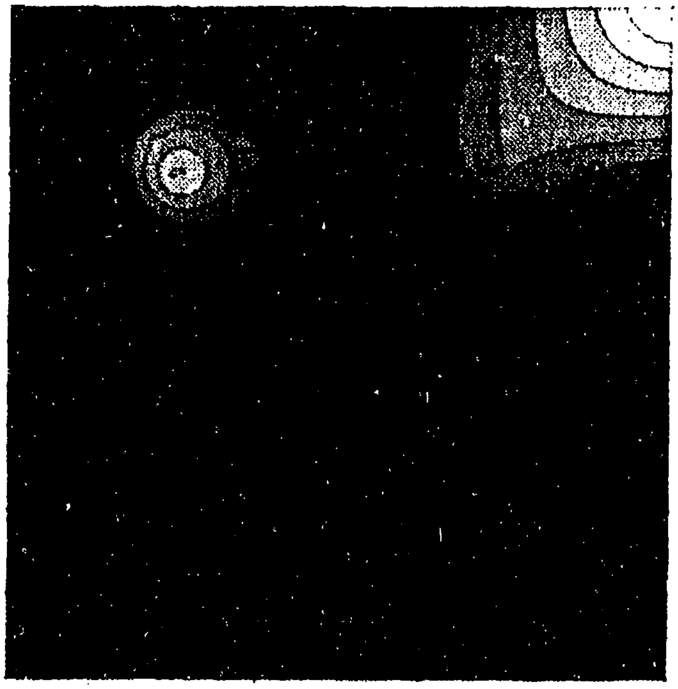
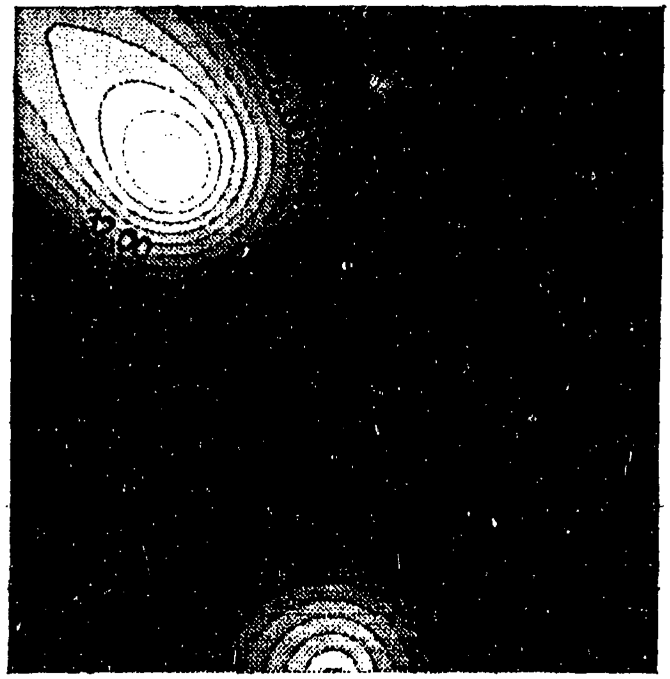




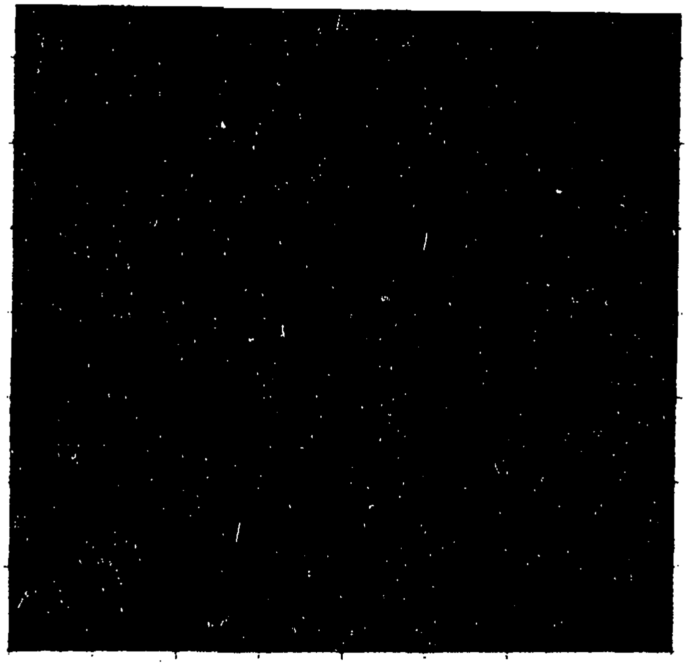
GRID# 0055, 20S70E

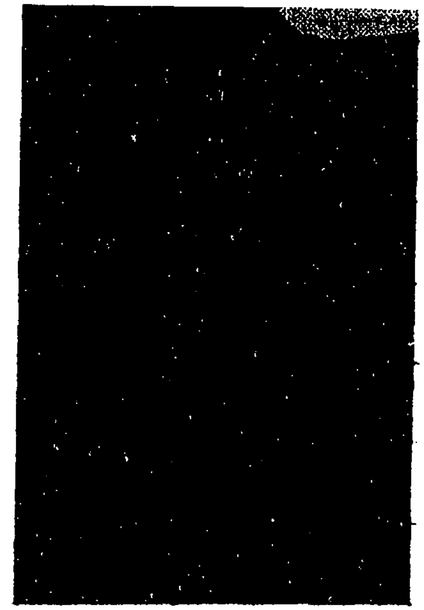
GRID# 0056, 40S 50E



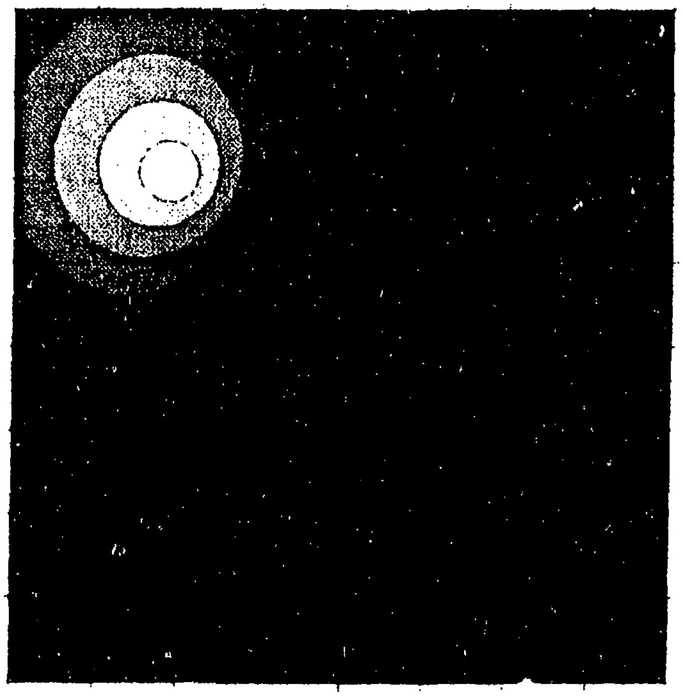


Plots are labled in pCi/g and gradation is every 2 pCi/g

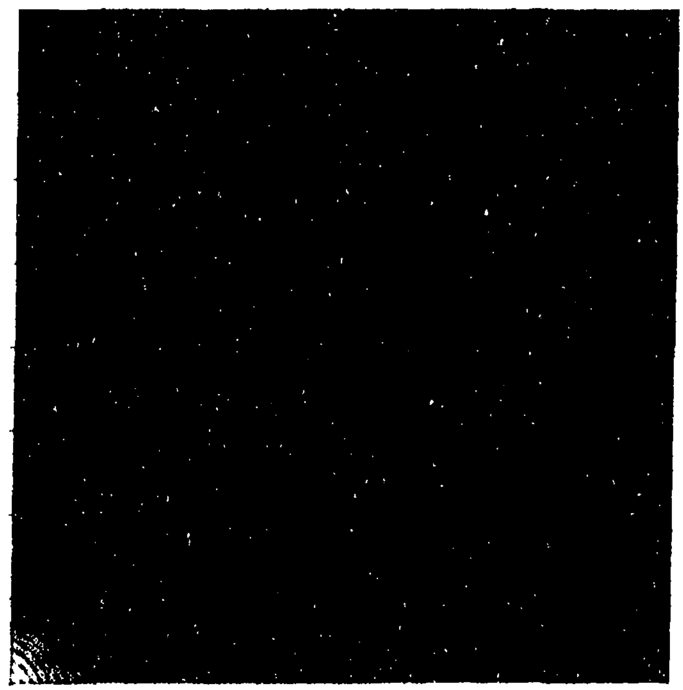




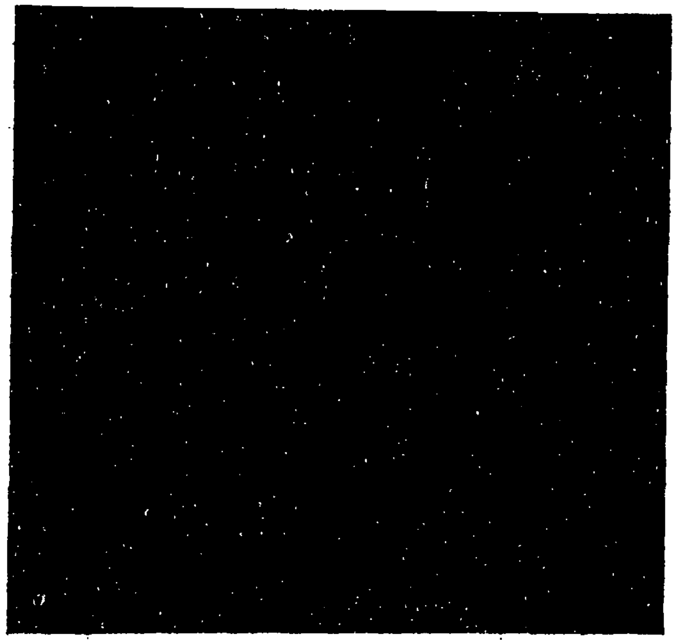
GRID# 0059, 80S40E



GRID# 0060, 70S 40E



Plots are labled in pCi/g and gradation is every 2 pCi/g



GRID# 0063, 40S 40E

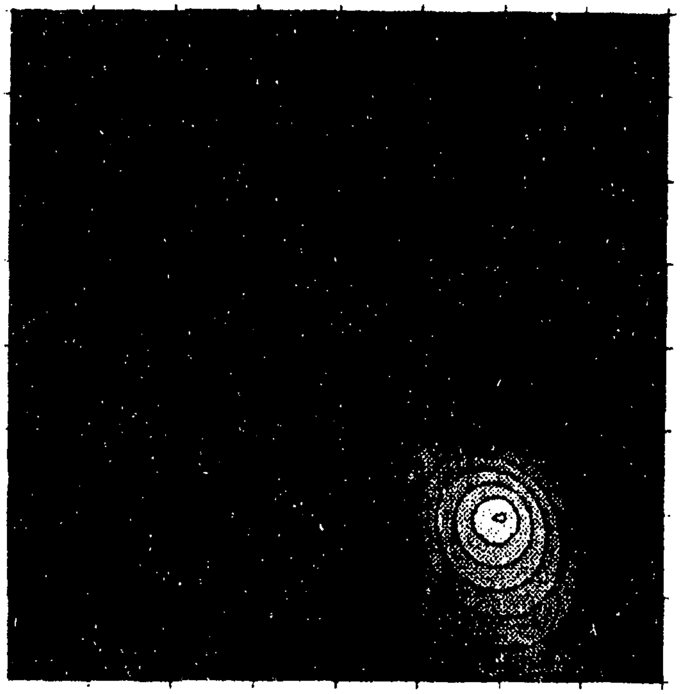
GRID# 0064, 30S 40E

Plots are labled in pCi/g and gradation is every 2 pCi/g

[redacted]

NORTH

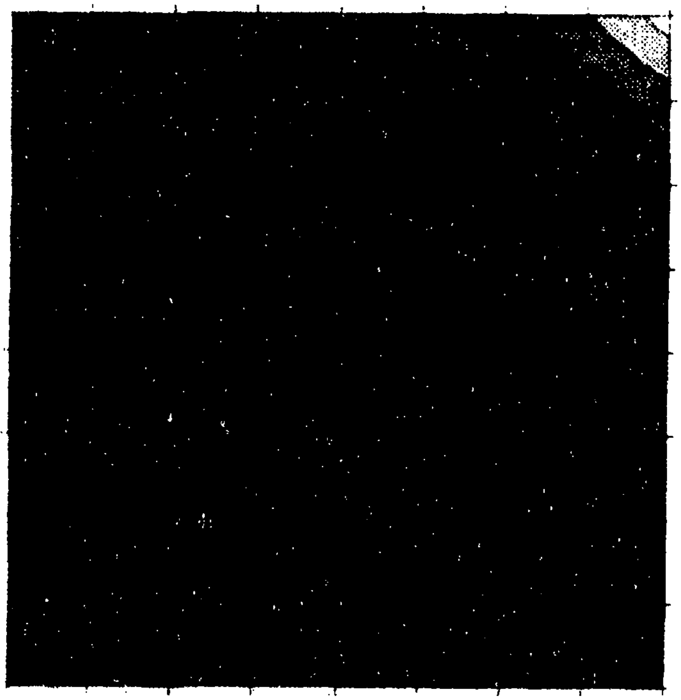
GRID# 0065, 70S 30E



GRID# 0066, 60S 30E

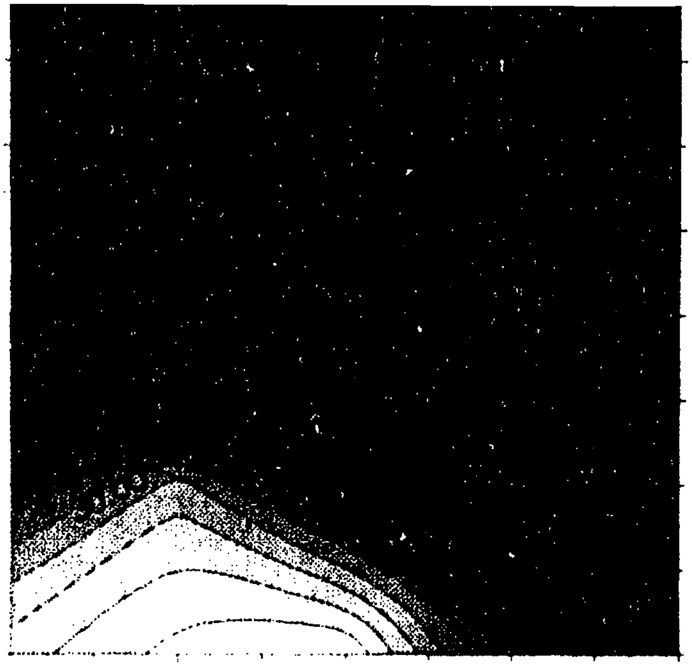
All Samples In This Grid
Were < or = to 1 pCi/g

GRID# 0067, 50S 30E



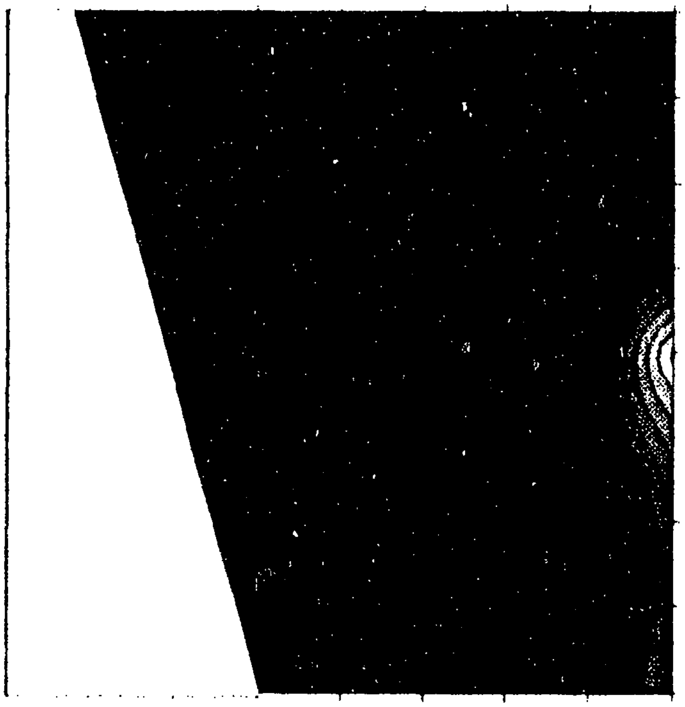
GRID# 0068, 30S 30E

Plots are labled in pCi/g and gradation is every 2 pCi/g



No Floor Check Samples Taken

GRID# 0071, 60S 20E

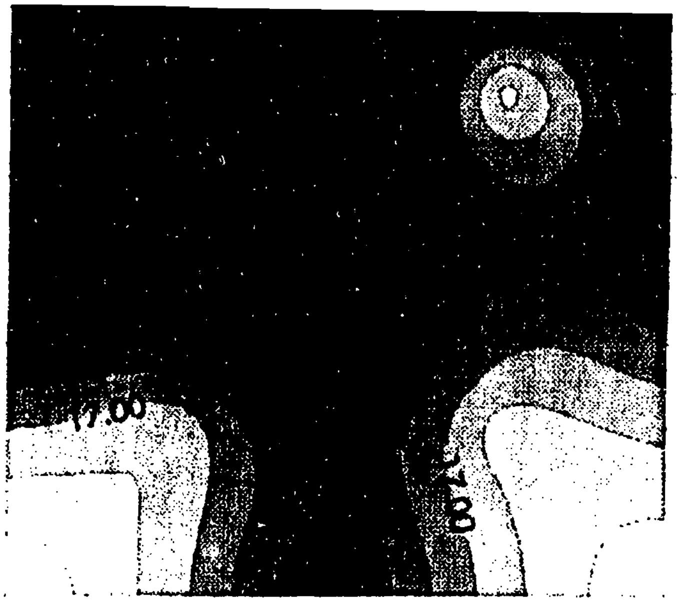


GRID# 0072, 50S 20E

Plots are labled in pCi/g and gradation is every 2 pCi/g

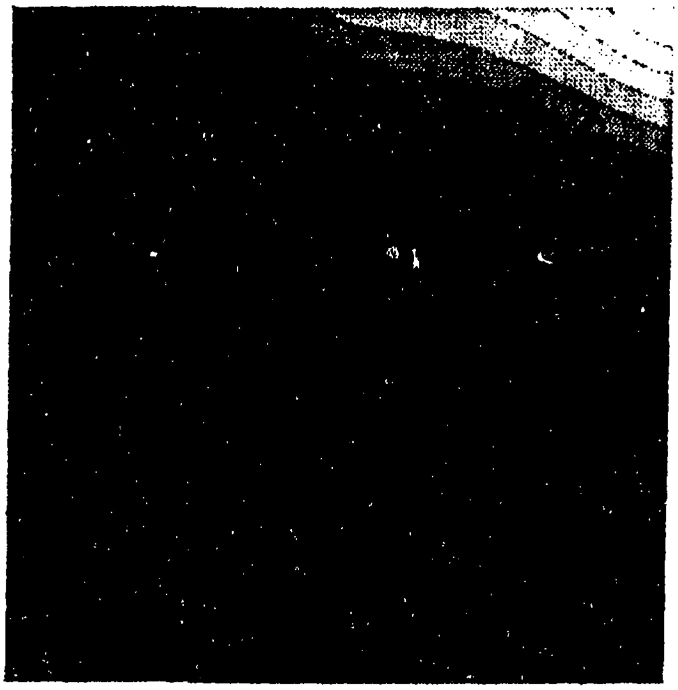
[redacted]

Table 1: Building 17 Hillside

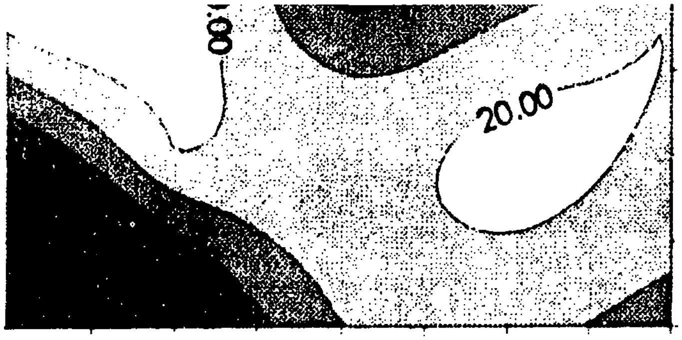


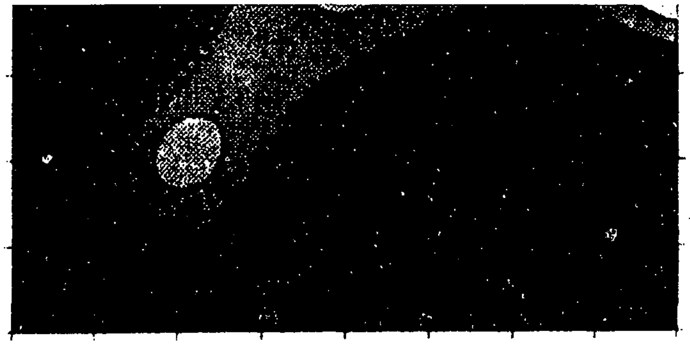
GRID# 0075, 20S 10E

GRID# 0076, 20S 0E

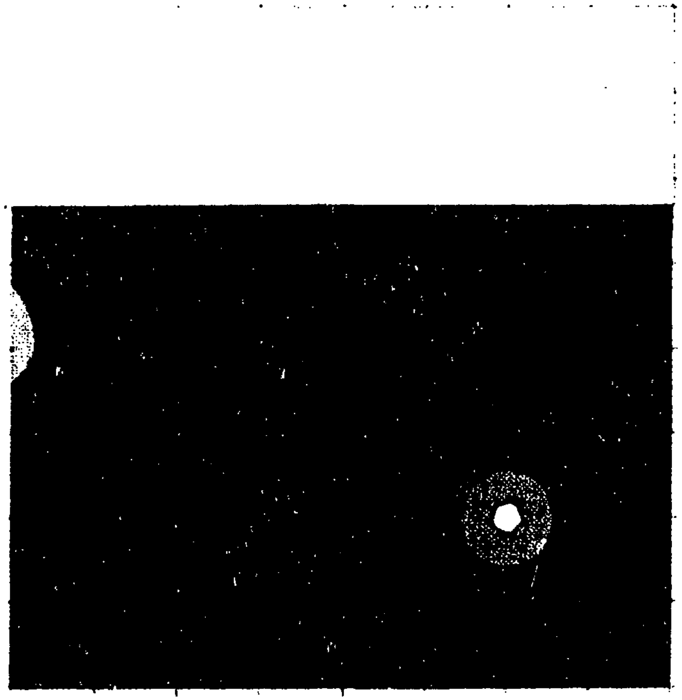


Plots are labled in pCi/g and gradation is every 2 pCi/g

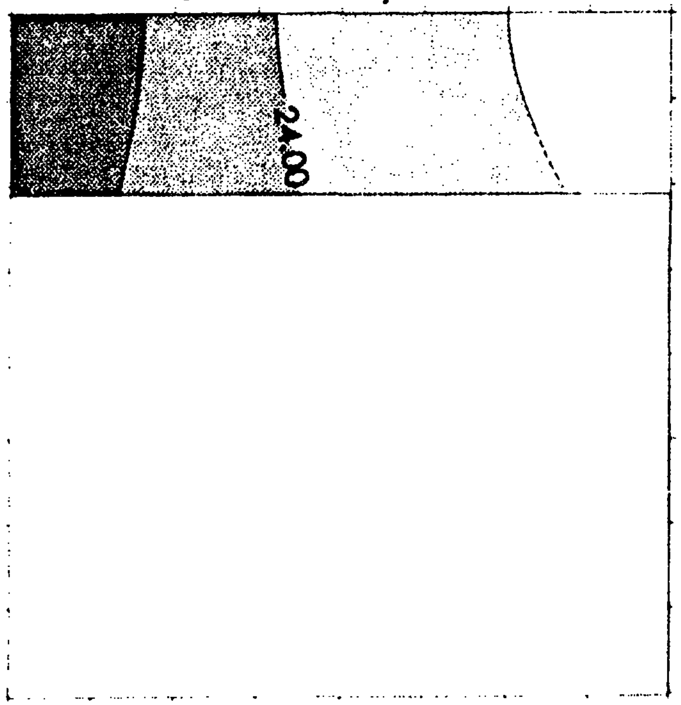




GRID# 0079, 130S 130E



GRID# 0080, 60S 80E



Plots are labled in pCi/g and gradation is every 2 pCi/g

POST REMEDIATION
URANIUM CONTAMINATION CONCENTRATION CONTOUR PLOT

NORTH

GRID# 0081, 70N 140E

No Floor Check Samples Taken

GRID# 0082, 70N 150E

No Floor Check Samples Taken

GRID# 0083, 70N 160E

No Floor Check Samples Taken

GRID# 0084, 80N 170E

No Floor Check Samples Taken

Plots are labled in pCi/g and gradation is every 2 pCi/g

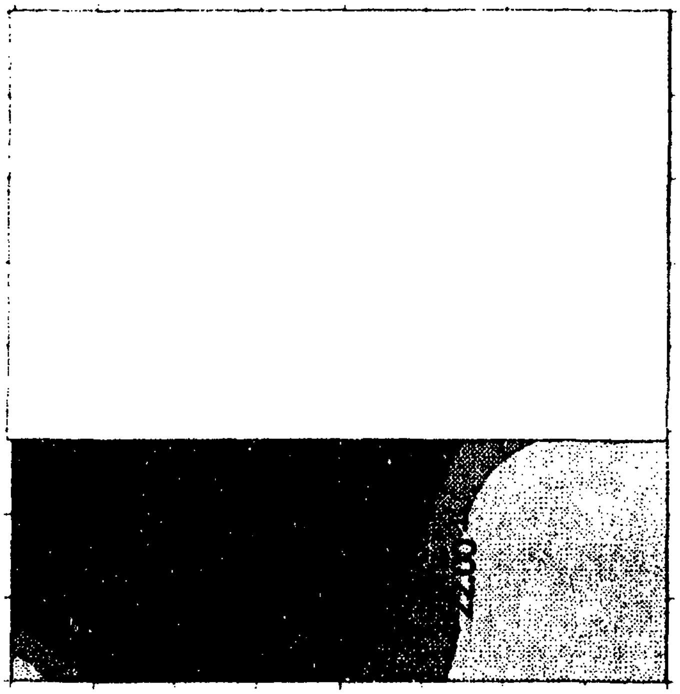
POST REMEDIATION
URANIUM CONTAMINATION CONCENTRATION CONTOUR PLOT

NORTH

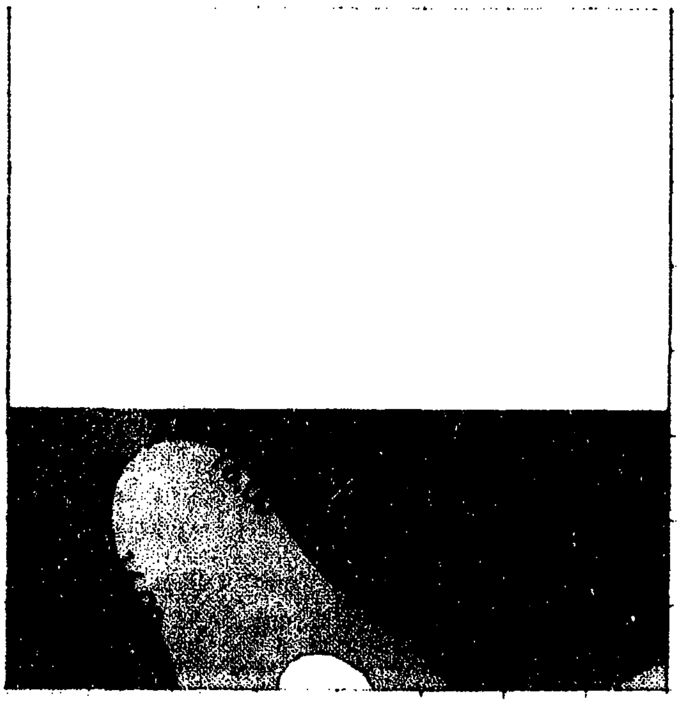
GRID# 0085, 10S 80E

No Floor Check Samples Taken

GRID# 0086, 20S 120E



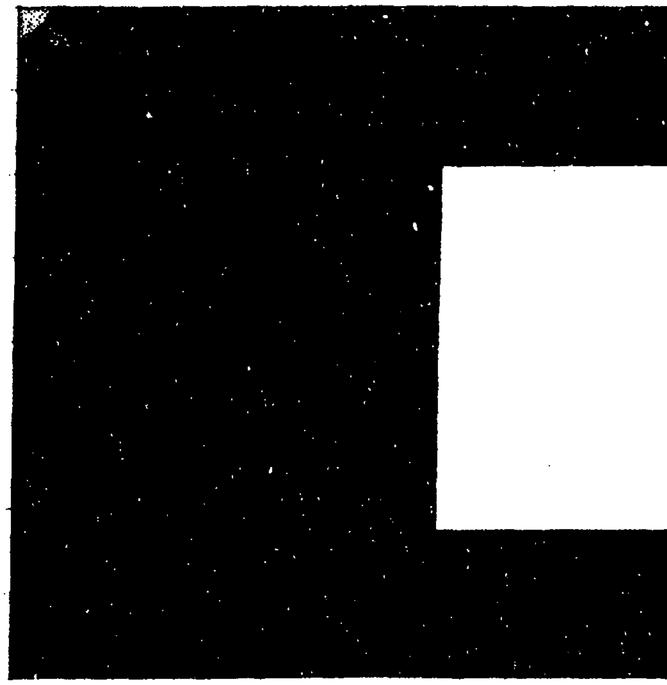
GRID# 0087, 20S 130E



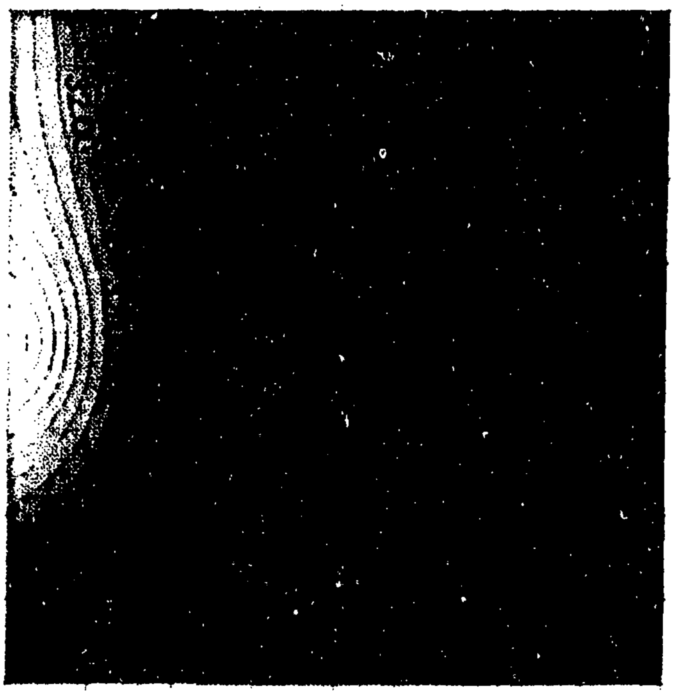
GRID# 0088, 20S 140E

No Floor Check Samples Taken

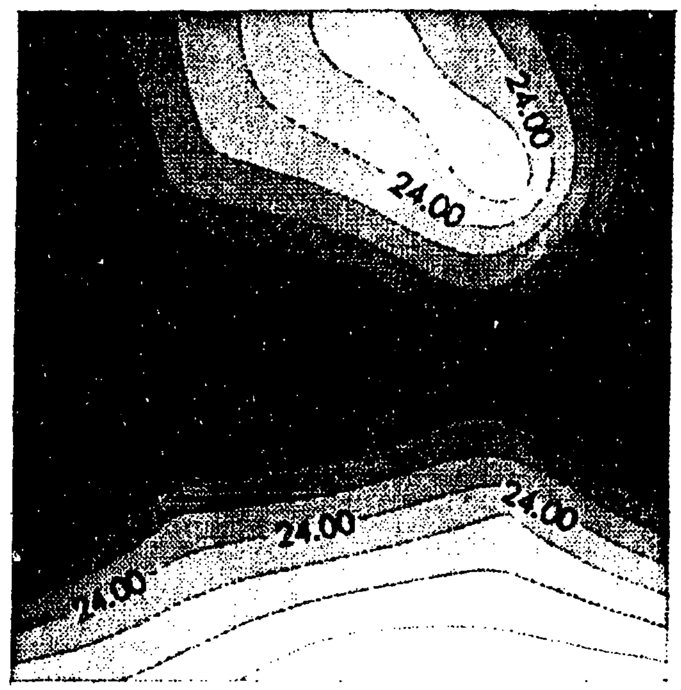
Plots are labled in pCi/g and gradation is every 2 pCi/g



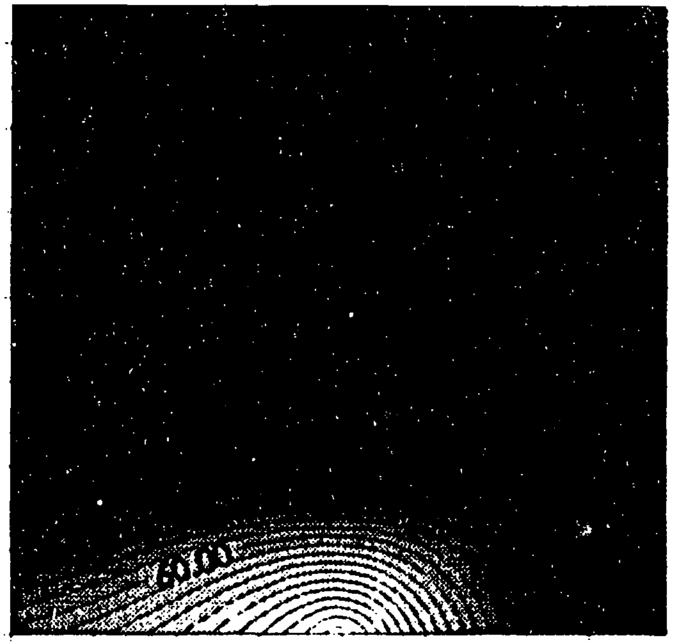
GRID# 0091, 40S 120E



GRID# 0092, 40S 130E



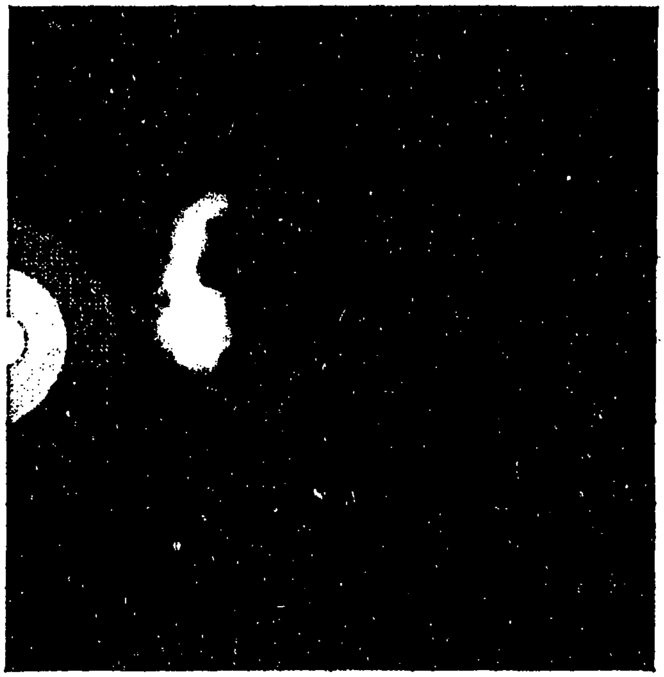
Plots are labled in pCi/g and gradation is every 2 pCi/g



GRID# 0095, 10S 70E

GRID# 0096, 40S 30E

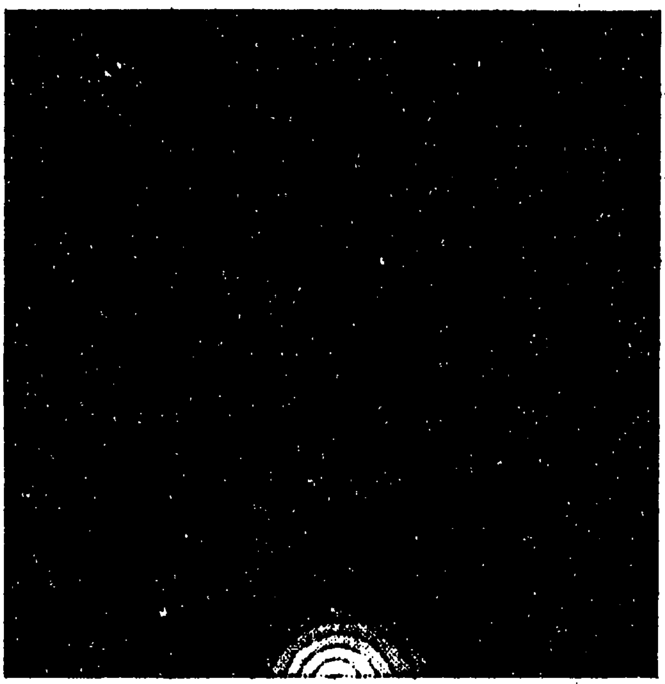
No Floor Check Samples Taken



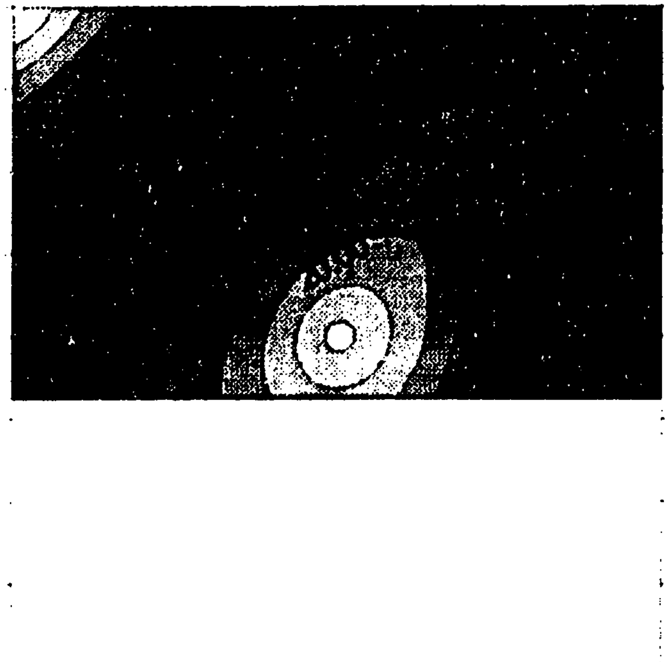
Plots are labled in pCi/g and gradation is every 2 pCi/g

[redacted]

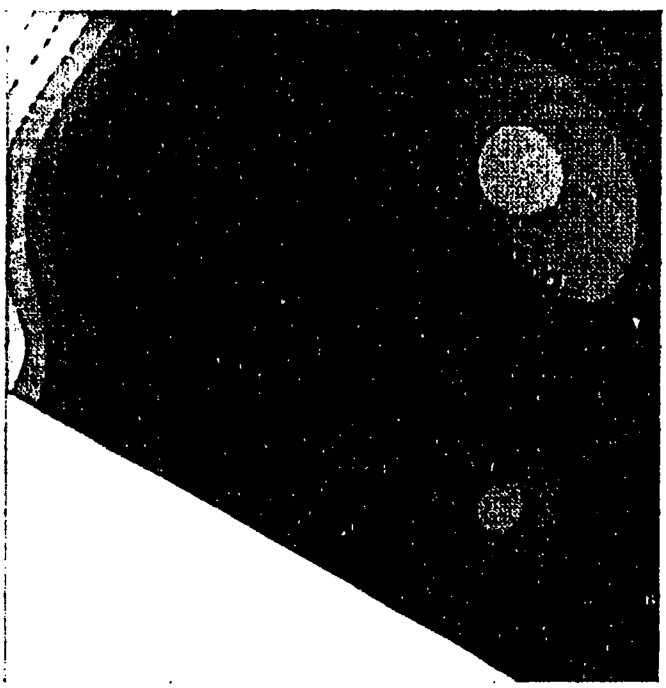
GRID# 0097, 40S 20E



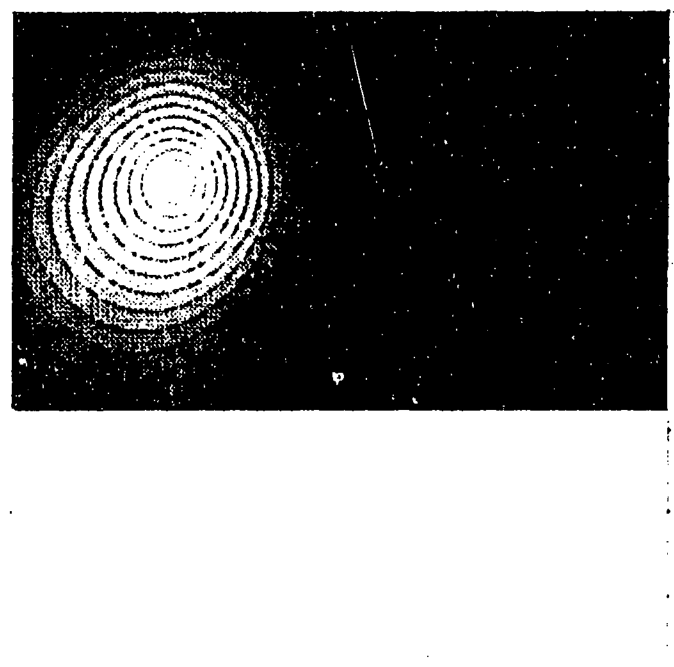
GRID# 0098, 50S 120E



GRID# 0099, 40S 140E



GRID# 0100, 50S 140E

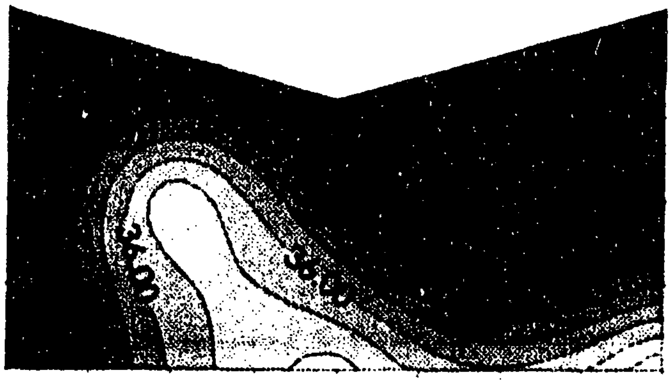


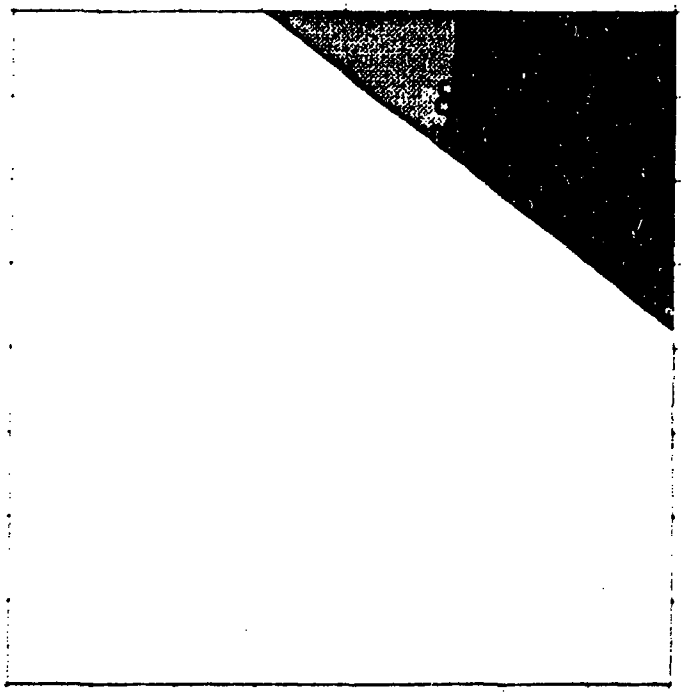
Plots are labled in pCi/g and gradation is every 2 pCi/g

No Floor Check Samples Taken

GRID# 0103, 20S 40E

GRID# 0104, 70S 20E





POST REMEDIATION
URANIUM CONTAMINATION CONCENTRATION CONTOUR PLOT

NORTH

GRID# 0105, 40S 10E

2 Check Samples Collected
Insufficient to Plot

Plots are labled in pCi/g and gradation is every 2 pCi/g

TEXAS INSTRUMENTS INCORPORATED

Attleboro, Massachusetts

Remediation of Building 10 Laboratory Wing Area (Exterior)

NRC License/Docket No: SNM-23/70-33

Final Report

Version 1.0

Prepared by

CPS Environmental, Inc.
June 1996

Remediation of Building 10 Laboratory Wing Area (Exterior)

Description

This report describes the remediation activities of an area described as the laboratory wing area of Building 10 at the Texas Instruments Incorporated Attleboro Site under USNRC License number SNM-23. The principal contaminate identified at this site was uranium from the former fuel fabrication activities at this site. The decommissioning criteria as established within the site remediation plan is 30 pCi/g total uranium. The Building 10 Laboratory Wing Area is described in detail within the documents entitled "Supplement to the 1992 Remediation Plan" and "Radiological Surveys of Open Land Areas." (Ref. 1,2)

Characterization

Radiological surveys conduced within this area include walk over scans, static measurements, and sub surface soil samples. The subsurface soil samples identified an area of contamination of approximately 120 m^2 extending in depth to approximately 0.6 m. This area is located at the grid coordinates 140-152N x 120- 130E as defined on reference map CPS-TI-0106H and CPS-TI-0106A. The subsurface contamination identified at this location had a maximum value of 122 pCi/g at 150N x 120 E (0-2' depth) with a Grid Cell Average of 32 pCi/g total uranium. The results of these radiological surveys are presented in detail within the report entitled "Radiological Surveys of Open Land Areas." (Ref. 2)

Excavation

Remediation of this area was conducted concurrently with the remediation activities of the "Metals Recovery Area". (Ref. 3) The methodology used in the performance of remediation activities was in accordance with the requirements put forth in the "Supplement to the 1992 Remediation Plan". Total volume excavated was 38.2 m^3 (1350 ft^3) (Ref. 4) and was dispositioned along with material from the metals recovery area.

Final Status Survey

Final Status surveys were conducted in the manner specified within the "Supplement to the 1992 Remediation Plan", and included surface soil samples from the floor of the excavation, walk over scans of the floor of excavation, and subsurface soil samples in adjoining grids.

All samples and measurements demonstrated results less than the criteria Soil sample results were obtained using the gross alpha counting technique as described within reference 1, 2, and 3 The survey data is presented within the attached tables and figures as follows Table 1, "Building 10 Laboratory Wing Excavation Floor Soil Sample Locations and Grid Cell Averages", Figure 1, "Building 10 Laboratory Wing Excavation Floor Soil Sample Locations", and Figure 2, "Building 10 Laboratory Wing Excavation Floor Grid Cell Averages" In addition, "D" size drawings are provided of Figure 1 and 2 as CPS-TI-0106I and CPS-TI-0106J respectively

References:

1. *Supplement to the 1992 Remediation Plan,* Texas Instruments Incorporated, December 1994

2. *Radiological Surveys of Open Land Areas,* CPS Environmental Inc , January 1995

3. *Remediation of the Metals Recovery Area,* Final Report, CPS Environmental, Inc , September 1995

4. Communication with E Otis Dyer to Mark A Griffon Regarding Excavation Volume Estimates, June 4, 1996

Table 1: Building 10 Laboratory Wing
Excavation Floor Soil Sample Locations and Grid Cell Averages

GRID LOCATION	SAMPLE LOCATION	SAMPLE ID	SAMPLE RESULTS
160Nx120E	150Nx121E	F10-3	2
	150Nx123E	F10-6	19
	150Nx126E	F10-9	2
		AVERAGE	7.666666667
150Nx120E	150Nx121E	F10-3	2
	150Nx123E	F10-6	19
	150Nx126E	F10-9	2
	144Nx123E	F10-1	2
	147Nx121E	F10-2	21
	144Nx123E	F10-4	27
	147Nx123E	F10-5	17
	144Nx126E	F10-7	29
	147Nx126E	F10-8	24
		AVERAGE	15.88888889

Figure 1
Building 10 Laboratory Wing : Excavation Floor Soil Sample Locations

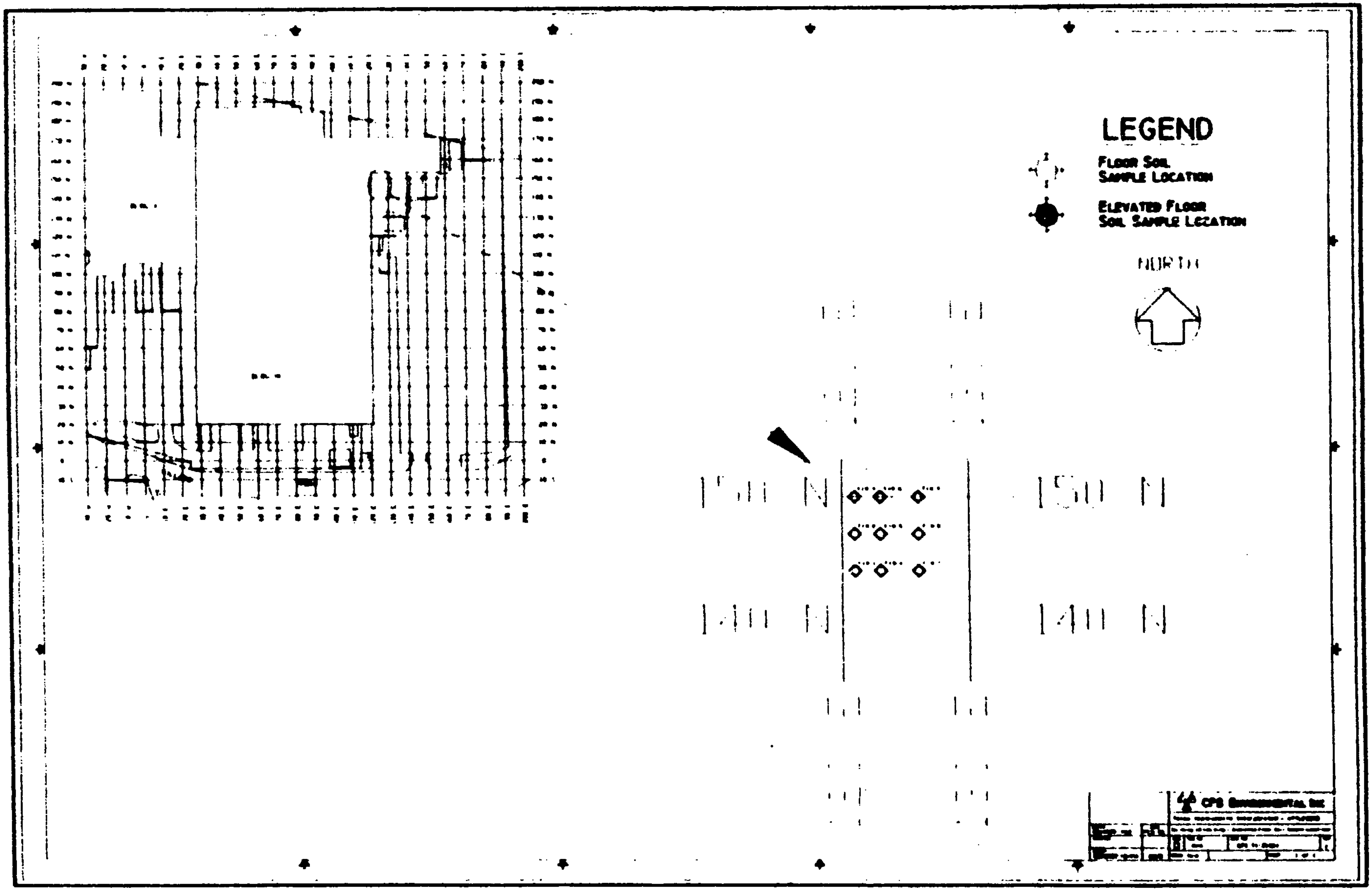
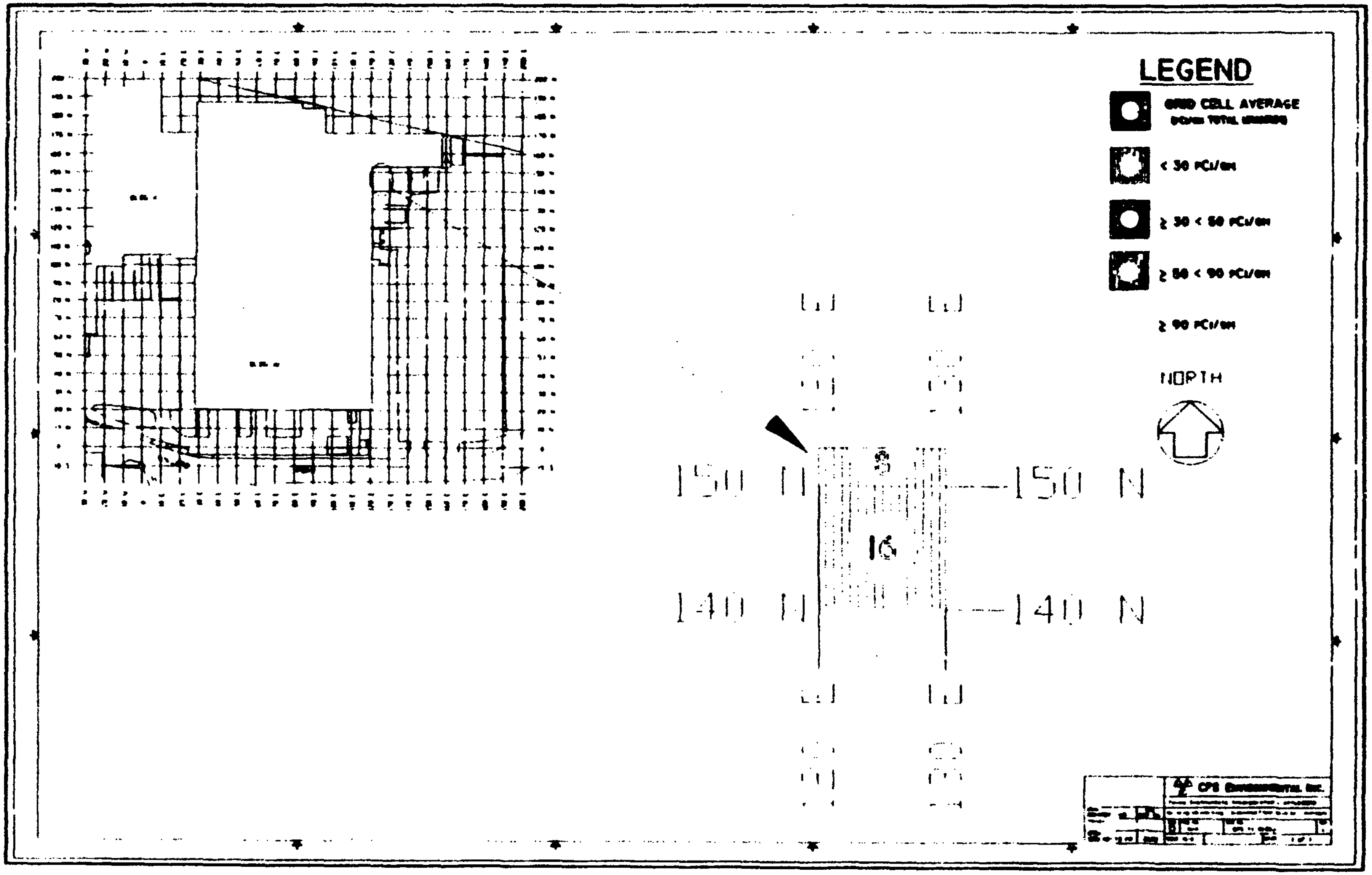


Figure 2
Building 10 Laboratory Wing : Excavation Floor Grid Cell Averages



TEXAS INSTRUMENTS INCORPORATED

Attleboro, Massachusetts

Remediation of Building 12 Thermal Ice Storage Area

NRC License/Docket No: SNM-23/70-33

Final Report

Version 1.0

Prepared by

CPS Environmental, Inc.
June 1996

Remediation of Building 12 Thermal Ice Storage Area

Description

This report describes the remediation activities of an area described as the thermal ice storage area of Building 12 at the Texas Instruments Incorporated Attleboro Site under USNRC License number SNM-23. The principal contaminate identified at this site was uranium from the former fuel fabrication activities at this site. The decommissioning criteria as established within the site remediation plan is 30 pCi/g total uranium. The Building 12 Area is described in detail within the documents entitled "Supplement to the 1992 Remediation Plan" and "Radiological Surveys of Open Land Areas." (Ref. 1,2)

Characterization

Radiological surveys conduced within this area include walk over scans, static measurements, and sub surface soil samples. The subsurface soil samples identified an area of contamination of approximately 200 m^2 extending in depth to approximately 6 feet. This area is located at the grid coordinates 160-170 N x 180- 200 E as defined on reference map CPS-TI-0103H and CPS-TI-0103C. The subsurface contamination identified at this location had a maximum value of 126 pCi/g (2-4' depth) with Grid Cell Averages of 46 pCi/g total uranium (160 - 170 N x 180 - 190 E) and 72 pCi/g total uranium (160 - 170 N x 190 - 200 E). The results of these radiological surveys are presented in detail within the report entitled "Radiological Surveys of Open Land Areas." (Ref. 2)

Excavation

Remediation of this area was conducted concurrently with the remediation activities of the "Metals Recovery Area". (Ref. 3) The methodology used in the performance of remediation activities was in accordance with the requirements put forth in the "Supplement to the 1992 Remediation Plan". Total volume excavated was 365 m^3 (12,890 ft^3) (Ref. 4) and was dispositioned along with material from the metals recovery area.

Final Status Survey

Final Status surveys were conducted in the manner specified within the "Supplement to the 1992 Remediation Plan", and included surface soil samples from the floor of the excavation, walk over scans of the floor of excavation, and subsurface soil samples in adjoining grids.

The excavation floor grid cell averages for both grids were found to be less than the 30 pCi/g total uranium criteria. Soil sample results were obtained using the gross alpha counting technique as described within reference 1, 2, and 3. The survey data is presented within the attached tables and figures as follows: Table 1, "Building 12 Thermal Ice Storage Area Excavation Floor Soil Sample Locations and Grid Cell Averages", Figure 1, "Building 12 Thermal Ice Storage Area Excavation Floor Soil Sample Locations", and Figure 2, "Building 12 Thermal Ice Storage Excavation Floor Grid Cell Averages". In addition, "D" size drawings are provided of Figure 1 and 2 as CPS-TI-0103I and CPS-TI-0103J respectively.

References:

1. *Supplement to the 1992 Remediation Plan,* Texas Instruments Incorporated, December 1994

2. *Radiological Surveys of Open Land Areas,* CPS Environmental Inc., January 1995

3. *Remediation of the Metals Recovery Area,* Final Report, CPS Environmental, Inc., September 1995

4. Communication with E. Otis Dyer to Mark A. Griffon Regarding Excavation Volume Estimates, June 4, 1996

Table 1: Building 12 Thermal Ice Storage
Excavation Floor Soil Sample Locations and Grid Cell Averages

GRID LOCATION	SAMPLE LOCATION	SAMPLE ID	SAMPLE RESULTS
170Nx180E	162Nx180E	F12-1	2
	162Nx182E	F12-2	2
	162Nx184E	F12-3	32
	162Nx186E	F12-4	16
	162Nx188E	F12-5	2
	162Nx190E	F12-6	19
	164Nx180E	F12-11	2
	164Nx182E	F12-12	2
	164Nx184E	F12-13	2
	164Nx186E	F12-14	2
	164Nx188E	F12-15	15
	164Nx190E	F12-16	2
	166Nx180E	F12-21	37
	166Nx182E	F12-22	19
	166Nx184E	F12-23	2
	166Nx186E	F12-24	18
	166Nx188E	F12-25	17
	166Nx190E	F12-26	17
	168Nx182E	F12-32	18
	168Nx184E	F12-33	2
	168Nx186E	F12-34	19
	168Nx188E	F12-35	16
	168Nx190E	F12-36	25
	168Nx190E	F12-37	38
	170Nx182E	F12-42	17
	170Nx186E	F12-43	25
	170Nx190E	F12-44	2
		AVERAGE	**13.7037037**
170Nx190E	162Nx190E	F12-6	19
	162Nx192E	F12-7	55
	162Nx194E	F12-8	19
	162Nx196E	F12-9	24
	162Nx198E	F12-10	2
	164Nx190E	F12-16	2
	164Nx192E	F12-17	2
	164Nx194E	F12-18	2
	164Nx196E	F12-19	2
	164Nx198E	F12-20	2
	166Nx190E	F12-26	17
	166Nx192E	F12-27	2
	166Nx194E	F12-28	2
	166Nx196E	F12-29	20
	166Nx198E	F12-30	2
	166Nx200E	F12-31	19

Table 1: Building 12 Thermal Ice Storage
Excavation Floor Soil Sample Locations and Grid Cell Averages

GRID LOCATION	SAMPLE LOCATION	SAMPLE ID	SAMPLE RESULTS
170Nx190E	168Nx190E	F12-37	38
(cont)	168Nx192E	F12-38	25
	168Nx194E	F12-39	43
	168Nx196E	F12-40	17
	168Nx198E	F12-41	19
	170Nx190E	F12-44	2
	170Nx195E	F12-45	2
		AVERAGE	**14.65217391**

Figure 1
Building 12 Thermal Ice Storage Area : Excavation Floor Soil Sample Locations

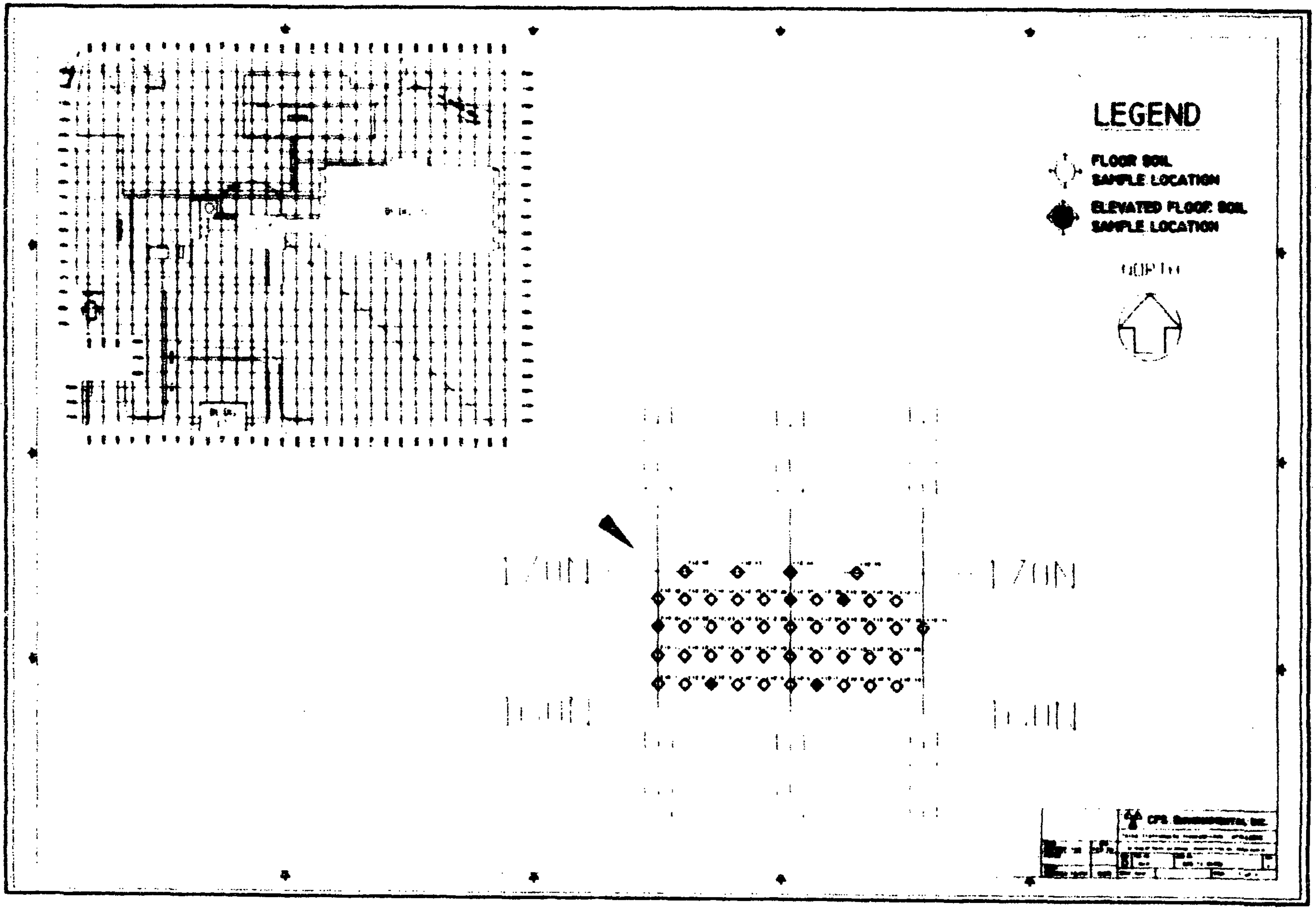
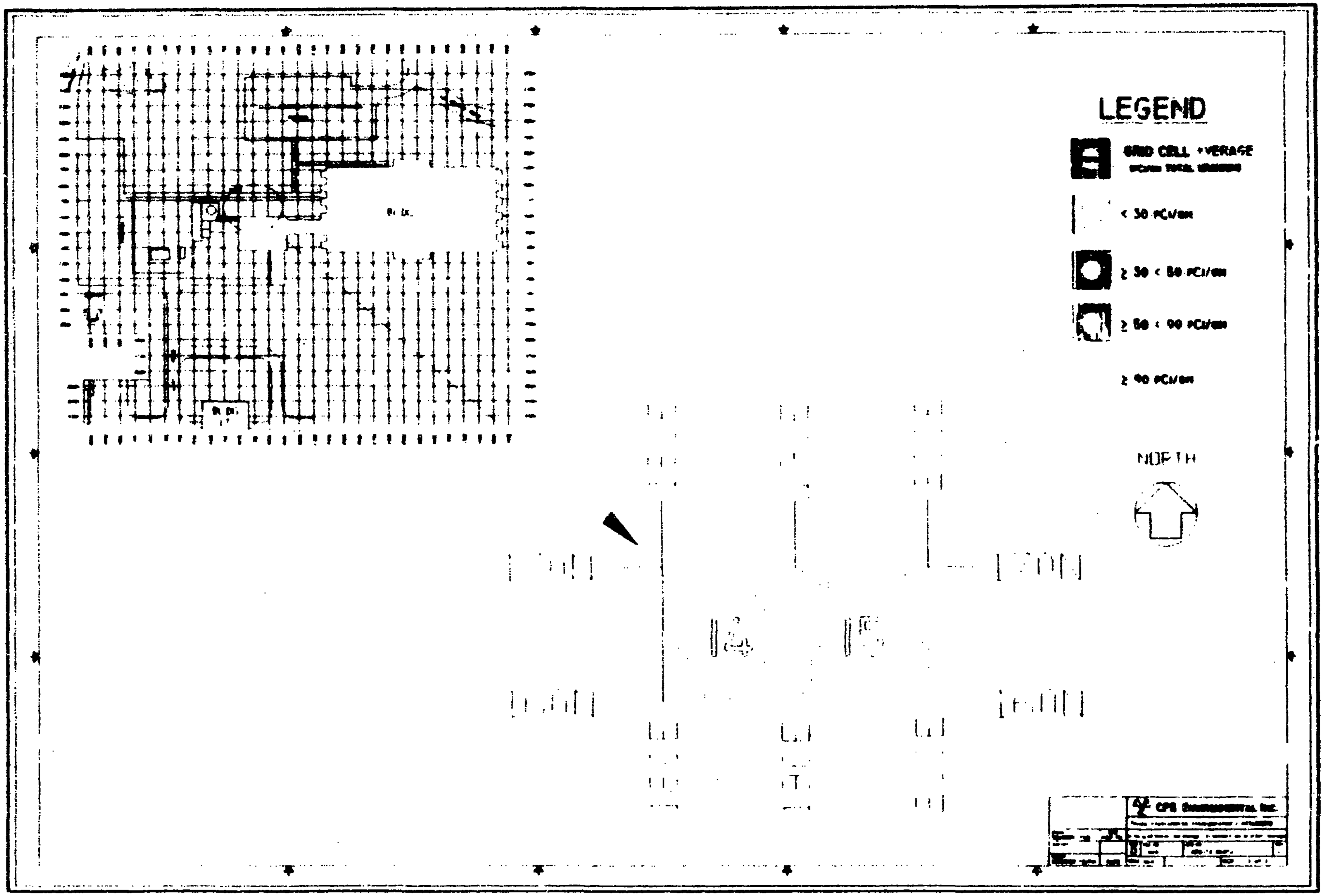


Figure 2
Building 12 Thermal Ice Storage Area : Excavation Floor Grid Cell Averages



TEXAS INSTRUMENTS INCORPORATED
Attleboro, Massachusetts

Remediation of Building 17 Hillside

NRC License/Docket No: SNM-23/70-33

Final Report

Version 1.0

Prepared by

CPS Environmental, Inc.
June 1996

Description

This report describes the remediation activities of an area described as the Hillside of Building 17 at the Texas Instruments Incorporated Attleboro Site under USNRC License number SNM-23. The principal contaminate identified at this site was uranium from the former fuel fabrication activities at this site. The decommissioning criteria as established within the site remediation plan is 30 pCi/g total uranium. The Building 17 Hillside Area is described in detail within the documents entitled "Supplement to the 1992 Remediation Plan" and "Radiological Surveys of Open Land Areas." (Ref. 1,2)

Characterization

Radiological surveys conduced within this area include walk over scans, static measurements, and sub surface soil samples. The subsurface soil samples identified an area of contamination of approximately 200 m^2 extending in depth to approximately 6 feet. This area is located at the grid coordinates 30 - 50 S x 130 - 160 E as defined on reference map CPS-TI-0108H and CPS-TI-0108A. The subsurface contamination identified at this location had a maximum value of 84 pCi/g total uranium at 45 S x 145 E (0-2' depth). The Grid Cell Averages within this area were as follows: 175 pCi/g (based on surface soil samples)(30 - 40 S x 130 - 140 E); 36 pCi/g (40 - 50 S x 140 - 150 E); 28 pCi/g (30 - 40 S x 140 - 150 E); and 26 pCi/g (40 - 50 S x 150 - 160 E). The results of these radiological surveys are presented in detail within the report entitled "Radiological Surveys of Open Land Areas." (Ref. 2)

Excavation

Remediation of this area was conducted concurrently with the remediation activities of the "Metals Recovery Area". (Ref. 3) The methodology used in the performance of remediation activities was in accordance with the requirements put forth in the "Supplement to the 1992 Remediation Plan". Total volume excavated was 141.4 m^3 (4995 ft^3) (Ref. 4) and was dispositioned along with material from the metals recovery area.

Final Status Survey

Final Status surveys were conducted in the manner specified within the "Supplement to the 1992 Remediation Plan", and included surface soil samples from the floor of the excavation, walk over scans of the floor of excavation, and subsurface soil samples in adjoining grids.

The excavation floor grid cell averages for all four grids were found to be less than the 30 pCi/g total uranium criteria. Soil sample results were obtained using the gross alpha counting technique as described within reference 1, 2, and 3. The survey data is presented within the attached tables and figures as follows: Table 1, "Building 17 Hillside Excavation Floor Soil Sample Locations and Grid Cell Averages"; Figure 1, "Building 17 Hillside Excavation Floor Soil Sample Locations", and Figure 2, "Building 17 Hillside Excavation Floor Grid Cell Averages" In addition, "D" size drawings are provided of Figure 1 and 2. as CPS-TI-0108I and CPS-TI-0108J respectively.

References:

1. *Supplement to the 1992 Remediation Plan,* Texas Instruments Incorporated, December 1994

2. *Radiological Surveys of Open Land Areas,* CPS Environmental Inc., January 1995

3. *Remediation of the Metals Recovery Area,* Final Report, CPS Environmental, Inc., September 1995

4. Communication with E. Otis Dyer to Mark A. Griffon Regarding Excavation Volume Estimates, June 4, 1996

Table 1: Building 17 Hillside
Excavation Floor Soil Sample Locations and Grid Cell Averages

GRID LOCATION	SAMPLE LOCATION	SAMPLE ID	SAMPLE RESULTS
30Sx130E	30Sx140E	F17-1	16
	30Sx137E	F17-2	2
	30Sx133E	F17-3	2
	30Sx131E	F17-4	2
	34Sx140E	F17-5	2
	34Sx137E	F17-6	2
	34Sx133E	F17-7	15
	34Sx131E	F17-8	20
	38Sx140E	F17-9	2
	38Sx137E	F17-10	27
	38Sx133E	F17-11	2
	38Sx131E	F17-12	22
		AVERAGE	**9.5**
30Sx140E	30Sx140E	F17-1	16
	34Sx140E	F17-5	2
	38Sx140E	F17-9	2
	30Sx142E	F17-13	15
	30Sx145E	F17-14	2
	30Sx148E	F17-15	2
	34Sx142E	F17-16	2
	34Sx145E	F17-17	2
	34Sx148E	F17-18	2
	38Sx142E	F17-19	20
	38Sx145E	F17-20	18
	38Sx148E	F17-21	2
		AVERAGE	**7.083333333**
40Sx140E	42Sx140E	F17-34	2
	42Sx143E	F17-35	17
	42Sx147E	F17-36	17
	44Sx140E	F17-37	2
	44Sx143E	F17-38	2
	44Sx147E	F17-39	33
	46Sx140E	F17-40	23
	46Sx143E	F17-41	32
	46Sx147E	F17-42	2
	48Sx140E	F17-43	29
	48Sx143E	F17-44	32
	48Sx147E	F17-45	26
	50Sx140E	F17-46	33
	50Sx143E	F17-47	2
	50Sx150E	F17-48	18
		AVERAGE	**18**

Table 1: Building 17 Hillside
Excavation Floor Soil Sample Locations and Grid Cell Averages

GRID LOCATION	SAMPLE LOCATION	SAMPLE ID	SAMPLE RESULTS
40Sx150E	42Sx152E	F17-22	2
	44Sx152E	F17-23	2
	46Sx152E	F17-24	26
	48Sx152E	F17-25	16
	42Sx155E	F17-26	20
	44Sx155E	F17-27	21
	46Sx155E	F17-28	2
	48Sx155E	F17-29	21
	42Sx158E	F17-30	2
	44Sx158E	F17-31	2
	46Sx158E	F17-32	31
	48Sx158E	F17-33	36
	50Sx150E	F17-48	18
		AVERAGE	15.30769231

Figure 1
Building 17 Hillside : Excavation Floor Soil Sample Locations

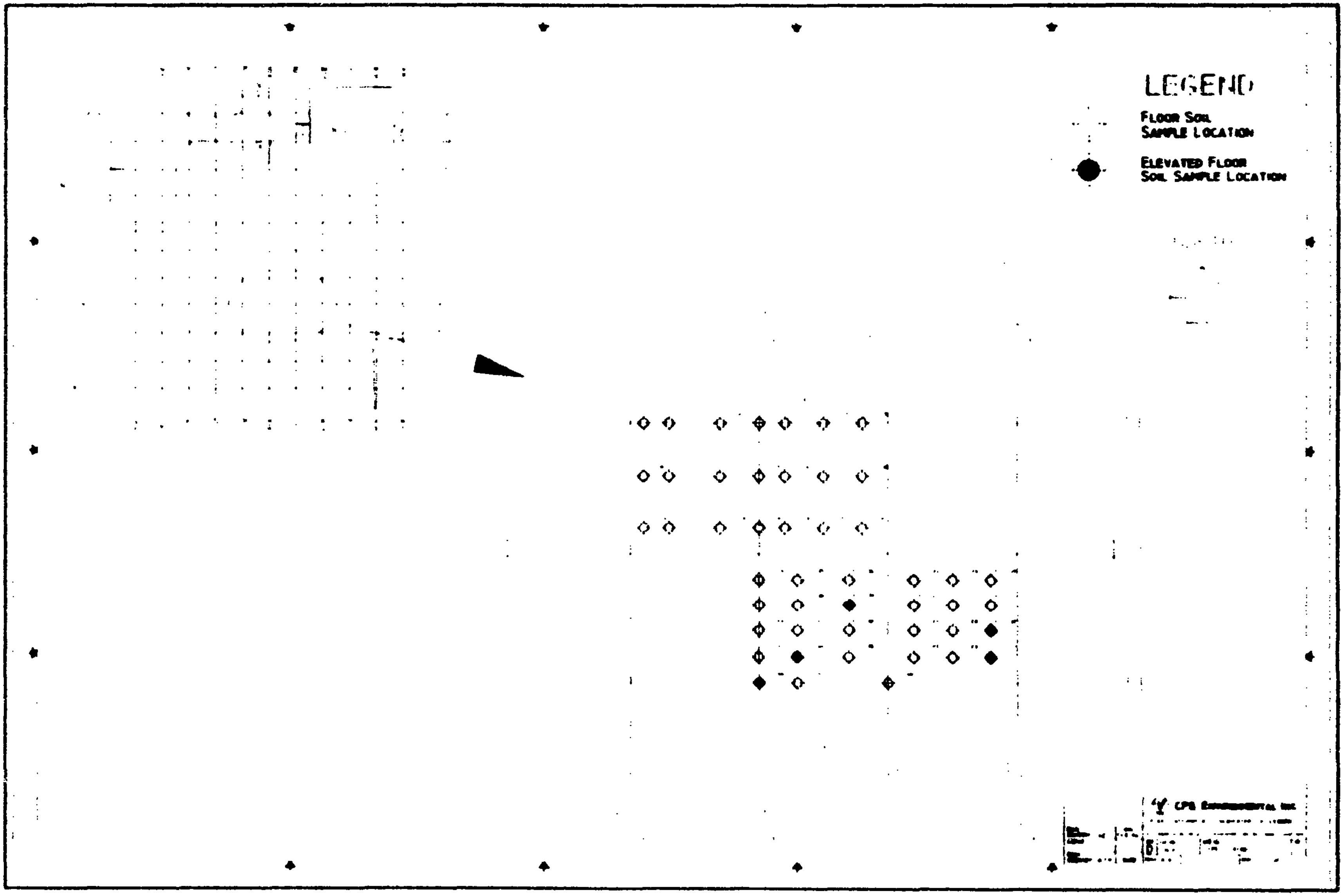
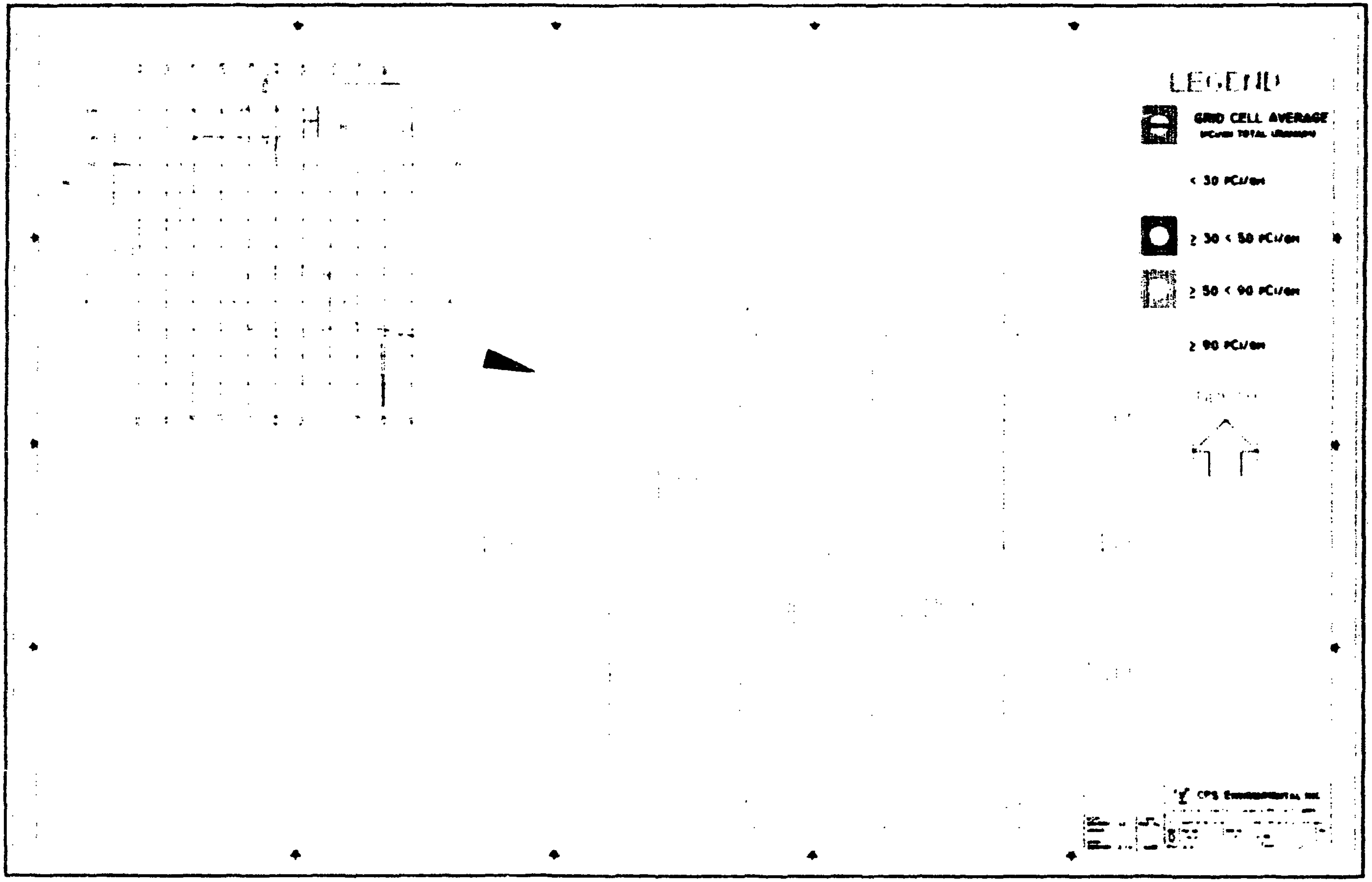


Figure 2
Building 17 Hillside : Excavation Floor Grid Cell Averages



ENVIROCARE OF UTAH, INC.

NOTICE TO TRANSPORT

(EC-1800) (Revised 3/94)

Envirocare has reviewed completed forms EC-0200 or EC-0175, EC-0650 and EC-0500. Based on our review of the information and certifications provided in those forms, Envirocare hereby issues notice that the following waste may be scheduled for transport and delivery to the Envirocare South Clive facility

Texas Instruments — 3/25/96
GENERATOR NAME — DATE

CONTRACTOR NAME

0249-01
GENERATOR RECORD # (GENERATOR NUMBER-WASTE STREAM NUMBER)

Uranium Contaminated Soil — <50,000 CF
WASTE STRRAM NAME — VOLUME OF MATERIAL

DELIVERY DATE ~~January~~ March/April 1996 ; LICENSED ____; NON-LICENSED ____

NORM ____; LARW X ; FUSRAP ____; 11e.(2) ____

(Andrew E. Drom) 3/25/96
Signature — Date

NOTICE: Transport and delivery of the material are to be done in accordance with a signed Disposal Agreement. Approved Radioactive Waste Shipment and Disposal Record forms (RSR's) must accompany the shipment(s). Upon arrival at the facility, the shipment will be made subject to incoming-shipment procedures and may be accepted or rejected by Envirocare for management at the facility.

YOUR WASTE MUST NOT CONTAIN FREE LIQUIDS OR PYROPHORIC, SHOCK-SENSITIVE, AIR-REACTIVE, OR WATER-REACTIVE MATERIALS, AND MUST CONFORM WITH THE FOLLOWING INCOMING SHIPMENT PARAMETER TOLERANCES:

RE-ISSUED FOLLOWING FREE-STANDING LIQUID INCIDENT

Solid pH	Ox/Red Test	Cyanide Test	"Sniffer"	Sulfide Test
5.57-6.23	Neither	HCN-ND	0-3.25	H_2S-ND

The above ranges have been established for your waste using the pre-shipment samples you sent.

DO NOT SHIP MATERIAL WHICH EXCEEDS ANY OF THE ABOVE TOLERANCES.

Should a sample of an incoming shipment be analyzed to be outside of these tolerances, your shipment will be rejected and only accepted following additional testing of the material and statements from the generator.

January 26, 1996

118945

Texas Instruments Incorporated

TEXAS INSTRUMENTS

34 Forest Street
P.O. Box 2964
Attleboro, MA 02703-0964

(508) 236-3800

March 19, 1996

Mr. William J. Sinclair
State of Utah
Department of Environmental Quality
Division of Radiation Control
168 North 1950 West
P. O. Box 144850
Salt Lake City, Utah 84114-4850

Dear Mr. Sinclair:

Thank you for your letter of March 7, 1996 in which you describe the actions taken by Envirocare of Utah as a result of intermodal containers (IMCs) being received at their radioactive waste disposal facility that contain free-standing liquid.

As stated in your letter, Texas Instruments Incorporated (TI) concurs that this problem is serious in nature and must be addressed immediately. As a result, I have directed Mr. Francis J. Veale, Jr., the Environmental Department Manager from my staff, to ensure that a corrective action plan is developed that will address the situation. A copy of our corrective action plan for the loading and transporting of soils is attached. It is the belief of both Roy F. Weston, Inc., our project management consultant, as well as TI, that this plan will address inspection techniques and mitigating activities to ensure that no further free-standing liquids are present within the IMCs.

We are presently reviewing these corrective actions with Envirocare. Upon review of this information, if you would like to discuss this matter further, or if you feel it beneficial, Mr. Veale will be available to meet with you at your convenience.

We appreciate your assistance in this matter and if you have any questions please do not hesitate to contact Mr. Veale at (508) 236-1804.

Sincerely,

MATERIALS & CONTROLS GROUP

Werner Schuele

Werner Schuele
Senior V.ce President
Site Manager

WHS:sk

Enclosure

CC: [redacted] Administrator, USNRC Region I
Robert M. Hallisey, Director, Mass. Radiation Control Program
Myron Bateman, Health Officer, Tooele Country Health Department
Jay Vance, Envirocare of Utah, Inc.
Francis J. Veale, Jr., TI
Michael J. Elliott, TI

118945

MAR 25 [redacted]

CORRECTIVE ACTION PLAN
For
Free-standing Liquids in Intermodal Containers
January 1996
Revised March 1996

1.0 Purpose

This corrective action plan describes procedures to be used to inspect for and mitigate conditions contributing to free liquids observed in intermodal containers (IMCs) containing radioactive soils excavated at the Texas Instruments Incorporated (TI) facility in Attleboro, Massachusetts. The soils will be disposed at the Envirocare of Utah, Inc. (Envirocare) facility in Clive, Utah.

2.0 Discussion

Free-standing liquids have been observed in IMCs containing soils arriving at Envirocare. This plan identifies active measures to be used to identify and mitigate conditions that may allow the propagation of free-standing liquids, and will be used in the handling and transportation of soils staged on site in Attleboro pending shipment to Envirocare.

TI and Roy F. Weston, Inc. (WESTON®) have expended considerable effort investigating the root cause of free-standing liquids in intermodal containers (IMCs). From this investigation, we have concluded that the root cause is one or both of two factors, the exodus of water from the soil or infiltrating precipitation during rail shipment. Both possible causes have been addressed in this plan.

3.0 Elements of the Corrective Action Plan

3.1 Testing

All IMCs received on site in Attleboro will be inspected for ice and/or standing water prior to loading. Any ice or standing water will be completely removed prior to initiating the loading operations.

Prior to loading, the soil type will be visually scrutinized to determine whether the soil has a high silt content and field tested per IMC to determine the moisture content using a nuclear density gauge. Soils with a moisture content greater than 20% will be blended with soil with a higher sand/gravel content to minimize the moisture content. Following blending, a follow-up measurement will be taken for moisture content, and the blending process will be repeated as necessary until the moisture content is below 20%.

Moisture content readings will be logged. Using the relationship that the weight of the water equals the moisture content times the total weight divided by one plus the moisture content, the maximum quantity of water in the soil to be transported will be calculated. From this information the quantity of absorbent necessary to absorb that maximum quantity will be water, and subsequently the sorbent will be added to that IMC.

Based upon field data and observations from Envirocare field personnel, there is no direct correlation between moisture content of the material and the quantities of free standing liquids observed in the IMCs at Envirocare. However, by field testing the soil to collect moisture content data before the soil is loaded, TI and WESTON® can calculate the total amount of water contained in an IMC. Assuming the worst case scenario for the release of the water from the soil, we will then provide enough sorbent material to account for the maximum amount of released water. All testing and blending determinations will be made by the quality control representative in conjunction with the TI site representative and/or WESTON® site manager.

3.2 Materials Handling and Mixing

All soil currently staged at the Attleboro facility is covered with plastic sheeting to promote runoff and prevent infiltration by precipitation. As of 15 January 1996, a temporary structure has been erected on the site. During inclement weather, loading operations will occur within the building. In addition, an adequate volume of material will be staged within the building prior to loading to eliminate introducing additional water via precipitation during loading.

3.3 Absorbent Material

Prior to placement of the double liners, five (5) bags of absorbent material, with an absorption capacity of approximately 80 gallons of water, will be placed in the corners of the empty IMC, and along the edge of the end gate. This material will be in position to absorb any water located outside of the liners, but wit... n the IMC.

During loading of soil, the soil in each IMC will be covered by *absorbent material supplied by Absorption Technologies* or equivalent to absorb any free liquid released from the soil during shipment. The brand of absorbent was recommended by Envirocare for its effectiveness as a sorbent, and for the fact that the material will not change the chemical composition of the stockpiled soil (see attached Material Safety Data Sheet (MSDS)). Any substitutions of absorbent material will be done only with prior written approval from Envirocare. The means for determining an adequate quantity are described in detail in Section 3.1 of this plan.

The absorbent material will be carefully placed in the corners and along the edges of the soil in the areas most likely to collect free standing liquids. Care will be taken to prevent placement of absorbent in those areas where free standing liquids are unlikely to collect, such as on the tops of the soil piles.

3.4 Container Lining

Prior to shipment, all IMCs will be inspected by the WESTON® quality control representative to confirm the mechanical integrity of the IMC upon receipt. Once this inspection has occurred, and any ice and/or free-standing water has been removed from the IMC, the IMC *will be lined with five (5) bags of absorbent material and* will be double-lined in preparation for loading operations.

3.5 Container Sealing

TI and WESTON® have investigated the type of sealant to be used on the IMCs. WESTON® conducted tests on various sealants, including the foam sealant used currently, to establish a means for eliminating external sources of water from entering the IMCs. Following loading of soil and absorbent material, IMC lids will be sealed using a double layer of spray foam insulation material. Based on test results, two layers of sealant will be used to maintain the integrity of the seal.

Following application of the sealant material, a layer of adhesive will be applied to cover all exposed foam surfaces. The adhesive to be used (*3M Frost Resistant tape*) is specially developed to remain adhered to metal surfaces down to ten degrees below zero. This will prevent direct water contact with the foam as an added preventative measure.

In addition to the sealant materials placed on the IMC, the gaskets located under the end gate will be specifically inspected for wear, cracking, and proper placement. Faulty or worn gaskets will be replaced and the end gate resealed prior to shipment to Envirocare.

The findings of the root cause analysis indicate that precipitation, introduced via a faulty IMC seal, may have contributed to the abnormally high amount of free standing liquid encountered in a particular IMC. The controls outlined above are intended to prevent water from entering the IMC via precipitation during transit. By eliminating water from sources outside of the IMC, and using the moisture content data to apply enough sorbent material to account for all the water contained within the soil, we have achieved a practical solution to the possible root causes and therefore eliminated the possibility of free-standing liquids in the IMCs received at the Envirocare facility.

3.6 Container Inspection

As a quality control measure, Mr. Timothy Laquerre will oversee the railcar loading operation and the WESTON® inspector assigned to the operation. The quality control representative will prepare a checklist verifying that measures described in the Corrective Action Plan were completed per container per railcar prior to release of the railcars. The inspection checklist will be maintained on file at the site, and will be made available to Envirocare on request.

Each requirement set forth in this plan will be included in the checklist to be completed by the quality control representative (see attached). Any deficiencies will be noted on the checklist and immediately corrected in the field prior to shipment. The checklist will then be annotated with the corrective action and the initials of the inspector to reflect the field correction.

In addition to the inspection by WESTON® personnel, each IMC will be inspected by a TI representative prior to shipment to Envirocare. A certificate of inspection will be completed for each railcar by the TI representative and will be submitted with the shipment.

3.7 Container Integrity

In addition to the measures set forth above, each IMC will be sealed with tamper seal to ensure that IMCs are not opened at any time between sealing in Attleboro and receipt at Envirocare.

TI has requested that a representative be on site at Envirocare during receipt of the initial IMCs sent from the TI facility to inspect and make detailed observations on the shipments. These observations will be used to refine the corrective action procedures for future shipments, if necessary.

Michael O. Leavitt
Governor
Dianne R. Nielson, Ph.D.
Executive Director
William J. Sinclair
Director

DEPARTMENT OF ENVIRONMENTAL QUA...
DIVISION OF RADIATION CONTROL
168 North 1950 West
P.O. Box 144850
Salt Lake City, Utah 84114-4850
(801) 536-4250 Voice
(801) 533-4097 Fax
(801) 536-4414 T.D.D.

March 7, 1996

Werner H. Schuele
Senior Vice President
Texas Instruments
34 Forest Street
P.O. Box 2964
Attleboro, Massachusetts 02703

Dear Mr. Forest:

On February 27, 1996, Envirocare of Utah, notified this agency that they had suspended Texas Instruments access to their low level radioactive waste disposal facility. On three occasions, the most recent being February 22, 1996, Envirocare had received for disposal, by intermodal containers, shipments of radioactive waste which contained free standing liquid. This waste was generated at the Texas Instruments operations located in Attleboro, Massachusetts.

Envirocare of Utah, Inc. possesses a radioactive material license, #UT2300249, issued by the Division of Radiation Control authorizing the company to perform disposal operations of low level and other radioactive wastes. The license prohibits Envirocare from receiving liquids as a normal course of business. It does however recognize that inadvertent shipments of liquid as a component of dry wastes might occur. Envirocare has submitted a Waste Management Plan which was reviewed and approved by this agency and commits Envirocare to certain actions if liquids are received. As you may be aware, Envirocare is committed to suspend shipments if ...ective actions taken by a waste generator have been ineffective and a third liquid in waste ... has occurred.

... Texas Instruments that the Division of Radiation Control regards these as ...ls are not approved for the transportation of liquids. Furthermore, State ...requirements regarding the shipment of radioactive contaminate... ... to the Envirocare waste disposal facility is needed by Te... ...uality assurance and quality control program desi... ...ing short of that goal is acceptable to the Di...

070-00033

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTROL

Michael O. Leavitt
Governor
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Executive Director
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March 7, 1996

Werner H. Schuele
Senior Vice President
Texas Instruments
34 Forest Street
P.O. Box 2964
Attleboro, Massachusetts 02703

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This letter is notify Texas Instruments that the Division of Radiation Control regards these as serious events. Intermodals are not approved for the transportation of liquids. Furthermore, State Radiation Control Rules and requirements regarding the shipment of radioactive contaminated liquids have not been met. If access to the Envirocare waste disposal facility is needed by Texas Instruments, then strict adherence to a quality assurance and quality control program designed to eliminate the problems is required and nothing short of that goal is acceptable to the Division.

UTAH CENTENNIAL

118945

Sincerely,

William J. Sinclair, Director

cc: Thomas T. Martin, Regional Administrator, USNRC Region I
Robert M. Halisey, Director, Mass. Radiation Control Program
Myron Bateman, Health Officer, Tooele County Health Department
Jay Vance, Envirocare of Utah, Inc.

070-00033
SNM-23

TEXAS INSTRUMENTS INCORPORATED ATTLEBORO FACILITY
BUILDING INTERIORS REMEDIATION
DRAINAGE SYSTEM CHARACTERIZATION

Prepared By
Roy F. Weston, Inc.

January 1996

LIMITATIONS / INCONSISTENCIES

(1) SOME MDFs HAVE BEEN RECALCULATED

(2) ONLY DRAIN LINES IN AFFECTED AREAS WERE PRESENTED IN FINAL REPORT. THIS DOCUMENT LOOKS AT AREAS ADJACENT TO AFFECTED AREAS / LOGICAL SAMPLING POINTS

(3) SOME INVENTORIES WERE RECALCULATED

(4) TABLE 1 DOES NOT DISTINGUISH BETWEEN VC AND CI SAMPLES

(5) INVENTORY CALCULATIONS IN THIS REPORT ARE FOR U 235 ONLY

1.0 INTRODUCTION

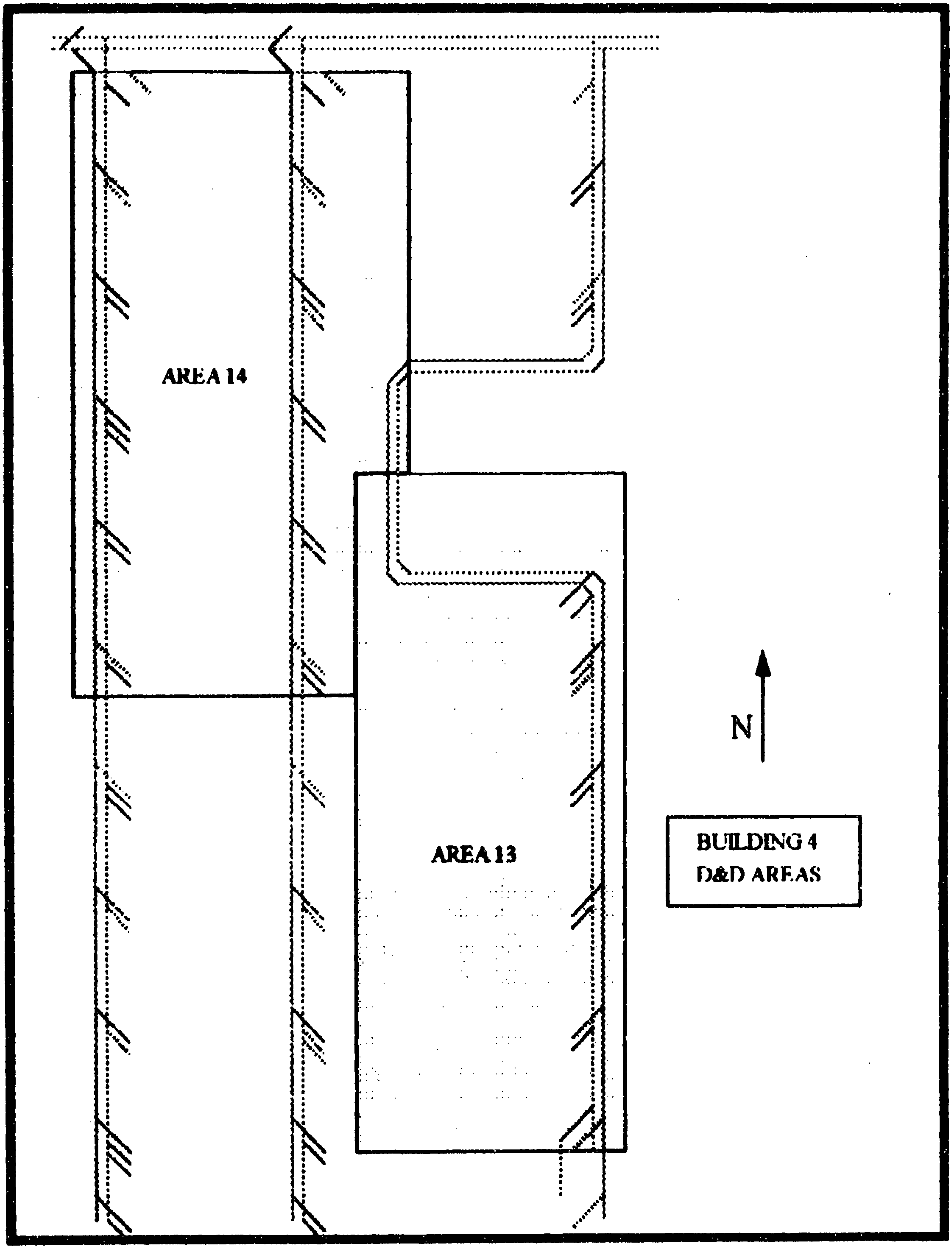
A radiological investigation of the subsurface drains servicing the affected areas of Buildings 4 and 10 at the Texas Instruments Incorporated (TI) Attleboro Facility was performed by Roy F. Weston, Inc. (WESTON), from 11 to 21 September 1995. Affected areas had been previously defined as part of the Building Interiors Remediation Project described in the *Supplement to the 1992 Remediation Plan*. The radiological characterization was conducted to determine the distribution, concentration and inventory of uranium-234, -235 and -238 in the drainage system as a result of historical nuclear material processing activities. Affected areas within these buildings at the TI Attleboro Facility are illustrated in Figures 1 and 2.

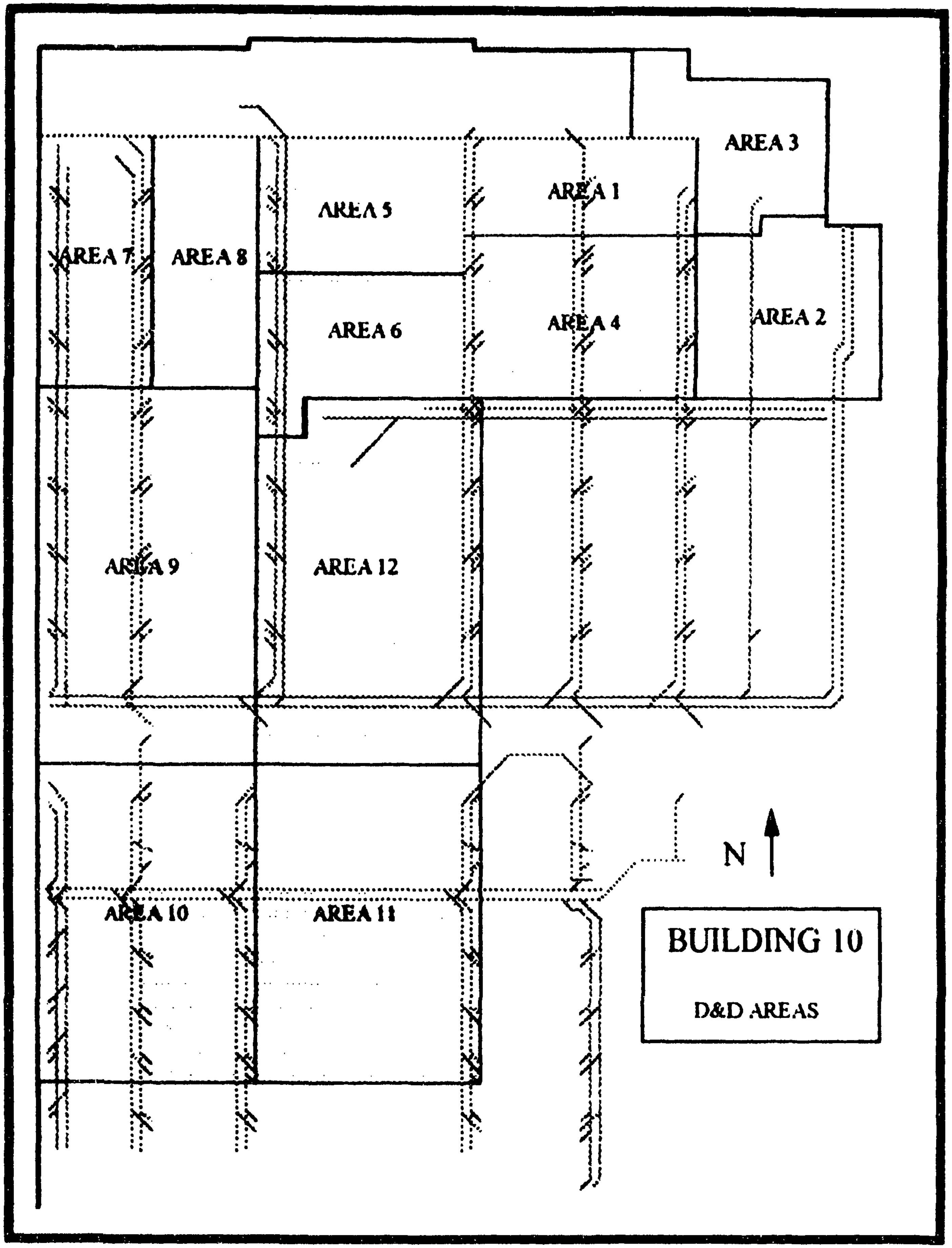
The drainage system investigation included two primary assessment efforts and the collection of pipe scale and/or other residue samples through direct access to the main lines. Direct-reading field radiological instrumentation was used to identify radioactive material inventory within "feed" lines originating at the concrete floor slab surface. Direct reading measurements were used as supplemental information in recommending pipes for removal or attempted decontamination. Isotopic uranium analyses of residue samples were processed to determine the residual mass of uranium-235 contained in the drainage system.

The drainage system investigation was performed immediately after the Pilot-Scale Interiors Remediation Project and prior to the Full-Scale Interiors Remediation Project. An aggressive investigation schedule was implemented in support of Nuclear Regulatory Commission (NRC) license termination and to assess the potential for inadvertent exposures to non-radiological workers performing routine drainage system maintenance and the potential for inadvertent criticality from relocation and/or disturbance of highly enriched and concentrated uranium.

1.1 Drainage System Description

Buildings 4 and 10 drainage systems consist of 4-inch vitreous clay (VC) and 4, 5, and 6-inch cast-iron (CI) lines (referred to as "arterial lines") located 2 to 3 feet below facility grade. These lines, which run from north to south or south to north, lines typically flow into east-west lines of 6 to 12-inches in diameter (referred to as "main lines"). Floor penetrations (referred to as "feeder lines") are typically 4-inches in diameter and may be encountered at various locations above the subsurface drainage system. Conversations with TI personnel have indicated that the VC lines accepted flow from floor drains, while the CI lines accepted flow from roof drains. These personnel also have indicated that there have been historical instances of "cross-routing" between these systems. This document uses the terms "drain" and "line" interchangeably.


AREA 14
AREA 13
N
BUILDING 4
D&D AREAS


AREA 3
AREA 1
AREA 5
AREA 7
AREA 8
AREA 2
AREA 6
AREA 4
AREA 9
AREA 12
N
AREA 10
AREA 11
BUILDING 10
D&D AREAS

1.2 Pilot-Scale Findings

The pilot-scale remediation was performed from June to August 1995. This study area included the Caged Area (Areas 1 and 4 on Figure 2) and the Screen Print Room (Area 7 on Figure 2). Based on the information collected during remediation activities, it was determined that the soil and pipes posed a potential safety concern and that the soil and pipes required excavation and removal under radiological controls. It also was determined that other drain lines within the affected areas of Buildings 4 and 10 should be surveyed for significant accumulation of concentrated radioactive material prior to the execution of full-scale remediation activities through the facilities.

1.2.1 Caged Area (Areas 1 and 4)

After a feed line floor penetration servicing an overhead roof drain was sampled, elevated readings were identified and investigated. The feed line was excavated to a depth of 3 feet, where it attached to a 4-inch CI main line. After the excavated lines were broken and removed, a small uranium rod of approximately 5 inches in length and 1/2 inch in diameter was identified and retrieved. While retrieving this rod, it was noted that the surrounding soil and pipes also exhibited elevated radiological measurements.

In addition to the 4-inch CI, a 4-inch VC line was identified at this location. Both pipes were opened and found to contain from 50-90 percent sediment and residue blockage. The pipe contents and surrounding soils were sampled and analyzed for total and isotopic uranium concentrations. Total uranium concentrations in the pipe sediments were 53,000 picocuries per gram (pCi/g) and 1,517 pCi/g for the CI and VC lines, respectively. The CI line and surrounding soils exhibited a uranium-235 concentration of 2,000 pCi/g and enrichment to 33 percent by weight, indicating that highly enriched uranium was leaking from the line into nearby soils. Approximately 5 feet of the CI line and several cubic yards of surrounding soil were removed during remediation activities. The remaining lines and soil will be removed during the remediation of Areas 5 and 6.

Near-surface recirculation piping ranging from 2 to 4 inches in diameter was frequently located near the slab surface in the Caged Area. Radiological surveys of this piping typically indicated marginal surface contamination on the interiors of the pipes, typically ranging from less than 3000 disintegration per minute (dpm)/100 cm^2. If surveys detected above background surface concentrations or if the pipe could not be readily opened for survey, it was disposed of as radioactive debris. Approximately 60 to 70 feet of this piping was disposed of in this manner.

1.2.2 Screen Print Room (Area 7)

During contaminated concrete removal at the north side of the Screen Print Room (Area 7), the initiation point of a 4-inch VC main line was encountered. This line exhibited surface contamination levels (on the pipe interior) as high as

1,000,000 dpm/100 cm^2, although did not contain a visible accumulation of residue. Approximately 15 feet of line was removed until surface contamination levels within the pipe were reduced to background levels. Minor soil contamination was noted near the initiation point of the line and excavated. Soil concentrations were 71.6 and 9.8 pCi/g in soils near the initiation point and line removal termination point, respectively. In contrast to the Caged Area, the Screen Print Room uranium enrichment indicated previous use of depleted uranium.

2.0 MATERIALS AND METHODS

Materials and methods used in the drainage system investigation were applied to two primary programs: sampling and analyses of residue contained within main lines, and radiological measurements within the interiors of arterial and feed lines accessible at or near the floor grade.

2.1 Sampling and Analysis of Pipe Residue

The radioactive material inventory was developed through sampling 13 subsurface locations of CI and VC lines. After available TI "as-built" diagrams were reviewed, these locations were selected based on historical information and/or suspected transfer of contaminated material to these lines. Radiological survey data from previous investigations and removal actions (undertaken in the pilot program) were used to identify potential routes of transfer through the facility. In general, one CI and one VC line were present at each location (except at location 4). If selected locations were blocked by stationary equipment or stock, alternate representative locations were identified. The final 15 sampling locations within Buildings 4 and 10 are shown on Figures 3 and 4, respectively.

At each sampling location, concrete was removed and soil was excavated to just below pipe level. The excavation was monitored with radiological instrumentation. A section of each pipe was cut open, allowing access into the pipes. After pipes were opened, a sample of the sediment or other residue in the pipe was collected and submitted for isotopic and/or total uranium analyses. The sedimentation and buildup within pipes was variable and was typically greater in the CI lines. Some VC lines had clean surfaces that would not yield a sample. Based upon direct observation, field personnel recorded the percentage blockage in the line. Lines with little or no buildup were typically rated at 5 to 10 percent blockage. Several VC pipes were not sampled due to liquid backup, pressurization, or leaking water.

2.2 Use of Direct Reading Radiological Instrumentation

Direct reading radiological instrumentation was used for both feed drain and main drain line surveys. The location of feed drain survey points is identified on Figures 3 and 4. Main drain line surveys were performed at several of the 15 locations identified on Figures certificates, and function check results) are maintained onsite within the 11 Nuclear Decommissioning Project file system.

2.2.1 Feed Drain Surveys

As part of the drain line investigation, characterization personnel used a specialized Bicron 1-inch by 1-inch sodium iodide gamma scintillator, coupled to a Ludlum Model 2221 Scaler/Ratemeter operating in ratemeter mode. The background count rate of this system ranged from 1,200 to 2,500 counts per minute (cpm) over the site work areas.

Many of the feed drain lines were open or had readily removable plugs or caps. Field personnel passed the detector through these lines until blockage or directional changes were encountered. The maximum detector response was recorded. The 1-inch by 1-inch detector is sensitive to the low-energy x-ray emissions associated with enriched and/or depleted uranium accumulations.

Prior to use of the aforementioned 1-inch by 1-inch sodium iodide system, a Ludlum Model 44-1 beta scintillator/Model 2221 scaler/ratemeter was used in 8 to 10 feed lines. Although the geometry of this system is not optimal for detecting large accumulations in or around pipes, it is adequate for identifying contaminated scale within the line.

2.2.2 Arterial and Main Drain Line Surveys

After excavating, breaking and sampling the several lines at locations 1 to 15, a Ludlum Model 133-2-1 waterproof Geiger-Mueller (GM) "peanut probe" detector was "snaked" through the line with a flexible rod and long-distance cable. The use of the probe identified any significant blockage in the main lines and identified large accumulations of radioactive materials within the drain lines or in the surrounding soils.

The Model 133-2-1 GM detector was linked to a Ludlum Model 2221 Scaler /Ratemeter operating in ratemeter mode. The background count rate of this system ranged from 15 to 20 cpm. The Model 133-2-1 has limited relative response capabilities when measuring enriched uranium due to the low energy x-rays and limited beta emission rate associated with the isotopic abundance of highly enriched uranium. For this reason, readings above background were assessed as potentially indicating a significant accumulation of enriched uranium.

The probe was snaked through the pipe in both directions from the access opening. Elevated detector measurements were noted at varying distances away from the access point. The terminal entry distance in each direction was recorded, and blockage or direction changes noted.

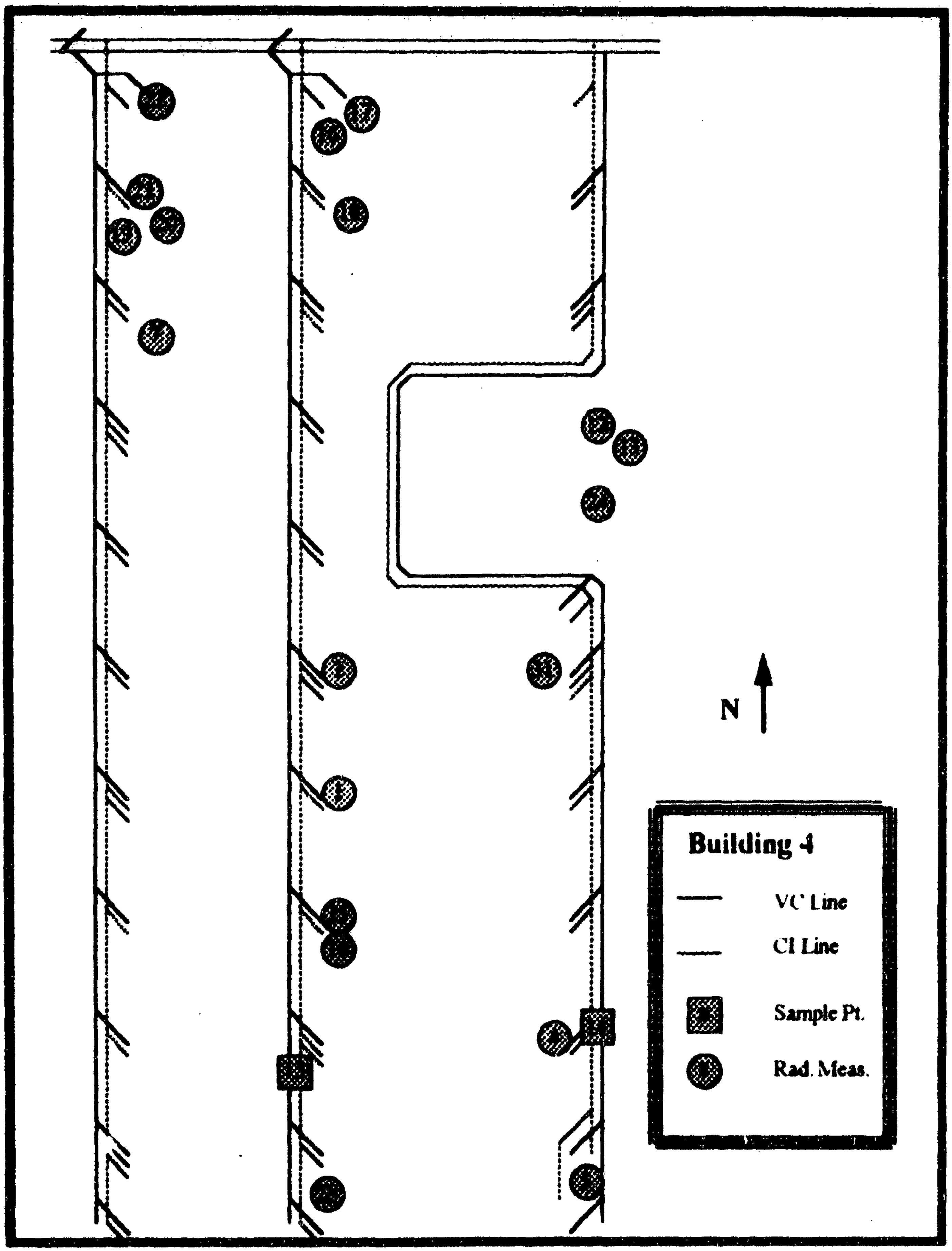
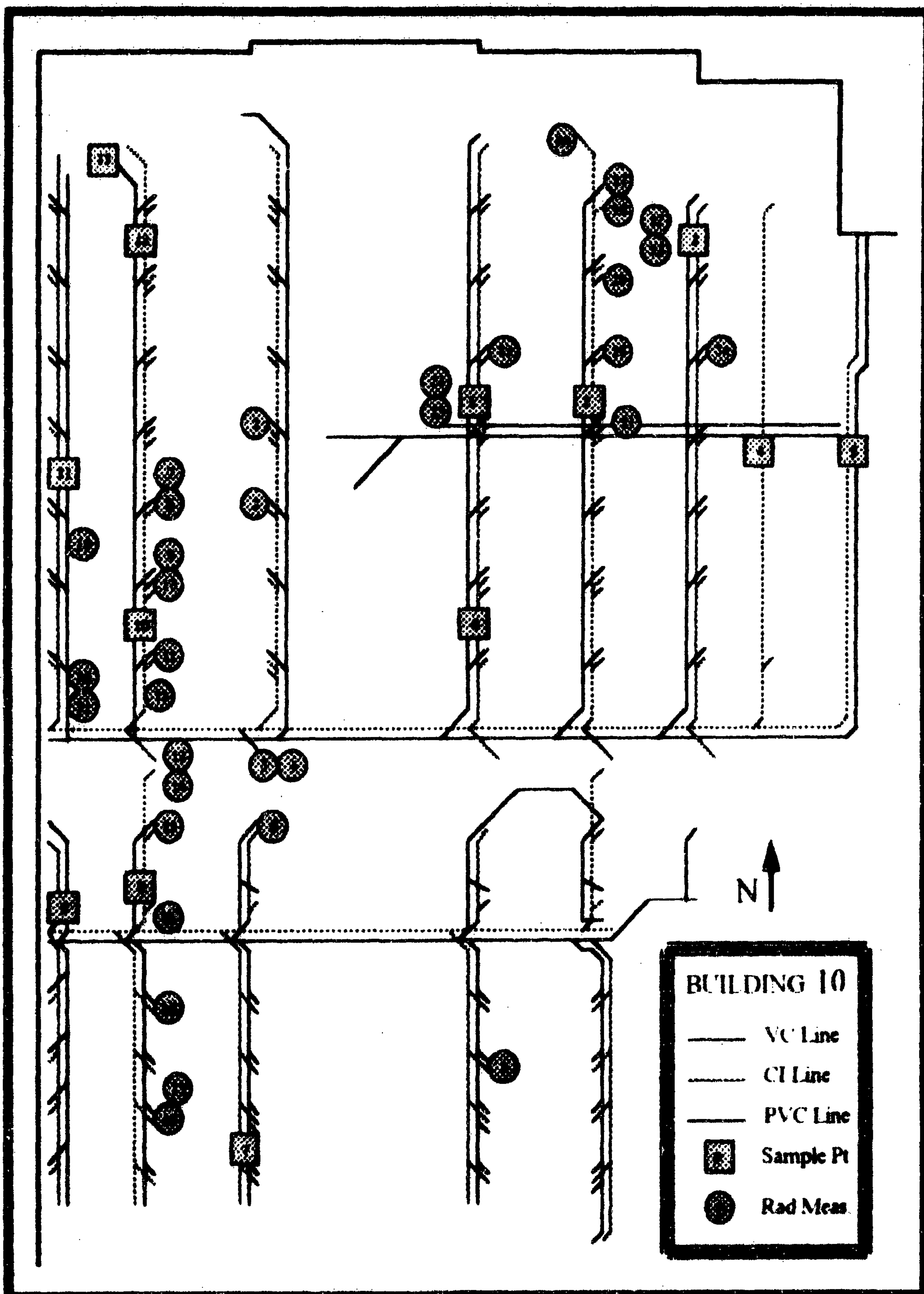

N
Building 4
VC Line
CI Line
Sample Pt.
Rad. Meas.

Figure 4. Building 10 Intrusive Sampling and Feed Line Measurement Locations



3.0 INVESTIGATION FINDINGS

Investigation findings include physical descriptions of the lines based on intrusive sampling activities, analytical results for samples collected in the drain lines, direct radiological measurements of the feed drain lines, total uranium and fissile material inventory, and a discussion of potential criticality considerations.

3.1 Physical Descriptions

The following discussions pertain to any or all main lines identified and opened at locations 1 to 15 on Figures 3 and 4.

Location 1 - Two pipes were identified and sampled at this location during the Pilot-Scale Interiors Remediation Project. The pipes are identified as 0815-04-4C-BSS-00-CI Pipe Inside and 0815-04-4C-BSS-00-VC Pipe Inside. During pilot investigations, high readings from the pipe feed line were noted and the pipe was excavated and removed to the main lines. The 4-inch CI and 4-inch VC pipes were opened; a small rod (5 inches long and 1/2-inch in diameter) was removed. Significant sediment buildup was identified. The sediment blocked at least 90 percent of the CI pipe and 50 percent of the VC pipe. This sediment was sampled and shipped for isotopic uranium analysis. It should be noted that these findings were the basis for the WESTON recommendation to perform drain line characterization prior to full -scale remediation activities.

Location 2 - Pipe location 2 includes a 4-inch CI pipe and 5-inch VC pipe. The CI pipe is identified as 0830-04-3D-BSS-CI Pipe Inside. There was very little buildup other than pipe scale, but a sample was collected and submitted for isotopic uranium analysis. The VC pipe was not sampled due to water flow and leakage in the area.

Location 3 - Pipe location 3 includes one 4-inch CI pipe identified as 0830-01-3B-BSS-00-CI Pipe Inside, and a 5-inch VC line. Very little residue was noted, but a scale sample was collected and submitted for isotopic uranium analysis. The VC line had no residue to sample.

Location 4 - Pipe location 4 included a 4-inch CI pipe that was independent of the traditional drain scenario in that it was alone and not parallel with a VC pipe. A sample (0916-02-2D-BSS-00-West Iron Pipe) was collected and submitted for isotopic uranium analysis.

Location 5 - Pipe location 5 includes an 8-inch CI pipe identified as 0916-02-2D-BSS-00-East Iron Pipe. This pipe is an arterial line for a large number of roof drains on the northeast part of Building 10. The VC line at this location was leaking water and could not be opened. A sample from the CI line was collected and submitted for isotopic uranium analysis.

Location 6 - Pipe location 6 was chosen due to its downgradient location from the accumulation of enriched uranium identified at location 1. Two pipes (0915-12-4E-BSS-00-Iron Pipe, a 5-inch CI; 0915-12-4E-BSS-00-Clay Pipe, a 4-inch VC) had very little amounts of sediment, but sample scrapings were collected and submitted for isotopic uranium analysis.

Location 7 - Pipe location 7 was the only accessible point to the line due to facility stock and surrounding structures. The corresponding samples are from a 5-inch CI pipe identified as 0914-10-6J-BSS-00-Iron Pipe and a 4-inch VC pipe identified as 0914-10-6J-BSS-Clay Pipe.

Location 8 - Pipe location 8 is located against the west wall of Building 10 near the 4 -10 connector The samples are from a 4-inch CI pipe identified as 0913-10-8H-BSS-00-CI Inside and a 4-inch VC pipe identified as 0913-10-8H-BSS-00-VC Inside.

Location 9 - Pipe location 9 has two pipes, a 4-inch CI pipe identified as 0913-10-7G-BSS-00-CI Inside and a 4-inch VC pipe identified as 0913-10-7G-BSS-00-VC Pipe.

Location 10 - Pipe location 10 is at the end of a pipe with known contamination. The two pipes sampled were a 6-inch CI pipe identified as 0912-09-7F-BSS-00-CI Pipe and a 4-inch VC pipe identified as 0912-09-7F-BSS-00-VC Pipe.

Location 11 - Pipe location 11 is at a point in a line just outside of the old Screen Print Room. The two lines sampled here were a 4-inch CI pipe identified as 0914-09-8D-BSS-00-Iron Pipe and a 4-inch VC pipe identified as 0914-09-8D-BSS-00-Clay Pipe.

Location 12 - Pipe Location 12 is a 4-inch VC pipe identified as 0728-07-8B-BSS-00-Wall at a point where it starts to run parallel with a wall. There was very little material at this point but a sample was taken and submitted for isotopic uranium analysis.

Location 13 - Pipe location 13 is in the same pipe as is in locations 10 and 12. It is a 4-inch VC pipe designated 0728-07-8B-BSS-00-Pipe. The pipe had approximately 1/2 inch of sediment built up inside of it.

Location 14 - Pipe location 14 is in Building 4 near the Lewis Mill. The two pipes accessed included a 5-inch CI pipe identified as 0919-13-2F-BSS-East Iron Pipe and a 4-inch VC pipe identified as 0919-13-2F-BSS East Clay Pipe. Both of the lines were 50 percent blocked with sediment buildup.

Location 15 - Pipe location 15 is also in Building 4 near the Lewis Mill. The two pipes here are also a 5-inch CI (0919-15-3F-BSS-West Iron Pipe) and a 4-inch VC pipe (0919-15-3F-BSS-00-West Clay Pipe). The CI line was 30 percent blocked with sediment and the VC line was 10 percent blocked with sediment buildup.

3.2 Sampling Analytical Results

Pipe scale and residue samples were packaged and shipped to TMA Eberline, Oak Ridge, for isotopic uranium analysis using the EML U-02 (Modified) procedure. All shipments were transported using chain-of-custody forms. Copies of these forms are maintained in the WESTON project files. Table 1 includes the reported results of uranium-234, -235, and -238 concentrations, respectively, as collected in any or all lines sampled at locations 1 through 15. The final column of the table presents the total uranium activity of the drain line residue as the sum of the isotopic uranium concentrations.

Table 1 also presents the calculated isotopic abundance by weight using the formula.

$$W\% = (SA_U / A_U) / \{(SA_{U\text{-}234} / A_{U\text{-}234}) (SA_{U\text{-}235} / A_{U\text{-}235}) (SA_{U\text{-}238} / A_{U\text{-}238})\} * 100$$

where:

$W\%$ = weight percentage of the uranium isotope
SA_U = specific activity of the uranium isotopes (pCi/g)
A_U = concentration of the uranium isotopes (pCi/g)
$SA_{U\text{-}234}$ = specific activity of uranium-234 (pCi/g)
$A_{U\text{-}234}$ = concentration of uranium-234 (pCi/g)
$SA_{U\text{-}235}$ = specific activity of uranium-235 (pCi/g)
$A_{U\text{-}235}$ = concentration of uranium-235 (pCi/g)
$SA_{U\text{-}2358}$ = specific activity of uranium-238 (pCi/g)
$A_{U\text{-}2358}$ = concentration of uranium-238 (pCi/g)

The highest uranium-235 enrichments (and concentrations) occur in the VC and CI arterial lines running from the north end of the Caged Area (under the main walkway) between sample locations 1 and 6. The enrichment in the CI line is relatively constant at 33 to 34 weight percent (w%), with an approximately ten-fold dilution in total uranium concentration between locations 1 and 6, from 53,000 - 5,900 pCi/g. The lowest total uranium concentrations and uranium-235 enrichments were identified in samples taken from locations 14 and 15 within Building 4.

Locations 4 and 5 accessed lines that had previously supported assay laboratories associated with nuclear material manufacturing activities. Sampling and visual observation confirmed that there was little to no accumulation of residue in these lines. Analytical data for both CI lines indicated a total uranium concentration of approximately 500 pCi/g in the thin layer of scale.

Table 1. Analytical Results From Pipe Residue Samples

Pipe Location Number	U-234 Conc. (pCi/g)	U-234 Enrmt. (w%)	U-235 Conc. (pCi/g)	U-235 Enrmt. (w%)	U-238 Conc. (pCi/g)	U-238 Enrmt. (w%)	Total U (pCi/g)
1	50600	0.29%	2000	33.13%	624.7	66.58%	53224.7
	935.5	0.01%	53	1.53%	529.2	98.46%	1517.7
2	400.8	0.10%	16.5	11.46%	19.8	88.45%	437.1
3	10.5	0.02%	0.8	4.25%	2.8	95.73%	14.1
4	444.2	0.06%	30.4	12.49%	33.1	87.45%	507.7
5	437.4	0.05%	21.4	7.12%	43.4	92.83%	502.2
6	128	0.18%	4.2	17.37%	3.1	82.45%	135.3
	5629	0.35%	193	34.72%	56.1	64.93%	5878.1
7	41.3	0.03%	1.4	3.19%	6.6	96.78%	49.3
	12.6	0.02%	2.6	12.23%	2.9	87.75%	18.1
8		NA	13[1]	NA	NA	NA	NA
		NA	1.8[1]	NA	NA	NA	NA
9	467	0.04%	20.5	4.69%	64.8	95.28%	552.3
	25.7	0.08%	1.1	10.23%	1.5	89.69%	28.3
10	127.5	0.03%	5.4	3.41%	23.8	96.57%	156.7
	18.5	0.00%	0.84	0.37%	34.9	99.62%	54.24
11	794.5	0.06%	36.4	8.55%	60.5	91.39%	891.4
	11.9	0.03%	1.5	12.06%	1.7	87.91%	15.1
12	12.1	0.00%	1.6	0.43%	58.1	99.57%	71.8
13	4.7	0.01%	0.15	0.47%	4.9	99.52%	9.75
14	6.1	0.01%	0.32	0.91%	5.4	99.08%	11.82
	7.4	0.02%	0.32	3.01%	1.6	96.96%	9.32
15	14.6	0.03%	0.33	1.93%	2.6	98.04%	17.53
	4.3	0.02%	0.33	3.53%	1.4	96.45%	6.03

[1] Sample results reported only for uranium-235.

3.3 Direct Measurement Results

Feed drain surveys and main line "snaking" are presented below.

3.3.1 Feed Drain Surveys

Feed drain measurements were performed based on the accessibility of the feed ports to the main lines. The background count rate of the 1-inch by 1-inch detector/Model 2221 Scaler/Ratemeter ranged from 1,200 to 2,500 cpm for Building 4 and 1,700 to 2,500 cpm for Building 10. As surveys were performed, it was determined that the approximate "in-pipe" background count rate ranged from 2,500 to 3,500 cpm. This background is slightly elevated due to the geometry effects associated with surveying a closed pipe. In several instances a Model 2221/Model 44-1 beta scintillation system was utilized for feed line measurements. The typical background of this system ranged from 60 to 80 cpm.

Drain head surveys from Buildings 4 and 10 are presented in Tables 2 and 3, respectively. The location numbers may be referenced to Figures 3 and 4.

Table 2. Feed Drain Surveys in Building 4.

Location Number	Pipe Matrix	CPM Above Background	Comments
1	CI	NA	Capped
2	VC	4,100	
3	CI	3,000	
4	VC	NA	Filled In
5	VC	2,700	
6	VC	2,100	
7	CI	2,100	
8	CI	3,500	
9	VC	5,600	
10	VC	4,300	
11	CI	3,200	
12	VC	4,300	
13	VC	3,900	
15	Concrete	4,000	At South Roll-up Door Building 4
16	CI	18,000	
17	VC	20,000	
19	CI	3,100	
20	CI	3,500	
21	CI	3,000	
22	CI	2,900	
23	VC	6,200	
24	VC	5,600	
25	VC	16,000	
26	VC	5,400	
27	CI/VC	5,200	Two Pipes Side By Side
28	CI	3,000	
29	VC	5,500	
30	VC	7,100	
31	VC	5,600	

Feed lines at locations 16, 17, and 25 exhibit gamma count rates approximately five to six times background. These feed lines will probably be removed during future decontamination activities in Building 4.

Table 3. Building 10 Feed Drain Surveys

Location Number	Pipe Matrix	Counts Per Minute (CPM)	Comments
1	CI	6,200	
2	CI	3,600	
3	VC	7,700	
4	CI	3,800	
5	VC	26,000	
6	VC	6,500	
7	VC	6,700	
8	CI	3,700	
9	CI	3,200	
10	VC	6,300	
11	VC	6,600	
12	CI	7,500	
13	VC	7,000	
14	CI	3,700	
15	VC	6,000	
16	CI	3,300	
17	CI	3,300	
18	VC	6,600	
19	VC	6,000	
20	CI	2,800	
21	CI	3,000	
22	CI	3,500	
23	VC	99[1]	B Scint
24	VC	309[1]	Pipe Line
25	CI	491[1]	Pipe Line
26	VC	150[1]	Pipe Line
27	VC	166[1]	
28	CI	113[1]	
29	CI	71[1]	
30	CI	92[1]	
31	CI	91[1]	
32	CI	143[1]	
33	CI	88[1]	
34	CI	98[1]	

[1]Measurements performed with beta scintillator.

The measurement performed at location 5 indicated gamma count rates in excess of ten times background. Subsequent sampling indicated small pieces of uranium metal around the feed port. This feed line was decontaminated in association with Area 9 activities.

Measurements performed at locations 10 to 14 indicated gamma count rates of approximately two to three times background. Several of these feed lines were removed during decontamination activities in Areas 9 and 10.

3.3.2 Main Drain Surveys

Table 4 presents radiological measurements collected with the GM peanut probe at various distances away from the pipe access point. Readings are designated with a cardinal compass designation; the distance is given in feet. Table 4 also presents the terminal distance of snake penetration, which typically resulted from a pipe directional change or line blockage.

Table 4. Arterial/Main Drain Line Surveys

Location	Direction	Max CPM	Distance (ft)	Direction	Max CPM	Distance (ft)
3 - CI	North	20-25	10	South	20-25	20
4 - CI	North	15-20	20	South	45	17
5 - CI	North	20-25	20	South	25-30	20
6 - CI	North	30-35	20	South	20-25	12
6 - VC	North	30-35	20	South	15-20	12

Measurements along the CI and VC lines between locations 1 and 6 confirm the presence of elevated uranium concentrations in and near the pipe. For the VC and CI lines, count rates decrease in the southerly direction. Measurements along the CI line associated with sample location 5 are inconclusive. A maximum measurement of 45 cpm in the southerly direction of the CI line at sample location 4 indicates the potential for subsurface accumulation of radioactive material.

3.4 Inventory Assessment

The discovery of drain lines containing high enrichment/concentrated uranium were discovered during the pilot-scale program. Consequently, it was necessary to calculate the mass of residual nuclear material contained in the entire drainage system. Inventory assessment was based upon the visual inspection of lines and associated estimates of percentage blockage, isotopic uranium concentrations associated with each residue sample, the length and diameter of each pipe section represented by a sample, and estimated density of scale or sediment. Based upon the following methodology, the residual nuclear material content has been estimated for all arterial and main lines under affected areas.

3.4.1 Grouping of Pipe Lengths to Representative Sampling Points

Table 5 contains a grouping of all lines associated with each sample collected during intrusive investigation activities. Each group contains a series of pipe lengths and associated diameters, as delineated on Figures 5 and 6. Each group was logically constructed based upon direction of flow and proximity to similar operations. Since all 6 to 12-inch main lines were not disturbed during the investigation, it was necessary to group these lines with arterial lines most likely exhibiting similar concentrations and blockage.

3.4.2 Calculation of Mass of Material Within Pipe Groups

For each group of pipe lines, the total mass of residue in each section (for lines of varying diameter) is calculated as a function of the interior volume, percentage blockage and density of residue. The calculations use the following equation:

$$M_R = (pi/d^2) * L * \%B * D_R$$

where:

M_R = mass of residue in section of line (g)
d = diameter of line section (cm)
L = length of line section (cm)
%B = percent blockage in line section (unitless)
D_R = density of residue (g/cm^3)

For each group presented in Table 5, the mass of residue is summed over all included sections. The lines associated with locations 1 and 6 contain the largest quantities of residue in Building 10. All other lines contain less than 10 percent blockage, resulting in reduced residue mass. Lines associated with location 15 in Building 4 exhibit 30 to 50 percent blockage and the largest associated residue mass.

3.4.3 Calculation of Uranium-235 Mass

The mass of residue for each group presented in Table 5 is multiplied by the uranium-235 concentration (shown in Table 1) associated with each sample location and drain line (VC or CI) to yield total uranium-235 activity. This activity is divided by the specific activity of uranium-235 (2.6 E-6 pCi/g) to yield the uranium-235 mass in grams. Table 5 presents the uranium-235 mass associated with all pipe sections in each group.

The CI line associated with locations 1 and 6 contains approximately 284 grams of uranium-235, which is approximately 98 percent of the Building 10 total of 295 grams. The Building 4 inventory has a significantly lower total of 0.3 grams, although the lack of information for location 15 lines could result in additional inventory.

Table 6.

Pipe Location Number	TI Number	Sample Location (pipes)	Diameter (inch)	Length (feet)	Additional Length (feet)	Blockage	Volume Built Up (cc)	U-235 Conc (pCi/g)	Mass U-235 (grams)	Pipe Location Number
1	25	0815-04-4C-BSS-00-CI PIPE	4	80	0	0.8	177820	2000	271.0	1
	26	0815-04-4C-BSS-00-VC PIPE	4	100	0	0.5	123556	53	5.0	
2	34	0830-04-3D-BSS-00-CI PIPE	4	80	0	0.05	9884	16.5	0.1	2
			5	60	0	0.05	11583	16.5	0.1	
			6	10	35	0.05	2780	16.5	0.0	
			8		40					
	n/a	VC PIPE	4		75					
3	35	0830-01-3B-BSS-00-CI PIPE	4	130	-35	0.05	16062	0.8	0.0	3
	n/a	VC PIPE	4		95					
4	58	0816-02-2D-BSS-00-WEST IRON PIPE	4	80	0	0.1	19769	30.4	0.5	4
			5	40	0	0.1	15444	30.4	0.4	
			6	15	0	0.1	8340	30.4	0.2	
5	55	0816-02-2D-BSS-00-EAST IRON PIPE	4	120	-120	0.1	29853	21.4	0.5	5
			6	40	-40	0.1	22240	21.4	0.4	
			8	150	-55	0.1	148267	21.4	2.4	
	n/a	VC PIPE	6		95					
6	51	0815-12-4E-BSS-00-CLAY PIPE	4	50	0	0.3	37067	4.2	0.1	6
	52	0815-12-4E-BSS-00-IRON PIPE	5	60	0	0.3	68600	193	10.2	
			6	10	0	0.3	16680	193	2.5	
7	47	0814-10-6J-BSS-00-CLAY PIPE	4	65	10	0.05	8031	1.4	0.0	7
	n/a	VC PIPE (2 untested pipes)	4		150					
	48	0814-10-6J-BSS-00-IRON PIPE	5	20		0.05	3861	2.8	0.0	
			6	45		0.05	12510	2.8	0.0	
	n/a	CI PIPE (2 untested pipes)	4		75					
			6		50					
			8		35					
8	n/a	0813-10-7G-BSS-00-VC INSIDE	4	25		0.075	4633	13	0.0	8
	n/a	VC PIPE (untested pipe)	4	25	20					
	n/a	0813-10-7G-BSS-00-CI INSIDE	4	25		0.075	4633	1.8	0.0	
	n/a	CI PIPE (untested pipe)	4	45	35					
Between 7,8 & 9	n/a	VC PIPE (main)	8		30					Between 7,8 & 9
			10		35					
	n/a	CI PIPE (main)	12		65					
9	40	0813-10-8H-BSS-00-VC INSIDE	4	25		0.1	6178	20.5	0.1	9
	41	0813-10-8H-BSS-00-CI INSIDE	4	25		0.1	6178	1.1	0.0	

Table 5.

Pipe Location Number	TI Number	Sample Location (pipes)	Diameter (inch)	Length (feet)	Additional Length (feet)	Blockage	Volume Built Up (cc)	U-235 Conc (pCi/g)	Mass U-235 (grams)	Pipe Location Number
10	37	0813-09-7F-BSS-00-VC INSIDE	4	130		0.1	32125	5.4	0.1	10
	38	0813-09-7F-BSS-00-CI INSIDE	4	10		0.1	2471	0.84	0.0	
			5	20		0.1	7722	0.84	0.6	
			6	40		0.1	22240	0.84	0.0	
			8	30		0.1	20883	0.84	0.0	
11	49	0814-09-8D-BSS-00-CLAY PIPE	4	150		0.1	37087	38.4	1.0	11
	50	0814-09-8D-BSS-00-IRON PIPE	4	150		0.1	37087	1.5	0.0	
12	19	0729-07-6B-BSS-00-WALL	4	20		0.05	2471	1.8	0.0	12
13	20	0729-07-6B-BSS-00-PIPE	4	8		0.1	1977	0.15	0.0	13
Pipes Not Tested Or Accounted For	n/a	VC PIPE (main)	6		100					Pipes Not Tested Or Accounted For
			8		95					
			10		65					
	n/a	CI PIPE (main)	8		40					
			10		60					
			12		120					
	n/a	VC PIPE (pipe under wall)	4		170					
	n/a	CI PIPE (pipe under wall)	4		80					
			5		60					
			6		10					
	n/a	PVC PIPE	4		210					
14	57	0819-13-2F-BSS-00-EAST CLAY PIPE	4	280		0.5	345858	0.32	0.1	14
	58	0819-13-2F-BSS-00-EAST IRON PIPE	5	250		0.5	482840	0.32	0.1	
			8	30		0.5	83400	0.32	0.0	
15	59	0819-13-3F-BSS-00-WEST CLAY PIPE	4	220		0.1	54385	0.33	0.0	15
	60	0819-13-3F-BSS-00-WEST IRON PIPE	5	175		0.3	202700	0.33	0.1	
			6	45		0.3	75080	0.33	0.0	
Other Pipes in Bldg 4	n/a	VC PIPE (main)	6		40					Other Pipes in Bldg 4
			8		70					
	n/a	CI PIPE (main)	10		70					
			12		40					
	n/a	VC PIPE (west)	4		200					
	n/a	CI PIPE (west)	6		200					
	n/a	VC PIPE (north 3)	4		210					
	n/a	CI PIPE (north 3)	5		210					
				2883	2856		5738.0	Total Feet of Pipe		

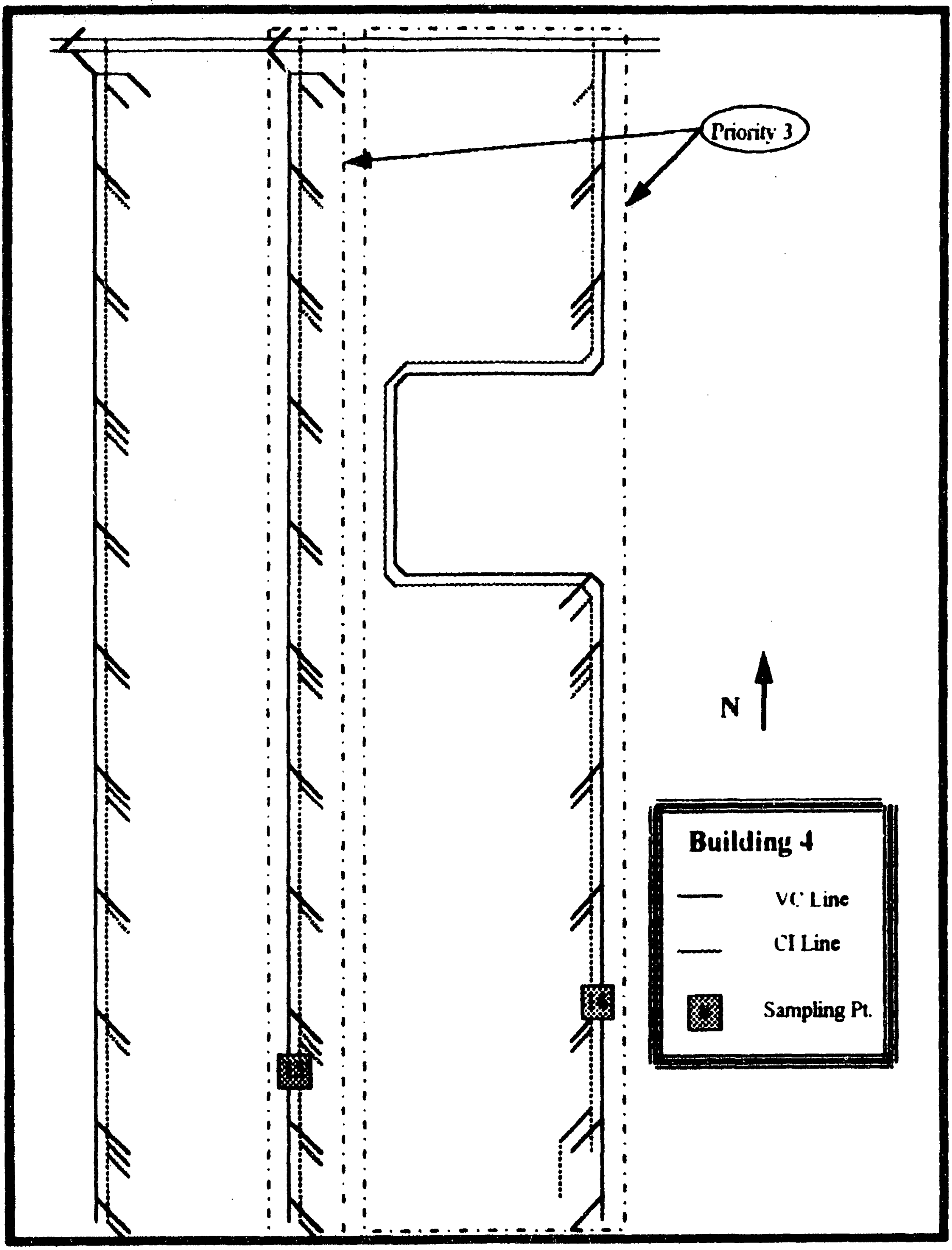
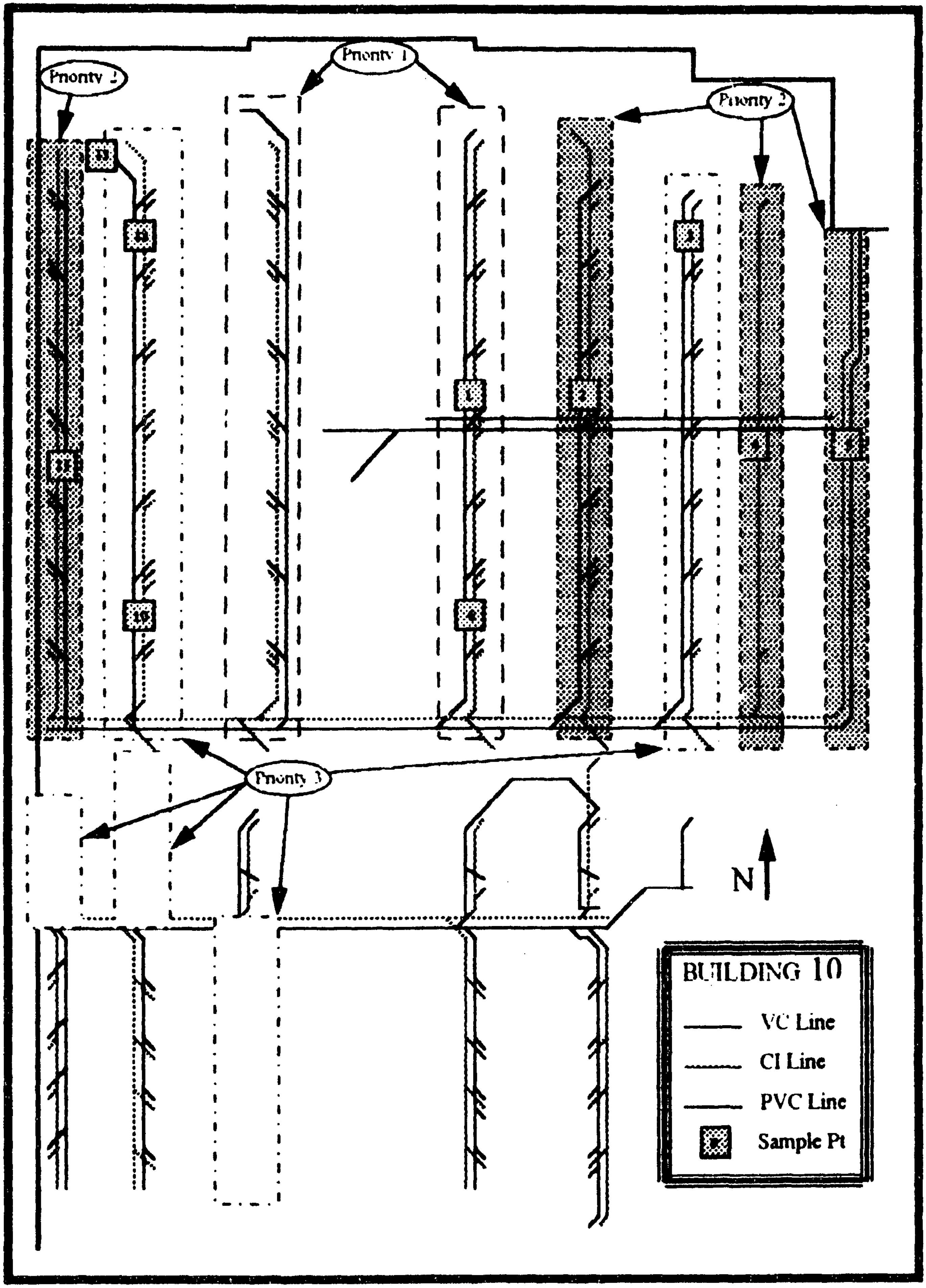

Priority 3
N
Building 4
VC Line
CI Line
Sampling Pt.

Figure 6. Building 10 Pipe Grouping for Uranium-235 Inventory Development



3.5 Criticality Concerns

The identification of uranium-235 enrichments as high as 34 percent by weight at concentrations exceeding 2000 pCi/g (in 4-inch CI lines) warranted the consideration of inadvertent criticality concerns. These inadvertent concerns could be the result of accumulation of fissile materials in subsurface traps, drain lines, or other collection points. A criticality assessment was performed for two scenarios probably encountered during remediation activities. The assessment scenarios addressed a drain line geometry of typical length packed with highly enriched uranium, and a packed drain line surrounded by highly contaminated soil in a hemispherical geometry. All criticality calculations were performed using the SCALE 4.1 code that contains KENO V.a. The constituents of soil (e.g., silicon, aluminum, calcium) used in calculations were derived from national or eastern United States averages.

3.5.1 Criticality Scenario #1 - *20-foot Length of 5-inch Diameter Pipe Filled with Soil Containing 80 Percent Enriched Uranium*

This scenario was assessed under the assumption that the pipe containing the uranium is stainless steel (wall thickness of approximately 0.25 inches). Two material content conditions within the pipe were assessed, the first consisting of pure uranium metal (80 percent enriched) and the second a mix of 80 percent uranium metal and 20 percent water. The calculation of k-effective was performed for a variety of bounding materials including concrete, vacuum, and water.

Given the aforementioned geometry and content conditions, the k-effective never exceeds 0.9. Therefore, an inadvertent criticality is not considered a possibility, given the field conditions.

3.5.2 Criticality Scenario #2 - *Leakage of Uranium from Pipe into Soil - Hemispherical Geometry*

This scenario was developed to determine the radius of contamination for a pipe and underlying soil. This radius will result in an inadvertent criticality given varying concentrations of highly enriched uranium. The scenario was modeled after conditions encountered during the pilot study in which a pipe had leaked in a hemispherical pattern below a drain line carrying enriched uranium waste. The critical radius was calculated for soil concentrations of 1,000,000 pCi/g, 100,000 pCi/g, and 10,000 pCi/g, respectively.

For a soil concentration of 1,000,000 pCi/g the surrounding soil must consist almost entirely of enriched uranium (density 19.1 g/cm^3). The underlying soil hemisphere was assumed to be surrounded by clean soil. A soil hemisphere radius of 18 cm yields an average k-effective of 1.

At a soil concentration of 10,000 pCi/g, no criticality will occur for any radius. The average k-effective value was calculated to be less than 0.85 for a soil hemisphere radius of 1,000 meters.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

HANDLING AND TREATMENT OF EXISTING LINES

As a result of the drainage system investigation, three categories of lines have been developed. Categories have been developed to define the type and extent of remedial action required and potential magnitude of health hazard due to intrusion by an untrained worker performing maintenance. Figures 5 and 6 present groupings of drain lines by the following categories which are described as:

PRIORITY 1 - Priority 1 lines require complete removal due to significant uranium concentrations in or around sections of the line. Potential hazards to untrained workers performing routine maintenance warrant the removal of this material by decontamination workers operating under the protocol of the current building decommissioning effort. The total uranium concentration of material in these lines ranges from 10,000 to 50,000 pCi/g. Priority 1 lines are encountered in Building 10 only, and are designated on Figure 6. Both "sets" of priority 1 lines include a 4-inch VC and 5-inch CI, and are routed from a north to south direction on either side of the former Health and Safety and 509 Departments. These lines bound Areas 5, 6, and 12. The set of lines bounding this area to the west terminate at the Beckhart wire drawing machine, while the set of lines to the east feeds into 8-12" main lines servicing other areas of Building 10.

PRIORITY 2 - Priority 2 lines require a cleaning effort to remove pipe scale and some sediment, typically exhibiting total uranium concentrations of 500 to 1000 pCi/g. These lines could pose a minor hazard to untrained workers performing routine maintenance operations; any intrusive actions should be performed with qualified radiological protection oversight. Priority 2 lines are encountered in Building 10 only, and appear to have serviced the laboratory wing and eastern sections of the former HFIR project. These lines are comprised of both CI and VC of varying diameter and are located in and around decontamination areas 2, 3, 7, 9, and 10 of Building 10.

PRIORITY 3 - Priority 3 lines contain little or no detectable radiological contamination, and would not require substantial decontamination or other special handling during the Building Interiors Project. These lines would pose little or no hazard to untrained workers performing routine maintenance operations or intrusive actions. Typical total uranium concentrations in these CI and VC lines range from background to 500 pCi/g. Although these lines contain some residue or scale exceeding the 30 pCi/g total uranium cleanup criteria, averaging of the thin layer usually results in a significantly lower uranium concentration when averaged over the mass of the entire pipe. This relationship is noted in "dilution factors" contained in Table 6. All lines within Building 4 are classified as Priority 3.

Table 6. Pipe mass dilution factors.

Inner Dia (in)	0.05 Blockage	0.1 Blockage	0.25 Blockage	0.5 Blockage
Cast Iron				
4	0.09	0.16	0.33	0.49
5	0.11	0.20	0.38	0.55
6	0.13	0.23	0.43	0.60
8	0.17	0.29	0.50	0.67
10	0.16	0.28	0.49	0.66
12	0.19	0.32	0.54	0.70
Vitreous Clay				
4	0.08	0.14	0.29	0.45
5	0.10	0.17	0.35	0.51
6	0.11	0.21	0.39	0.56
8	0.15	0.26	0.47	0.64
10	0.14	0.25	0.45	0.62
12	0.17	0.29	0.50	0.67

CRITICALITY

Based on the existing drainage system configuration, uranium-235 concentrations and physical form of residue, an inadvertent criticality is not considered a credible possibility. However, criticality scenarios should be modified if new data indicate a change in the projected maximum enrichments and concentrations, or significant collection points are identified in the drainage system. Given the mass of uranium-235 available, the cleaning of Priority 2 lines will not result in the accumulation of pressure wash water potentially achieving inadvertent criticality.

4.2 Recommendations

The recommendations with respect to remediation of the drainage systems are as follows:

1) Complete removal of designated Priority 1 paired lines and any contaminated soils that are encountered. Replacement with new lines per TI specifications.

2) Application of cleaning methods to Priority 2 lines. The sequence will proceed with line photography and initial survey, high-pressure line cleaning and liquid retention, and

resurvey of the lines. Priority 3 lines should be subject to this procedure as schedule and cost factors allow. Implementation of these procedures would be in accordance with the principle of reducing contamination and potential exposures to as low as reasonable achievable.

4.3 Limitations

Pilot-scale findings demonstrated that uncharted contaminated near-surface equipment recirculation and transfer piping may be encountered. This piping is typically identified through thorough investigation of concrete slabs above or near former equipment pads, subsurface features including sumps, and surface/subsurface trenches. These procedures will be used during full-scale characterization and decontamination operations to ensure that these features are included/validated.

Texas Instruments Incorporated

TEXAS INSTRUMENTS

34 Forest Street
P O Box 2964
Attleboro, MA 02703-0964

(508) 236-3800

18 October 1995

SENT VIA FACSIMILE

Mr. David W. Tordoff, On-Scene Coordinator
U.S. Environmental Protection Agency
Environmental Services Division
Emergency Response Section
60 Westview Street
Lexington, MA 02173-3185

Re: NPDES Exclusion Extension Request
Contaminated Soil Excavation Project
Texas Instruments Incorporated, Attleboro, MA

Dear Mr. Tordoff:

Due to larger volumes of soil requiring excavation at greater depths than originally anticipated, the above referenced soil excavation project for which an NPDES Permit Exclusion was issued on 27 July 1995, will continue longer than the 12 weeks granted in the EPA approval letter. Pursuant to the conditions specified in the approval letter, Texas Instruments Incorporated (TI) is writing to request an extension of the exclusion for an additional 18 weeks, or until 22 February 1996.

If TI does not hear anything to the contrary, we will assume this extension request has been granted. If you have any questions, feel free to contact WESTON's project engineer Mr. Lee Baronas at (603) 228-1334 or you may contact me at (508) 236-1809. Thank you for your assistance on this matter.

Sincerely yours,

MATERIALS & CONTROLS GROUP

Michael J. Elliott ljb

Michael J. Elliott
Environmental Manager
Environmental, Safety & Health Dept.

MJE:ljb

cc: Mr. Mark Roberts, U.S. NRC - Region I
Mr. Francis J. Veale, Jr., Esq., TI - Attleboro
Mr. Lee J. Baronas, WESTON

OCT 2 3 1995

TEXAS INSTRUMENTS

34 Forest Street
P O Box 2964
Attleboro, MA 02703 0964
(508) 236 3800

21 July 1995

EXPRESS MAIL
RETURN RECEIPT REQUESTED

Mr. David W. Tordoff, On-Scene Coordinator
U.S. Environmental Protection Agency
Environmental Services Division
Emergency Response Section
60 Westview Street
Lexington, MA 02173-3185

Re: NPDES Exclusion Request
Contaminated Soil Excavation Project
Texas Instruments Incorporated
34 Forest Street
Attleboro, MA 02703

Dear Mr. Tordoff:

Texas Instruments Incorporated (TI) is writing to request an emergency exclusion from the National Pollutant Discharge Elimination System (NPDES) for a soil excavation project located near Buildings 11 and 12 at TI's Attleboro, Massachusetts facility. TI is pursuing this excavation project to remediate soils contaminated with Low Level Radioactive Waste (LLRW), primarily Uranium, and to a lesser extent, Thorium. The NPDES exclusion is necessary to discharge water generated during excavation dewatering activities and during equipment and material decontamination activities. Excavation is scheduled to commence during the week of 24 July 1995 and construction activities are anticipated to continue until early October 1995. TI has undertaken this remediation project as part of a Decommissioning Plan approved by the U.S. Nuclear Regulatory Commission (NRC). Roy F. Weston, Inc. (WESTON) has been retained by TI as the Construction Manager for this remediation project.

The excavation areas from which the LLRW contaminated soil will be removed are shown on the attached figure. Approximately 9,200 cubic yards of contaminated soil will be removed. The depth of excavation is anticipated to be 4 to 6 feet below grade, although it may be as deep as 10 feet at three locations. It is anticipated that a 50 to 100 gallons per minute of groundwater and accumulated rainwater will require intermittent discharge during the excavation dewatering.

Once removed, potentially contaminated soils will be staged in the "soil processing area". The soils will be mechanically screened to remove stones and/or debris. The soils will be loaded onto rail cars for off-site disposal. The screened stones and debris will be washed to remove soil residue potentially contaminated with low level radionuclides. Construction equipment will also be decontaminated. Water used for material and equipment decontamination will be city water obtained from area hydrants. The washwater will be collected and combined with that from dewatering activities for processing prior to discharge.

The radionuclide contaminants in the subsurface at this location are typically insoluble and easily removed via conventional filtration unit operations. Therefore, we plan to pass the extracted groundwater and washwater through a proven treatment system consisting of sedimentation in one or more Frac-Tanks and filtration through a series of bag and cartridge filters prior to discharge. The same system has been successfully employed during similar remediation projects at the site in 1993 and 1994. (Exclusions from NPDES requirements were granted for these earlier operations.) The treatment system is anticipated to operate at approximately 50 to 100 gpm and will not exceed 200 gpm. Following treatment, the water will be discharged to the storm drain system with ultimate discharge at Outfall No. 004.

GENERAL INFORMATION:

Project Name: LLRW Contaminated Soil Remediation Project
Proposed Dewatering/Filtration System

Site Location: Texas Instruments Incorporated
34 Forest Street, MS 10-02
Attleboro, MA 02703

Contact: Michael J. Elliott
Environmental Manager
Materials & Controls Group, Texas Instruments Incorporated
(508) 236-1809

EPA ID No.: MAD007325814
NPDES Permit No.: MA0001791
US NRC Special Nuclear Material License No. 23

Proposed Discharge Location: Outfall No. 004 - discharges into an unnamed brook which flows into Cooper's Pond. Cooper's Pond is a tributary to the Wading River which is part of the Taunton River Watershed.

Proposed Discharge Rate: 200 gpm (maximum).

Security: All equipment related to the project will be contained within a secure area. Armed security guards also regularly patrol the entire grounds.

MECHANICAL/HYDRAULIC CONCEPTUAL DESIGN

The following describes the proposed dewatering and filtering system. This system has been used previously at the site for similar construction activities. An attached one-line diagram illustrates the proposed system.

Each excavation with groundwater present will be dewatered by pumping standing water from a shallow gravel packed sump placed at the deepest point in the excavation. The water will be withdrawn either by a gas operated trash pump or a vacuum truck and conveyed to the treatment system either by pipe/hose or by truck.

Material and equipment decontamination washwater will be collected at each decontamination area and conveyed to the treatment system either by pump or vacuum truck.

Water from excavation dewatering or decontamination activities will be pumped into one or more Frac-Tanks in series. Large solids will be allowed to settle.

A second pump will draw water from the Frac-Tank and pump it to a bag filter. The bag filter is rated for flows up to 200 gpm and has an effective size of 150 microns.

Following the bag filter, the water will be filtered through a cartridge filter with an effective size of 75 microns. This filter is referred to as cartridge filter #1. The filter is rated for 200 gpm.

The water will then be filtered through a cartridge filter with an effective size of 10 microns. This filter is referred to as cartridge filter #2 and is rated for 200 gpm.

The filtered water will be discharged to the stormwater drain system where it will flow by gravity to Outfall No. 004.

The effluent will be monitored continuously for flow as it is discharged to the storm drain. Samples will be collected for chemical analyses according to the attached schedule.

Residual sediment in the settling tanks and used filters will be disposed off-site with the contaminated soil.

MONITORING AND REPORTING PROGRAM

Effluent monitoring for radiologic and chemical content will be performed as described below:

Radiological Monitoring

In accordance with NRC regulations, the proposed dewatering is subject to regulations contained in 10 CFR 20, "Standards for Radiation Protection". Paragraph 106 states that the licensee shall not discharge an effluent stream concentration that exceeds the limits specified in Appendix B, Table II as averaged over a year. In the case of Uranium, the allowable ceiling limit for both natural and enriched forms is 3 E-5 μCi/ml. Analytical data from previous dewatering activity indicates that the unfiltered groundwater contains radioactive levels three orders of magnitude below this allowable limit.

The influent and filtered effluent will be monitored regularly to demonstrate compliance. Since the effluent may be intermittent, the sampling frequency will be based partly on volume. TI proposes to collect one grab sample every 100,000 gallons, but not more frequently than every other day during the first week of operation, followed by one sample per week for the remaining duration of the project.

Chemical Monitoring

Historical data from groundwater monitoring wells has shown that traditional organic contaminants are present at low levels in the vicinity of the project site. Monitoring is proposed as an early warning precaution, so that corrective actions can be taken should organics be detected above MCLs.

TI proposes to collect grab samples at the same frequency as for Radiological Monitoring described above. Samples will be analyzed for Aromatic Hydrocarbons (EPA Method 602) and Total Petroleum Hydrocarbons (EPA Method 418.1). Please note that Aromatic Hydrocarbons include Benzene, Toluene, Ethylbenzene and Xylene, commonly referred to as "BTEX". Samples for Total Suspended Solids analysis will be collected from the influent of each stage of filter, as well as from the effluent.

The results of the monitoring program will be submitted to your office by the 28th of each following month. Data will be reported on summary tables with the original laboratory results and QA/QC documentation attached.

TI will provide you with 24-hour notice of system start-up.

Dewatering and collection of decontamination washwater will be performed by WESTON and their subcontractors under TI's oversight. Operation and maintenance of the filtering system and influent and effluent monitoring which will be performed by TI. If you have any questions, feel free to contact WESTON's project engineer Mr. Lee Baronas at (603) 228-1334 or you may contact me at (508) 236-1809.

Sincerely yours,

MATERIALS & CONTROLS GROUP

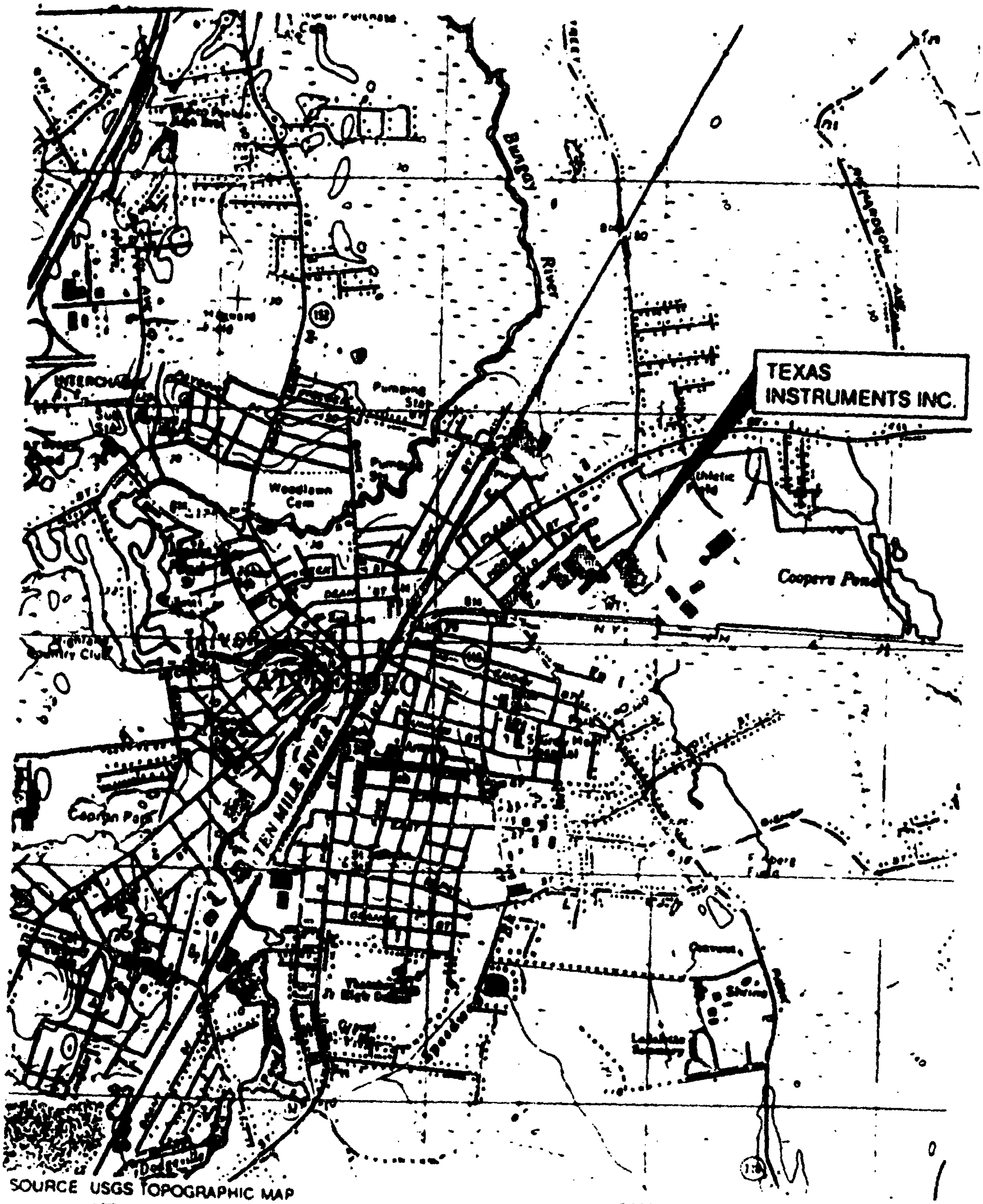
Michael J. Elliott LJB

Michael J. Elliott
Environmental Manager
Environmental, Safety & Health Dept.

MJE:ljb

Attachments

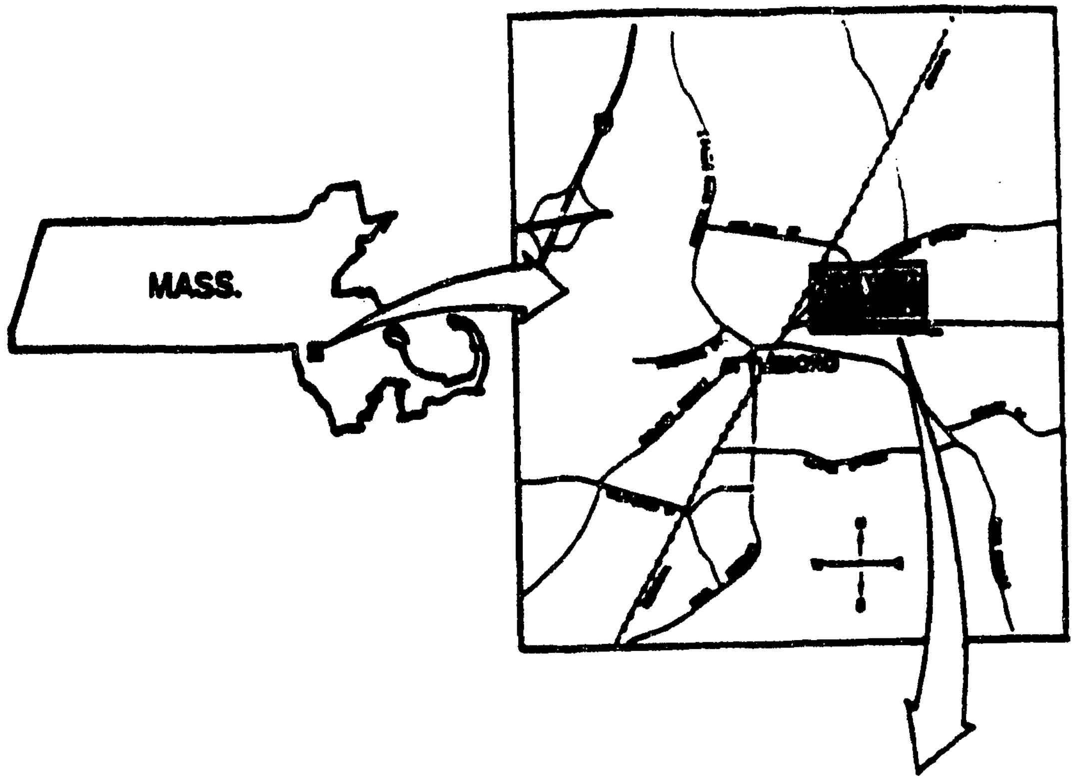
cc: Mr. Mark Roberts, U.S. NRC - Region I
Mr. Daniel V. Bartosh, Jr., TI - Dallas
Mr. John O'Donnell, TI - Dallas
Mr. Francis J. Veale, Jr., Esq. , TI - Attleboro
Mr. Lee J. Baronas, WESTON

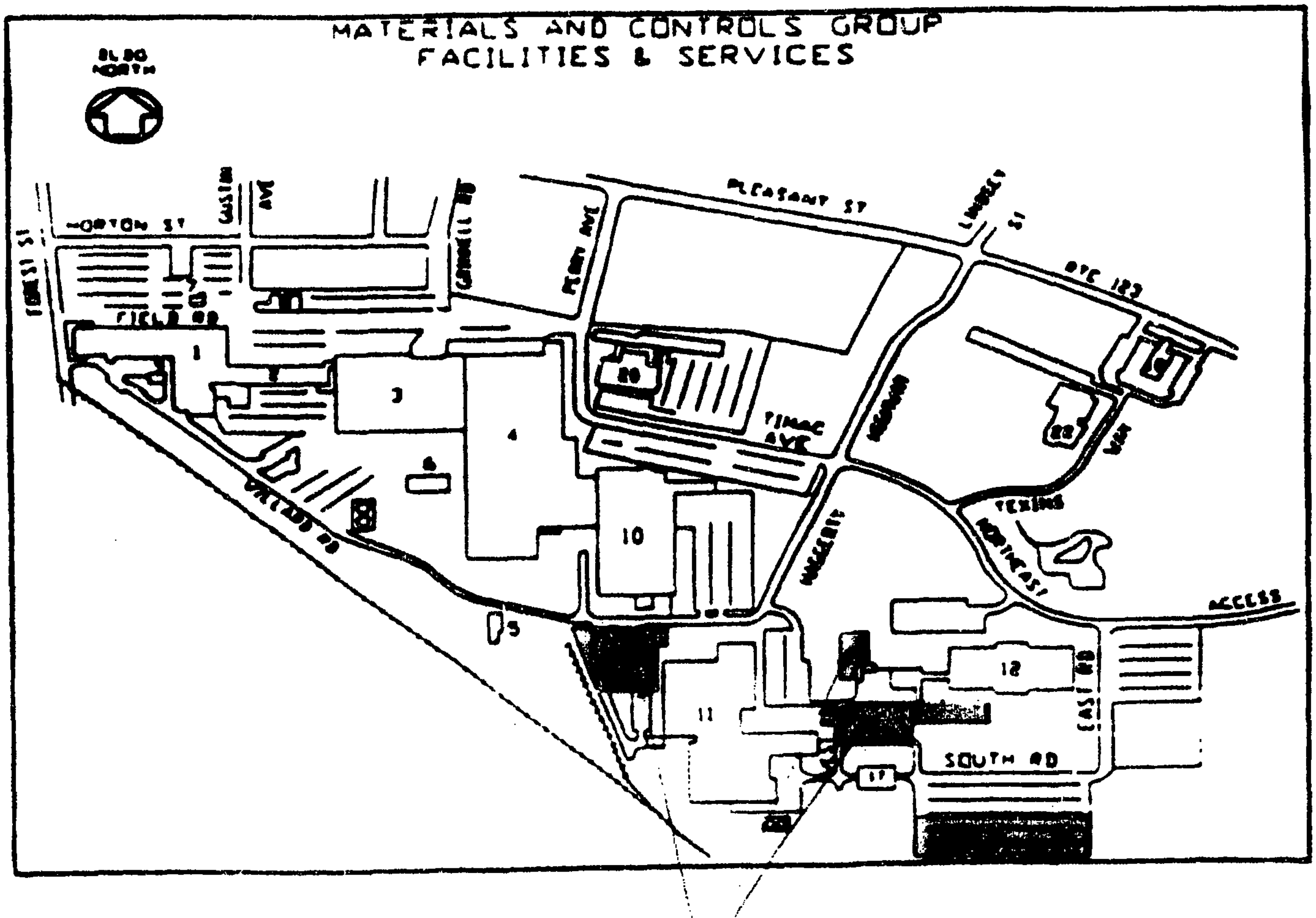


SOURCE USGS TOPOGRAPHIC MAP
ATTLEBORO MASS R I

FIGURE 1 LOCATION PLAN - TI ATTLEBORO SITE

Figure 2
Map of Massachusetts and Attleboro Showing Location and Plan View of the Texas Instruments Site.

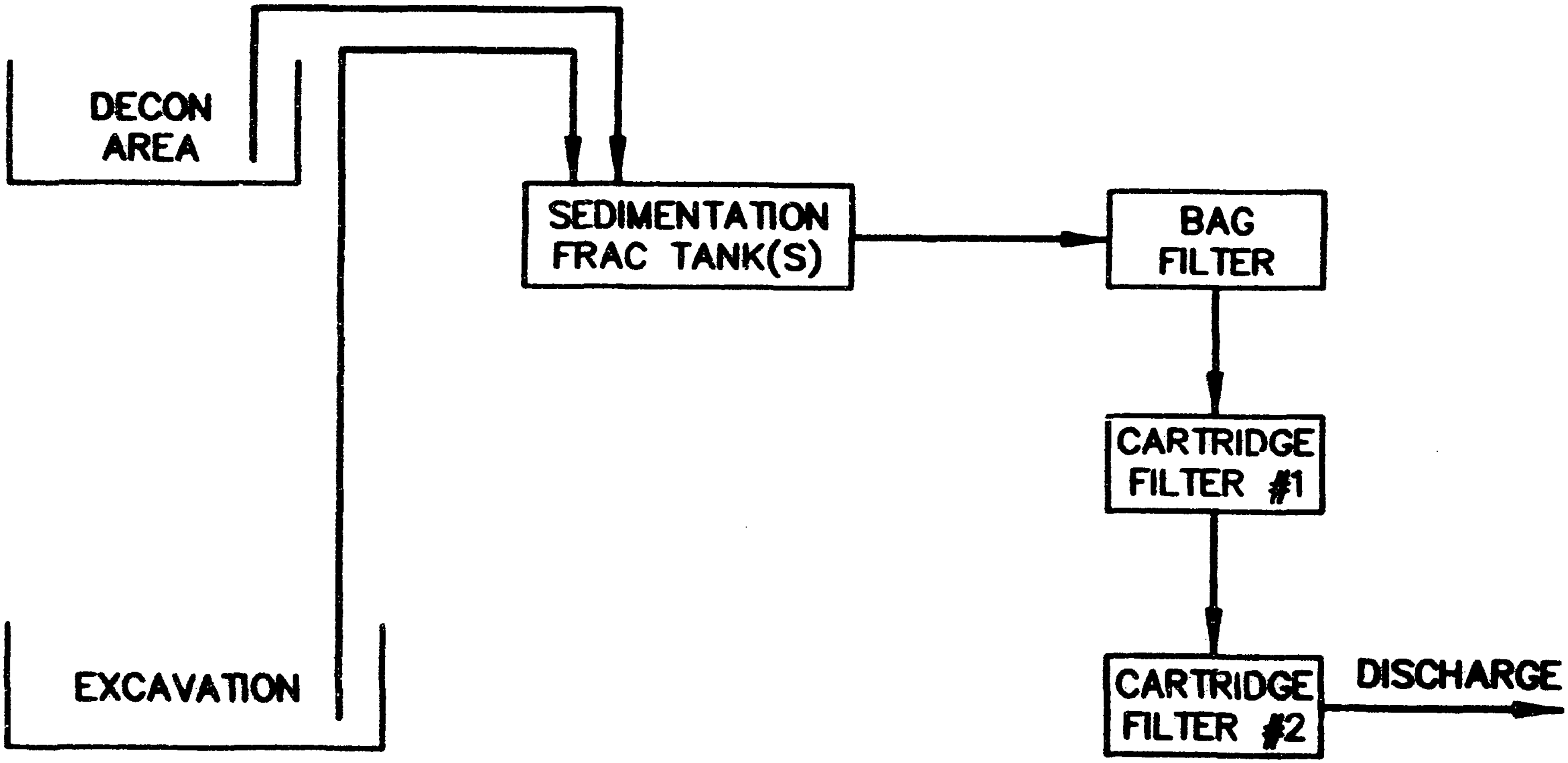




Excavation Areas — Soil Processing Area

PROPOSED TREATMENT SYSTEM

TEXAS INSTRUMENTS INCORPORATED
ATTLEBORO, MASSACHUSETTS



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

April 26, 1995

License No. SNM-23
Docket No. 070-00033
Control No. 118945

David Lederer
Remedial Project Manager
U. S. Environmental Protection Agency, Region I
J. F. K. Federal Building (HRM)
Boston, MA 02203

SUBJECT: TEXAS INSTRUMENTS, INC., ATTLEBORO, MASSACHUSETTS

Dear Mr. Lederer:

On March 23, 1994 Mark Roberts and I discussed the status of the Texas Instruments, Inc. site on Forest Avenue in Attleboro, Massachusetts with you at the Environmental Protection Agency (EPA) Region I office in Boston, Massachusetts. That exchange of information helped us understand some of the concerns that the EPA has in regard to the Attleboro site and the Shpack Landfill site in Norton, Massachusetts where radioactive material from the Attleboro facility has allegedly been disposed. This letter is to [illegible] request that the EPA identify and communicate to the NRC any [illegible] concerns that the EPA may have concerning radioactive contamination at the Forest Avenue site or the termination of License No. SNM-23.

Since you explained that your involvement has been primarily [illegible] site, the following historical information about the Texas [illegible] Attleboro site is provided to clarify the Nuclear Regulatory [illegible] relationship to the site. The General Plate [illegible] of Metals and [illegible] Inc., began to fabricate enriched uranium fuel [illegible] in Attleboro, Massachusetts in 1957. In 1959 Metals and Controls merged with Texas Instruments who continued operations at the site using enriched and natural uranium for the fabrication of nuclear fuel for U.S. Navy and commercial customers from 1959 through 1981. Fabrication and associated activities were conducted at various buildings on the Attleboro site under contract to the Atomic Energy Commission (AEC) and under an AEC (later an NRC) license. The current NRC license for the site is License No. SNM-23. Due, in part, to the presence of the buried contaminated soil and scrap on the site discussed below, in 1990 the NRC placed the Texas Instruments Attleboro site on its Site Decommissioning Management Plan (SDMP) list as a means to elevate NRC attention to the site and ensure more timely decommissioning.

Following the cessation of active operations using NRC licensed material, Texas Instruments, although still licensed by the NRC, began decommissioning the areas of the site where licensed radioactive material had been used. A number of the buildings were cleaned and surveyed for radioactive contamination in 1985 and released for unrestricted use since residual contamination levels met appropriate NRC guidelines. In addition to the radioactive contamination in the buildings, an unknown quantity of uranium contaminated soil and metal scrap had been buried on site (in an area which is now between Buildings 11 and 12).

In July 1992 Texas Instruments submitted a decommissioning plan for the burial area. The plan was approved by the NRC in August 1992 and Texas Instruments initiated the remediation activities. NRC confirmatory measurements following the completion of the remediation activities identified additional contaminated areas adjacent to the remediated areas. Texas Instruments submitted additional decommissioning plans that were approved by the NRC and implemented in the summer of 1993. A final radiological survey was conducted by Texas Instruments' contractor and submitted to the NRC in September 1993.

With the submission of the final survey report for the burial area, Texas Instruments submitted a request for the NRC to terminate License No. SNM-23 and release the facility for unrestricted use. In response to this request and following NRC review of the final survey report, the NRC requested its contractor, the Oak Ridge Institute for Science and Education (ORISE) to perform measurements and surveys to confirm that these areas have been remediated to meet the NRC's decommissioning criteria for release for unrestricted use. The ORISE survey did not identify any areas that exceed the NRC decommissioning criteria and the February 1994 ORISE confirmatory survey report documents these findings. A copy of this report is enclosed.

In late 1993 Texas Instruments discovered additional soil contaminated with uranium on the site. During 1994 they remediated that contamination and conducted a thorough review of the entire site to ensure that all contaminated areas have been identified. Additional areas of contamination were identified during this review. Those areas are scheduled to be remediated in 1995.

We are currently considering a request from Texas Instruments to approve the site characterization and their final decommissioning plan. Shortly, we will publish a Federal Register Notice requesting comments on the final plan and informing the public of the opportunity for a hearing. While a final decision has not yet been made, we expect to resolve any comments or questions concerning the final decommissioning plan and approve final decommissioning of the site. Following implementation of the plan, Texas Instruments will provide a final survey and we will conduct a confirmatory survey.

We will evaluate the submissions from Texas Instruments, the ORISE confirmatory survey report, the confirmatory surveys following the remediation now under way, and historical information concerning the site in order to determine if the entire site can be released for unrestricted use. Based on the information now available to me, it is likely that, following implementation of the final decommissioning plan, in late 1995 or early 1996, we will be prepared to release the site for unrestricted use and terminate License No. SNM-23.

The NRC believes that the decision to terminate License No. SNM-23 and release the Forest Avenue site for unrestricted use may be done without resolution of all concerns regarding radioactive material at the Shpack Landfill. Since it is our understanding that EPA has regulatory authority regarding the radioactive contamination at the Shpack Landfill site and since that site is not licensed, NRC does not plan involvement in that matter. The NRC will, of course, continue to cooperate with and make available to the EPA any information it has following termination of the license.

We would appreciate a formal response to this letter by August 1, 1995 so that we can continue our reviews, consider your views and comments and complete action on the request to terminate License No. SNM-23.

Please contact Mark Roberts at (610) 337-5094 or me at (610) 337-5252 should you have any questions concerning this letter or would like to discuss this matter further.

Thank you for your cooperation in this matter.

Sincerely,

John R. Kinneman, Chief
Site Decommissioning Section
Division of Radiation Safety
and Safeguards

Enclosures:
Confirmatory Surveys of the [illegible]
[illegible]

[illegible]

[illegible]
Radiation Control Program
Commonwealth of Massachusetts
Department of Health
150 Tremont St., 11th Floor
Boston, MA [illegible]

Alexander Williams, Ph.D
EM 421 Cloverleaf Building
19901 Germantown Road
U.S. Department of Energy
Germantown, MD 20874-1290

Jim Kopotic, Former Sites
Restoration Division
Oak Ridge Operations Office
U.S. Department of Energy
P.O. Box 2001
Oak Ridge, TN 37831-2001

D. Lederer
U.S. Environmental Protection Agency

cc w/o encl:

Michael Elliott
Environmental Manager
Texas Instruments, Incorporated
34 Forest Street
Attleboro, MA 02703

<u>Distribution w/encl:</u>
Region I Docket Room (w/concurrences)
PUBLIC
M. Weber, NMSS
W. Hehl, RI
J. Joyner, RI
S. Shankman, RI
D. Chawaga, RI
J. Roth, NMSS

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OFFICE	RI:DRSS	C	RI:DRSS	E	RI:DRSS	N				
NAME	MCRoberts		JDKinneman		Joyner					
DATE	4/ /95		4/25/95		4/14/95					

OFFICIAL RECORD COPY

TELEPHONE CONVERSATION RECORD	Date:2/16/95	Time:2:45
Mail Control No.:None	License No.: SNM-23	Docket No.: 070-00033
Person Called:James P. Mooney Health Agent Director	Organization: Attleboro Health Dept.	Telephone Number:(508) 223-2222
Person Calling: Mark Roberts		
Subject: Well water use in the Holden Street area of Attleboro		
Summary: There is a city well located along the Bungay River near Bank Street . This well is immediately downstream of the Holden Street fill area. The well was a secondary source of water to the municipal supply and was used only in high water use periods in the summer. The well has not been used in approximately the last 7 years since the water has high levels of iron and manganese (the water meets potable standards, however the taste and color were not acceptable). The well is in the shallow aquifer. For approximately the last 50 years, the homes in the Holden Street area are virtually 100% served by the municipal water system, the source of which is an entirely different watershed than the Bungay River watershed. Mr. Mooney was not aware of any potable water wells in the general area of Holden Street. The city has not had any problems meeting EPA drinking water standards for radioactivity. D 2/21/95		
Action Required/Taken:Place info. in TI file		
Signature:	Date: 2/16/95	

OFFICIAL RECORD COPY ML 10

1 1 8 9 4 5

Texas Instruments Incorporated

TEXAS INSTRUMENTS

34 Forest Street
P.O. Box 2964
Attleboro, MA 02703 0964

(508) 236-3800

January 12, 1995

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

SNM No. 23
Docket No. 70-33

Mr. Mark Roberts
NUCLEAR REGULATORY COMMISSION
Region I, NMSS
475 Allendale Road
King of Prussia, PA 19406

Dear Mr. Roberts,

As you requested at a meeting in your offices on November 23, 1994, Texas Instruments Incorporated (TI) is submitting all available survey information that was collected during the Supplemental Radiological Survey for the area bordering the southern portion of Building 11.

The relevant information is attached in a letter from TI's health physics consultant, CPS, dated January 10, 1995. This information will also be included in the Supplemental Radiological Survey Report to be submitted presently.

If I can be of further assistance on this matter, or if you have any questions, please do not hesitate to contact me at (508)236-1809.

Sincerely,

MATERIALS & CONTROLS GROUP
ENVIRONMENTAL, SAFETY, AND HEALTH DEPARTMENT

Michael J. Elliott
Environmental Manager

Encl.

118945

TELEPHONE CONVERSATION RECORD	Date:1/11/95	Time:08:30
Mail Control No.: 118945	License No.: SNM-23	Docket No.: 070-00033
Person Called:Mark Roberts	Organization: Texas Instruments	Telephone Number:(508) 236-1809
Person Calling: Michael Elliott		
Subject: Additional contamination found at Attleboro site		

Summary: Mr. Elliott informed me that surveys performed in support of the decommissioning of the Attleboro, MA facility identified Ra-226 contamination inside Building 1. GM and NaI survey meter readings were a few times background. A qualitative sample analysis identified the contaminant as Ra-226. Additional measurements are underway, including an evaluation of airborne Rn-222 (and progeny), and a consultant has been retained to prepare a report that will be submitted to the Commonwealth of MA.

Mr. Elliott also stated that remediation work would commence in a few weeks on the fixed contamination areas identified in Buildings 4 and 10. Work would be performed by Bartlett Nuclear.

Survey results for an area behind Building 11 are scheduled to be sent to me my next Monday (1/16). This is the area where material was apparently removed to the Holden Street fill area. After review of this information, I can complete the evaluation of the Holden Street area.

Action Required/Taken: Inspect remediation work in a couple of months (look at Ra-226 area if desired). Review Building 11 survey data as soon as reasonably possible after receipt.

Signature:	Date:1/11/95 ⓓ 1/12/95

OFFICIAL RECORD COPY ML 10

November 16, 1994

MN NO. 94-135

U. S. Nuclear Regulatory Commission
Region I
Notice of Licensee Meeting

Name of Licensee:	Texas Instruments, Incorporated 34 Forest Street Attleboro, Massachusetts 02703
Name of Facility:	Texas Instruments, Incorporated
Docket No.	070-00033
Time and Date of Meeting:	8:30 a.m., November 23, 1994
Location of Meeting:	U. S. Nuclear Regulatory Commission 475 Allendale Road DRSS Conference Room King of Prussia, Pennsylvania 19406
Purpose of Meeting:	Open meeting to present supplement to site characterization and remediation plant for Texas Instruments, Incorporated Attleboro site.
NRC Attendees:	James H. Joyner, Chief, Facilities Radiological Safety and Safeguards Branch John D. Kinneman, Chief, Site Decommissioning Section (SDS) Mark C. Roberts, Senior Health Physicist, SDS
Licensee Attendees:	Francis J. Veale, Jr., Environmental Safety & Health Manager Michael J. Elliott, Environmental Manager Mark Griffon, Consultant, CPS, Incorporated

Note: This Meeting is OPEN to the public. Attendance by NRC personnel should be made known by 5:00 p.m. on November 21, 1994 via a telephone call to Mark Roberts, Region I, 475 Allendale Road, King of Prussia, Pa 19406, (610) 337-5094. Handicapped persons requiring assistance to attend or participate in the meeting should make their requests known to Mr. Roberts no later than two business days prior to the meeting.

Prepared By: Original Signed By:
Mark C. Roberts, Senior Health Physicist
Site Decommissioning Section

Approved By:
John D. Kinneman, Chief
Site Decommissioning Section

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Hugh L. Thompson, Jr., Deputy Executive Director for
Nuclear Materials Safety, Safeguards and Operations Support
James Lieberman, Director, Office of Enforcement
Robert M. Bernero, Director, Office of Nuclear Material
Safety and Safeguards
William M. Dean, Regional Coordinator, EDO
Carl Paperiello, Director, Division of Industrial
and Medical Nuclear Safety, NMSS
Malcolm Knapp, Director, Division of Waste Management, NMSS
John H. Austin, Chief, LLW and Decommissioning Projects Branch, NMSS
John E. Glenn, Chief Medical, Academic, and Commercial
Use Safety Branch, NMSS
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RA Secretary
DRA Secretary

DOCUMENT NAME: G:TI.MTG

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OFFICE	RI:DRSS	C	RI:DRSS	C					
NAME	Roberts mCR		Kinneman						
DATE	11/16/94		11/ /94						

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TEXAS INSTRUMENTS

November 2, 1994

Effective 24 October 1994, Texas Instruments Attleboro, Massachusetts, USA, telephone exchange will change from 699 to 236. The new switchboard number will be 508-236-3800. You can dial directly using 508-236-xxxx (all extensions will remain the same).

Mr. Mark Roberts, CHP
Senior Health Physicist
U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406

Dear Mark,

Pursuant to our conversation of today, I am formally writing to request that History Associates Incorporated (HAI) of Rockville, Maryland be allowed to review Texas Instruments Incorporated (TI), Materials & Controls Group's files at your facility. HAI has been retained to assist TI in developing a systematic history of our nuclear business. We therefore authorize HAI to review all documents on our behalf.

It is my hope that you can accommodate them the week of November 7, 1994. I will have my office or HAI contact you to obtain a convenient time. I appreciate your assistance in this matter.

Sincerely yours,

Materials & Controls Group

Francis J. Vinale

Francis J. Vinale, Jr.
Environmental, Safety, and Health
Department Manager
Attorney at Law

cc: Mike Elliott, TI
Kathy Nawyn, HAI

118945
NOV - 7 1994

TEXAS INSTRUMENTS

June 27, 1994 BY FACSIMILE

License No. SNM-23
Docket No. 70-33
Control No. 118945

Mr. Mark Roberts
U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406-1415

Re: Request for a meeting on June 28, 1994 at 2:30 p.m.

Dear Mr. Roberts,

In recent weeks, we have engaged in numerous conversations concerning site decommissioning for the Attleboro facility of Texas Instruments Incorporated (TI). In order to elucidate the general approach and concepts that TI is developing in this regard, I am writing to respectfully request a meeting at the Region I offices in King of Prussia. If it is convenient, I would like to suggest a meeting at 2:30 p.m. on Tuesday, June 28, 1994.

TI will be represented by Francis J. Veale Jr., ESH Manager, and myself, Environmental Manager. Since there is really only one topic of discussion, I would estimate that the discussion might last an hour or two at most.

The meeting discussion will center on TI's plans to perform additional site characterization surveys, and if necessary additional remediation efforts, at several locations. These locations are considered to possess a potential for contamination either because of data contained in earlier survey documents, or due to historical or anecdotal evidence that nuclear materials were previously managed in such locations. To help guide the discussion, TI has prepared a site drawing with symbols representing each of the potential suspect locations.

Based on the opinion and guidance gleaned from this meeting, TI will formulate an action plan, submit it to the NRC for approval if deemed necessary, and proceed accordingly.

I look forward to seeing you tomorrow.

Sincerely yours,
MATERIALS & CONTROLS GROUP

Michael J. Elliott

Michael J. Elliott
Environmental Manager

TEXAS INSTRUMENTS INCORPORATED • 34 FOREST STREET • ATTLEBORO, MA 02703
508-699-3800 • TELEX 210901 • CABLE TEXINS

118945

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
ENVIRONMENTAL SERVICES DIVISION
60 WESTVIEW STREET, LEXINGTON, MASSACHUSETTS 02173-3185

RECEIVED
MAY 03 1994
MICHAEL J. ELLIOTT

April 28, 1994

Mr. Michael Elliott
Texas Instruments, Inc.
34 Forest Street
Attleborough, Massachusetts 02703

Re: NPDES Permit Exclusion for dewatering during soil excavation at your Metals Recovery Site, 34 Forest Street.

Dear Mr. Elliott:

Based on information provided in your April 20th letter, I grant you, pursuant to 40 CFR 122.3(d), an emergency exclusion from the National Pollution Discharge Elimination System (NPDES), in order that dewatered during soil excavation may be performed at the referenced location.

Subject to other controls that may be established by the State of Massachusetts, and the Town of Attleborough, you are authorized to discharge up to 100 gallons per minute of treated water from a treatment system consisting of groundwater depression leading to a holding and settling tank, then through a bag filtration unit, and then through two particulate filters prior to discharge into an unnamed tributary of Cooper's Pond. Operations must be conducted in accordance with the following conditions:

1. No discharge of oil, sufficient to cause a sheen (as defined in 40 CFR 110), occurs to the tributary. The discharge of a sheen of oil constitutes an oil spill and must be reported, immediately, by you or your contractor to the National Response Center [(800) 424-8802.

2. Security provisions are maintained to assure that system failure, vandalism, or other incident will be addressed in a timely fashion, preventing the loss of oil or contaminated water to the receiving waters.

3. Sampling and analysis, in accordance with EPA methods, is performed for Benzene, Toluene, Ethyl Benzene, and Xylenes (BTEX). Total BTEX is not to exceed 100 ppb, while Benzene may not exceed 5 ppb. Total Petroleum Hydrocarbons may not exceed 5 ppm. The liquid effluent may not exceed the levels prescribed in 10 CFR 20.106 for radioactivity. Co-60 may not exceed 3.0 x 10-5. Cs-137 and Eu-154 may not exceed 2.0 x 10-55. Eu-152 may not exceed 8.0 x 10-5, and no other radionuclide may exceed 3.0 x 10-6.

Sampling and analysis of the influent to particulate removal, between filters (if more than one is used in series), and the effluent to the unnamed tributary, is to be conducted every other day for the first week of operations, then at least weekly for the balance of operations.

Analytical Reports, with quality control information, are to be reported to the DEP Regional Engineer, and to this office by the 28th of the following month.

4. You, or your representative, provide 24 hours notice of system start-up, if start-up occurs after April 29, 1994.

This exclusion is granted for a period of four weeks. Although four weeks, with a flow of up to 100 gpm is anticipated, the exclusion may be adjusted, verbally, based on operational conditions (ie; adverse weather).

If any questions should arise, please do not hesitate to contact me at (617) 860-4362.

Sincerely,

David W. Tordoff
On-Scene Coordinator
Emergency Response Section

cc:	T. Landry	USEPA-Permits
	K. Keohane	Mass DEP-DWPC
	L. Domizio	Mass DEP-DSHW
	J. Kowell	Mass DEP-DSHW

-MSG M#= 00834008 FR=EXST TO=MJE   SENT=04/25/94 12:27 PM
R#=194 ST=C DIV=0050 CC=00514 BY=EXST AT=04/25/94 10:19 AM
msg

ALERT!! ALERT!!

ATTLEBORO SUPERVISORS' BULLETIN

NUCLEAR REMEDIATION UPDATE

April 25, 1994 94:065

As part of the final decommissioning of the site's nuclear materials license, the site's Environmental Engineering team conducted a survey of all areas on site where nuclear activity was known to have taken place during the time TI was in the nuclear fuel business in the 1950s and 60s.

Some evidence of contaminated soils was found in the Metals Recovery area in the vicinity of Building 5. Further sampling has confirmed the need to remove soil from the vicinity of the building. This work is expected to begin on Thursday, April 28; however site preparation is already in process.

The material to be removed is low-level radioactive material that poses no significant risk to public health or the environment. A health physicist will be present during the excavation to monitor exposure levels and oversee removal operations.

Once the soil is removed, it will be screened and packaged for transport to a licensed nuclear disposal site. The area will then be sampled again and landscaping will be restored.

Anyone with questions on the project is invited to call Environmental Engineering at X1809.

Mike Elliott

****

OFFICIAL RECORD COPY MT. 10 118945

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TEXAS INSTRUMENTS

April 23, 1994

SNM Lic. No. 23
Docket No. 70-33
Control No. 118945

Mr. Mark Roberts
U.S. Nuclear Regulatory Commission
Region 1
475 Allendale Road
King of Prussia, PA 19406

Re: Texas Instruments Incorporated
Metals Recovery Area (Bldg-5) Soil Excavation

Dear Mr. Roberts,

Per your request, I am forwarding information regarding TI's project to remediate contaminated soils at the Metals Recovery Area in the vicinity of Building 5 at our Attleboro site. As we discussed, TI has retained the same contractors that were used for the large Former Burial Site Remediation during 1992 and 1993. Therefore, this is an experienced team. We have learned from our past experience, both the positive and the negative, and we have incorporated these lessons into our planning.

In preparation for the excavation, TI has has invested a significant effort in the planning and assessment activities. TI is confident that the vertical and horizontal extent of the contamination has been accurately delineated. TI has organized several planning meetings with the entire project team to coordinate the project and plan for contingencies. Below, I will describe,in outline form, some of the major elements of this project.

1.0 Estimated Volume Requiring Excavation = 9700 cu. ft.

2.0 Description of the three locations within the Metals Recovery Area (Please refer to the attached drawings)

2.1 The baseline excavation covers an area of approximately 1000 sq. ft. It is an undeveloped, un-paved area behind Bldg-5. The majority of the excavation will extend two feet below the surface, but in a few locations deeper, and in one location down to six feet. The total expected volume is approximately 3500 cu. ft.

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APR 23

When Frank Veale and I contacted you on March 24, 1994, we indicated that the total Uranium concentrations were in the hundreds and even thousands of picocuries per grams (pCi/gm). This information was based on only four samples collected in November of 1993 from the most contaminated locations. Since then, we have performed extensive soil sampling during March and April of 1994 to characterize the area. It turns out that the average concentration of contamination is on the order of 100-200 pCi/gm or less, and that there are only a handful of samples in the 1000 range.

2.2 Outlying Area No. 1. This is not far from the Baseline Excavation Area, and it covers an area of approximately 200 sq. ft. It is located on the western boundary fenceline. Half the area is open soil (outside the fence), and half the area is under pavement. The expected volume from this location is approximately 200 cu. ft.

Soil borings have indicated that the contamination at this location is confined to a thin layer 4 to 6 inches thick. Concentrations are mostly on the order of 100-200 pCi/gm or less with an occasional higher value in some spots on the order of 1000 pCi/gm.

2.3 Outlying Area No. 2. This area is entirely covered by pavement. It is located near a small wooden structure known as the skid shack. It covers approximately 6000 sq. ft., and the expected volume is 6000 cu. ft.

Soil borings have documented a layer of contamination below the asphalt with a thickness ranging from 4 to 8 inches. Concentrations are mostly on the order of 100-200 pCi/gm or less with an occasional higher value in some spots on the order of 1000 pCi/gm.

3.0 Schedule

3.1	Excavate, process soils, sample, and backfill Baseline Area and Outlying Area No. 1. Duration = 1 week.	4/28
3.2	Transport first shipment of 8 Dump Trailers to Envirocare.	5/6

3.3	Excavate, process soils, sample, and backfill Outlying Area No. 2. Duration = 1 week.	5/9
3.4	Transport second shipment of 8 Dump Trailers to Envirocare.	5/14
3.5	Decontaminate work area. Duration = 3 days	5/16
3.6	Transport final shipment of Dump Trailers to Envirocare. (Not more than 8)	5/23
3.7	Restore area to original condition. Duration = 3 days	5/24
3.8	Project Complete	5/27

4.0 Project Team

4.1 Project Manager:
Michael Elliott
Environmental Manager
TI - Materials & Controls Group

4.2 Health Physics Consultant:
CPS, Inc.
Lowell, MA

4.3 Excavation Contractor:
Franklin Environmental, Inc.
Wrentham, MA

4.4 Structural Engineering Consultant:
Odeh Engineers, Inc.
North Providence, RI

4.5 Other specialties within TI:
Facilities, Human Resources, Security, Safety, Chemical Control, Wastewater Treatment, and Purchasing.

I am confident that with the planning and preparation that has preceded this project, and the experience of the project team, it will be successfully accomplished in a timely and professional manner. I hope that the above outline provides you with a clear understanding of our intended course of action. If It is not clear, or if if you would like further detail, I would be more than willing to visit your offices in King of Prussia if that is more convenient for you and your staff. Please do not hesitate to contact me if that is the case.

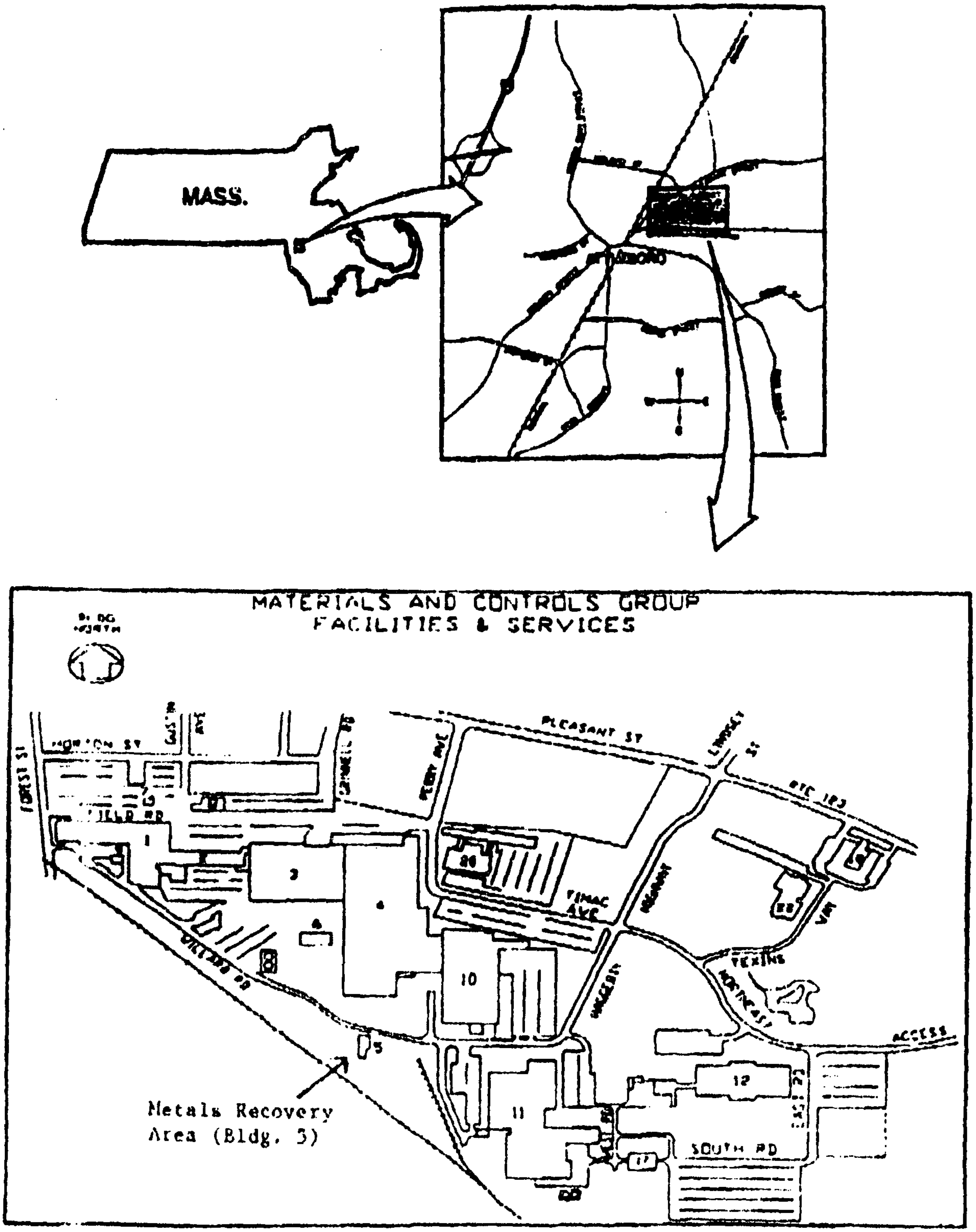
Sincerely yours,
Materials & Controls Group

Michael J. Elliott

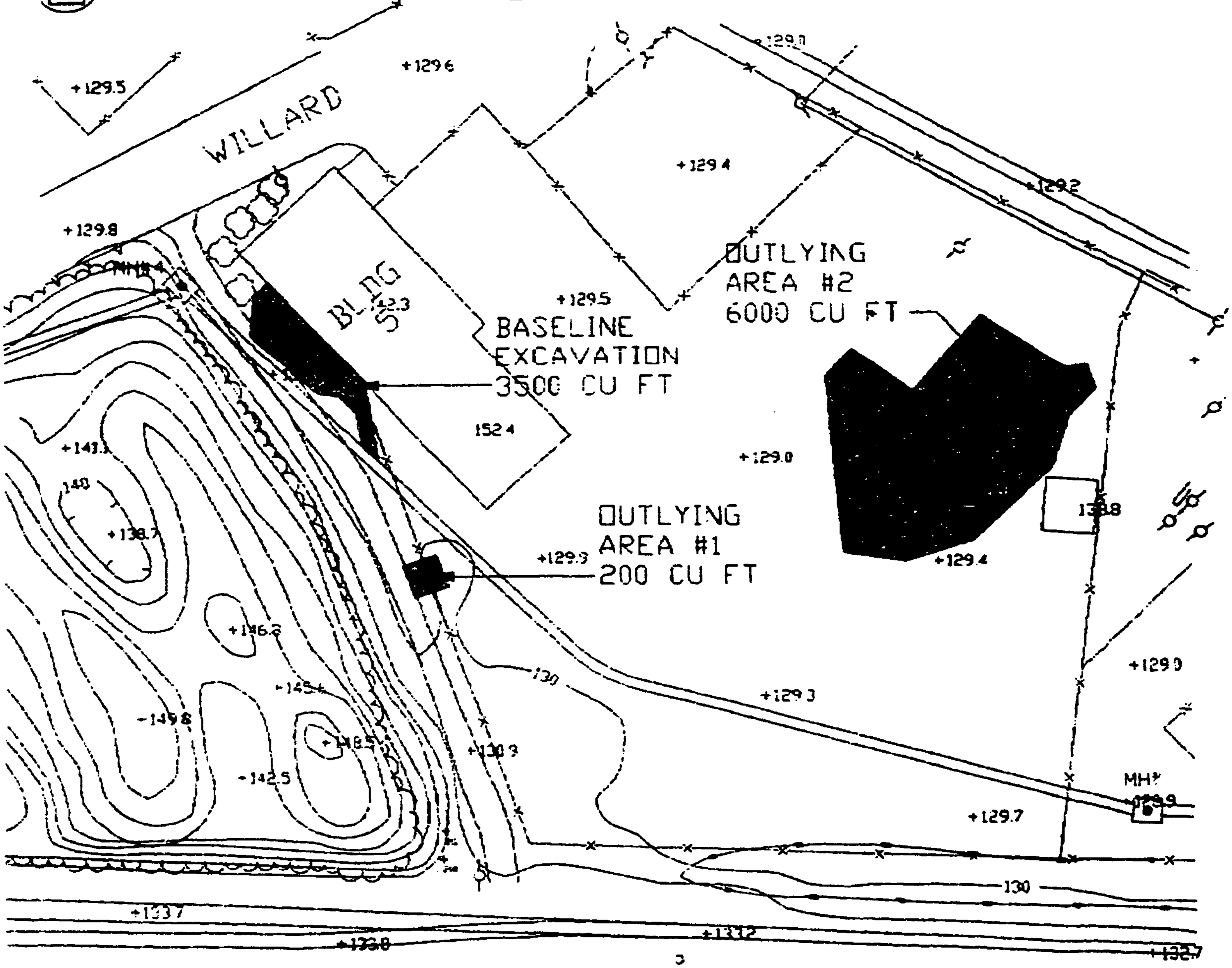
Michael J. Elliott
Environmental Manager

CC: Mr. Francis J. Veale Jr., Esq. - ESH Manager, Attleboro
Mr. John O'Donnell - Corporate RSO, Dallas
Mr. M. Dean Chapman - Site RSO, Attleboro

Figure 2.1
Map of Massachusetts and Attleboro Showing Location and Plan View of the Texas Instruments Site.



MATERIALS AND CONTROLS GROUP
ENVIRONMENTAL-SAFETY-INDUSTRIAL HEALTH
METALS RECOVERY - BUILDING 5
EXCAVATION PLAN



118845

TEXAS INSTRUMENTS

April 20, 1994

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. David W. Tordoff, On-Scene Coordinator
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Environmental Services Division
Emergency Response Section
60 Westview Street
Lexington, MA 02173-3185

Re: Request for Exclusion From NPDES Requirements
Metals Recovery Area (Bldg-5) Soil Excavation
Proposed Start Date - April 28, 1994
Texas Instruments Incorporated
34 Forest Street
Attleboro, MA 02703

Dear Mr. Tordoff:

Texas Instruments Incorporated (TI) is writing to request an emergency exclusion from the National Pollutant Discharge Elimination System (NPDES) for a soil excavation project located adjacent to the Metals Recovery Area (Bldg-5) at TI's Attleboro, Massachusetts facility. TI is pursuing this excavation project to remediate soils contaminated with low levels of radioactive material, primarily Uranium, and to a lesser extent, Thorium. The excavation is expected to generate somewhere between 100 and 150 cubic yards of soil. Excavation is scheduled to commence on April 28, 1994, and it is expected to be complete by mid-May. TI is authorized to perform this remediation in accordance with its special nuclear material license administered through the U.S. Nuclear Regulatory Commission (NRC).

The sole purpose of the exclusion permit is to evacuate groundwater should it be encountered during the excavation. Given the fact that the majority of the excavation will not penetrate more than two to three feet below the surface, and groundwater is generally six feet below the surface at this location, we do not expect to generate large volumes of water. Therefore, this project will not generate a continuous flow, but rather, an intermittent flow when groundwater is encountered.

The radionuclide contaminants that one finds in the subsurface at this location are insoluble and easily removed via conventional filtration unit operations. Therefore, TI plans to pass the extracted groundwater prior to discharge through a proven treatment system consisting of a series of bag and cartridge filters. (Last year TI successfully employed the same system in a similar application for which an exclusion permit was issued on May 3, 1993. In that case, the system was sized to treat a continuous flow of up to 125 gpm. It ran for a period of approximately one and a half months, and successfully removed the radionuclides of concern to below detectable limits ,i.e. well below the applicable discharge limits.)

GENERAL INFORMATION:

Project Name: Metals Recovery Area Soil Excavation
Proposed Dewatering/Filtration System

Site Location: Texas Instruments Incorporated
34 Forest Street, MS 10-02
Attleboro, MA 02703

Contact: Michael J. Elliott
Environmental Manager
(508) 699-1809

EPA I.D. No: MAD007325814
NPDES Permit No: MA0001791
U.S. NRC Special Nuclear Material License No. 23

Proposed Discharge Location: Outfall No. 005 - This outfall discharges into an un-named brook that flows into Cooper's Pond. Cooper's Pond is a tributary to the Wading River which is part of the Taunton River Watershed.

Discharge Rate: 50-100 gpm. The exact volume will be determined in the field.

Security: All equipment related to this project will be contained within a fenced and locked area. Armed security guards regularly patrol the entire grounds including this area.

MECHANICAL/HYDRAULIC CONCEPTUAL DESIGN:

The following is an outline of the proposed dewatering and filtration system. Refer to the attached schematic line diagram representing the same information.

- A perforated drum shall be located in the deepest section of the excavation area with a suction line connected to pump #1, gas operated trash pump or electric sump pump.

- A 400 gallon baffled tank will receive flow from pump #1. Large settleable solids will be removed by returning flow to the excavation as needed.

- A second pump will draw from the stilling tank and supply pressurized flow to a bag filter rated for flows to 100 GPM.

- The pressurized flow will continue through cartridge filter #1 containing forty 30" cartridge filters.

- The flow will continue to cartridge filter #2, removing suspended solids to the target particle size (10 microns or less).

- The discharge will drain to outfall #005. When operating the effluent will be monitored continuously for flow. Samples will be collected for radiological and chemical analysis according to the schedule described below.

Manufacturers' specifications from the MWM Company are attached. These describe the proposed filtering equipment for this project.

MONITORING AND REPORTING PROGRAM:

Effluent monitoring can be divided into two categories: one being radiological, and the other being chemical.

1. Radiological Monitoring

In accordance with NRC regulations, the proposed dewatering project is subject to regulations contained in 10 CFR 20, "Standards for Radiation Protection." In particular, paragraph 106 states that the licensee shall not discharge an effluent stream concentration that exceeds the limits specified in Appendix B, Table II as averaged over a year. In the case for Uranium, the regulations place an allowable ceiling limit for both Natural and Enriched forms at 3.0 E-5 μCi/ml.

The filtered effluent will be monitored on a regular basis to demonstrate compliance. Since the effluent will be intermittent, the sampling frequency will be based primarily on volume. TI proposes grab one sample every 100,000 gallons, but not more frequently than three(3) times in the first week, and not more than once per week thereafter.

2. Chemical Monitoring

TI proposes to collect grab samples at the same frequency as the Radiological Monitoring Samples will be analyzed for Aromatic Hydrocarbons (EPA Method 602), and Total Petroleum Hydrocarbons (EPA Method 418.1). (Note that Aromatic Hydrocarbons include Benzene, Toluene, Ethyl-Benzene, and Xylene "BTEX".)

The results of the monitoring program will be submitted to your office by the 28th day of the following month. Data will be reported on summary tables with the original laboratory results and QA/QC documentation attached.

Please feel free to contact me if you have any questions or concerns. I would be happy to supply any additional information which you may deem necessary.

Sincerely,

MATERIALS AND CONTROLS GROUP

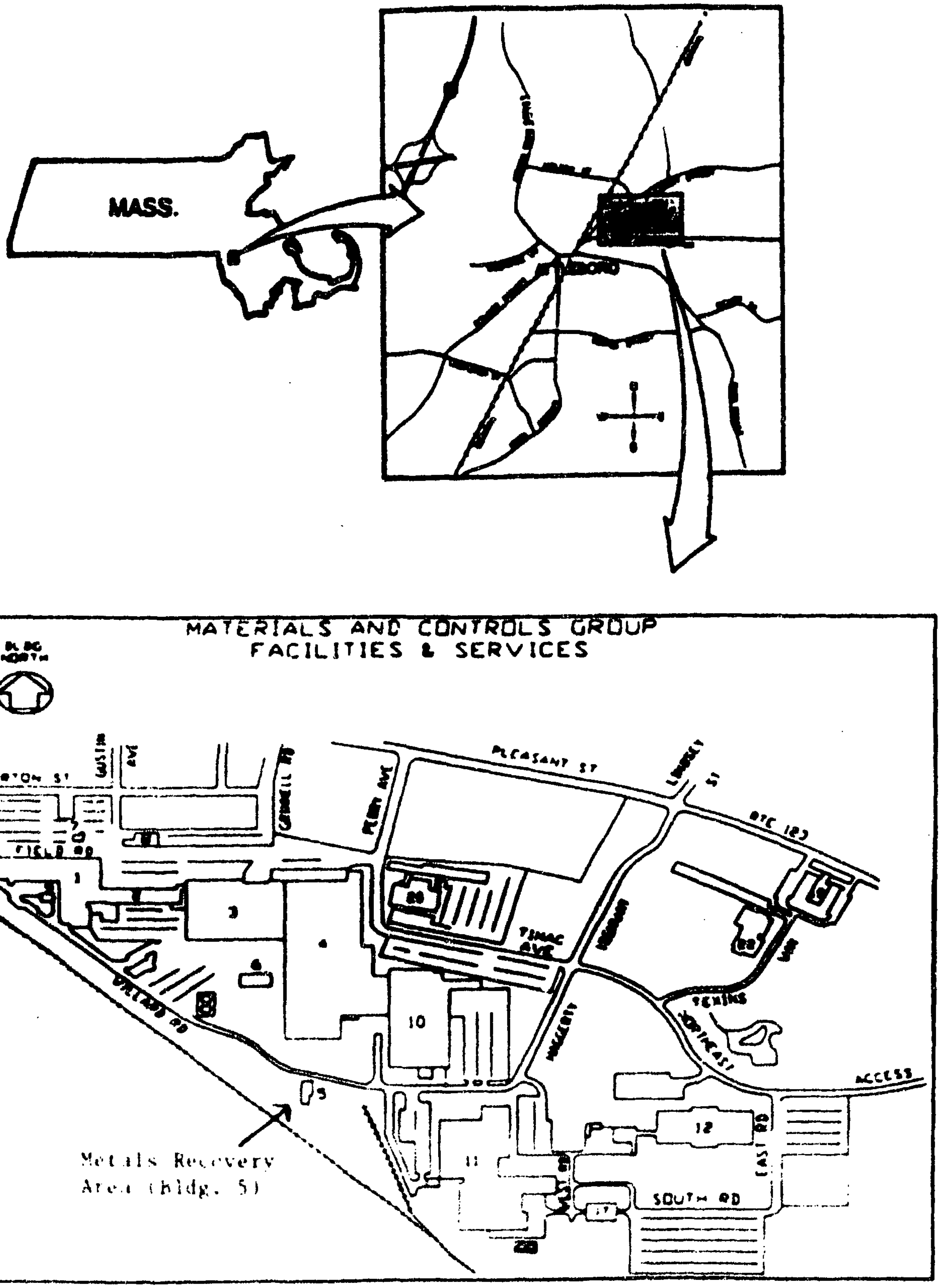
Michael J. Elliott

Michael J. Elliott
Evironmental Manager
Environmental, Safety & Health Dept.

Attachments

cc: Mr. Mark Roberts, U S NRC - Region I
Mr. Daniel V Bartosh, Jr , TI - Dallas
Mr John O'Donnell, TI - Dallas
Mr. Francis J Veale, Jr , TI - Attleboro

Figure 2.1
Map of Massachusetts and Attleboro Showing Location and Plan View of the Texas Instruments Site.



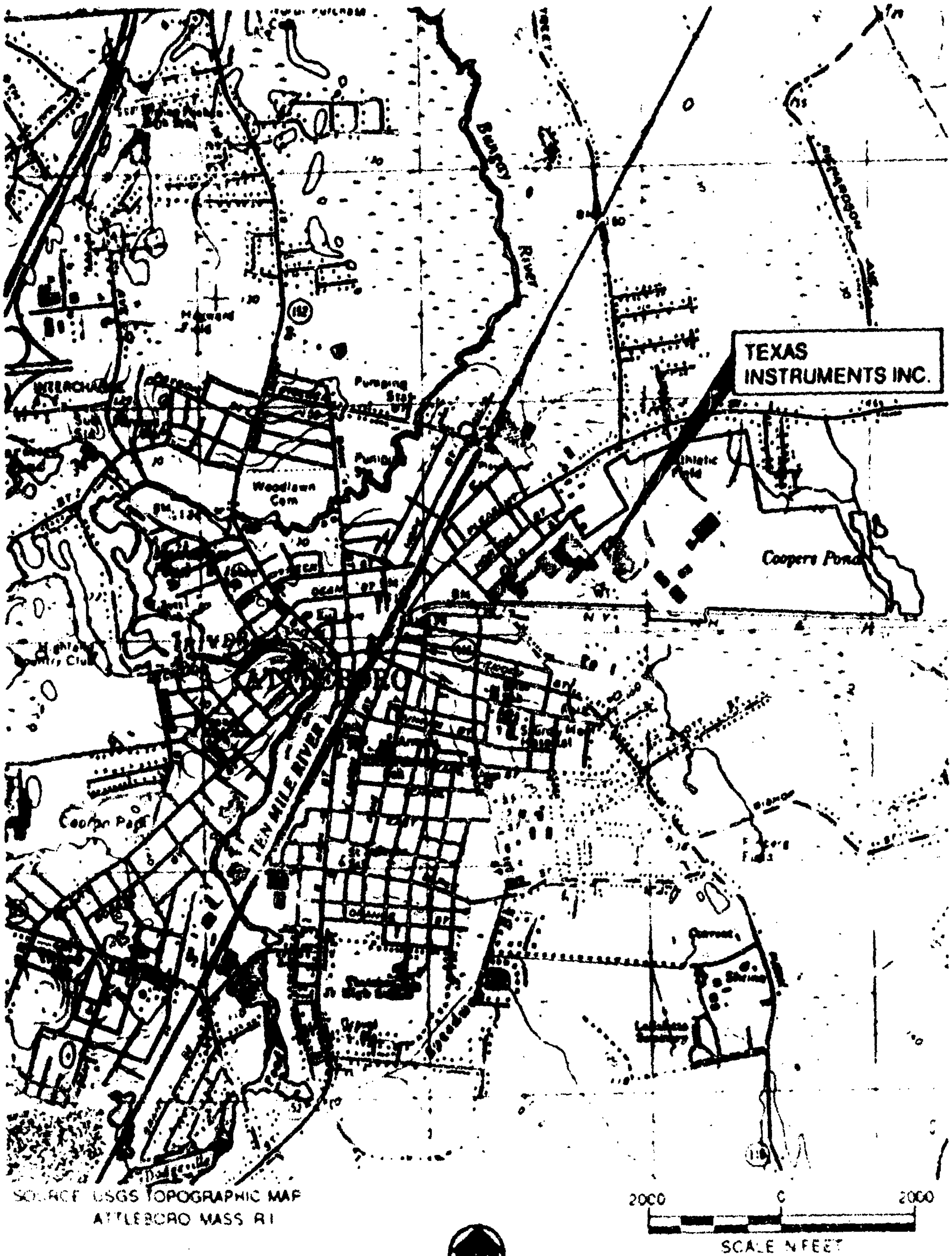
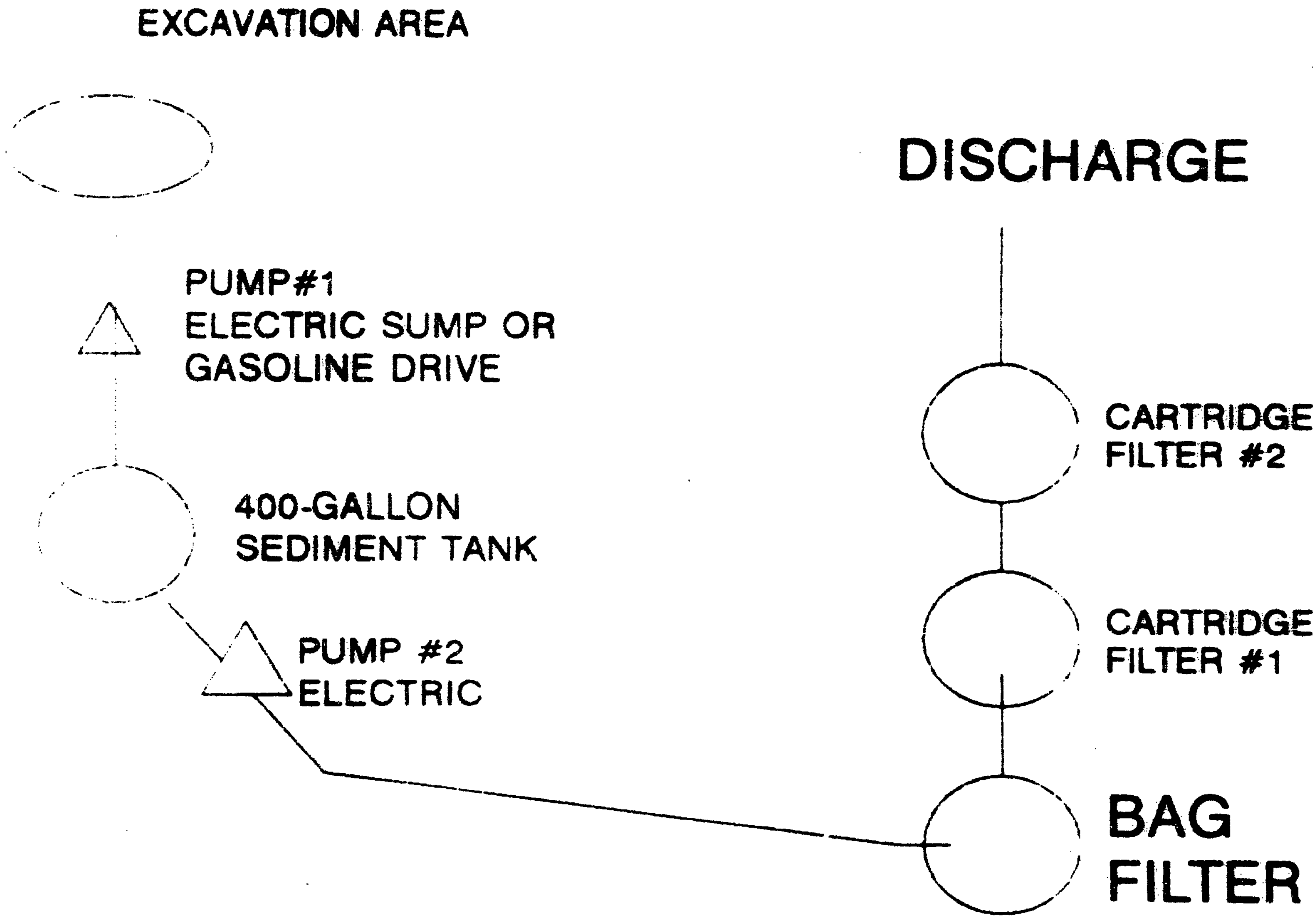


FIGURE 1-1. LOCATION PLAN – TI ATTLEBORO SITE


EXCAVATION AREA
PUMP#1
ELECTRIC SUMP OR
GASOLINE DRIVE
400-GALLON
SEDIMENT TANK
PUMP #2
ELECTRIC
DISCHARGE
CARTRIDGE
FILTER #2
CARTRIDGE
FILTER #1
BAG
FILTER

118945

MS-16

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TEXAS INSTRUMENTS

April 11, 1994

CERTIFIED MAIL
RETURN RECEIPT REQUEST

License No. SNM-23
Docket No. 70-33
Control No. 118945

Mr. Mark Roberts
U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406-1415

Re: Response to NRC's request for additional information contained in a letter dated February 7, 1994.

Dear Mr. Roberts,

As requested in a letter from the NRC dated February 7, 1994, Texas Instruments Incorporated (TI) is providing additional information regarding the remediation of the Former Radioactive Waste Burial Site at its Attleboro property. This correspondence addresses each of the numbered items as they appeared in the February 7 letter.

The attached copy of the letter from CPS, TI's Health Physics contractor, dated March 7, 1994, responds to items 1 through 3.

As regards item 4, TI employed Teledyne Isotopes of Westwood, New Jersey to perform the radiological analysis of the groundwater samples.

Based on our phone conversation of March 4, 1994, I trust this clarifies any outstanding issues regarding the Final Report. If I can be of further assistance on this matter, please do not hesitate to contact me.

Sincerely yours,
MATERIALS & CONTROLS GROUP

Michael J. Elliott

Michael J. Elliott
Environmental Manager

TEXAS INSTRUMENTS INCORPORATED • 34 FOREST STREET • ATTLEBORO, MA 02703
508-699-3800 • TELEX 210801 • CABLE TEXINS

118945

CPS

Creative Pollution Solutions, Inc.

Environmental Consulting Services
(508) 441-1604

7 March 1994

Mike Elliott
Texas Instruments Incorporated
34 Forest Street
Attleboro, MA 02703

Dear Mr Elliott,

Subject. Additional information requested by the NRC regarding the Final Report (September 1993) for the remediation of the former radioactive waste burial site

This is in reference to the letter received from the NRC on 7 February 1994 Included below are the corrections requested by the NRC

Corrections

1) Sargents Rule as shown on page C-2 and page 10 of Appendix J should be changed as follows

$R = 0.526\ E - 0.094$, where R is the range in grams/cm^2

$R = 0.526\ (2.3) - 0.094$

$R = 1.1158$ grams/cm^2, for a soil density of 2.0 grams/cm^3

$R = 0.5579$ cm or 0.2196 inches

2) For the last paragraph on page C-2, 50 grams should be changed to 200 grams

3) On page 5 of Appendix J in the third paragraph, 10m^2 should read 100m^2 (this should be changed in two places within the paragraph)

If any other questions come up please feel free to give me a call

Sincerely,

Mark Griffon

P.O. Box 9253
Lowell, MA 01853

TOTAL P.01

FEB - 7 1994

License No. SNM-23
Docket No. 070-00033
Control No. 118945

Michael Elliott
Environmental Engineering Manager
Texas Instruments, Inc.
Materials and Controls Group
MS 10-04
34 Forest Street
Attleboro, Massachusetts 02703

Dear Mr. Elliott:

Subject: ADDITIONAL INFORMATION REGARDING REMEDIATION OF THE FORMER RADIOACTIVE WASTE BURIAL SITE AT THE TEXAS INSTRUMENTS, INC. FACILITY, ATTLEBORO, MASSACHUSETTS

This in reference to your letter dated September 23, 1993 requesting release of the Attleboro, Massachusetts facility for unrestricted use and termination of License No. SNM-23 and the accompanying September 1993 Final Report of the Remediation of the Former Radioactive Waste Burial Site. In order to continue our review of your request, we need the following information:

1. In the equations on page C-2 of the September 1993 Final Report and also in the same equations on page 10 of Appendix J of the report, the fourth line of the Sargent's equation is incorrect. The constant -0.094 is not an exponent in the equation, but should be subtracted from the earlier product (See Radiological Health Handbook, 1970, pages 29 and 123). Also, the conversion of centimeters to inches in the final line of the equation is incorrect. Although these errors do not substantially change the conclusion concerning the use of the GM survey meter for gross screening of materials, you should submit a corrected calculation.

2. In the last paragraph on page C-2 of the September 1993 Final Report, either the sample mass should read 200 grams or the sample volume should read 25 cm^3 if a soil density of 2.0 $grams/cm^3$ is assumed. Please confirm the appropriate value.

3. On page 5 of Appendix J of the September 1993 Final Report, please confirm that 10 m^2 should read 100 m^2.

4. Please indicate the name of the laboratory where the groundwater samples were analyzed.

OFFICIAL RECORD COPY ML 10

At the request of the NRC, the staff of the Oak Ridge Institute for Science and Education (ORISE) reviewed the September 1993 Final Report and provided comments to the NRC prior to ORISE performing a confirmatory survey at the facility on December 14 and 15, 1993. The ORISE staff requested additional information or an explanation of the following items: the definition of the closed and open circles on Figure 5.1; an explanation of column headings in the Gross Alpha Screening Data Attachment in Appendix C; a cross-reference for the sample locations and drilling logs in Appendix D and the survey data in Appendix C; and a definition of the abbreviation "REF" in Table 5, Appendix E. ORISE also provided an informational comment on the calibration NaI probe discussed in Appendix E. You do not need to respond to these comments since they were all resolved during discussions among ORISE, NRC and your contractor, CPS, Inc., during the December 1993 confirmatory survey.

In Table 1 of Appendix E in the September 1993 Final Report, you identify areas that were above background based on your walkover survey results. In the September 1993 report there do not appear to be any results of soil samples performed in these areas. In lieu of requesting Texas Instruments, Inc. to provide additional analytical data for these areas, the NRC requested ORISE to collect soil samples for analysis. Preliminary data from ORISE indicates that the total uranium concentrations of these samples are less than the release criteria of 30 pCi/gram. No additional survey data from these areas is required at this time.

We will continue our review upon receipt of the above requested information. Please reply in duplicate to my attention at the Region I office and refer to Mail Control No. 118945. The reviewer for this licensing action is Mark Roberts. If you have any questions regarding this letter please call the reviewer at (610) 337-5094 or me at (610) 337-5252.

Thank you for your cooperation in this matter.

Sincerely,

Original Signed By
D. Kinneman

John D. Kinneman, Chief
Site Decommissioning Section
Division of Radiation Safety
and Safeguards

bcc:
Region I Docket Room (w/concurrences)
M. Roberts, RI

RI:DRSS	RI:DRSS
Roberts MCR	Kinneman
02/4/94	02/7/94

ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION
ENERGY/ENVIRONMENT SYSTEMS DIVISION

February 23, 1994

Mark C. Roberts
U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19400

SUBJECT: FINAL REPORT—CONFIRMATORY SURVEY OF THE TEXAS INSTRUMENTS INCORPORATED FORMER BURIAL SITE, ATTLEBORO, MASSACHUSETTS [DOCKECT 070-00033]

Dear Mr. Roberts:

Enclosed are five copies of the subject document. The draft report was revised as requested. Per our telephone conversation on 2/3/94, there was no need to recalculate the total uranium values in Table 2. A U-234 to U-235 activity ratio of 22:1, used by the licensee, is appropriate, based on isotopic analysis performed for samples collected during the December 92 survey of this site.

If you have any questions or need additional information, please contact me at (615) 576-3355 or Michele Landis at (615) 576-2908.

Sincerely,

Armin J. Ansari, Ph.D.
Project Leader
Environmental Survey and
Site Assessment Program

AJA:rde

Enclosure

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CONFIRMATORY SURVEY OF THE TEXAS INSTRUMENTS, INC. FORMER BURIAL SITE ATTLEBORO, MASSACHUSETTS

[DOCKET 070-00033]

A. J. ANSARI

Prepared for the
U.S. Nuclear Regulatory Commission
Region I Office

ORISE 94/B-71

CONFIRMATORY SURVEY OF THE TEXAS INSTRUMENTS, INC. FORMER BURIAL SITE ATTLEBORO, MASSACHUSETTS

Prepared by

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Prepared for the

U.S. Nuclear Regulatory Commission
Region I Office

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FINAL REPORT

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**CONFIRMATORY SURVEY
OF THE TEXAS INSTRUMENTS, INC.
FORMER BURIAL SITE
ATTLEBORO, MASSACHUSETTS**

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ABBREVIATIONS AND ACRONYMS

ASME	American Society of Mechanical Engineers
cm	centimeter
cm^2	square centimeter
cpm	counts per minute
CPS	Creative Pollution Solutions
EML	Environmental Measurement Laboratory
EPA	Environmental Protection Agency
ESSAP	Environmental Survey and Site Assessment Program
m	meter
m^2	square meter
M&C	Metals and Controls, Incorporated
MDA	minimum detectable activity
NaI	sodium iodide
NIST	National Institute for Standards Technology
NRC	Nuclear Regulatory Commission
ORAU	Oak Ridge Associated Universities
ORISE	Oak Ridge Institute for Science and Education
pCi/g	picocuries per gram
PIC	Pressurized Ionization Chamber
RSAP	Radiological Site Assessment Program
TI	Texas Instruments, Incorporated
μR/h	microroentgen per hour

CONFIRMATORY SURVEY
OF THE TEXAS INSTRUMENTS, INC.
FORMER BURIAL SITE
ATTLEBORO, MASSACHUSETTS

INTRODUCTION AND SITE HISTORY

The Texas Instruments Incorporated site at Attleboro, Massachusetts, was owned and operated by Metals and Controls, Inc. (M&C) until 1959, at which time M&C merged with Texas Instruments, Incorporated (TI). The General Plate Division of M&C began processing nuclear materials in 1952, and between 1952 and 1959 fabricated uranium foils for reactor experiments and fuel components and complete reactor fuel cores for the U.S. Navy. Source material license D-549 was issued permitting acquisition and title to not more than 22.7 kg (50 pounds) of refined source material for use in the production of uranium foils; additional source material was acquired and used under contract with the U.S. Government. Special nuclear materials license No. SNM-23 was issued, permitting acquisition and title to 110 kg of enriched uranium for fabrication of the fuel components and cores. After the merger in 1959, Texas Instruments continued fabricating reactor fuel cores, primarily for research and production reactors. Also, source materials, i.e., natural uranium and thorium, were fabricated for sale to various corporations.

A 1964 Texas Instruments health and safety manual states that uranium- and thorium-contaminated noncombustible scrap material and machinery were collected in 55-gallon steel drums and were disposed of through authorized agencies, or were buried on-site in compliance with 10CFR20.304. Records indicate two known burials of radioactive material, one in 1958 of contaminated ductwork, and one in 1961 of 28.4 [illegible] of enriched uranium noncombustible scrap. The burial site was closed in 1967. Work with nuclear materials was gradually reduced beginning in 1968 and was terminated in 1974. The interiors of the three buildings where radioactive materials were used were decontaminated by the licensee and in 1983 the buildings were released for unrestricted use by the Nuclear Regulatory Commission (NRC).

The Radiological Site Assessment Program (RSAP) of the Oak Ridge Associated Universities (ORAU) conducted a radiological survey of portions of the facility's outdoor areas during April and May, 1984. The results of that survey indicated several areas with surface and/or subsurface uranium concentrations in excess of guidelines.[1] In the summer of 1992, Creative Pollution Solutions, Inc. was contracted by Texas Instruments Inc. to initiate remediation activities. The licensee submitted a post-excavation radiological survey report to the NRC in November of 1992.[2]

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) performed a confirmatory survey of the excavated area in December of 1992. The results of that survey indicated that the full extent of the burial site, particularly on the west side, adjacent to Building 11 parking lot, had not been determined.[3] Subsequently, further remediation of the former burial site was performed by Creative Pollution Solutions, Inc. Following those remediations, the licensee completed final survey activities and backfilling operations.[4]

The U.S. Nuclear Regulatory Commission, Region I Office, requested that the Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) perform an independent confirmatory survey of the former burial site. This report summarizes the procedures and results of that survey.

SITE DESCRIPTION

The Texas Instruments Inc. Facility, Attleboro, MA is located in North Attleboro, approximately 48 kilometers south of Boston on Route 123 (Figure 1). The former burial site is located between Buildings 11 and 12 (Figure 2). The area of concern for remediation activities was approximately 10,000 m². The excavated area at the burial site was approximately 2,500 m² and the average depth of the excavated area was approximately 1.5 meters. The west end of the excavation extended into the parking lot, adjacent to Building 11. The excavated area has been backfilled and landscaped. The area which extended into the parking lot has been repaved.

OBJECTIVES

The objectives of the confirmatory process are to provide independent document reviews and radiological data, for use by the NRC in evaluating the adequacy and accuracy of the licensee's radiological survey data, relative to established guidelines.

DOCUMENT REVIEW

The final radiological status report, provided by the Texas Instruments Incorporated, was reviewed by ESSAP as part of the confirmatory activities.[4] Analytical procedures and methods utilized by the licensee were reviewed for adequacy and appropriateness. The data were reviewed for accuracy, completeness, and compliance with applicable NRC guidelines.

PROCEDURES

On December 14 and 15, 1993, ESSAP performed a confirmatory survey of the former burial site and the areas of concern immediately adjacent to the burial site. The survey was conducted in accordance with a survey plan which was submitted to and approved by the NRC, Region I Office.[5]

REFERENCE GRID

A 10 m x 10 m grid was established during ESSAP's radiological survey of this site in 1984 which was subsequently used by the licensee.[2,4] The same reference grid was used in this survey.

SURFACE SCANS

Surface scans of the former burial site (approximately 10,000 m^2) were performed using NaI detectors coupled to countrate meters with audible indicators. Surface scans for gamma radiation were performed on 100% of the former excavation and the two meter perimeter immediately surrounding that area. Approximately 50% of the remaining surface area was also scanned.

EXPOSURE RATE MEASUREMENTS

Background exposure rates, determined during a previous ESSAP survey of this facility, were used for comparison.[1]

Exposure rate measurements were performed at 1 m above the surface at 12 locations, using a pressurized ionization chamber (PIC). Measurement locations are illustrated in Figure 3.

SOIL SAMPLING

The analytical results of background soil samples, collected during a previous ESSAP survey of this facility, were used for comparison.[1]

Five surface soil samples were obtained at the center of randomly selected grid blocks. In addition, two surface soil samples were collected from the area between grid coordinates 185N, 170E and 195N, 180E where the licensee had reported slightly elevated gamma radiation.[4] Sampling locations are illustrated in Figure 4.

Thirty-seven soil samples were collected from 14 boreholes. The boreholes were drilled on and around the former excavated area to depths of approximately 2 meters, except for a number of locations where relatively large pieces of rock were encountered at a depth of approximately 1-1.5 meters. On the west side of the excavation, boreholes were drilled 3 meters from the edge of the former excavation at approximately 20 meter intervals. For the remaining perimeter area, boreholes were drilled at approximately 40 meter intervals. The location of a number of boreholes had to be moved because of their proximity to buried water, gas, and compressed air lines.

The boreholes were scanned for gamma activity, using a collimated NaI detector coupled to a countrate meter with an audible indicator. Systematic soil samples were collected from the surface (0-15 cm), the middle (85-100 cm), and the bottom (185-200 cm) of each borehole. In the parking lot area, the "surface" soil sample was approximately 30 cm below the surface of the pavement. Furthermore, when the depth of a borehole was 1.5 m, the bottom soil sample was collected at 135-150 cm. When the depth of a borehole was 1 m, only two samples were collected from that borehole (0-15, and 85-100 cm).

SAMPLE ANALYSIS AND DATA INTERPRETATION

Samples and data were returned to ORISE's ESSAP laboratory in Oak Ridge, TN for analysis and interpretation. Exposure rates were reported in μR/h. Soil samples were analyzed by gamma spectrometry. Spectra were reviewed for U-235, U-238, Th-232, Th-228, and any other identifiable photopeaks. Soil sample results were reported in units of picocuries per gram (pCi/g). Additional information concerning major instrumentation, sampling equipment, and analytical procedures is provided in Appendices A and B. Results were compared to NRC guidelines which are provided in Appendix C.

FINDINGS AND RESULTS

DOCUMENT REVIEW

ESSAP reviewed the licensee's radiological survey data and comments were provided to the NRC.[6] In ESSAP's opinion, the licensee documents provide an adequate description of the radiological condition of the facility relative to the NRC guidelines for release for unrestricted use.

SURFACE SCANS

Surface scans for gamma activity did not identify any locations of elevated direct radiation.

EXPOSURE RATE MEASUREMENTS

The background exposure rates, previously measured at this site, ranged from 10 to 11 μR/h and averaged 10 μR/h.[1]

Exposure rates, measured at 12 locations in the vicinity of the former burial site, ranged from 9 to 11 μR/h. (Table 1).

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES

Total uranium concentrations in background soil samples, previously determined for this site, ranged from 1.0 to 2.4 pCi/g.[1]

Concentrations of U-235, U-238, and total uranium in surface soil samples ranged from <0.1 to 0.4 pCi/g, 0.7 to 10 pCi/g, and 3.0 to 20 pCi/g, respectively. Concentrations of U-235, U-238, and total uranium in subsurface soil samples ranged from <0.1 to 0.6 pCi/g, 0.6 to 13 pCi/g, and 2.9 to 27 pCi/g, respectively (Table 2).

COMPARISON OF RESULTS WITH GUIDELINES

The NRC guidelines for residual concentrations of radionuclides in soil, established for license termination or release of a facility for unrestricted use are presented in Appendix C. The primary contaminant of concern at this site is enriched uranium.

The soil concentration guideline for enriched uranium is 30 pCi/g.[7] The total uranium concentrations in all surface and subsurface soil samples were within this limit.

At this site, the applicable NRC guideline for exposure rate at 1 m above the surface is 10 μR/h above background, consistent with the Branch Technical Position.[7] All exposure rates were within this limit.

SUMMARY

During the period December 14 and 15, 1993, at the request of the NRC Region I Office, the Environmental Survey and Site Assessment Program of ORISE performed a confirmatory survey of the former burial site at Texas Instruments Incorporated. The survey activities consisted of surface scans for gamma activity, exposure rate measurements, and soil sampling.

Exposure rates were all within the 10 μR/h above background criterion. The radionuclide concentrations in surface and subsurface soil samples were less than the applicable guidelines for release for unrestricted use. In ESSAP's opinion, the licensee documents provide an adequate description of the radiological condition of the facility.

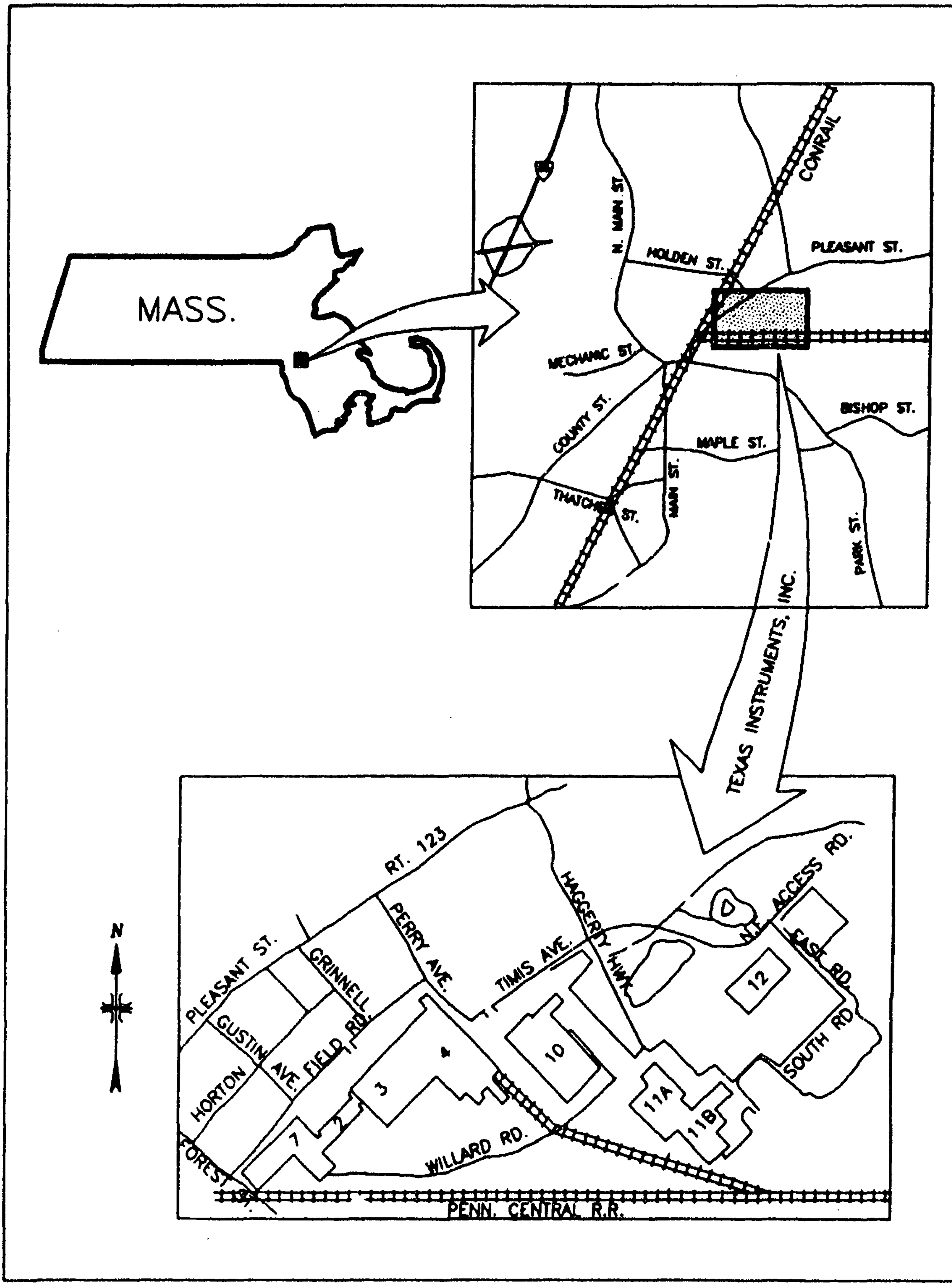

FIGURE 1: Map of Attleboro, Massachusetts – Location and Plan View of the Texas Instruments Site

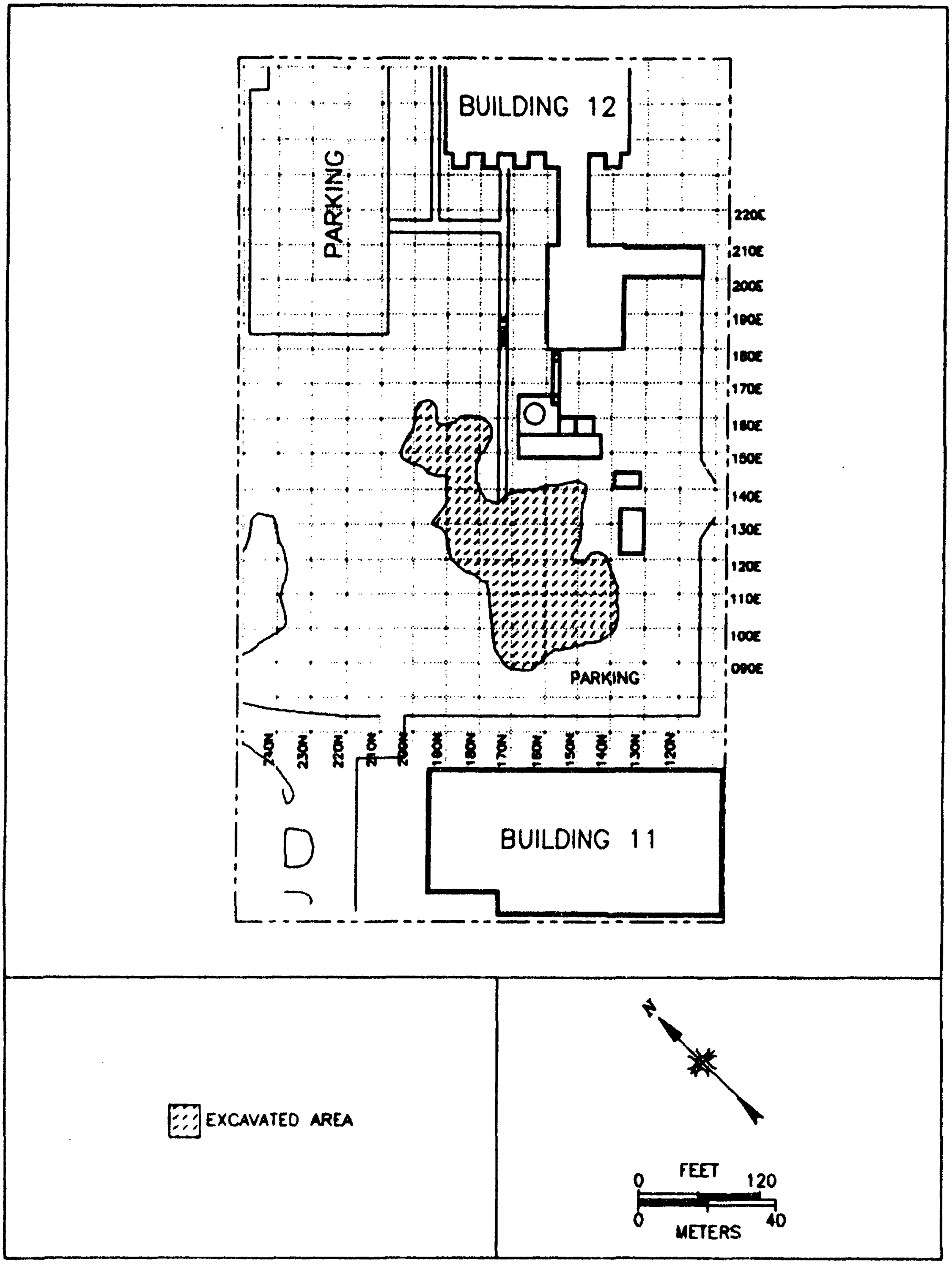

FIGURE 2: The Former Burial Site – Extent of Excavation

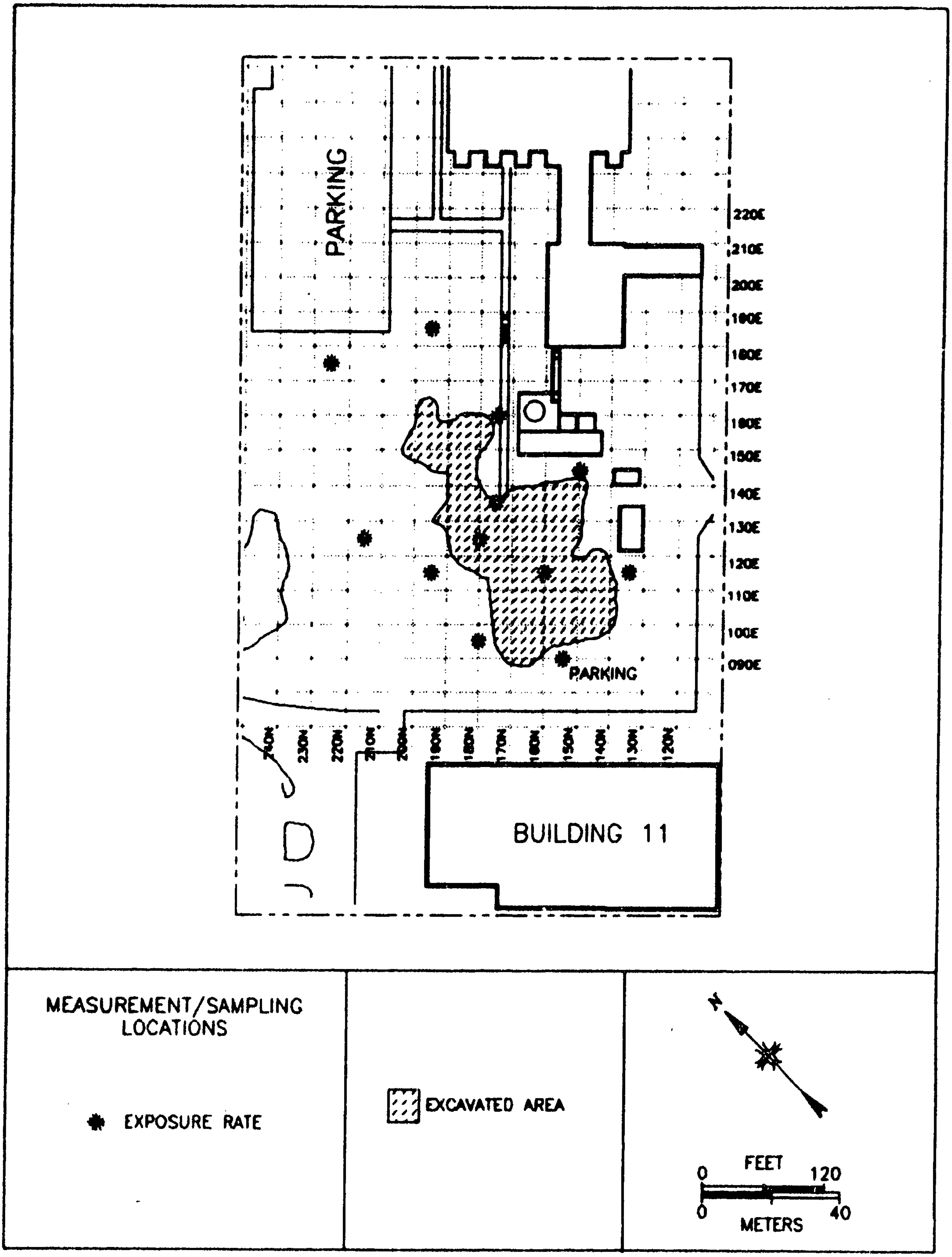

FIGURE 3: The Former Burial Site – Exposure Rate Measurement Locations

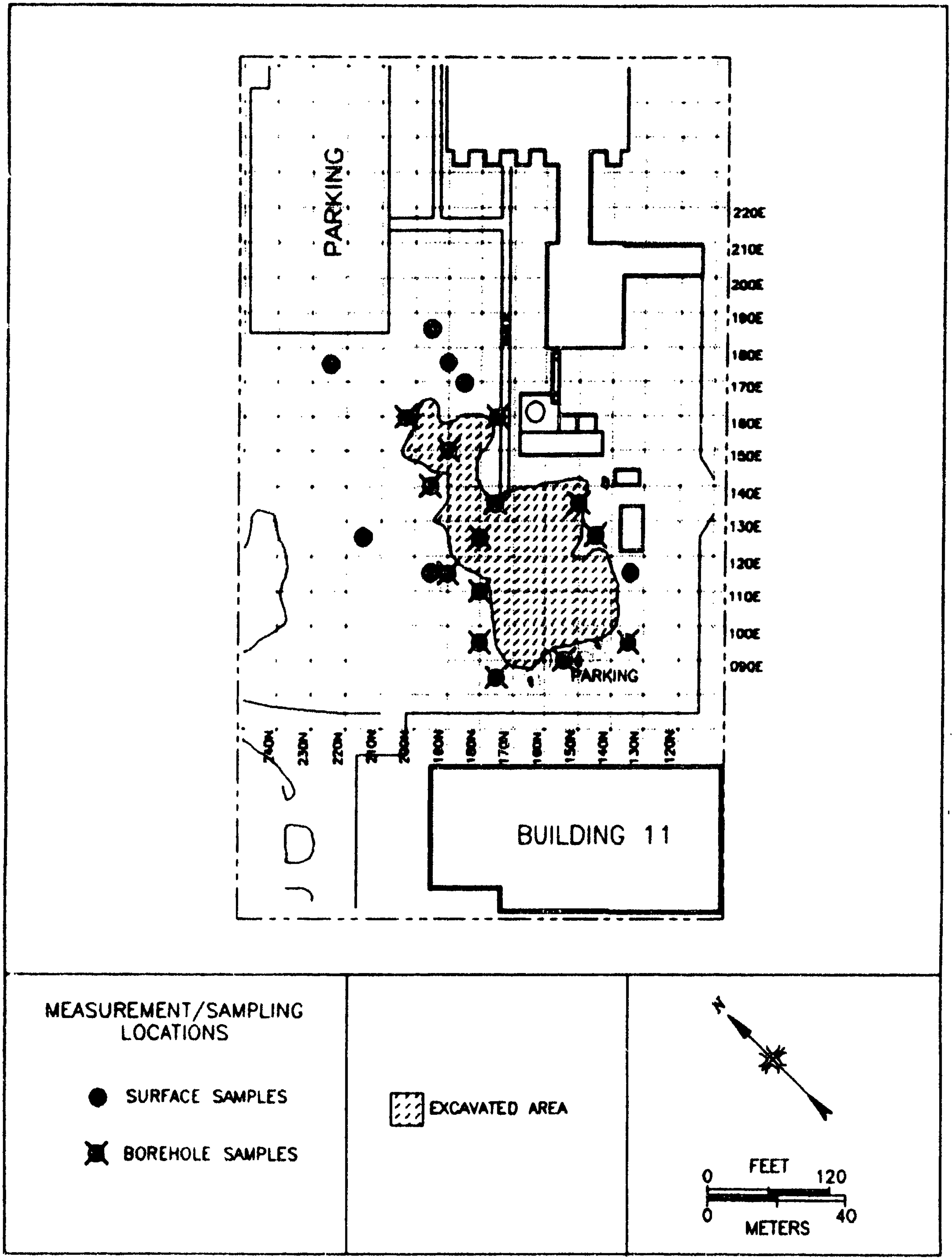

FIGURE 4: The Former Burial Site – Soil Sampling Locations

TABLE 1

EXPOSURE RATE MEASUREMENTS
TEXAS INSTRUMENTS, INC.
FORMER BURIAL SITE
ATTLEBORO, MASSACHUSETTS

Location[a]	Exposure Rate at 1 m above the surface (μR/h)
135N, 115E	9
150N, 145E	9
155N, 90E	11
160N, 115E	9
175N, 135E	9
175N, 160E	10
180N, 95E	11
180N, 125E	9
195N, 115E	10
195N, 185E	9
215N, 125E	9
225N, 175E	9

[a]Refer to Figure 3.

TABLE 2

URANIUM CONCENTRATIONS IN SOIL SAMPLES
TEXAS INSTRUMENTS, INC.
FORMER BURIAL SITE
ATTLEBORO, MASSACHUSETTS

Location[a]	Depth (cm)	Uranium Concentrations (pCi/g)[b]		
		U-235	U-238	Total U[c]
135N, 95E	0-15	0.3 ± 0.1	3.2 ± 1.2	10
	85-100	<0.1	0.6 ± 1.4	<2.9
	185-200	0.2 ± 0.1	2.3 ± 1.2	6.9
135N, 115E	0-15	0.2 ± 0.1	0.9 ± 1.0	5.5
145N, 125E	0-15	<0.1	6.0 ± 1.7	<8.3
	85-100	0.2 ± 0.1	4.4 ± 1.3	9.0
150N, 135E	0-15	<0.1	2.6 ± 1.1	<4.9
	85-100	0.3 ± 0.1	4.1 ± 0.9	11
155N, 90E	0-15	<0.1	1.1 ± 1.0	<3.4
	85-100	<0.1	2.2 ± 0.8	<4.5
	185-200	0.2 ± 0.1	3.2 ± 1.4	7.8
175N, 85E	0-15	0.1 ± 0.1	1.5 ± 1.0	3.8
	85-100	<0.1	1.8 ± 1.4	<4.1
	135-105	<0.1	1.6 ± 1.3	<3.9
175N, 135E	0-15	<0.1	2.0 ± 1.5	<4.3
	85-100	0.3 ± 0.1	7.2 ± 1.5	14
175N, 160E	0-15	0.2 ± 0.1	1.6 ± 1.1	5.6
	85-100	0.2 ± 0.1	1.6 ± 1.4	6.2
	185-200	0.2 ± 0.1	1.8 ± 0.9	6.4
180N, 95E	0-15	<0.2	3.7 ± 1.3	<8.3
	85-100	<0.1	1.7 ± 1.2	<4.0
	185-200	0.1 ± 0.1	3.4 ± 1.2	5.7
180N, 110E	0-15	0.4 ± 0.1	10.4 ± 2.1	20
	85-100	0.4 ± 0.1	12.7 ± 1.7	22
	135-150	<0.1	2.4 ± 1.8	<4.7

TABLE 2 (Continued)

URANIUM CONCENTRATIONS IN SOIL SAMPLES
TEXAS INSTRUMENTS, INC.
FORMER BURIAL SITE
ATTLEBORO, MASSACHUSETTS

Location[a]	Depth (cm)	Uranium Concentrations (pCi/g)[b]		
		U-235	U-238	Total U[c]
185N, 125E	0-15	<0.1	1.7 ± 1.2	<4.0
	85-100	0.3 ± 0.1	4.5 ± 1.3	11
185N, 170E	0-15	<0.1	0.7 ± 0.9	<3.0
190N, 115E	0-15	<0.1	2.4 ± 1.5	<4.7
	85-100	0.5 ± 0.1	2.1 ± 1.5	14
190N, 150E	0-15	<0.1	0.8 ± 1.0	<3.1
	85-100	0.4 ± 0.1	6.5 ± 1.6	16
	185-200	0.6 ± 0.1	10.3 ± 1.8	24
190N, 175E	0-15	0.1 ± 0.1	1.5 ± 1.0	3.8
195N, 115E	0-15	0.4 ± 0.1	3.4 ± 1.6	13
195N, 140E	0-15	<0.1	1.2 ± 0.9	<3.5
	85-100	0.3 ± 0.1	2.1 ± 1.1	9.0
	185-200	<0.1	1.7 ± 1.1	<4.0
195N, 185E	0-15	<0.1	1.1 ± 0.8	<3.4
200N, 160E	0-15	<0.1	1.2 ± 1.2	<3.5
	85-100	0.6 ± 0.1	13 ± 2.0	27
	185-200	0.5 ± 0.1	2.8 ± 1.0	14
215N, 125E	0-15	<0.1	1.4 ± 0.9	<3.7
225N, 175E	0-15	<0.1	1.6 ± 1.2	<3.9

[a]Refer to Figure 4.
[b]Uncertainties represent the 95% confidence level based only on counting statistics.
[c]Total uranium concentrations are calculated based on a U-234 to U-235 activity ratio of 22:1.

REFERENCES

1. "Radiological Survey of the Texas Instruments Site, Attleboro, Massachusetts," Oak Ridge Associated Universities, January, 1985.

2. "Post Excavation Radiological Survey Report, Texas Instruments Incorporated Burial Site, Attleboro, Massachusetts," Creative Pollution Solutions, Inc., November 28, 1992.

3. Letter from A. Jaberaboansari (ORISE) to J. Roth (NRC), reference: "Interim Radiological Survey Report for the Texas Instruments Incorporated Burial Site," January 25, 1993.

4. "Remediation of the Former Radioactive Waste Burial Site," Final Report, Creative Pollution Solutions, Inc., September 1993.

5. "Confirmatory Survey Plan for the Texas Instruments Incorporated Burial Site, Attleboro, Massachusetts," Oak Ridge Institute for Science and Education, December 6, 1993.

6. Letter from A. J. Ansari (ORISE) to M. C. Roberts (NRC), reference: "Comments on the Final Report: Remediation of the Former Radioactive Waste Burial Site at Texas Instruments Incorporated," December 1, 1993.

7. U.S. Nuclear Regulatory Commission, "Disposal of Onsite Storage of Thorium and Uranium Wastes from Past Operations," 46 FR 52061, Washington, D.C., October 23, 1981.

APPENDIX A

MAJOR INSTRUMENTATION

APPENDIX A

MAJOR INSTRUMENTATION

The display of a specific product is not to be construed as an endorsement of the product or its manufacturer by the authors or their employers.

DIRECT RADIATION MEASUREMENT

Instruments

Eberline Pulse Ratemeter
Model PRM-6
(Eberline, Santa Fe, NM)

Ludlum Ratemeter-Scaler
Model 2200
(Ludlum Measurements, Inc.,
Sweetwater, TX)

Detectors

Reuter-Stokes Pressurized Ion Chamber
Model RSS-111
(Reuter-Stokes, Cleveland, OH)

Victoreen NaI Scintillation Detector
Model 489-55
3.2 cm x 3.8 cm Crystal
(Victoreen, Cleveland, OH)

LABORATORY ANALYTICAL INSTRUMENTATION

High Purity Extended Range Intrinsic Detectors
Model No: ERVDS30-25195
(Tennelec, Oak Ridge, TN)
Used in conjunction with:
Lead Shield Model G-11
(Nuclear Lead, Oak Ridge, TN) and
Multichannel Analyzer
3100 Vax Workstation
(Canberra, Meriden, CT)

High-Purity Germanium Detector
Model GMX-23195-S, 23% Eff.
(EG&G ORTEC, Oak Ridge, TN)
Used in conjunction with:
Lead Shield Model G-16
(Gamma Products, Palos Hills, IL) and
Multichannel Analyzer
3100 Vax Workstation
(Canberra, Meriden, CT)

APPENDIX B

SURVEY AND ANALYTICAL PROCEDURES

APPENDIX B

SURVEY AND ANALYTICAL PROCEDURES

SURVEY PROCEDURES

Surface Scans

Surface scans for gamma activity were performed by passing the probes slowly over the surface; the distance between the probe and the surface was maintained at a minimum. The scans were performed using NaI detectors coupled to countrate meters with audible indicators. Identification of elevated levels was based on increases in the audible signal from the recording and/or indicating instrument.

Exposure Rate Measurements

Measurements of gamma exposure rates were performed at 1 m above the surface, using a pressurized ionization chamber (PIC).

Soil Sampling

Approximately 1 kg of soil was collected at each sample location. Surface soil samples were collected at 0-15 cm depth. Samples from boreholes were collected from the surface (0-15 cm), the center (85-100 cm), and the bottom (185-200 cm) of each borehole. When the depth of a borehole was 1.5 m, the bottom soil sample was collected at 135-150 cm. When the depth of a borehole was 1 m, only two samples were collected from that borehole (0-15, and 85-100 cm). Collected samples were placed in a plastic bag, sealed, and labeled in accordance with ESSAP survey procedures.

ANALYTICAL PROCEDURES

Gamma Spectrometry

Samples of soil were dried, mixed, crushed, and/or homogenized as necessary, and a portion sealed in 0.5-liter Marinelli beaker or other appropriate container. The quantity placed in the beaker was chosen to reproduce the calibrated counting geometry. Net material weights were determined and the samples counted using intrinsic germanium detectors coupled to a pulse height analyzer system. Background and Compton stripping, peak search, peak identification, and concentration calculations were performed using the computer capabilities inherent in the analyzer system. Energy peaks used for determination of radionuclides of concern were:

U - 235	0.186 MeV
U - 238	0.063 MeV from Th-234*
Th-228	0.583 MeV from Tl-208
Th-232	0.911 MeV from Ac-228*

*Secular equilibrium assumed.

Spectra were also reviewed for other identifiable photopeaks.

UNCERTAINTIES AND DETECTION LIMITS

The uncertainties associated with the analytical data presented in the tables of this report represent the 95% confidence level for that data based only on counting statistics. Additional uncertainties associated with sampling and measurement procedures, have not been propagated into the data presented in this report.

Detection limits, referred to as minimum detectable activity (MDA), were based on 2.71 plus 4.66 times the standard deviation of the background count. When the activity was determined to be less than the MDA of the measurement procedure, the result was reported as less than MDA. Because of variations in background levels, measurement efficiencies, and contributions from other radionuclides in samples, the detection limits differ from sample to sample and instrument to instrument.

CALIBRATION AND QUALITY ASSURANCE

Calibration of all field and laboratory instrumentation was based on standards/sources, traceable to NIST, when such standards/sources were available. In cases where they were not available, standards of an industry recognized organization were used. Calibration of pressurized ionization chambers was performed by the manufacturer.

Analytical and field survey activities were conducted in accordance with procedures from the following ESSAP documents:

- Survey Procedures Manual, Revision 7
- Laboratory Procedures Manual, Revision 8
- Quality Assurance Manual, Revision 6

The procedures contained in these manuals were developed to meet the requirements of DOE Order 5700.6C and ASME NQA-1 for Quality Assurance and contain measures to assess processes during their performance.

Quality control procedures include:

- Daily instrument background and check-source measurements to confirm that equipment operation is within acceptable statistical fluctuations.
- Participation in EPA and EML laboratory Quality Assurance Programs.
- Training and certification of all individuals performing procedures.
- Periodic internal and external audits.

APPENDIX C

GUIDELINES FOR RESIDUAL CONCENTRATIONS OF THORIUM AND URANIUM WASTES IN SOIL

On October 23, 1981, the Nuclear Regulatory Commission published in the Federal register a notice of Branch Technical Position on "Disposal or Onsite Storage of Thorium and Uranium Wastes from Past Operations." This document established guidelines for concentrations of uranium and thorium in soil, that will limit maximum radiation received by the public under various conditions of future land usage. These concentrations are as follows:

Material	Maximum Concentrations (pCi/g) for various options			
	1[a]	2[b]	3[c]	4[d]
Natural Thorium (Th-232 + Th 228) with daughters present and in equilibrium	10	50	--	500
Natural Uranium (U-238 + U-234) with daughters present and in equilibrium	10	--	40	200
Depleted Uranium:				
Soluble	35	100	--	1,000
Insoluble	35	300	--	3,000
Enriched Uranium:				
Soluble	30	100	--	1,000
Insoluble	30	250	--	2,500

[a]Based on EPA cleanup standards which limit radiation to 1 mrad/yr to lung and 3 mrad/yr to bone from ingestion and inhalation and 10 μR/h above background from direct external exposure.
[b]Based on limiting individual dose to 170 mrem/yr.
[c]Based on limiting equivalent exposure to 0.02 working level or less.
[d]Based on limiting individual dose to 500 mrem/yr and in case of natural uranium, limiting exposure to 0.02 working level or less.

JAN 26 1994

License No. SNM-23
Docket No. 070-00033
Control No. 118945

Armin Ansari, Ph.D.
Project Leader
Oak Ridge Institute for Science and Education
Environmental Survey and Site Assessment Program
P.O. Box 117
Oak Ridge, Tennessee 37831-0117

Dear Dr. Ansari:

Subject: COMMENTS ON THE DRAFT REPORT - CONFIRMATORY SURVEY OF THE TEXAS INSTRUMENTS, INC. FORMER BURIAL SITE, ATTLEBORO, MASSACHUSETTS

Thank you for the Draft Report -- Confirmatory Survey of the Texas Instruments, Inc. Former Burial Site, Attleboro, Massachusetts. Comments from the Region I staff are marked on an enclosed copy of the report.

We appreciate the prompt preparation of the draft report following the survey. Please let our office know when a final report is expected. You should contact Mark Roberts of my staff at (610) 337-5094 if you have any questions concerning our comments.

Thank you again for your assistance and cooperation in this matter.

Sincerely,

Original Signed By:
John D. Kinneman

John D. Kinneman, Chief
Site Decommissioning Section
Division of Radiation Safety
and Safeguards

Enclosure: Copy of Draft Confirmatory Survey Report with NRC Region I comments

cc (w/o enclosure):
Michelle Landis, ORISE, ESSAP
James Berger, ORISE, ESSAP

OFFICIAL RECORD COPY ML 10

bcc (w/o enclosure):
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SUBJECT: DRAFT REPORT—CONFIRMATORY SURVEY OF THE TEXAS INSTRUMENTS, INC. FORMER BURIAL SITE, ATTLEBORO, MASSACHUSETTS [DOCKECT 070-00033]

Dear Mr. Roberts:

Enclsoed are three copies of the subject document for your review and comment. Please direct your comments or questions to me at (615) 576-3355 or Michele Landis at (615) 576-2908.

Sincerely,

Armin J. Ansari, Ph.D.
Project Leader
Environmental Survey and
Site Assessment Program

AJA:rde

Enclosure

cc: J. Parrott, NRC/NMSS, 6H3
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M. Landis, ORISE
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PMDA, 6E6
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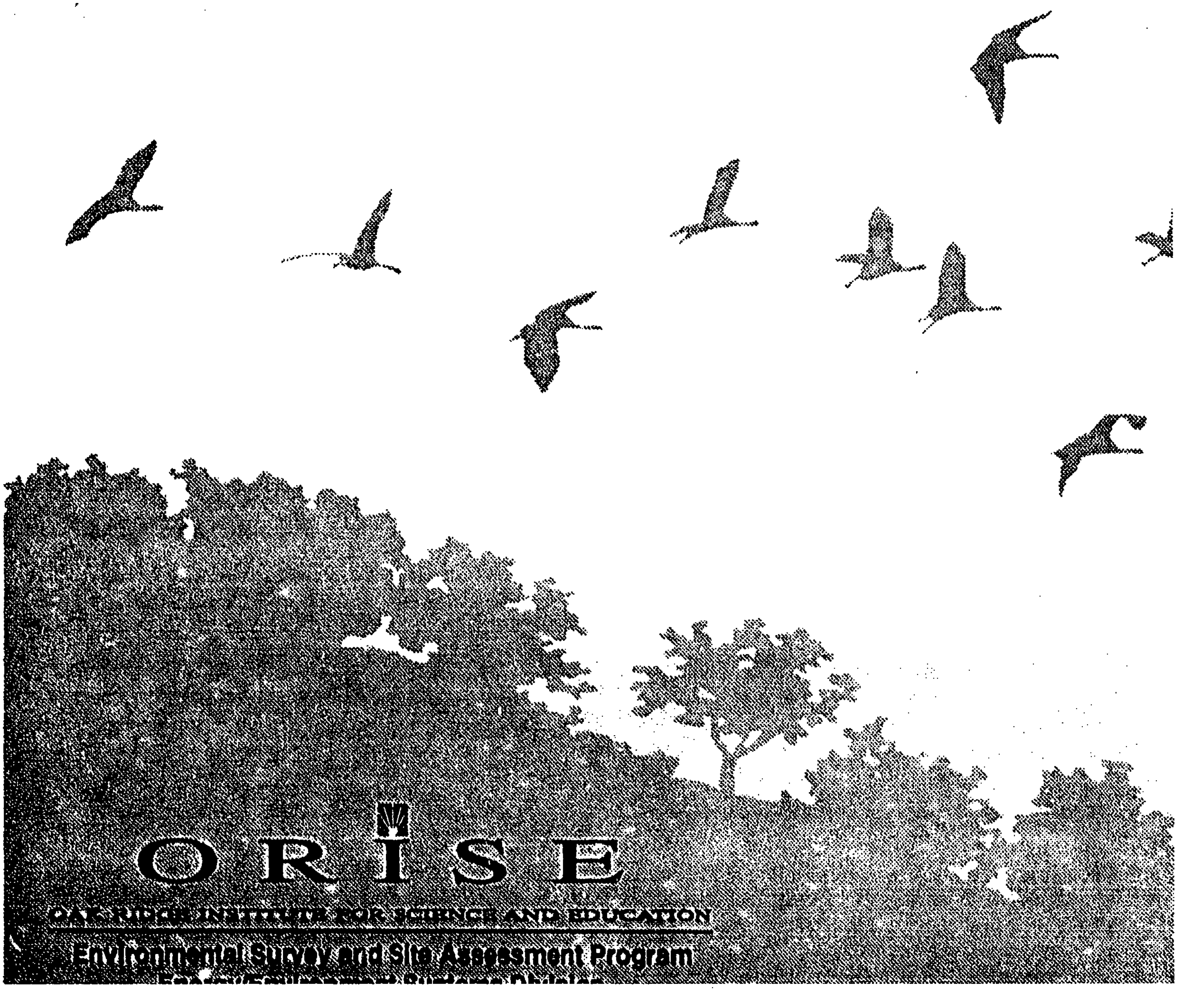
CONFIRMATORY SURVEY OF THE TEXAS INSTRUMENTS, INC. FORMER BURIAL SITE ATTLEBORO, MASSACHUSETTS

[DOCKET 070-00033]

A. J. ANSARI

Prepared for the
U.S. Nuclear Regulatory Commission
Region I Office



ORISE

OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

Environmental Survey and Site Assessment Program

CONFIRMATORY SURVEY
OF THE TEXAS INSTRUMENTS, INC.
FORMER BURIAL SITE
ATTLEBORO, MASSACHUSETTS

Prepared by

A. J. Ansari

Environmental Survey and Site Assessment Program
Energy/Environment System Division
Oak Ridge Institute for Science and Education
Oak Ridge, Tennessee 37831-0117

Prepared for the

U.S. Nuclear Regulatory Commission
Region I Office

January 1994

DRAFT REPORT

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CONFIRMATORY SURVEY
OF THE TEXAS INSTRUMENTS, INC.
FORMER BURIAL SITE
ATTLEBORO, MASSACHUSETTS

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ACKNOWLEDGEMENTS

The author would like to acknowledge the significant contributions of the following staff members:

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ABBREVIATIONS AND ACRONYMS

ASME	American Society of Mechanical Engineers
cm	centimeter
cm^2	square centimeter
cpm	counts per minute
CPS	Creative Pollution Solutions
EML	Environmental Measurement Laboratory
EPA	Environmental Protection Agency
ESSAP	Environmental Survey and Site Assessment Program
m	meter
m^2	square meter
M&C	Metals and Controls, Incorporated
MDA	minimum detectable activity
NaI	sodium iodide
NIST	National Institute for Standards Technology
NRC	Nuclear Regulatory Commission
ORAU	Oak Ridge Associated Universities
ORISE	Oak Ridge Institute for Science and Education
pCi/g	picocurie's per gram
PIC	Pressurized Ionization Chamber
RSAP	Radiological Site Assessment Program
TI	Texas Instruments, Incorporated
μR/h	microroentgen per hour

CONFIRMATORY SURVEY OF THE TEXAS INSTRUMENTS, INC. FORMER BURIAL SITE ATTLEBORO, MASSACHUSETTS

INTRODUCTION AND SITE HISTORY

The Texas Instruments Incorporated site at Attleboro, Massachusetts, was owned and operated by Metals and Controls, Inc. (M&C) until 1959, at which time M&C merged with Texas Instruments, Incorporated (TI). The General Plate Division of M&C began processing nuclear materials in 1952, and between 1952 and 1959 fabricated uranium foils for reactor experiments and fuel components and complete reactor fuel cores for the U.S. Navy. Source material license D-549 was issued permitting acquisition and title to not more than 22.7 kg (50 pounds) of refined source material for use in the production of uranium foils; additional source material was acquired and used under contract with the U.S. Government. Special nuclear materials license No. SNM-23 was issued, permitting acquisition and title to 110 kg of enriched uranium for fabrication of the fuel components and cores. After the merger in 1959, Texas Instruments continued fabricating reactor fuel cores, primarily for research and production reactors. Also, source materials, i.e., natural uranium and thorium, were still being fabricated for sale to various corporations.

A 1964 Texas Instruments health and safety manual states that uranium- and thorium-contaminated noncombustible scrap material and machinery were collected in 55-gallon steel drums and were disposed of through authorized agencies, or were buried on-site in compliance with 10CFR20.304. Burials were made from 1958 to 1961, and the burial site was closed in 1967. Records indicate two known burials, one in 1958 of contaminated ductwork, and one in 1961 of 28.4 mCi of enriched uranium noncombustible scrap. Work with nuclear materials was gradually reduced beginning in 1968 and was terminated in 1974. The interior of the facility was decontaminated and released for unrestricted use by the Nuclear Regulatory Commission (NRC) in 1983.

The Radiological Site Assessment Program (RSAP) of the Oak Ridge Associated Universities (ORAU) conducted a radiological survey of portions of the facility's outdoor areas during April and May, 1984. The results of that survey indicated several areas with surface and/or subsurface uranium concentrations in excess of guidelines.[1] In the summer of 1992, Creative Pollution Solutions, Inc. was contracted by Texas Instruments Inc. to initiate remediation activities. The licensee submitted a post-excavation radiological survey report to the NRC in November of 1992.[2]

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) performed a confirmatory survey of the excavated area in December of 1992. The results of that survey indicated that the full extent of the burial site, particularly on the west side, adjacent to Building 11 parking lot, had not been determined.[3] Subsequently, further remediation of the former burial site was performed by Creative Pollution Solutions, Inc. Following those remediations, the licensee completed final survey activities and backfilling operations.[4]

The U.S. Nuclear Regulatory Commission, Region I Office, requested that the Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) perform an independent confirmatory survey of the former burial site. This report summarizes the procedures and results of that survey.

SITE DESCRIPTION

The Texas Instruments Inc. Facility, Attleboro, MA is located in North Attleboro, approximately 48 kilometers south of Boston on Route 123 (Figure 1). The former burial site is located between Buildings 11 and 12 (Figure 2). The area of concern for remediation activities was approximately 10,000 m^2. The excavated area at the burial site was approximately 2,500 m^2 and the average depth of the excavated area was approximately 1.5 meters. The west end of the excavation extended into the parking lot, adjacent to Building 11. The excavated area has been backfilled and landscaped. The area which extended into the parking lot has been repaved.

OBJECTIVES

The objectives of the confirmatory process are to provide independent document reviews and radiological data, for use by the NRC in evaluating the adequacy and accuracy of the licensee's radiological survey data, relative to established guidelines.

DOCUMENT REVIEW

The final radiological status report, provided by the Texas Instruments Incorporated, were reviewed by ESSAP as part of the confirmatory activities.[4] Analytical procedures and methods utilized by the licensee were reviewed for adequacy and appropriateness. The data were reviewed for accuracy, completeness, and compliance with applicable NRC guidelines.

PROCEDURES

On December 14 and 15, 1993, ESSAP performed a confirmatory survey of the former burial site. The survey was conducted in accordance with a survey plan which was submitted to and approved by the NRC, Region I Office.[5]

REFERENCE GRID

A 10 m x 10 m grid was established during ESSAP's radiological survey of this site in 1984 which was subsequently used by the licensee.[2,4] The same reference grid was used in this survey.

SURFACE SCANS

Surface scans of the former burial site (approximately 10,000 m^2) were performed using NaI detectors coupled to countrate meters with audible indicators. Surface scans for gamma radiation were performed on 100% of the former excavation and the two meter perimeter immediately surrounding that area. Approximately 50% of the remaining surface area was also scanned.

EXPOSURE RATE MEASUREMENTS

Background exposure rates, determined during a previous ESSAP survey of this facility, were used for comparison.[1]

Exposure rate measurements were performed at 1 m above the surface at 12 locations, using a pressurized ionization chamber (PIC). Measurement locations are illustrated in Figure 3.

SOIL SAMPLING

The analysis results of background soil samples, collected during a previous ESSAP survey of this facility, were used for comparison.[1]

Five surface soil samples were obtained at the center of randomly selected grid blocks. In addition, two surface soil samples were collected from the area between grid coordinates 185N, 170E and 195N, 180E where the licensee had reported slightly elevated gamma radiation.[4] Sampling locations are illustrated in Figure 4.

Thirty-seven soil samples were collected from 14 boreholes. The boreholes were drilled on and around the former excavated area to a depth of approximately 2 meters, except for a number of locations where relatively large pieces of rock were encountered at a depth of approximately 1-1.5 meters. On the west side of the excavation, boreholes were drilled 3 meters from the edge of the former excavation at approximately 20 meter intervals. For the remaining perimeter area, boreholes were drilled at approximately 40 meter intervals. The location of a number of boreholes had to be moved because of their proximity to water, gas, and compressed air lines.

The boreholes were scanned for gamma activity, using a collimated NaI detector coupled to a countrate meter with an audible indicator. Systematic soil samples were collected from the surface (0-15 cm), the middle (85-100 cm), and the bottom (185-200 cm) of each borehole. In the parking lot area, the "surface" soil sample was approximately 30 cm below the surface of the pavement. Furthermore, when the depth of a borehole was 1.5 m, the bottom soil sample was collected at 135-150 cm. When the depth of a borehole was 1 m, only two samples were collected from that borehole (0-15, and 85-100 cm).

SAMPLE ANALYSIS AND DATA INTERPRETATION

Samples and data were returned to ORISE's ESSAP laboratory in Oak Ridge, TN for analysis and interpretation. Exposure rates were reported in μR/h. Soil samples were analyzed by gamma spectrometry. Spectra were reviewed for U-235, U-238, Th-232, Th-228, and any other identifiable photopeaks. Soil sample results were reported in units of picocuries per gram (pCi/g). Additional information concerning major instrumentation, sampling equipment, and analytical procedures is provided in Appendices A and B. Results were compared to NRC guidelines which are provided in Appendix C.

FINDINGS AND RESULTS

DOCUMENT REVIEW

ESSAP reviewed the licensee's radiological survey data and comments were provided to the NRC.[6] In ESSAP's opinion, the licensee documents provide an adequate description of the radiological condition of the facility relative to the NRC guidelines for release to unrestricted use.

SURFACE SCANS

Surface scans for gamma activity did not identify any locations of elevated direct radiation.

EXPOSURE RATE MEASUREMENTS

The background exposure rates, previously measured at this site, ranged from 10 to 11 μR/h and averaged 10 μR/h.[1]

Exposure rates, measured at 12 locations on the former burial site ranged from 9 to 11 μR/h. (Table 1).

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES

Total uranium concentrations in background soil samples, previously determined for this site, ranged from 1.0 to 2.4 pCi/g.[1]

Concentrations of U-235, U-238, and total uranium in surface soil samples ranged from <0.1 to 0.4 pCi/g, 0.7 to 10 pCi/g, and 3.0 to 20 pCi/g, respectively. Concentrations of U-235, U-238, and total uranium in subsurface soil samples ranged from <0.1 to 0.6 pCi/g, 0.6 to 13 pCi/g, and 2.9 to 27 pCi/g, respectively (Table 2).

COMPARISON OF RESULTS WITH GUIDELINES

The NRC guidelines for residual concentrations of radionuclides in soil, established for license termination or release of a facility for unrestricted use are presented in Appendix C. The primary contaminant of concern at this site is enriched uranium.

The soil concentration guideline for enriched uranium is 30 pCi/g.[7] The total uranium concentrations in all surface and subsurface soil samples were within this limit.

At this site, the applicable NRC guideline for exposure rate at 1 m above the surface is 10 μR/h above background, consistent with the Branch Technical Position.[7] All exposure rates were within this limit.

SUMMARY

During the period December 14 and 15, 1993, at the request of the NRC Region I Office, the Environmental Survey and Site Assessment Program of ORISE performed a confirmatory survey of the former burial site at Texas Instruments Incorporated. The survey activities consisted of surface scans for gamma activity, exposure rate measurements, and soil sampling.

Exposure rates were all within the 10 μR/h above background criterion. The radionuclide concentrations in surface and subsurface soil samples were less than the applicable guidelines for release for unrestricted use. In ESSAP's opinion, the licensee documents provide an adequate description of the radiological condition of the facility.

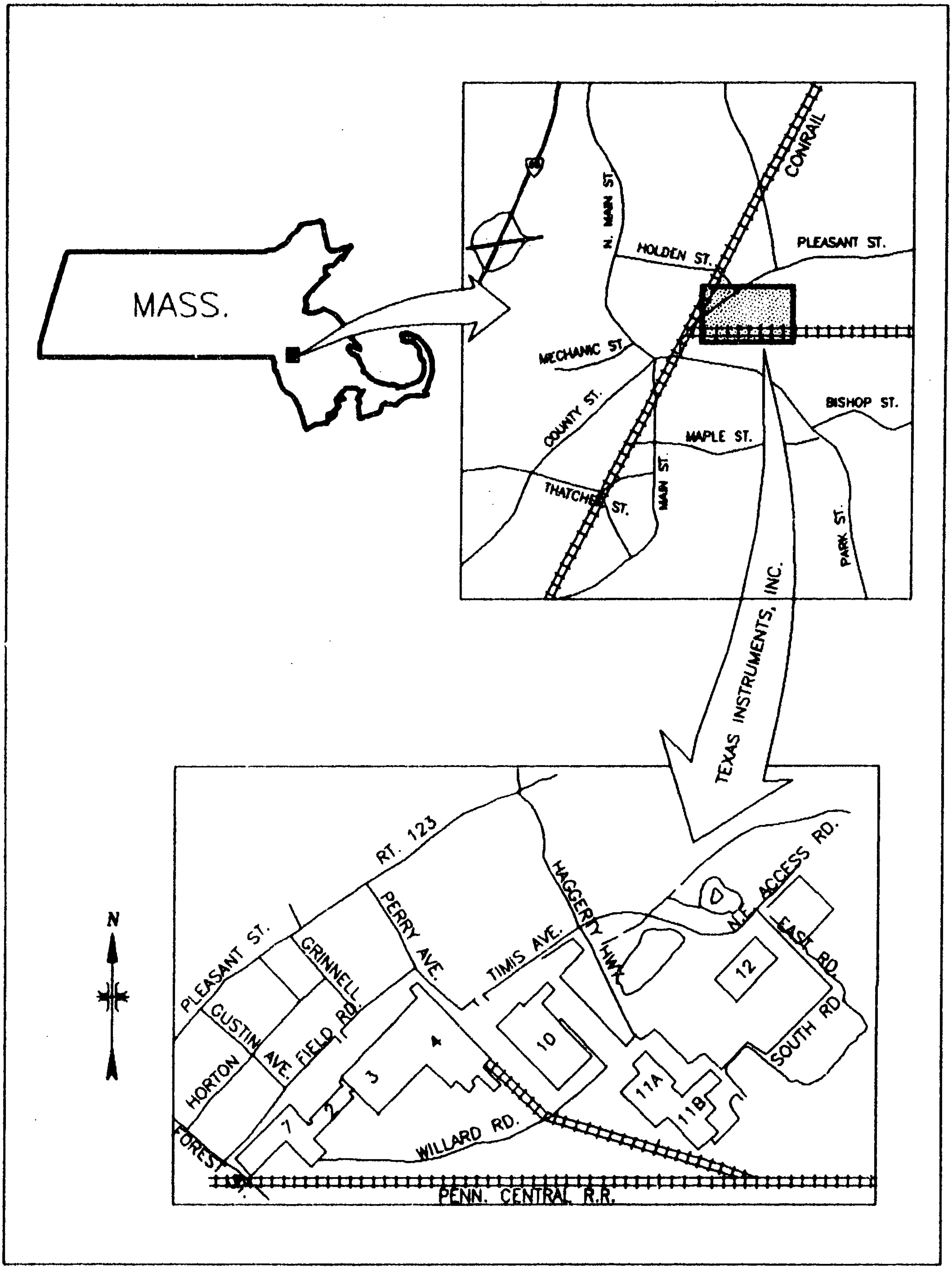

FIGURE 1: Map of Attleboro, Massachusetts – Location and Plan View of the Texas Instruments Site

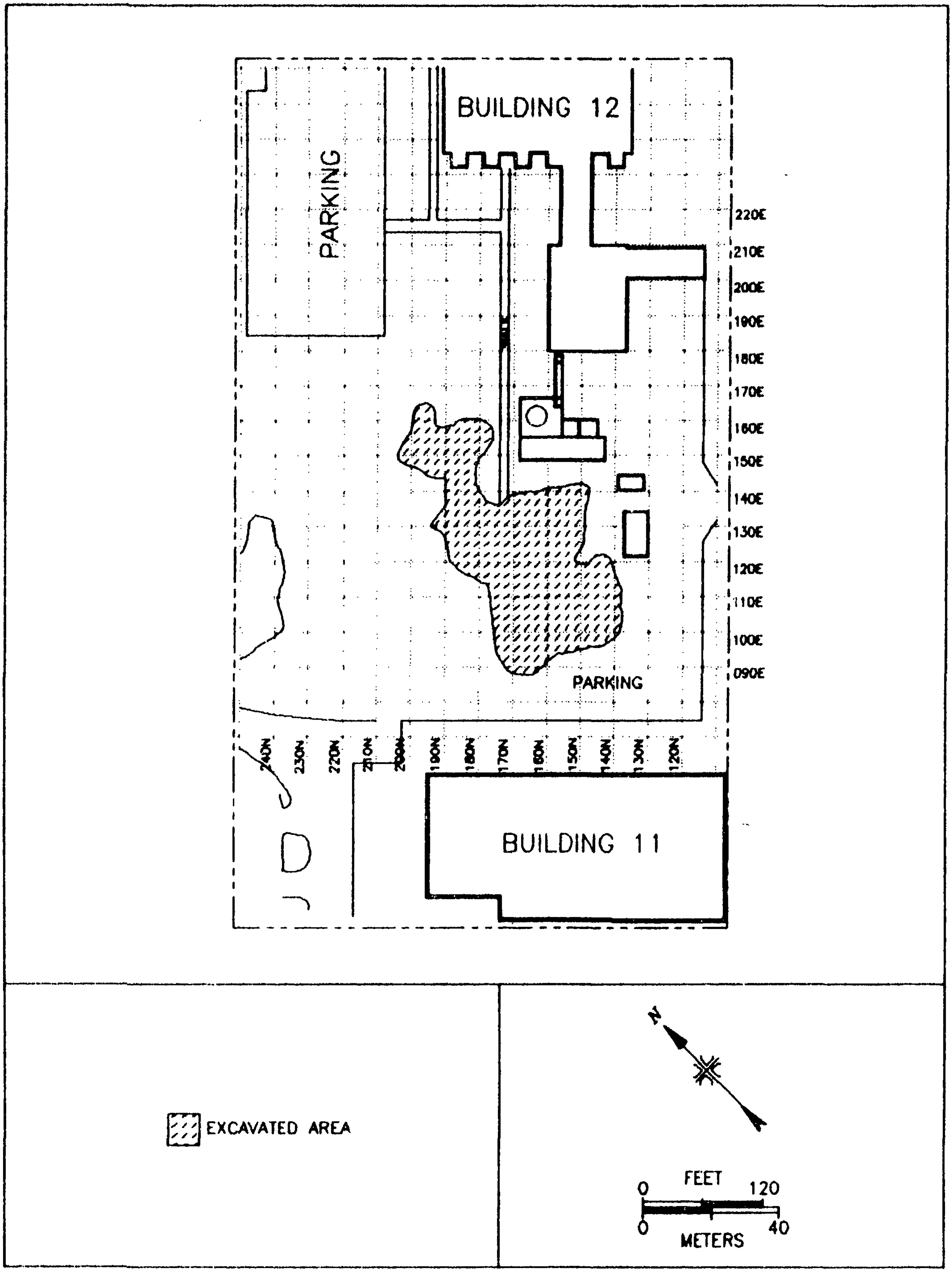

FIGURE 2: The Former Burial Site – Extent of Excavation

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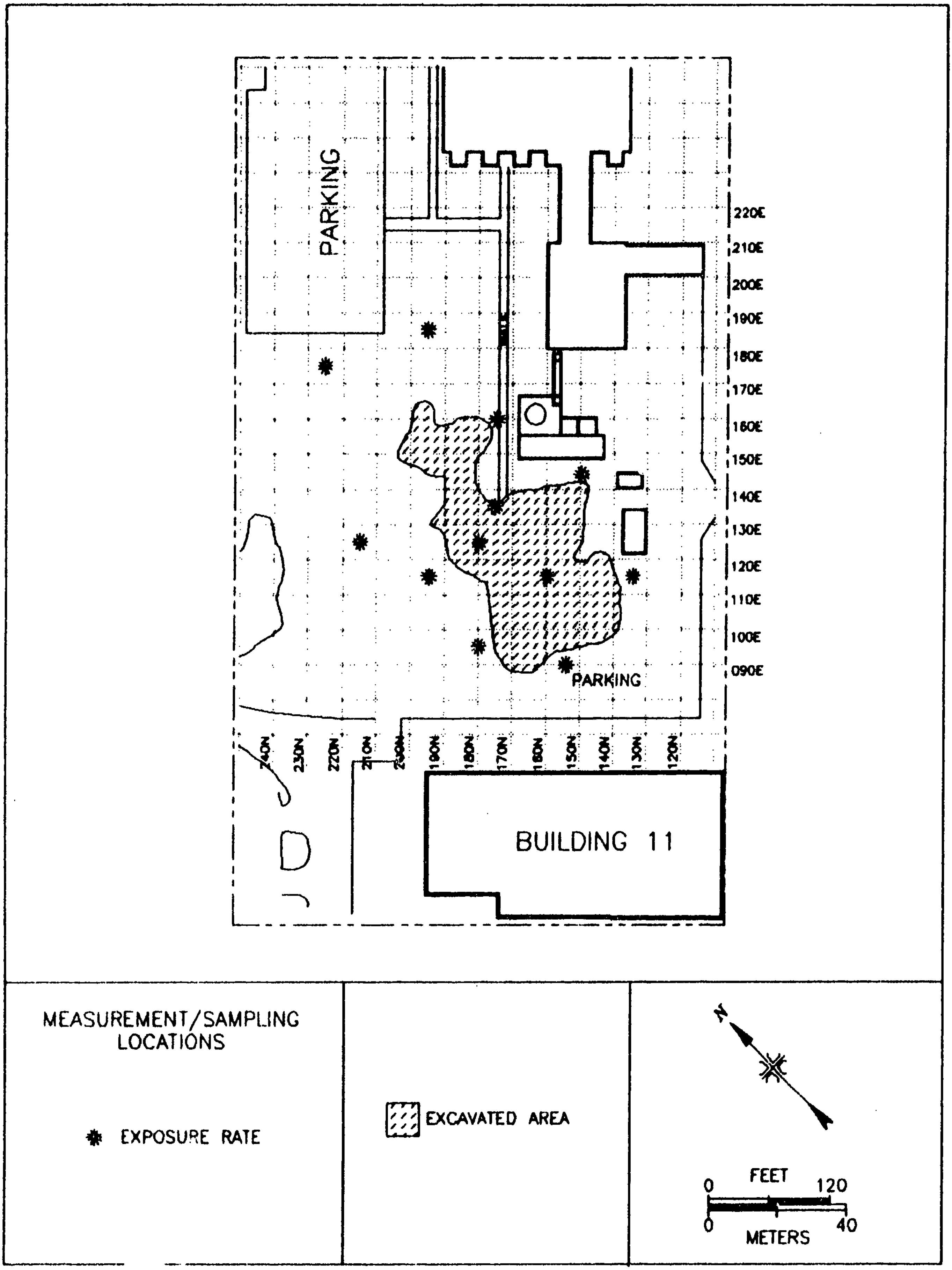

FIGURE 3: The Former Burial Site – Exposure Rate Measurement Locations

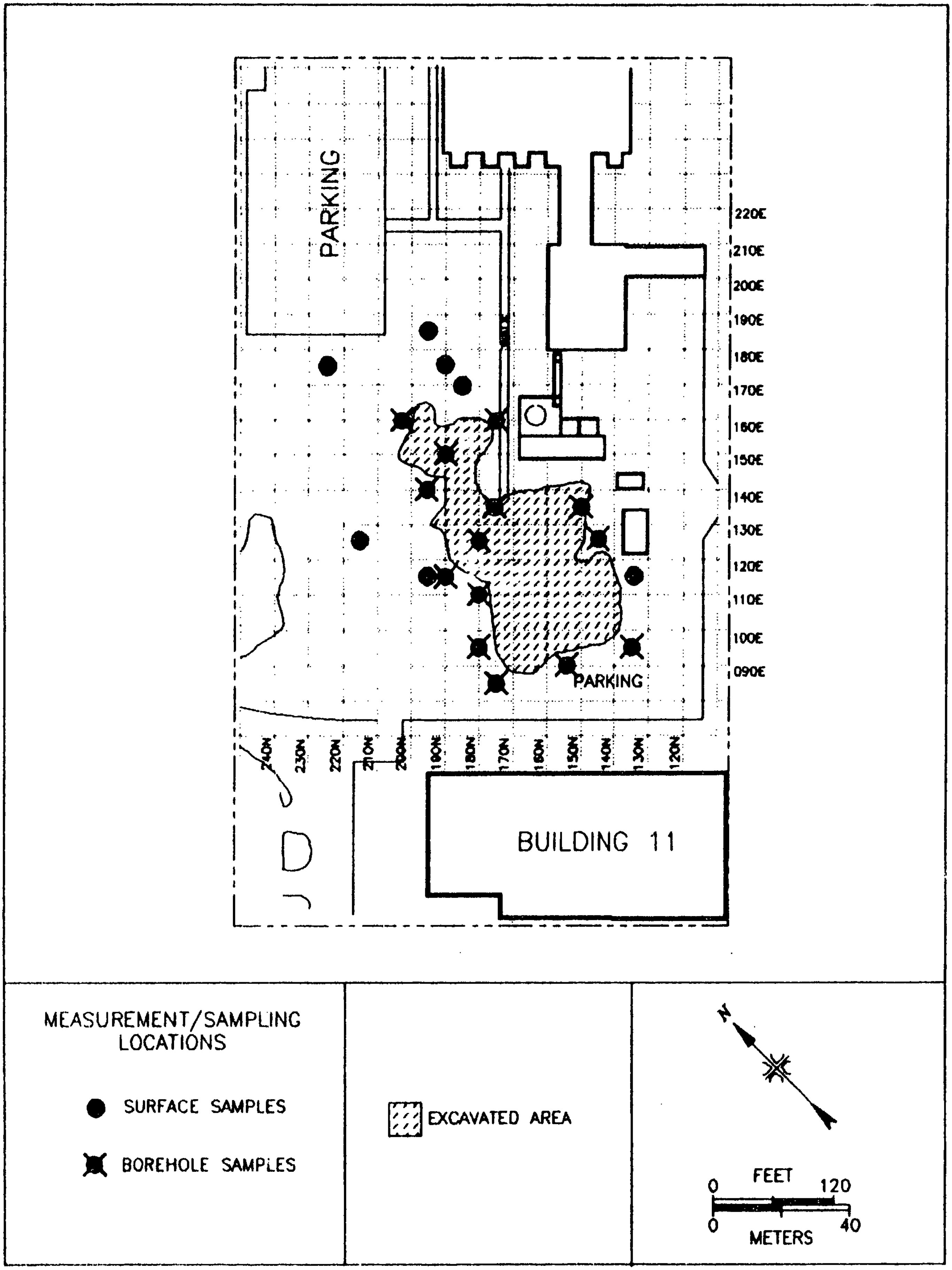

FIGURE 4: The Former Burial Site – Soil Sampling Locations

TABLE 1

EXPOSURE RATE MEASUREMENTS
TEXAS INSTRUMENTS, INC.
FORMER BURIAL SITE
ATTLEBORO, MASSACHUSETTS

Location[a]	**Exposure Rate at 1 m above the surface (μR/h)**
135N, 115E	9
150N, 145E	9
155N, 90E	11
160N, 115E	9
175N, 135E	9
175N, 160E	10
180N, 95E	11
180N, 125E	9
195N, 115E	10
195N, 185E	9
215N, 125E	9
225N, 175E	9

[a]Refer to Figure 3.

TABLE 2

URANIUM CONCENTRATIONS IN SOIL SAMPLES
TEXAS INSTRUMENTS, INC.
FORMER BURIAL SITE
ATTLEBORO, MASSACHUSETTS

Location[a]	Depth (cm)	Uranium Concentrations (pCi/g)[b]		
		U-235	U-238	Total U[c]
135N, 95E	0-15	0.3 ± 0.1	3.2 ± 1.2	10
	85-100	<0.1	0.6 ± 1.4	2.9
	185-200	0.2 ± 0.1	2.3 ± 1.2	6.9
135N, 115E	0-15	0.2 ± 0.1	0.9 ± 1.0	5.5
145N, 125E	0-15	<0.1	6.0 ± 1.7	8.3
	85-100	0.2 ± 0.1	4.4 ± 1.3	9.0
150N, 135E	0-15	<0.1	2.6 ± 1.1	4.9
	85-100	0.3 ± 0.1	4.1 ± 0.9	11
155N, 90E	0-15	<0.1	1.1 ± 1.0	3.4
	85-100	<0.1	2.2 ± 0.8	4.5
	185-200	0.2 ± 0.1	3.2 ± 1.4	7.8
175N, 85E	0-15	0.1 ± 0.1	1.5 ± 1.0	3.8
	85-100	<0.1	1.8 ± 1.4	4.1
	135-105	<0.1	1.6 ± 1.3	3.9
175N, 135E	0-15	<0.1	2.0 ± 1.5	4.3
	85-100	0.3 ± 0.1	7.2 ± 1.5	14
175N, 160E	0-15	0.2 ± 0.1	1.6 ± 1.1	5.6
	85-100	0.2 ± 0.1	1.6 ± 1.4	6.2
	185-200	0.2 ± 0.1	1.8 ± 0.9	6.4
180N, 95E	0-15	<0.2	3.7 ± 1.3	8.3
	85-100	<0.1	1.7 ± 1.2	4.0
	185-200	0.1 ± 0.1	3.4 ± 1.2	5.7
180N, 110E	0-15	0.4 ± 0.1	10.4 ± 2.1	20
	85-100	0.4 ± 0.1	12.7 ± 1.7	22
	135-150	<0.1	2.4 ± 1.8	4.7

TABLE 2 (Continued)

URANIUM CONCENTRATIONS IN SOIL SAMPLES
TEXAS INSTRUMENTS, INC.
FORMER BURIAL SITE
ATTLEBORO, MASSACHUSETTS

Location[a]	Depth (cm)	Uranium Concentrations (pCi/g)[b]		
		U-235	U-238	Total U[c]
185N, 125E	0-15	<0.1	1.7 ± 1.2	4.0
	85-100	0.3 ± 0.1	4.5 ± 1.3	11
185N, 170E	0-15	<0.1	0.7 ± 0.9	3.0
190N, 115E	0-15	<0.1	2.4 ± 1.5	4.7
	85-100	0.5 ± 0.1	2.1 ± 1.5	14
190N, 150E	0-15	<0.1	0.8 ± 1.0	3.1
	85-100	0.4 ± 0.1	6.5 ± 1.6	16
	185-200	0.6 ± 0.1	10.3 ± 1.8	24
190N, 175E	0-15	0.1 ± 0.1	1.5 ± 1.0	3.8
195N, 115E	0-15	0.4 ± 0.1	3.4 ± 1.6	13
195N, 140E	0-15	<0.1	1.2 ± 0.9	3.5
	85-100	0.3 ± 0.1	2.1 ± 1.1	9.0
	185-200	<0.1	1.7 ± 1.1	4.0
195N, 185E	0-15	<0.1	1.1 ± 0.8	3.4
200N, 160E	0-15	<0.1	1.2 ± 1.2	3.5
	85-100	0.6 ± 0.1	13 ± 2.0	27
	185-200	0.5 ± 0.1	2.8 ± 1.0	14
215N, 125E	0-15	<0.1	1.4 ± 0.9	3.7
225N, 175E	0-15	<0.1	1.6 ± 1.2	3.9

[a]Refer to Figure 4.
[b]Uncertainties represent the 95% confidence level based only on counting statistics.
[c]Total uranium concentrations are calculated based on a U-234 to U-235 activity ratio of 22:1.

REFERENCES

1. "Radiological Survey of the Texas Instruments Site, Attleboro, Massachusetts," Oak Ridge Associated Universities, January, 1985.

2. "Post Excavation Radiological Survey Report, Texas Instruments Incorporated Burial Site, Attleboro, Massachusetts," Creative Pollution Solutions, Inc., November 28, 1992.

3. Letter from A. Jaberaboansari (ORISE) to J. Roth (NRC), reference: "Interim Radiological Survey Report for the Texas Instruments Incorporated Burial Site", January 25, 1993.

4. "Remediation of the Former Radioactive Waste Burial Site", Final Report, Creative Pollution Solutions, Inc., September 1993.

5. "Confirmatory Survey Plan for the Texas Instruments Incorporated Burial Site, Attleboro, Massachusetts", Oak Ridge Institute for Science and Education, December 6, 1993.

6. Letter from A. J. Ansari (ORISE) to M. C. Roberts (NRC), reference: "Comments on the Final Report: Remediation of the Former Radioactive Waste Burial Site at Texas Instruments Incorporated", December 1, 1993.

7. U.S. Nuclear Regulatory Commission, "Disposal of Onsite Storage of Thorium and Uranium Wastes from Past Operations", 46 FR 52061, Washington, D.C., October 23, 1981.

APPENDIX A

MAJOR INSTRUMENTATION

APPENDIX A

MAJOR INSTRUMENTATION

The display of a specific product is not to be construed as an endorsement of the product or its manufacturer by the authors or their employers.

DIRECT RADIATION MEASUREMENT

Instruments

Eberline Pulse Ratemeter
Model PRM-6
(Eberline, Santa Fe, NM)

Ludlum Ratemeter-Scaler
Model 2200
(Ludlum Measurements, Inc.,
Sweetwater, TX)

Detectors

Reuter-Stokes Pressurized Ion Chamber
Model RSS-111
(Reuter-Stokes, Cleveland, OH)

Victoreen NaI Scintillation Detector
Model 489-55
3.2 cm x 3.8 cm Crystal
(Victoreen, Cleveland, OH)

LABORATORY ANALYTICAL INSTRUMENTATION

High Purity Extended Range Intrinsic Detectors
Model No: ERVDS30-25195
(Tennelec, Oak Ridge, TN)
Used in conjunction with:
Lead Shield Model G-11
(Nuclear Lead, Oak Ridge, TN) and
Multichannel Analyzer
3100 Vax Workstation
(Canberra, Meriden, CT)

High-Purity Germanium Detector
Model GMX-23195-S, 23% Eff.
(EG&G ORTEC, Oak Ridge, TN)
Used in conjunction with:
Lead Shield Model G-16
(Gamma Products, Palos Hills, IL) and
Multichannel Analyzer
3100 Vax Workstation
(Canberra, Meriden, CT)

APPENDIX B

SURVEY AND ANALYTICAL PROCEDURES

APPENDIX B

SURVEY AND ANALYTICAL PROCEDURES

SURVEY PROCEDURES

Surface Scans

Surface scans for gamma activity were performed by passing the probes slowly over the surface; the distance between the probe and the surface was maintained at a minimum. The scans were performed using NaI detectors coupled to countrate meters with audible indicators. Identification of elevated levels was based on increases in the audible signal from the recording and/or indicating instrument.

Exposure Rate Measurements

Measurements of gamma exposure rates were performed at 1 m above the surface, using a pressurized ionization chamber (PIC).

Soil Sampling

Approximately 1 kg of soil was collected at each sample location. Surface soil samples were collected at 0-15 cm depth. Samples from boreholes were collected from the surface (0-15 cm), the center (85-100 cm), and the bottom (185-200 cm) of each borehole. Collected samples were placed in a plastic bag, sealed, and labeled in accordance with ESSAP survey procedures.

ANALYTICAL PROCEDURES

Gamma Spectrometry

Samples of soil were dried, mixed, crushed, and/or homogenized as necessary, and a portion sealed in 0.5-liter Marinelli beaker or other appropriate container. The quantity placed in the determined and the samples counted using intrinsic germanium detectors coupled to a pulse height analyzer system. Background and Compton stripping, peak search, peak identification, and concentration calculations were performed using the computer capabilities inherent in the analyzer system. Energy peaks used for determination of radionuclides of concern were:

U - 235	0.186 MeV
U - 238	0.063 MeV from Th-234*
Th-228	0.583 MeV from Tl-208
Th-232	0.911 MeV from Ac-228*

*Secular equilibrium assumed.

Spectra were also reviewed for other identifiable photopeaks.

UNCERTAINTIES AND DETECTION LIMITS

The uncertainties associated with the analytical data presented in the tables of this report represent the 95% confidence level for that data based only on counting statistics. Additional uncertainties associated with sampling and measurement procedures, have not been propagated into the data presented in this report.

Detection limits, referred to as minimum detectable activity (MDA), were based on 2.71 plus 4.66 times the standard deviation of the background count. When the activity was determined to be less than the MDA of the measurement procedure, the result was reported as less than MDA. Because of variations in background levels, measurement efficiencies, and contributions from other radionuclides in samples, the detection limits differ from sample to sample and instrument to instrument.

CALIBRATION AND QUALITY ASSURANCE

Calibration of all field and laboratory instrumentation was based on standards/sources, traceable to NIST, when such standards/sources were available. In cases where they were not available, standards of an industry recognized organization were used. Calibration of pressurized ionization chambers was performed by the manufacturer.

Analytical and field survey activities were conducted in accordance with procedures from the following ESSAP documents:

- Survey Procedures Manual, Revision 7
- Laboratory Procedures Manual, Revision 7
- Quality Assurance Manual, Revision 6

The procedures contained in these manuals were developed to meet the requirements of DOE Order 5700.6C and ASME NQA-1 for Quality Assurance and contain measures to assess processes during their performance.

Quality control procedures include:

- Daily instrument background and check-source measurements to confirm that equipment operation is within acceptable statistical fluctuations.
- Participation in EPA and EML laboratory Quality Assurance Programs.
- Training and certification of all individuals performing procedures.
- Periodic internal and external audits.

APPENDIX C

GUIDELINES FOR RESIDUAL CONCENTRATIONS OF THORIUM AND URANIUM WASTES IN SOIL

Guidelines for Residual Concentrations of Thorium and Uranium Wastes in Soil

On October 23, 1981, the Nuclear Regulatory Commission published in the Federal register a notice of Branch Technical Position on "Disposal or Onsite Storage of Thorium and Uranium Wastes from Past Operations." This document established guidelines for concentrations of uranium and thorium in soil, that will limit maximum radiation received by the public under various conditions of future land usage. These concentrations are as follows:

Material	Maximum Concentrations (pCi/g) for various options			
	1[a]	2[b]	3[c]	4[d]
Natural Thorium (Th-232 + Th-228) with daughters present and in equilibrium	10	50	--	500
Natural Uranium (U-238 + U-234) with daughters present and in equilibrium	10	--	40	200
Depleted Uranium:				
Soluble	35	100	--	1,000
Insoluble	35	300	--	3,000
Enriched Uranium:				
Soluble	30	100	--	1,000
Insoluble	30	250	--	2,500

[a]Based on EPA cleanup standards which limit radiation to 1 mrad/yr to lung and 3 mrad/yr to bone from ingestion and inhalation and 10 μR/h above background fro
m direct external exposure.
[b]Based on limiting individual dose to 170 mrem/yr.
[c]Based on limiting equivalent exposure to 0.02 working level or less.
[d]Based on limiting individual dose to 500 mrem/yr and in case of natural uranium, limiting exposure to 0.02 working level or less.

1 1 8 9 4 5

ORISE

OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

December 6, 1993

Mark C. Roberts
U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19400

SUBJECT: CONFIRMATORY SURVEY PLAN FOR THE TEXAS INSTRUMENTS INCORPORATED BURIAL SITE, ATTLEBORO, MASSACHUSETTS. [Docket 070-00033]

Dear Mr. Roberts:

Enclosed is a copy of the subject document. The survey is scheduled to begin on December 14th. If you have any questions, please contact me at (615) 576-3355 or Michele Landis at (615) 576-2908.

Sincerely,

Armin J. Ansari, Ph.D.
Project Leader
Environmental Survey and
Site Assessment Program

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File #205

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P O BOX 117, OAK RIDGE, TENNESSEE 37831 0117

118945

FOR THE TEXAS INSTRUMENTS INCORPORATED BURIAL SITE, ATTLEBORO, MASSACHUSETTS

SITE HISTORY AND DESCRIPTION

The Texas Instruments Incorporated site at Attleboro, Massachusetts, was owned and operated by Metals and Controls (M&C) until 1959, at which time M&C merged with Texas Instruments, Inc. The General Plate Division of M&C began processing nuclear materials in 1952, and between 1952 and 1959 fabricated uranium foils for reactor experiments and fuel components and complete reactor fuel cores for the U.S. Navy. Source material license D-549 was issued permitting acquisition and title to not more than 22.7 kg (50 pounds) of refined source material for use in the production of uranium foils; additional source material was acquired and used under contract with U.S. Government. Special nuclear materials license No. SNM-23 was issued, permitting acquisition and title to 110 kg of enriched uranium for fabrication of the fuel components and cores. After the merger in 1959, Texas Instruments continued fabricating reactor fuel cores, primarily for research and production reactors. Also, source materials, i.e., natural uranium and thorium, were still being fabricated for sale to various corporations.

A 1964 Texas Instruments health and safety manual states that uranium- and thorium-contaminated noncombustible scrap material and machinery were collected in 55-gallon steel drums and were disposed of through authorized agencies, or were buried on-site in compliance with 10CFR20.304. Burials were made from 1958 to 1961, and the burial site was closed in 1967. Records indicate two known burials, one in 1958 of contaminated ductwork, and one in 1961 of 28.4 mCi of enriched uranium noncombustible scrap. Work with nuclear materials was gradually reduced beginning in 1968 and was terminated in 1974. The interior of the facility was decontaminated and released for unrestricted use by the Nuclear Regulatory Commission (NRC) in 1983.

Prepared by the Environmental Survey and Site Assessment Program of Oak Ridge Institute for Science and Education, Oak Ridge, TN, under interagency agreement (NRC Fin. A-9076) between the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy.

The Radiological Site Assessment Program of the Oak Ridge Associated Universities (ORAU) conducted a radiological survey of portions of the facility's outdoor areas during April and May, 1984. The results of that survey indicated several areas with surface and/or subsurface uranium concentrations in excess of guidelines.[1] In the summer of 1992, Creative Pollution Solutions, Inc. was contracted by Texas Instruments Inc. to initiate remediation activities. The licensee submitted a post-excavation radiological survey report to the NRC in November of 1992.[2] The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education performed a confirmatory survey of the excavated area in December of 1992. The results of that survey indicated that the full extent of the burial site, particularly on the west side, adjacent to Building 11 parking lot, had not been determined.[3] Subsequently, further remediation of the former burial site was performed by Creative Pollution solutions, Inc. The licensee has completed the final survey activities and backfilling operations.[4]

The Texas Instruments Inc. Facility, Attleboro, MA is located in North Attleboro, approximately 48 kilometers south of Boston. The former burial site is located between Buildings 11 and 12. The area of concern for remediation activities was approximately 10,000 m^2. The excavated area at the burial site was between 2,500 to 3,000 m^2 and the average depth of the excavated area was approximately 1.5 meters. This area has been backfilled. The U.S. Nuclear Regulatory Commission, Region I Office, has requested that the Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) perform an independent confirmatory survey of the former burial site.

OBJECTIVE

The objective of a confirmatory survey is to provide independent document reviews and radiological data, for use by the NRC in evaluating the adequacy and accuracy of the licensee's radiological status report, relative to established guidelines.

RESPONSIBILITY

Work described in this survey plan will be performed under the direction of Michele Landis, Project Manager and Armin Ansari, Project Leader with ESSAP. The cognizant site supervisor has the authority to make appropriate changes to the survey procedures as deemed necessary. After consultation with the NRC site representative, the scope of the survey plan may be altered. Deviations to the survey plan or procedures will be documented in the site log book.

DOCUMENT REVIEW

ESSAP will review the licensee's radiological survey data. Procedures and methods utilized by the licensee will be reviewed for adequacy and appropriateness. The post-remedial action data will be reviewed for accuracy, completeness and compliance with guidelines.

PROCEDURES

Survey activities will be conducted in accordance with the ORISE ESSAP Survey Procedures Manual. Specific procedures applicable to this survey are listed on page 4 of this survey plan.

Reference Grid

A 10 m grid was established during ESSAP's radiological survey of the area in 1984 which was subsequently used by the licensee.[7] The same reference grid will be used in this survey.

Surface Scans

Surface scans of the former excavation and the surrounding area (approximately 10,000 m^2) will be performed using NaI detectors coupled to countrate meters with audible indicators. Surface scans for gamma radiation will be performed on 100% of the former excavation and the two meter perimeter immediately surrounding that area. Approximately 50% of the remaining surface area will also be scanned. Areas of elevated direct radiation will be noted for further investigation.

Exposure Rate Measurements

Background exposure rates, determined from previous ESSAP surveys of this facility, will be used for comparison.

Exposure rate measurements will be performed at 1 m above the surface at a minimum of 10 locations. Exposure rate measurements will be performed using a Pressurized Ionization Chamber (PIC).

SOIL SAMPLING

Surface soil samples will be obtained at the center of randomly selected grid blocks in the area surrounding the former excavation. A minimum of five surface soil samples will be collected in that area. One sample will be collected from the area between grid coordinates 185N,170E and 195N,180E where the licensee reported slightly elevated gamma activity.

Subsurface soil samples will be collected from boreholes drilled on and around the former excavated area. Boreholes will be drilled by the licensee to a depth of approximately 2 meters. On the west side of the excavation, boreholes will be drilled 3 meters from the edge of the former excavation at approximately 20 meter intervals. For the remaining perimeter area, boreholes will be drilled at approximately 40 meter intervals. Additional boreholes may be drilled at other locations depending on survey findings and with consultation with the NRC site representative. Each borehole will be scanned for gamma activity using a collimated NaI detector coupled to countrate meters with audible indicators. Systematic soil samples will be collected from the surface (0-15 cm), the middle (100-115 cm) and the bottom (200-215 cm) of each borehole. Additional soil samples will be collected at locations of elevated gamma activity.

SAMPLE ANALYSIS AND DATA INTERPRETATION

Samples and data will be returned to ORISE's ESSAP laboratory in Oak Ridge, TN for analysis and interpretation. Soil samples will be analyzed by gamma spectrometry and the results reported in pCi/g. Exposure rates will be reported in μR/h. The data generated will be compared with the licensee's documentation and NRC guidelines established for release to unrestricted use. Results will be presented in a report and provided to the NRC for review and comment.

GUIDELINES

The soil concentration guideline, for enriched uranium, is 30 pCi/g.[5] The exposure rate limit is 5 μR/h above background.[6]

TENTATIVE SCHEDULE

Measurement and Sampling	December 14-16, 1993
Sample Analysis	January. 1994
Draft Report	March, 1994

LIST OF CURRENT PROCEDURES

Applicable procedures from ORISE ESSAP Survey Procedures Manual include:

Section 5.0 Instrument Calibration and Operational Check-Out

- 5.1 General Information
- 5.2 Electronic Calibration of Ratemeters
- 5.3 Gamma Scintillation Detector Check-Out and Cross Calibration
- 5.4 Alpha Scintillation Detector Calibration and Check-Out
- 5.5 GM Detector Calibraticn and Check-Out
- 5.13 Field Measuring Tape Calibration

Section 6.0 Site Preparation

6.2 Reference Grid System

Section 7.0 Scanning and Measurement Techniques

7.1 Surface Scanning

7.2 Gamma Logging of Boreholes

Section 8.0 Sampling Procedures

8.1 Surface Soil Sampling

8.2 Subsurface Soil Sampling

8.9 Sample Identification and Labeling

Section 9.0 Integrated Survey Procedures

9.1 Background Measurements and Baseline Sampling

9.2 General Survey Approaches and Strategies

Section 10.0 Health and Safety and Control of Cross Contamination

Section 11.0 Quality Assurance and Quality Control

REFERENCES

1. "Radiological Survey of the Texas Instruments Site, Attleboro, Massachusetts," Oak Ridge Associated Universities, January, 1985.

2. "Post Excavation Radiological Survey Report, Texas Instruments Incorporated Burial Site, Attleboro, Massachusetts," Creative Pollution Solutions, Inc., November 28, 1992.

3. Letter from A. Jaberaboansari (ORISE) to J. Roth (NRC), reference: "Interim Radiological Survey Report for the Texas Instruments Incorporated Burial Site", January 25, 1993.

4. "Remediation of the Former Radioactive Waste Burial Site", Final Report, Creative Pollution Solutions, Inc., September 1993.

5. "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material," U.S. Nuclear Regulatory Commission, Division of Fuel Cycle and Material Safety, Washington D.C., August 1987.

6. "Review Plan: Evaluating Decommissioning Plans for Licensees Under 10 CFR Parts 30, 40, and 70", U.S. Nuclear Regulatory Commission, Washington, D.C., 1991.

ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

December 3, 1993

Mark C. Roberts
U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19400

SUBJECT: PROPOSED CONFIRMATORY SURVEY PLAN FOR THE TEXAS INSTRUMENTS INCORPORATED BURIAL SITE, ATTLEBORO, MASSACHUSETTS. [Docket 070-00033]

Dear Mr. Roberts:

Enclosed is a copy of the subject document for your review and comment. The survey is tentatively scheduled to begin on December 14th. Please direct your questions or comments to me at (615) 576-3355 or Michele Landis at (615) 576-2908.

Sincerely,

Armin J. Ansari, Ph.D.
Project Leader
Environmental Survey and
Site Assessment Program

AJA:rde

Enclosure

cc: J. Parrott, NRC/NMSS, 6H3
T. Mo, NRC/NMSS, 4E4
D. Tiktinsky, NRC/NMSS
J. Kinneman, NRC/Region I
M. Landis, ORISE
J. Berger, ORISE
PMDA, 6E6
File #205

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P O BOX 117, OAK RIDGE, TENNESSEE 37831 0117

118045

INCORPORATED BURIAL SITE, ATTLEBORO, MASSACHUSETTS

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4. "Remediation of the Former Radioactive Waste Burial Site", Final Report, Creative Pollution Solutions, Inc., September 1993.

5. "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material," U.S. Nuclear Regulatory Commission, Division of Fuel Cycle and Material Safety, Washington D.C., August 1987.

6. "Review Plan: Evaluating Decommissioning Plans for Licensees Under 10 CFR Parts 30, 40, and 70", U.S. Nuclear Regulatory Commission, Washington, D.C., 1991.

APPENDIX A

COST ESTIMATE*
CONFIRMATORY SURVEY
FOR THE TEXAS INSTRUMENTS
INCORPORATED BURIAL SITE,
ATTLEBORO, MASSACHUSETTS

Survey Preparation - $5,600

Survey preparation includes the following activities: document reviews, survey plan, the cost and time estimates, trip planning and preparation (equipment calibration and packing).

On-Site Activities - $11,200

On-site activities will include 9 man-days at the site performing the following: gamma scans, soil sampling, and exposure rate measurements. The on-site expenses also include unpacking equipment, and logging in samples upon return to Oak Ridge.

Travel - $12,100

Travel expenses include transportation to and from the site (airlines, rental vehicle_, hotel expenses, and perdiem.

Sample Analysis - $4,500

Includes analysis of approximately 60 soil samples by gamma spectrometry.

Report Preparation - $12,000

The report preparation will include the following activities: tabulation of data, illustrations, writing and reviewing the draft and final reports, word processing and reproduction.

<u>Total Cost Estimate</u> - $45,400

***Estimates are for survey activities described in this survey plan. Reduction or increase in the scope of the survey would result in changes in the original estimate in the "on-site activities" and "sample analysis" categories. Due to the nature of the survey, this estimate is a best guess. Site and weather conditions and survey findings may change the scope of the survey and increase or decrease the cost estimate. Major changes to the scope of the survey, if necessary, will be made only after consultation with the NRC site representative.**

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ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

December 1, 1993

Mark C. Roberts
U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19400

SUBJECT: COMMENTS ON THE FINAL REPORT: "REMEDIATION OF THE FORMER RADIOACTIVE WASTE BURIAL SITE" AT TEXAS INSTRUMENT INCORPORATED, ATTLEBORO, MASSACHUSETTS. [Docket 070-00033]

Dear Mr. Roberts:

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) has reviewed the subject document. The attached comments are offered for your consideration.

If there are any questions regarding these comments, please direct them to me at (615) 576-3355 or Michele Landis at (615) 576-2908.

Sincerely,

Armin J. Ansari
Project Leader
Environmental Survey and
Site Assessment Program

AJA:ttc

Attachment

cc: J. Parrott, NRC/NMSS, 6H3
T. Mo, NRC/NMSS, 6H3
D. Tiktinsky, NRC/NMSS
J. Kinneman, NRC/Region I
M. Landis, ORISE
J. Berger, ORISE
PMDA, 6E6
File #205

118945

P.O. BOX 117, OAK RIDGE, TENNESSEE 37831-0117

General Comments

1. Primarily, the licensee has used the Alpha Screening method for analysis of soil samples. In ESSAP's opinion, this appears to be an appropriate method of analysis as compared with gamma spectrometry (letter from A. Jaberaboansari to J. Roth, 2/4/93).

2. Although the total uranium concentration in several soil samples exceeds the 30 pCi/g criterion, the licensee demonstrates that the average concentration within a 10 m x 10 m grid block is less than 30 pCi/g of total uranium. This provision for averaging within a grid block was included in the licensee's Remediation Plan (Appendix J) and approved by the NRC.

   On page 5 of Appendix J, 10 m^2 should be 100 m^2.

3. The exposure rate guideline applicable to this site was not included in the licensee's Remediation Plan. However, the exposure rate guideline of 10 μR/h above background was used by the licensee in the final survey. This is consistent with the Branch Technical Position, but does not agree with the August 1991 Policy and Guideline FC 91-2, Standard Review Plan, which indicates an average exposure rate guideline of 5 μR/h above background.

Specific Comments

1. Figure 5.1. The two different symbols (closed and open circles) are not defined.

2. Appendix C, page C-2. Minor error in calculations: 0.243 cm equals 0.096 inches.

3. Appendix C, Attachment , Gross Alpha Screening Data. Column headings "NC1", "NC2", "EC1", and "EC2" are not defined. Also, it is not clear what pages are referred to in the "page" column.

   Also, this attachment is to include diagrams indicating sample locations (as stated on page 1 of Appendix D). These diagrams are not included.

4. Appendix D. Bore hole sampling locations and drilling logs are provided in Attachments 1 and 2. However, it appears that the information presented here can not be cross referenced to the alpha screening data in Appendix C, by either the sample ID number or the sampling location. Such information should be provided.

5. Appendix E, Table 1. The four locations with the highest gamma scan results were adjacent to each other and covered an approximately 75 m^2 area. Was any soil sample analysis performed in this area?

6. Appendix E, Table 5. "REF" is not defined.

7. Appendix E. The use of a NaI gamma scintillation probe to measure exposure rates is acceptable only when the probe is properly cross calibrated. In addition, Co-60 is not an appropriate calibration source for determining exposure rates when the contaminant is uranium. A similar comment was provided earlier (letter from A. Jaberaboansari to J. Roth, 12/4/92). In spite of this, the survey results do not indicate a potential problem in meeting the 10 μR/h limit.

8. Appendix F, Section 3.0. Please indicate the name of the laboratory at which the groundwater samples were analyzed.

TEXAS INSTRUMENTS

December 1, 1993

Mr. Mark Roberts
U.S. Nuclear Regulatory Commission
Region 1
475 Allendale Road
King of Prussia, PA 19406

Re: Texas Instruments Incorporated
SNM Lic. No. 23
Docket No. 70-33

Dear Mr. Roberts,

Per our discussion, I am providing the information you requested concerning the distance and direction from the Former Burial Site on the Texas Instruments Incorporated (TI), Attleboro property to the nearest residential dwelling.

As I previously indicated, the TI Attleboro site is quite expansive, and since it is situated on the edge of an urban area, there are numerous residential abutters. For the most part, residential properties directly abut the TI property along its northern boundary.

Due to the fact that the Former Burial Site is located on the eastern side of the TI complex where property boundaries reach their maximum separation, there are no residential properties within more than a quarter of a mile. Based on measurements derived from a 1:200 scale topographic map of the site and its environs that was generated in 1989 using aerial surveying techniques, the distances and directions to the three nearest residential properties from the Former Burial Site are as follows:

1. 1550 feet to the Southwest

2. 1700 feet to the North

3. 1800 feet to the Northeast.

I would be happy to provide you with a copy of the topographic map if you feel it could be of any assistance.

On another topic, I would like to confirm that I have retained the services of Guild Drilling to perform soil borings and split-spoon sampling when you come to the site during the week of December 13 to perform the verification survey. Since they

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have performed all previous sampling related to this project, I'm sure you will be pleased with their service. TI will also provide the Health Physicist to monitor radiological health and safety during the drilling operations.

Please feel free to contact me at (508) 699-1809 if I can be of further assistance on these matters.

Sincerely yours,
Materials & Controls Group

M.J. Elliott

Michael J. Elliott
Environmental Engineering Manager

CC: Mr. Francis J. Veale Jr., Esq. - ESH Manager, Attleboro
Mr. John O'Donnell - Corporate RSO, Dallas
Mr. M. Dean Chapman - Site RSO, Attleboro

TEXAS INSTRUMENTS

September 23, 1993

Mr. Jerome Roth
U.S. Nuclear Regulatory Commission
Region 1
475 Allendale Road
King of Prussia, PA 19406

Re: Texas Instruments Incorporated
SNM Lic. No. 23
Docket No. 70-33

Dear Mr. Roth,

Between August of 1992 and September of 1993, Texas Instruments Incorporated (TI) performed field activities and surveys to remediate the Former Radioactive Waste Burial Site which was located on its Attleboro property. The following Final Report documents these activities and demonstrates that TI has successfully completed the remediation program outlined in the Remediation Plan submitted to the U.S. Nuclear Regulatory Commission (NRC) dated July 14, 1992. Likewise, TI has achieved the stated cleanup goals required to release the site for unrestricted use consistent with Option 1 of the 1981 Branch Technical Position.

Since the Final Report is rather voluminous, TI would be happy to send representatives to the Region 1 offices at the convenience of the NRC, and to provide an oral presentation on contents and conclusions contained within the report.

Submission of this Final Report culminates three years of effort which began with a letter of commitment to the NRC dated September 13, 1990. At that time TI committed to the goal of remediating its Former Radioactive Waste Burial Site as part of its license termination activities. Having achieved this goal, and presuming that NRC approval is forthcoming, TI will have satisfied all remaining requirements toward total decommissioning of its former nuclear operations. Thus, there should remain no impediments preventing license termination.

In light of this, TI respectfully requests that the NRC commence license termination procedures at its earliest convenience.

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Please feel free to contact me at (508) 699-1809 if I can be of further assistance on this matter.

Sincerely yours,
Materials & Controls Group

Michael J. Elliott

Michael J. Elliott
Environmental Engineering Manager

CC: Mr. Werner Schuele - Site Manager, Attleboro
Mr. Francis J. Veale Jr., Esq. - ESH Manager, Attleboro
Mr. John O'Donnell - Corporate RSO, Dallas

Exhibit 1

REQUEST FOR TECHNICAL ASSISTANCE (RFTA)

INSPECTOR'S NAME Mark Roberts TELEPHONE # (215) 337-5094

FACILITY NAME AND LOCATION Texas Instruments, Inc. Attleboro, Massachusetts

DOCKET 070-00033 DATE OF REQUEST 11/1/93 RFTA # 94-003 (LEAVE BLANK)

TAC # - U 00750

FEE OR NON-FEE RECOVERABLE Fee

PROVIDE APPLICATION DATE (FROM LICENSEE) September 1993

PLEASE CHECK NEW LICENSE ___ AMENDMENT X RENEWAL ___

DESCRIPTION OF WORK TO BE PERFORMED (INCLUDING SCHEDULE) (USE SEPARATE SHEET IF NEEDED) Perform radiological survey of the areas where licensed material was found in the previous ORISE survey (parking lot area between Buildings 11 and 12). Area has been backfilled so a drilling contractor will likely be necessa for soil samples from and around the previously excavated areas.

FOR CONFIRMATORY SURVEY REQUESTS, PLEASE ANSWER THE FOLLOWING:

1. HAS PRELIMINARY INFORMATION BEEN RECEIVED FROM LICENSEE? YES x NO ___
1A. HAS THIS INFORMATION BEEN REVIEWED BY NRC AND IS IT ACCEPTABLE? YES ___ NO ___
   Information has been preliminarily reviewed by NRC and a more complete review is underway.
   (NOTE: ORAU SHOULD BE PROVIDED 30 CALENDAR DAYS TO REVIEW INFORMATION AND PREPARE FOR SURVEY).
2. IS A PRELIMINARY SITE VISIT NEEDED? No WHEN? ___
3. DATE SURVEY PLAN NEEDED As soon as reasonbly possible. *
4. DATE SURVEY NEEDED As soon as reasonbly possible. *

AUTHORIZATION

* Site survey should be scheduled as soon as reasonbly practicabl however, it is recognized that the need to arrange a drilling contractor may be the limiting factor on survey initiation.

INSPECTOR 11-1-93 BRANCH CHIEF 11/2/93 DATE

EMERGENCY AUTHORIZATION (SEE INSPECTION CHAPTER 0312 FOR DEFINITION OF ACCEPTABLE EMERGENCY REQUESTS). EXPLAIN, ON SEPARATE SHEET, THE JUSTIFICATION FOR THE EMERGENCY REQUEST. *NOTE THAT THE REQUEST CANNOT BE PROCESSED WITHOUT THIS JUSTIFICATION.

DIVISION DATE

APPROVAL

HQ TAPM 11/14/93 DATE HQ TM 11/10/93 DATE

TIN NO

Texas Instruments Incorporated
Attleboro, Massachusetts

Remediation
of the
Former Radioactive Waste Burial Site
(NRC License SNM-23)

Final Report

Prepared by

Creative Pollution Solutions, Inc.
September 1993

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TEXAS INSTRUMENTS INCORPORATED
FINAL REPORT: REMEDIATION OF THE FORMER
RADIOACTIVE WASTE BURIAL SITE

License:	SNM-23	Date:	September 1993
Docket No:	70-33	Version:	1.0

1.0 BACKGROUND INFORMATION

1.1 Nuclear Operations

The Texas Instruments Incorporated (TI), Attleboro, Massachusetts site was owned and operated by Metals & Controls, Inc. (M & C) until 1959, at which time M & C merged with TI. The General Plate Division of M & C began processing nuclear materials in 1952, and between 1952 and 1959 fabricated uranium foils for reactor experiments and fuel components and complete reactor fuel cores for the U.S. Navy. Source material license D-549 was issued permitting acquisition and title to refined source material for use in the production of the uranium foils; and special nuclear materials license No. SNM-23 was issued, permitting acquisition and title to enriched uranium for fabrication of the fuel components and cores. After the merger in 1959, TI continued fabricating reactor fuel cores, for government research and production reactors in addition to the nuclear Navy program. Also, source materials (e.g., natural uranium and thorium) were used under the same programs. TI's involvement in the nuclear Navy business continued into 1966. The final chapter of TI's nuclear business involved the fabrication of High Flux Isotope Reactor fuels (HFIR). The HFIR project extended for approximately thirteen years between 1968 - 1981.

On-site burials of scrap materials contaminated with uranium were conducted at the Texas Instruments Incorporated site in accordance with 10 CFR 20.304. The former radioactive waste burial site was believed to have operated from approximately 1958 through 1961, however materials found during the 1992 excavation suggest the first burials may have occurred in the early 1950's.

Work with nuclear materials was gradually reduced beginning in 1968 and was terminated in 1974. The interior of the facility (buildings 3, 4 and 10) was decontaminated and released for unrestricted use by the Nuclear Regulatory Commission (NRC) in 1983.

1.2 Summary of Radiological Surveys

In 1982 and 1983, TI conducted two radiological surveys in and around the location of the former radioactive waste burial site. Both studies indicated that residual levels were within regulatory guidance established by the NRC, Option 1-4 of the Branch Technical Position (Federal Register v.46,n.205, 23 October, 1981, pg 52061-52063, "Disposal or On-Site Storage of Thorium or Uranium Wastes from past Operations.") The second study further recommended that the former burial site should remain intact and undisturbed as all contaminated material was buried and reasonably inaccessible.

A follow-up verification study by the NRC (1985) identified some "isolated" pockets of surface and sub-surface contamination. The Oak Ridge Associated Universities (ORAU) study[1] reiterated much of what was already known from the TI radiological surveys. Data from the ORAU study suggested that the majority of the residual radioactivity was associated with small fragments of metal and other scrap material discernable from the surrounding soil particles. Furthermore, most of the contamination was found within the first few feet of the surface. Radioactivity was not found to be migrating with the groundwater flow. The report concluded, however, that there were isolated pockets of surface and subsurface contamination that exceeded the limits allowed by the NRC under Option 1 of the Branch Technical Position (BTP). Option 1 prescribes levels acceptable for release with no restrictions. As a result of these findings, the ORAU study virtually eliminated the possibility of terminating the SNM license without some degree of remediation.

In the summer of 1992 additional surveys of the burial site were performed by Creative Pollution Solutions, Inc. (CPS), a radiological consulting firm, to better determine the levels of residual activity and the extent of contamination in preparation for remediation within the burial area.

The results of the ORAU survey along with the CPS survey results were the basis for estimating areas requiring remediation and projecting volumes of soil for disposition. Remediation of the burial area began on August 31, 1992.

Radiological surveys were performed to demonstrate that Option 1 of the BTP had been achieved. These surveys were initiated in November 1992. Following submittal of the results of these surveys, on-site verification surveys were performed by both the NRC and Oak Ridge Institute for Science and Education (ORISE).

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[1] Radiological Survey of the Texas Instruments Site, Attleboro, Massachusetts, Final Report, January 1985, Oak Ridge Associated Universities, Report Number RSAP/ SMPB-8

This report describes the results of these surveys and demonstrates that the former radioactive waste burial site now satisfies the NRC guidelines for release for unrestricted use. These surveys are detailed in this report.

2.0 SITE DESCRIPTION

2.1 General Description

The Texas Instruments Incorporated, Attleboro, Massachusetts, site is located approximately 48 kilometers south of Boston on Route 123. The area of concern was the area between buildings 11 and 12, to the southwest of building 12 (see Figure 2.1).

The area of concern for remediation activities was believed to be within an area previously defined as the burial area (see Figure 2.2). This defined boundary covers an area of approximately 10,000 m^2. This was the area within which the burials described in section 1.1 of this report took place. The actual excavation covered an area of approximately 2500 to 3000 m^2.

The burials were believed to be at least 1.2 m deep and covered with a soil cap of unknown thickness. There is no indication that any liner material was used. The site was disturbed during construction of Building 12, and contaminated soil from the original burial trenches was apparently distributed over a larger area. For this reason, the area of concern was the larger burial area (approximately 10,000 m^2). This area was fairly level and clear of obstructions, with the exception of some landscaping details and a five foot wide concrete sidewalk located parallel and along the 170 North gridline. The area was bounded by a bog on the north northeast side (see Figure 2.2) and by buildings and paved areas for the remaining areas. For this report "burial area" refers to this larger area, and "burial site" refers to the smaller area requiring excavation.

The underground utilities between buildings 11 and 12 were of concern since excavation affected that area. The utilities in the area included a 8 inch gas line, three air lines, a 12 inch water main, a sewer main, a telephone cable, and a communication duct.

The site hydrogeology has been well documented by subsurface investigations initiated for concerns over non radiological groundwater contaminants elsewhere at the Attleboro site. The burial area is located at a groundwater flow divide and thus the hydraulic gradient is relatively flat. As a result of this condition the groundwater flow rates at this location are extremely slow. Further discussion of the hydrogeology and other water sampling are found in Appendix F.

2.2 Survey Findings

2.2.1 Background Levels and Baseline Concentrations

The ORAU survey reported background exposure rates and dose rates along with baseline radionuclide concentrations in soil and water for five locations, from the Attleboro area (but not on or near TI property). The reported exposure rates ranged from 10-11 μR/h, both at contact and at 1 meter above the surface. Dose rates measured at the surface ranged from 21 to 31 μrad/h.

Soil samples were obtained and analyzed isotopically. The soil concentration ranges for the radionuclides of interest were: U-235, <0.11 to <0.34 pCi/g (picocuries per gram); U-238, <0.78 to 2.74 pCi/g; Th-232, 0.54 to 1.23 pCi/g; and Ra-226, 0.41 to 0.84 pCi/g.

Ground water samples were analyzed for gross alpha and beta concentrations. These samples ranged from <0.32 to 0.59 pCi/l (picocuries per liter) and 1.42 to 3.07 pCi/l, respectively.

These levels and concentrations are typical of those normally occurring in nature. As part of the remedial activities CPS also collected a background soil sample from an area in Attleboro (but not on or near TI property). This sample was submitted for alpha spectrographic analysis. Concentrations of radionuclides in this background soil sample were: U-235 - 0.025 pCi/g, U-238 - 0.7 pCi/g and U-234 - 0.7 pCi/g .

2.2.2 *Burial Area Findings -- ORAU Survey (1984)*

During the ORAU survey, direct radiation levels were measured at grid line intersections throughout the burial area (see Figure 2.3). The gamma exposure rates measured at 1 m above the surface ranged from 10 to 13 μR/h. At surface contact, the exposure rates ranged from 10 to 14 μR/h. In addition to the grid line measurements ORAU also identified numerous small areas with slightly elevated surface radiation levels. Contact gamma exposure rates ranged from 16 to 200 μR/h.

Surface soil samples were taken at alternate grid line intersections. These samples contained U-235 and U-238 soil concentrations ranging from <0.11 to 8.15 pCi/g and <0.38 to 44.9 pCi/g respectively. The highest value of U-235 and U-238 were identified at locations 235N x 165E and 165N x 125E respectively.

Surface soil samples were also taken in the areas identified as having elevated contact radiation levels. Concentrations of U-235 ranged from < 1.78 to 590 pCi/g. The maximum level was in the sample collected at 185N x 149E. Concentrations of U-238 ranged from <46.6 to 887 pCi/g. The maximum level was found in the sample collected at 154N x 111E.

Radionuclide concentrations in subsurface soils were determined by taking samples from several boreholes within the burial area. Elevated concentrations of U-235 were determined ranging from 6.03 pCi/g to 20.6 pCi/g. Elevated concentrations of U-238 were determined ranging from 5.48 pCi/g to 680 pCi/g.

Subsurface water samples were also taken from the boreholes. At seven locations outside of the burial area, gross alpha and beta concentrations were slightly elevated above baseline concentrations. Gross alpha concentrations ranged from 1.36 to 8.66 pCi/l, and gross beta concentrations ranged from 3.03 to 14.0 pCi/l. Additionally, water samples were collected from four locations in the burial area. The gross alpha concentrations ranged from 1.21 to 101 pCi/l and the gross beta concentrations ranged from 6.20 to 251 pCi/l. Though these levels appear to be elevated compared to other samples taken, the aqueous samples were not filtered prior to analysis. Subsequent sampling in 1993 provides a better characterization of groundwater quality. (see Appendix F)

2.2.3 Burial Area Findings -- CPS Surveys (1992)

The pre-excavation surveys performed by CPS, Inc. included a pilot study ("Radiological Characterization of Texas Instruments Incorporated", 7/92 Appendix G) and a subsurface sampling study ("Supplemental Subsurface soil sampling ...", 8/92 Appendix I). These surveys did not include walkover surveys, water sampling or ground water sampling since the ORAU study appeared to adequately cover these aspects of the survey.

In the pilot study a trenching scheme was used in an attempt to better determine the extent and depth of contamination. The trenches along with a few test pits were excavated in the areas shown in Figure 2.4. The concentration of total uranium in soil samples obtained during the pilot study, based on alpha screening results, ranged from 8.22 to 3349 pCi/g total uranium. Specifically the concentrations of total uranium in samples from trench A, B, C and D ranged from 9.06 to 44.88 pCi/g , 8.22 to 27.99 pCi/g , 20.34 to 84.66 pCi/g , and 14.18 to 3349 pCi/g respectively. The concentrations in samples from the test pits ranged from 11.24 to 117.63 pCi/g total uranium. The highest concentration identified was found in the "D trench" at 170N x 130E. This sample was found at approximately 3 - 4 feet depth. The high end concentrations were found in only a few samples.

The subsurface sampling survey included selected sample locations based on previous elevated samples and random sample locations selected within the burial area. The concentration of total uranium in soil, based on alpha screening results, ranged from 8 pCi/g total uranium to 227 pCi/g total uranium. Thirty one samples, from nineteen locations, were identified above the 30 pCi/g criteria however, only four showed concentrations greater than 200 pCi/g total uranium. The results of this subsurface soil sampling are detailed in Appendix I.

3.0 MANAGEMENT COMMITMENT AND PROJECT ORGANIZATION

3.1 Management Policy

From the outset of the project, TI established the goal to remediate the former radioactive waste burial site to the levels prescribed in Option 1 of the BTP. Originally, initial estimates, in the most optimistic scenario, projected the volume of soil and debris requiring disposal would not exceed 10,000 cubic feet. In the end, the actual volume of soil disposed proved to be approximately 63,000 cubic feet. Though the scope of the project expanded to this degree, TI remained committed to achieving Option 1 criteria within the burial area.

The health and safety procedures and policies implemented during the site operations took priority over all other site operations. A conservative approach was always exercised with regard to personnel and environmental monitoring. During the site excavation, twenty-four hour security was maintained to protect the public from the physical dangers of an excavation site. After the excavation process was complete and prior to backfilling, a temporary, six foot high chain link fence was erected to prevent unauthorized access to the burial area.

In order to provide positive public relations, TI proactively disseminated information to the media, public officials and the site workforce. Prior to the physical excavation TI issued a press release which explained exactly what contaminants were involved on the site and what measures were being taken to rectify the problem. As the time period over which the physical excavation took place was extended, TI issued periodic updates. The Environmental Department of TI routinely conducted management and supervisor briefings to update site personnel on the status of the project.

To assist in all of the above, TI established a Task Force which met on a weekly basis to oversee the physical actions on the site. The Task Force was a multi-disciplinary committee consisting of TI personnel from: Environmental Engineering, Health and Safety, Facilities, Transportation, Purchasing, Security, and Human Resources. The committee also included representatives from the two primary contractors on the site: Creative Pollution Solutions (CPS) and Franklin Environmental Services (FES). This task force assisted in making all decisions involving health and safety, remediation, human relations, waste disposal, transportation, and security.

3.2 Project Organization

TI contracted with two companies to perform the majority of the work on site. CPS was contracted for the radiological support for site operations. This included advising TI on areas requiring excavation as well as providing radiological health and safety support on site. FES was contracted for the excavation portion of the site work. In addition, FES provided all non-radiological health and safety support. Two other contractors for TI, Bartlett Nuclear and Guild Drilling, were asked to work under the supervision of CPS. The oversite of all site operations was the responsibility of TI. Figure 3.1 shows an organizational chart for the project.

During the backfill and restoration of the site, TI contracted with four additional contractors to perform backfilling of the excavated area, asphalt paving of the parking lot, restoration landscaping, and topographic surveying of the excavated area. The contractors used for these operations were Walsh Construction, Narrangansett Improvement, Old Farm Nurseries, and E. Otis Dyer, respectively.

4.0 REMEDIATION ACTIVITIES

4.1 Remediation Criteria

The purpose of the remediation of the burial area was to excavate contaminated soil to the extent necessary to achieve clean-up criteria prescribed in Option 1 of the BTP. For processed uranium (uranium without daughter products) the criteria for surface contamination or contamination of soil in areas without use restriction are 35 pCi/g for depleted uranium and 30 pCi/g for enriched uranium. The acceptable exposure rate at one meter above the surface as determined by the NRC is 10 μR/h above background or 21 μR/h total for this location (i.e., approximately 2 times background). This goal was to be achieved by using the approach outlined in the "Remediation Plan" in Appendix J.

4.2 Contaminants Identified

The primary contaminants of interest for the remediation of the burial area were: U-234, U-235 and U-238. Prior to remediation of the site, surveys indicated that the contaminated soil concentrations in the burial area were believed to be slightly greater then the Option 1 criteria of 30 pCi/g total uranium. There was some indication that some of the metal debris in the burial area was contaminated to a greater extent than the soil.

While a few areas were found to have elevated levels of Thorium-232 it was determined that elevated thorium levels were associated with elevated uranium levels. Remediation controlled on the basis of uranium exclusively, resulted in a proportional reduction of thorium to below its acceptable levels and therefore thorium was not of significant concern. For this reason the focus of the remediation was on the level of total uranium activity in soil.

4.3 Previous Radiological Surveys

Previous radiological surveys included surveys performed by TI, ORAU, and CPS. These surveys were performed between 1982 and 1992. The surveys were used to determine the extent and depth of contamination within the burial area. These surveys indicated that the major area

of contamination was between 160N - 190N x 110E - 140E. Some of the initial survey data provided by ORAU indicated that isolated debris might be more of a problem than the surrounding soils.

4.4 Chronology of Site Operations

This section outlines the chronology of site operations involved in the remediation of the former radioactive waste burial site at TI. The operations described below took place between July 1992 and September 1993. Figure 4.1 shows a timeline of the entire process.

4.4.1 *Pilot Study*

In July, 1992 TI retained CPS to perform a pilot study to better determine the extent of the contaminants within the burial area. A series of parallel trenches were excavated. The trenches were approximately 30 meters long and 2-3 feet deep. Composite samples were taken from the trenches.

Soil samples were analyzed using a gross alpha screening method to allow for rapid field assessment of the contaminants (see Appendix C). Four composite samples were sent to a certified laboratory for analysis by both alpha and gamma spectroscopy. A correlation was established between the gross alpha screening method and the alpha spectroscopy data. The gross alpha screening was also shown to have very good correlation with gamma spectroscopy data (see Appendix C). Once characterized, isotopic information was no longer necessary for comparison with the total uranium criteria. The results of the pilot survey can be found in Appendix G.

During the pilot study, the health and safety requirements of the site included: level C protection (full face respirators and tyvek suits) within the exclusion zone (see Figure 4.2), Breathing Zone Air (BZA) sampling, personal Thermoluminescent Dosimeters (TLDs), and Area Air (AA) sampling. This level of protection was selected as a conservative measure. For the actual remediation of the site, the level of protection was downgraded to level D (no respiratory protection).

The pilot study successfully identified one highly elevated sample. This sample was obtained at a depth of approximately 4-5 feet. One conclusion from the pilot excavation was that the contaminants may have been deeper than initially expected.

4.4.2 *Initial Remediation Estimates*

Initial remediation estimates were provided based on the limited information available from the ORAU survey and the CPS pilot study. The remediation option report, as provided in Appendix H, presented several options ranging from further characterization to the removal of a limited number of elevated locations. In the most optimistic scenario, it was estimated that the remediation would generate approximately 6,000 ft^3 of soil and debris for disposal. On the conservative side, the remediation options presented indicated volumes in excess of 30,400 ft^3.

After review of radiological characteristics, debris content, anticipated volumes, modes of transportation, and financial objectives, available disposal options were evaluated. Based on these criterion, the most viable disposal option was determined to be EnviroCare of Utah. This decision was facilitated by the sites ability to handle uranium contaminated materials and to receive bulk rail shipments.

Due to the large variation in the volume estimates additional subsurface sampling was performed to aid in the selection of the appropriate remediation option.

4.4.3 Pre Excavation Survey

With the identification of contamination at a depth greater than one meter, identified in the CPS pilot study, further selected split spoon samples were taken. The sampling protocol for this exercise was to sample the burial area to a greater depth and over a larger area than in the pilot study. This survey was designed in an attempt to bound the extent of the contamination.

This survey focused specific attention in the area of 160N - 190N x 110E - 140E due to the results of the CPS pilot study and the ORAU survey. Exclusive of this sampling, random samples were also collected within the larger defined burial area.

The results of this survey indicated contamination, at concentrations greater than 30 pCi/g of total uranium, was not limited to isolated locations. Based upon these results, revised estimates for remediation were generated.

4.4.4 Revised Remediation Estimates

After the pre-excavation survey CPS provided revised remediation estimates incorporating the additional subsurface sampling results. These estimates concluded that larger areas might require remediation.

A remediation plan was developed to minimize total volumes. The remediation plan outlined a two phase approach. The first phase was to remediate isolated elevated locations. The second phase was to excavate remaining areas identified in the plan for removal of debris and disposition of materials. This plan (Appendix J) was submitted and approved by the NRC on August 26, 1992, as Amendment No. 16 to License No. SNM-23 (Appendix K).

4.4.5 Initial Excavation

The initial excavation of the burial area started on August 31, 1992. Initially, the excavation was performed using a small backhoe. Excavated materials were transferred directly to a front end loader for transport to a mechanical screener to separate potentially contaminated debris and aggregate from the soils. GM monitoring and alpha screening techniques were employed to determine extent of excavation and disposition of soils. The sampling method is included within Appendix C.

The excavation began at 170N x 130E, the location where the most elevated sample had been previously identified. The first day of excavation identified a large pocket of debris at a depth of approximately 4 - 6 feet. Some of the debris indicated surface readings with a pancake GM detector of greater than 20,000 counts per minute (cpm). The surrounding soil had concentrations ranging from 100 pCi/g to > 5000 pCi/g total uranium based on gross alpha screening results.

The debris consisted of laboratory bottles, graphite crucibles, extruded uranium/ zirconium tubes, mounted uranium samples, 55 gallon drums, partial mock fuel elements, metal fines, uranium ingots, ductwork, uranium/aluminum plates, etc. Some of the debris could be directly associated with contract work performed under the direction of the Schenectedy Naval Reactor Office.

Due to the volume of debris excavated, five specimens were assayed to determine isotopic enrichments. These specimens were determined to have either natural or depleted abundancies of U-235. This assay information was later used for determining activities for shipment and is provided in Appendix B, Attachment 3.

The volume of debris and levels of contamination were greater than anticipated. These findings dictated an adjustment in the approach to remediation.

4.4.6 *Adjustment in approach to remediation*

Since the levels of soil contamination and debris were higher than expected, an adjustment in the remediation approach was implemented. This adjustment would allow for the separation of highly contaminated soil / debris from soils with moderate levels of contamination (between 30 pCi/g and 500 pCi/g), and soils which may be suitable for backfill.

As of September 10, 1992, the total volume of contaminated soil / debris staged for disposal was approximately 10,000 ft^3. The excavation continued on the south side of the burial area at 160N - 165N x 135E - 150E. It appeared that a trench of contaminated material exhibiting elevated levels of radioactivity, easily identifiable by both radiation levels and a characteristic dark gray color, cut diagonally through these grid points. This trench was at a depth of approximately 4 to 6 feet. In many areas the contaminated soils extended approximately 1 to 2 feet below existing groundwater elevations.

Field observations indicated that the contamination did not extend far below the ground water levels. Since the volume of wet soils was relatively small, and pumping to locations outside the excavation presented regulatory obstacles, no mechanical dewatering was performed. Rather, the wet soils were staged and allowed to drain back into the excavation prior to further processing.

As the excavation proceeded the increased volumes mandated a change in the methods for processing and staging soils. On September 15, 1992 larger excavation equipment was brought on site in order to remove identified volumes more efficiently. An additional mechanical screener was brought on site to facilitate soil processing. Rather than attempting to stage all soils in roll-off containers, soils were staged in piles within the exclusion zone. Wet soils were staged near the excavated area as previously discussed. Even after air drying some of the wet soils required stabilization prior to ultimate disposition.

Shipment of contaminated soils for disposal to EnviroCare of Utah began in early October of 1992. The higher activity soil / debris was packaged in B-25 boxes and loaded on rail cars for shipment. The remaining soils were acceptable in bulk load form and therefore were loaded directly in rail cars for shipment (See Appendix B).

On September 26, 1992, the excavation of the north side of the burial area was initiated. The remediation approach was modified by first excavating the top 1 to 2 feet of soil, which was usually determined to be below BTP Option 1 criteria, then excavating the remaining area to acceptable levels. Samples were taken from the floor of the excavation, prior to the infiltration of ground water and rain water into the area. These samples were used as part of a site survey subsequently submitted to the NRC. This survey is included in Appendix E.

On November 28, 1992, TI submitted a survey of the burial area to the NRC. This survey consisted of alpha screening results for soil samples from the floor of the excavated area and a gamma exposure rate walkover survey for the remaining areas within the defined burial area. Figure 4.3 shows the extent of the excavated area at this point.

4.4.7 *Initial NRC / ORISE Site Visit*

The NRC and ORISE arrived at TI on December 15, 1992, to perform a verification survey of the burial area. ORISE performed a gamma exposure rate walkover survey in the burial area and along the bounds of the excavated area. With the assistance of CPS, ORISE took a limited number of soil samples from the floor of the excavation (through several feet of standing water) and from the overburden piles. At the time of the site visit, the NRC raised concerns with levels found on some walls of the excavation. NRC recommended that the bounds of the excavation be extended in certain areas and that the extent of the excavation be verified.

4.4.8 *Extending the Bounds of the Excavation*

From December 15, 1992 to January 5, 1993, the bounds of the excavation were extended in accordance with the NRC recommendations. The bounds of the excavation were extended in locations where the NaI readings, on the accessible portion of the wall, were greater than two times background. Subsurface split spoon soil samples were taken to demonstrate that the excavation had been appropriately extended. As shown in Figure 4.4, the excavation extended beyond the original exclusion zone and into the building 11 parking lot.

The excavation in this area was in close proximity to a 12 inch water main providing the only service for fire protection and all other uses within two buildings. In order to prevent freezing or physical damage to the exposed water main, this area was immediately backfilled after removal of contaminated soils and confirmatory sampling. Prior to the backfilling, TI notified the NRC of its intent and obtained their concurrence.

On January 8 1993, a revised final survey report was submitted to the NRC.

4.4.9 Scraping the Floor of the Excavation

The NRC reviewed the TI "Revised Final Survey Report", dated January 8, 1993 along with the ORISE verification survey results of December 15, 1992, and recommended that TI address two elevated locations on the floor of the excavated area. To address these locations it was necessary to dewater the excavated area.

Dewatering involved pumping the water out of the excavated area, filtering the water and discharging the effluent. Discussions between TI and the NRC concerning the dewatering operation concluded that this operation, and its subsequent discharge, was consistent with the existing requirements of TIs license. In order to meet Environmental Protection Agency (EPA) requirements, TI obtained a National Pollution Discharge Elimination System (NPDES) permit exclusion for the discharge of the effluent. Approval from the EPA was received on May 3, 1993. Discussion of radiological aspects of the water pumped and site hydrogeology is found in Appendix F.

The pumping process began on May 14, 1993. Since there was continuous groundwater infiltration, the floor of the excavation was never completely dry however, continuous pumping allowed for access with excavation equipment. Pumping was concluded on June 9, 1993.

CPS performed a walkover survey within the excavated area to identify any areas greater than two times background on the NaI survey meter. In addition to the two locations identified in the NRC inspection report, several other isolated locations were identified during this walkover. In most cases, these isolated locations were due to a small amount of debris and were remediated by hand digging. The two locations identified by the NRC required more extensive scraping which was achieved through the use of conventional excavation equipment. The scraping in these regions involved excavation to depths ranging from 2 to 12 inches.

4.4.10 NRC survey

On June 2, 1993, the NRC conducted a site inspection. During the inspection the NRC performed a walkover survey within the excavated area. All areas within the excavated area were determined to be between 1 and 1.5 times background (using NaI survey meter) except for two locations (185N x 157E and 177.5N x 122E) which showed levels of 3 times background. These locations were remediated during the day of the NRC survey.

The NRC also performed a walkover with a Micro-R meter within the excavated area. The exposure rates at one meter above the floor of the excavation ranged from 11 μR/hr to 15 μR/hr.

The NRC obtained four soil samples from the areas scraped. The concentrations of these samples ranged from 16 pCi/g to 58 pCi/g based on gross alpha screening.

4.4.11 Topographical Survey

On June 3, 1993, prior to the backfilling operation, TI retained the services of E. Otis Dyer, a Registered Professional Engineer and Land Surveyor, to develop a topographical map of the excavation area and its environs. This map recorded the horizontal and vertical extent of the excavation at the point in time when all field work ceased as the project objectives had been achieved. This map is provided as a size "D" print located at the end of this report.

4.4.12 Backfilling

After the NRC inspection was complete, backfilling of the excavated area began. The overburden piles were used as backfill material. During the backfill operation CPS conducted quality assurance walkover surveys.

5.0 FINAL SURVEY

5.1 Introduction

The final survey was conducted to demonstrate that the criteria outlined in Option 1 of the BTP was achieved. It included three main components: split spoon samples taken around the perimeter of the excavated area, soil samples collected from the floor of the excavation, and a walkover survey which assessed exposure rates. These surveys were performed in accordance with the remediation plan.

This final survey report includes data collected during the post excavation survey report (November 28, 1992), the revised final survey (January 8, 1993), data collected after the final scraping of the floor of the area (June 3, 1993), and final walkover results after backfilling was completed in late June 1993. A description of the methodology and results from these surveys are included in Appendix E. A summary of the findings is included below.

5.2 Perimeter Split Spoon Sampling

The perimeter split spoon sampling demonstrated that the excavation addressed the appropriate areas. The split spoon sample locations are shown in Figure 5.1. The average concentration over the total depth of each borehole (0 to 6 feet) ranged from 7.0 to 27.7 pCi/g. The concentrations of individual split spoon samples ranged from 4 pCi/g to 37 pCi/g. These results are tabulated in Appendix E.

5.3 Surface soil sampling within the excavated area

Surface soil sampling of the floor of the excavation consisted of samples at each corner, and in the middle of each 10 meter x 10 meter grid cell. These locations are shown in Figure 5.2. The concentrations of the soil samples ranged from 4 pCi/g to 55 pCi/g. The 10 meter x 10 meter grid cell averages, within the excavated area, ranged from 18.2 pCi/g to 31.6 pCi/g. While two grid cells averaged slightly over the 30 pCi/g criteria, these averages are conservative by virtue of the analytical technique. As demonstrated in the alpha screening correlation in Appendix C and ORISE's independent analysis of split samples taken during the initial NRC / ORISE site visit, alpha screening results at concentrations less than 20 pCi/g are conservative. This conservatism is documented in correspondence between ORISE and NRC of January 25, 1993 included in Appendix K. Details of the surface soil sampling results are tabulated in Appendix E.

5.4 Walkover surveys of the Burial Area

After the backfilling operation was completed, and prior to landscaping, CPS conducted an extensive walkover survey of the burial area. Results of a near surface walkover survey, using a NaI survey meter, identified four locations in excess of one and one half times background. No areas were identified greater than two times background. Results of the one meter survey, at all 10 meter x 10 meter grid locations within the burial area, indicated results between one and one and one half times background. The results of these surveys are further discussed in Appendix E.

6.0 CONCLUSIONS

Between July 1992 and July 1993, the former radioactive waste burial site at TI was successfully remediated. The final volume of soil and debris requiring disposal was approximately 63,000 cubic feet. Radiological surveys conducted between November 1992 and July 1993 demonstrate that the remediation efforts were effective in reducing residual activity within the burial site to meet NRC Option 1 BTP criteria for release.

Figure 2.1
Map of Massachusetts and Attleboro Showing Location and Plan View of the Texas Instruments Site.

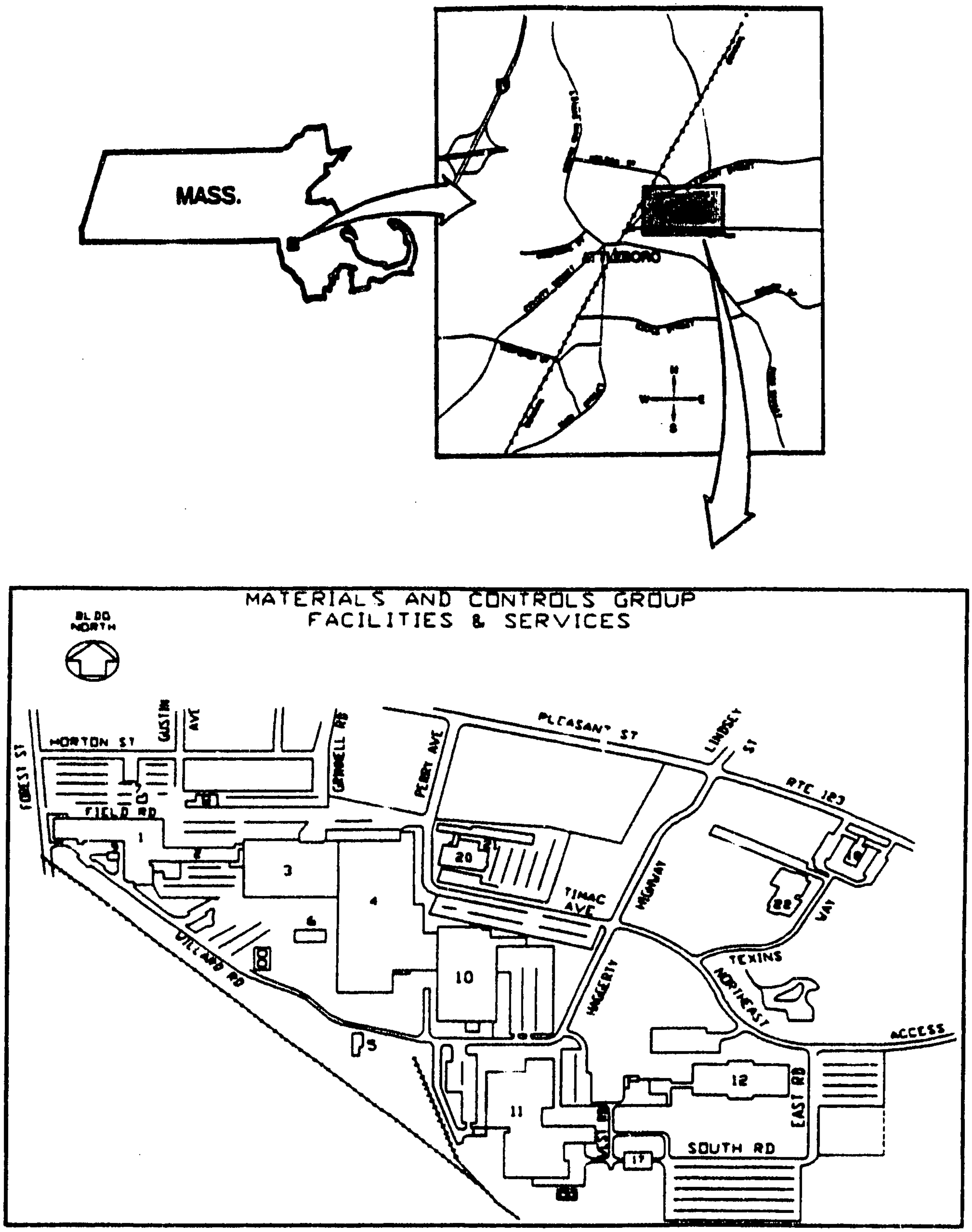

Figure 2.2
Defined Burial Area

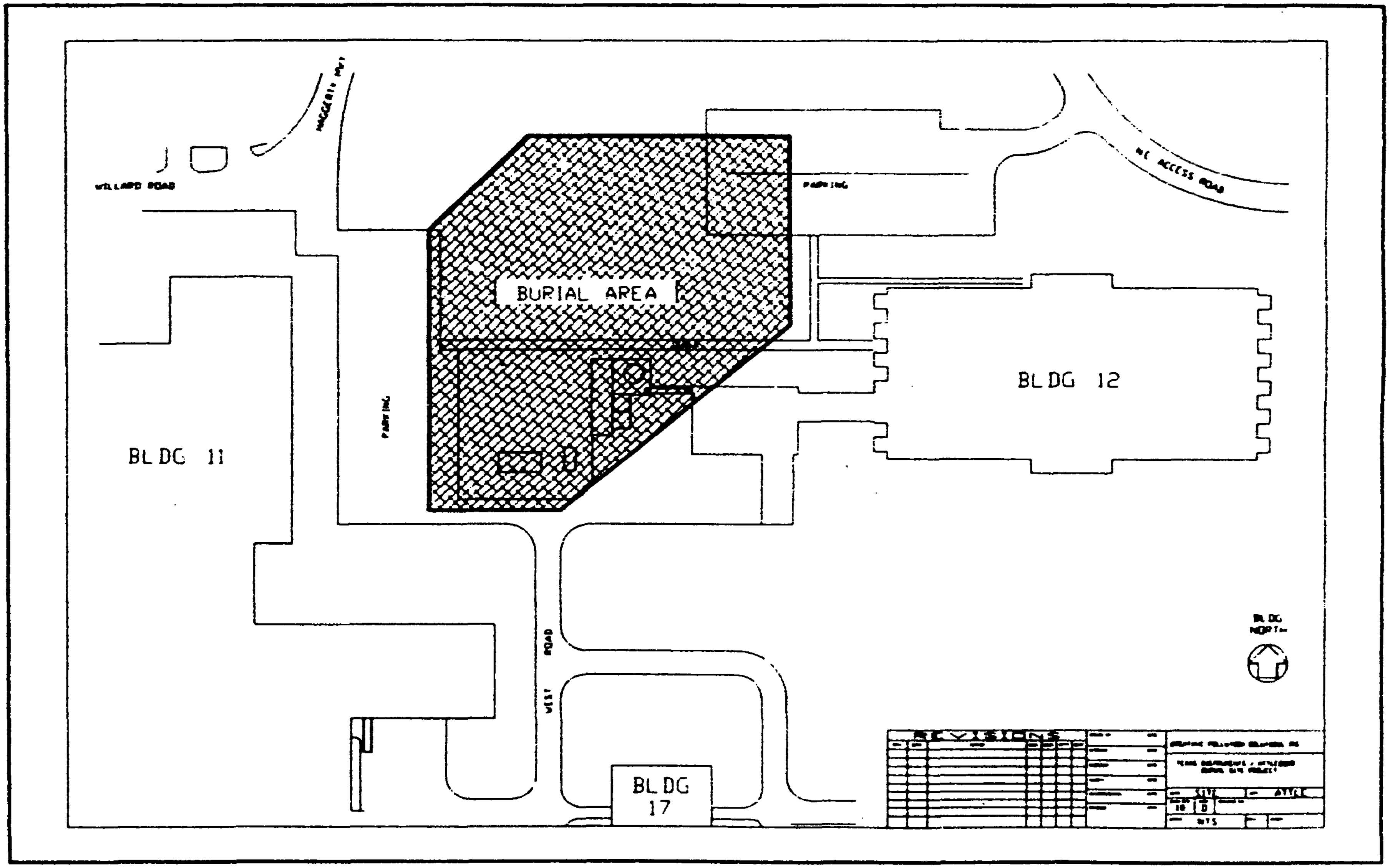

Figure 2.3
Burial Area with Grid Layout

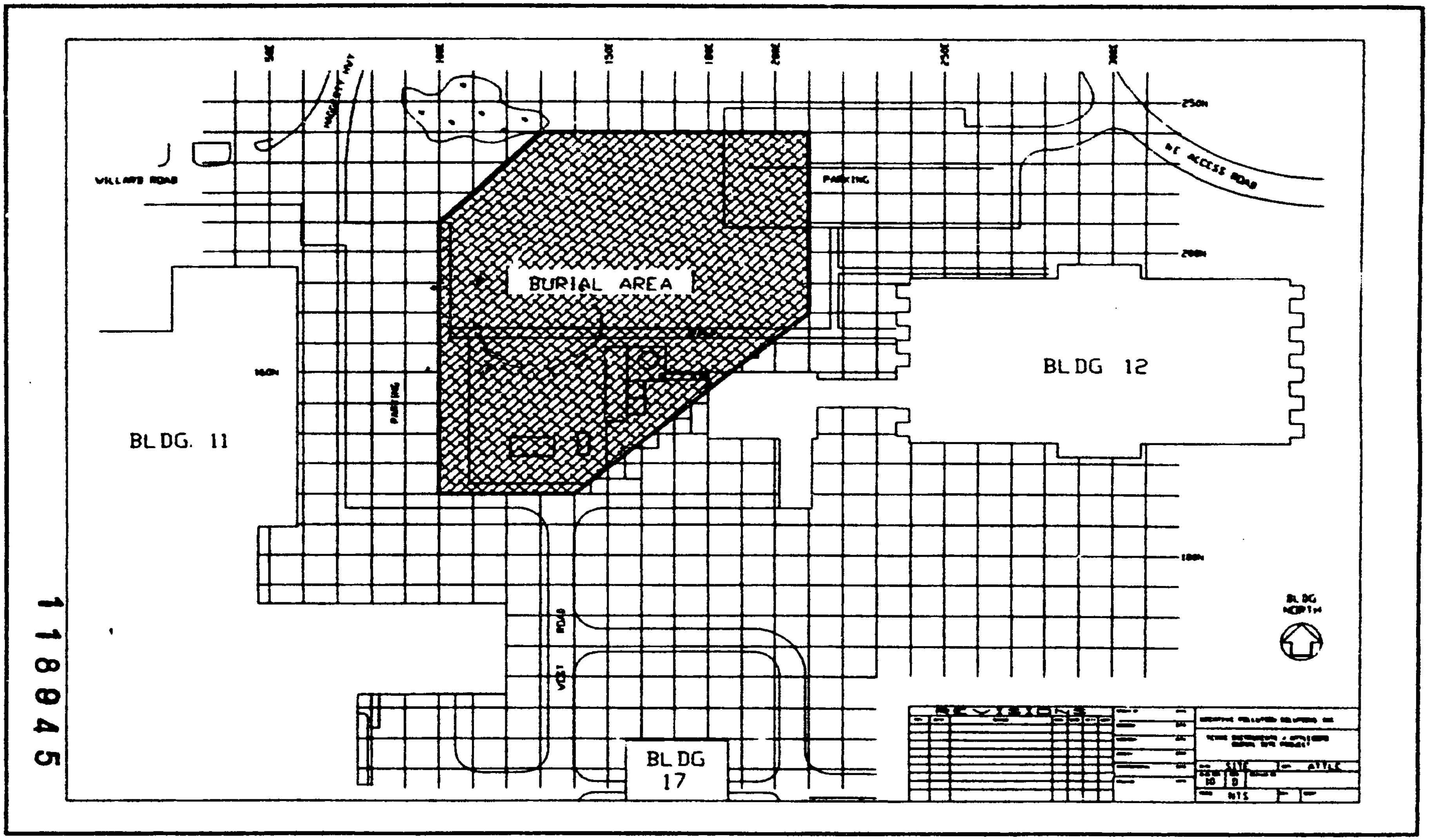

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Figure 2.4
Pilot Survey Site Layout

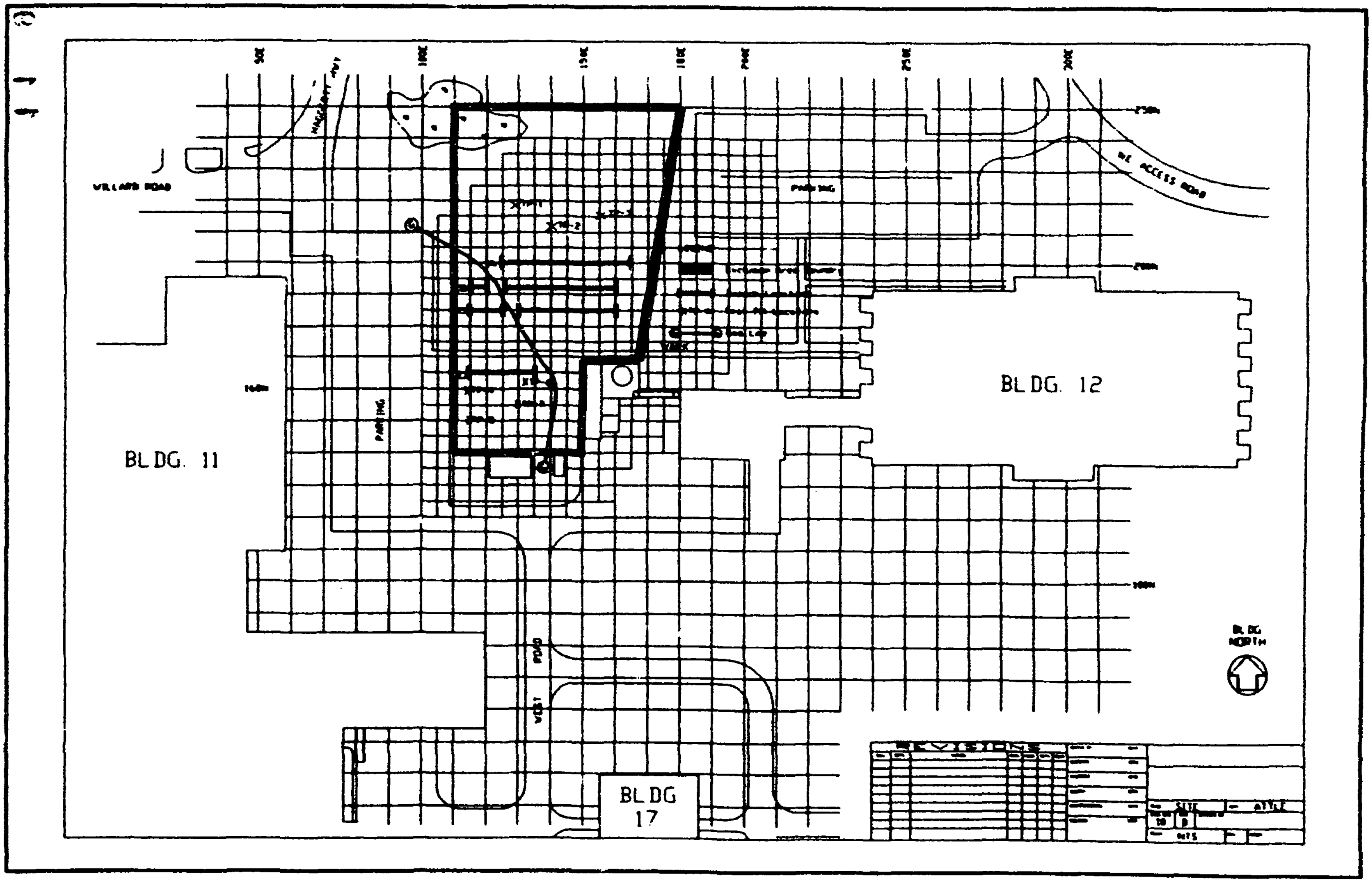

Figure 3.1
Organizational Chart

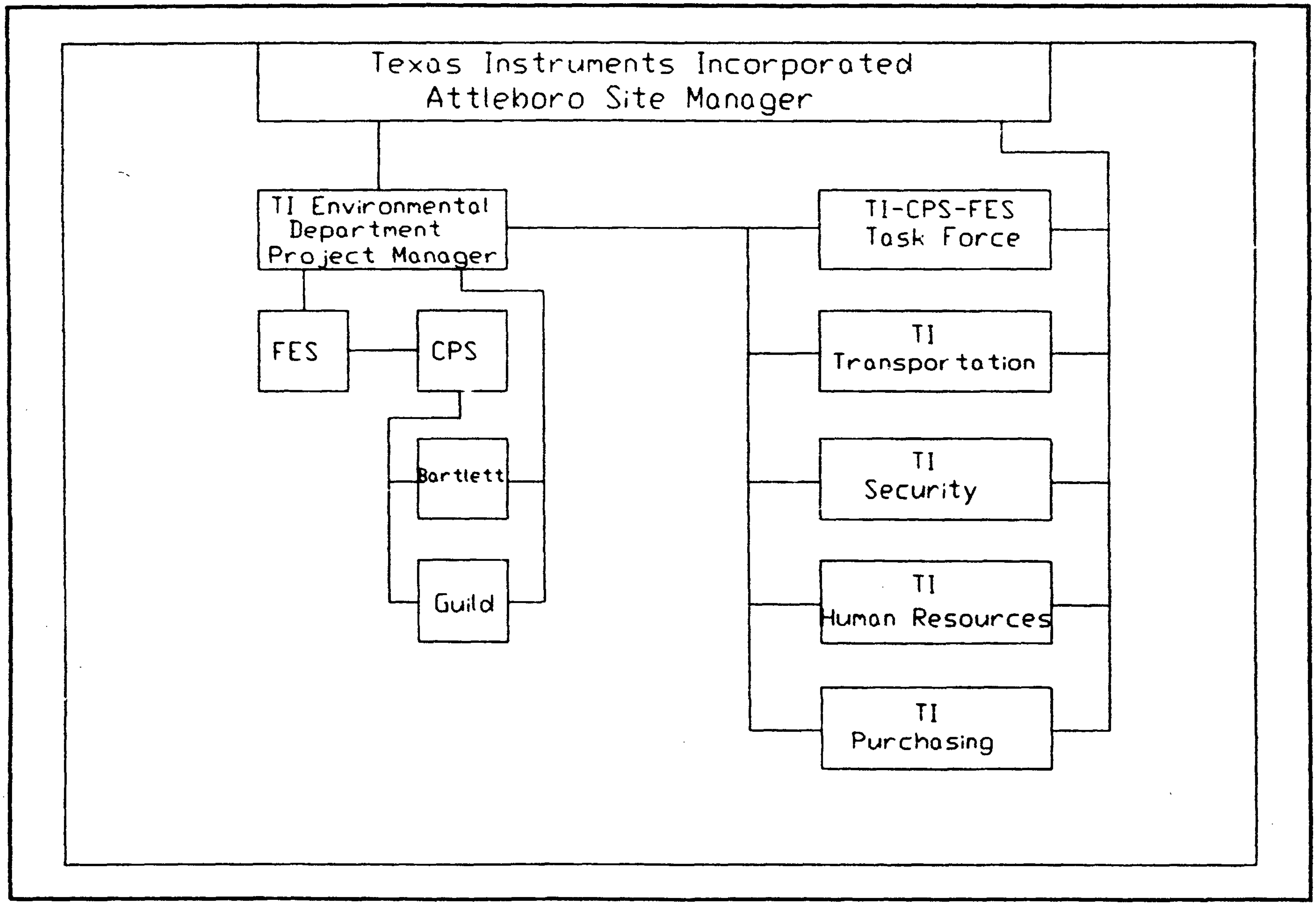

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Figure 4.1
Schedule for Texas Instruments Incorporated Soil Remediation

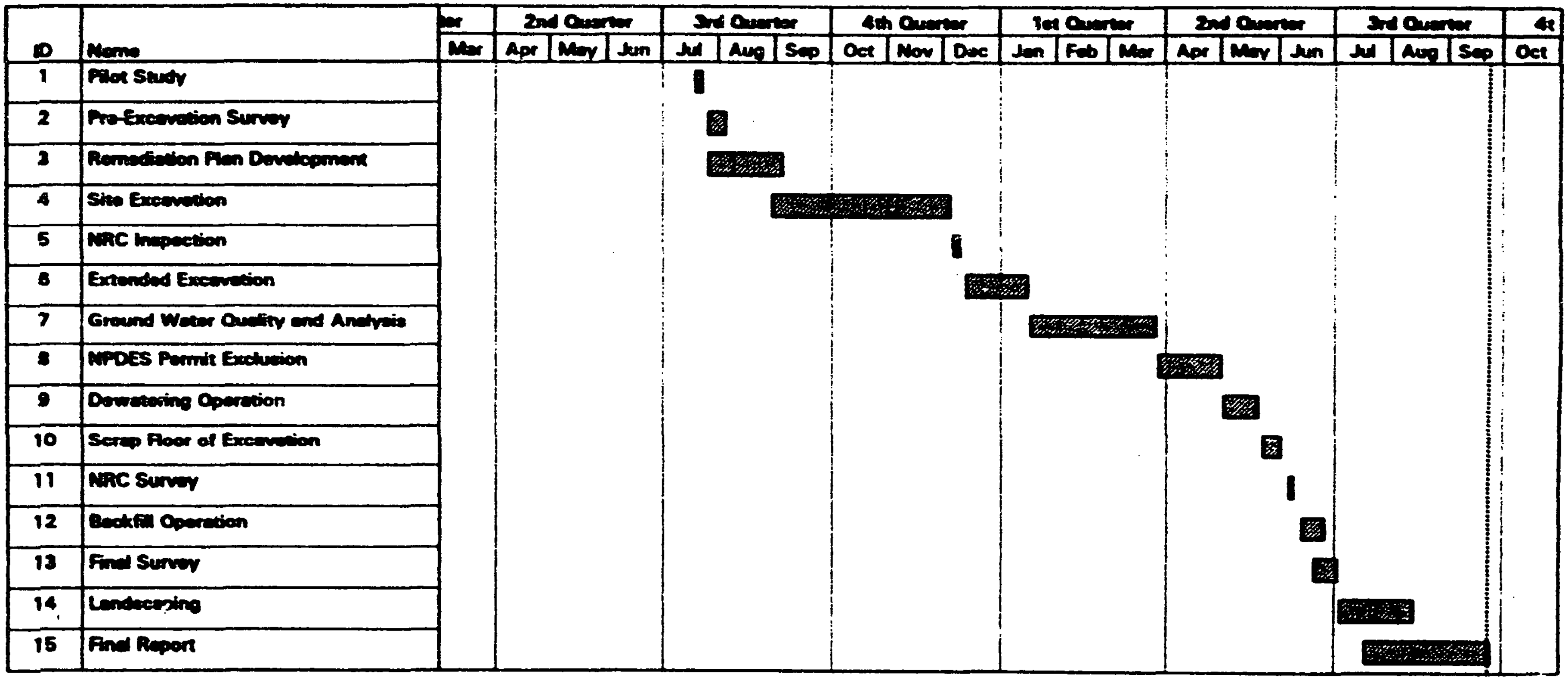


Figure 4.2
Control Zone Layout

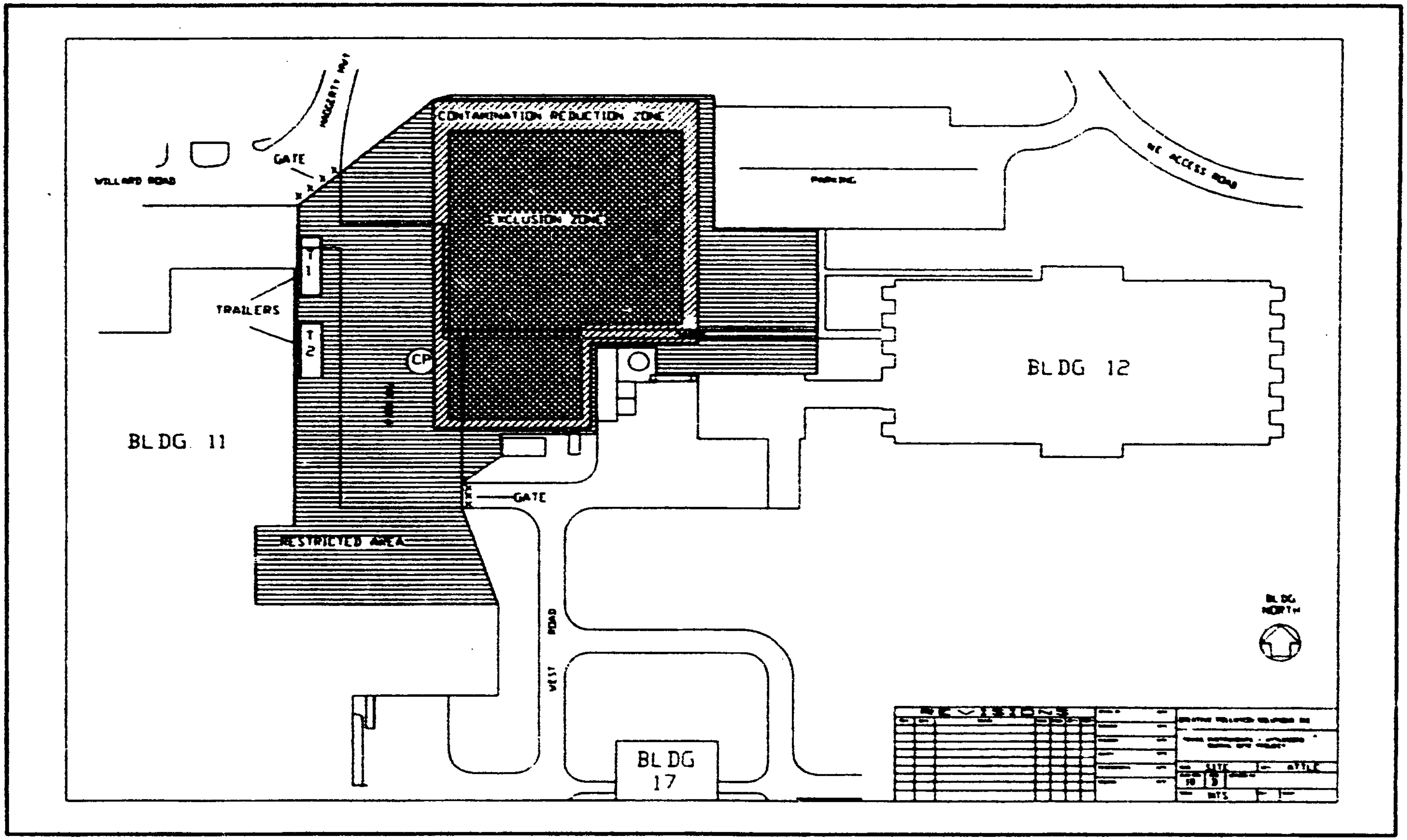


Figure 4.3
Extent of Excavation as of November 28, 1992.

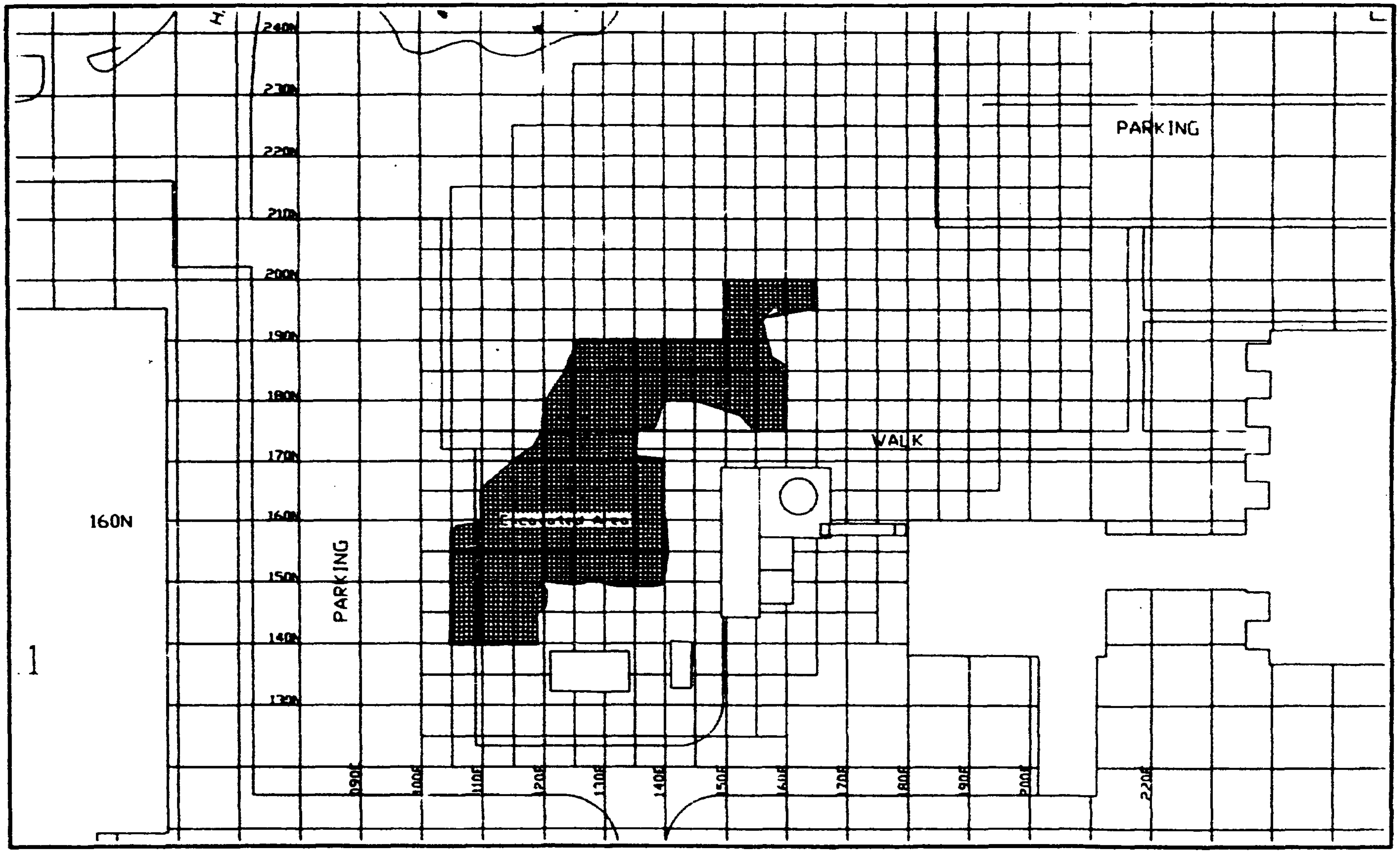


Figure 4.4
Final Site Excavation

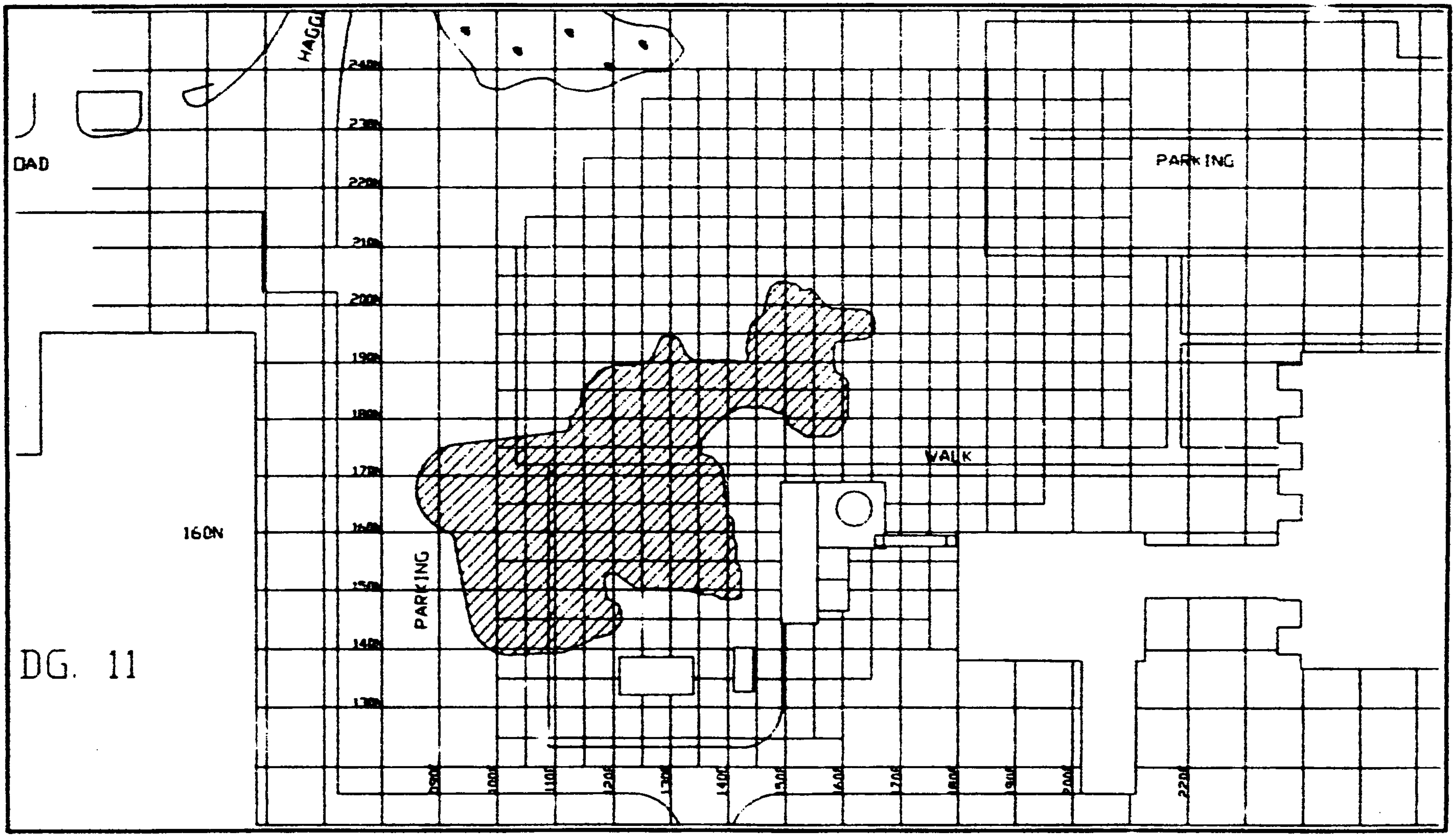


Figure 5.1
Split Spoon Sample Locations

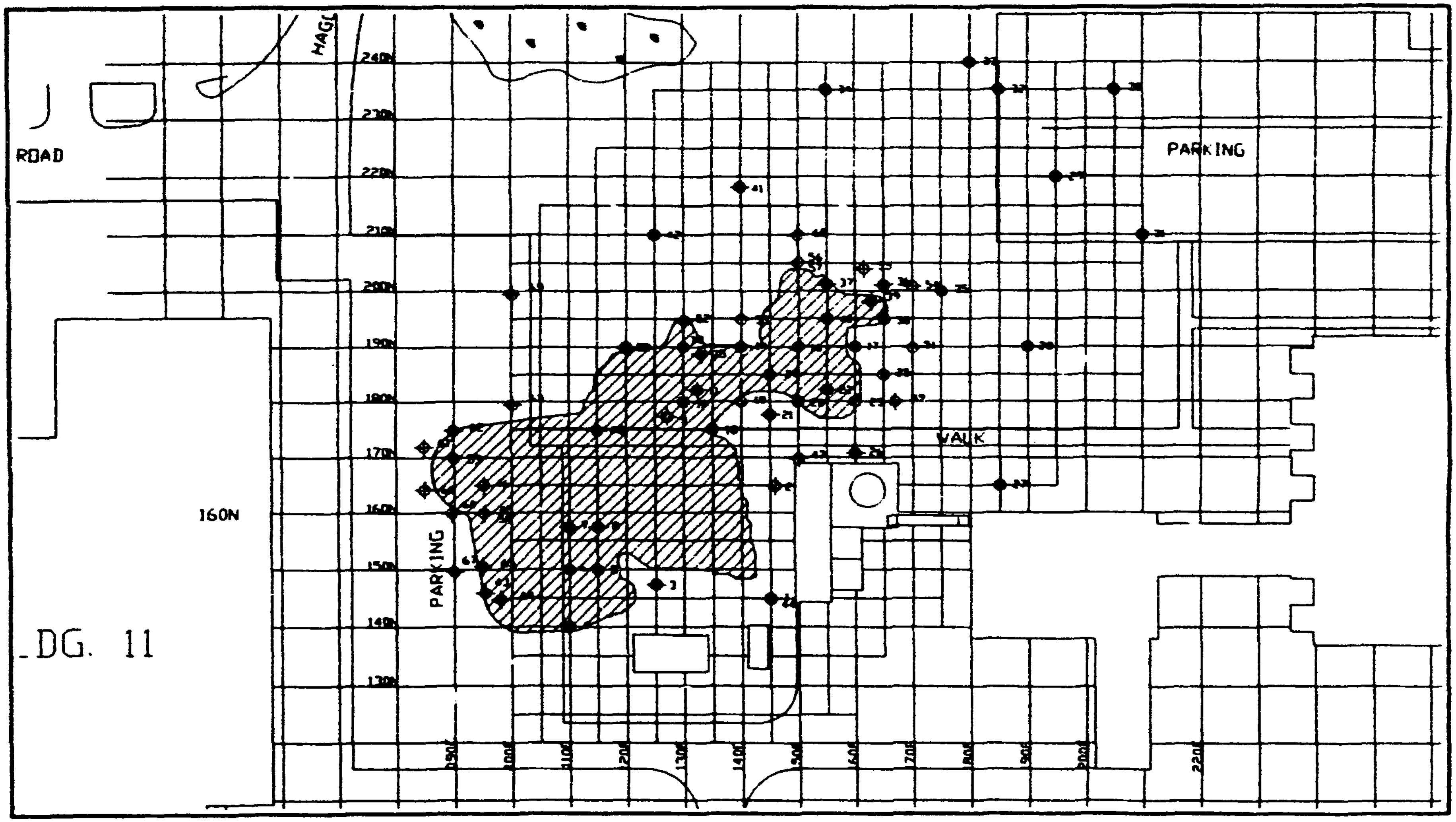
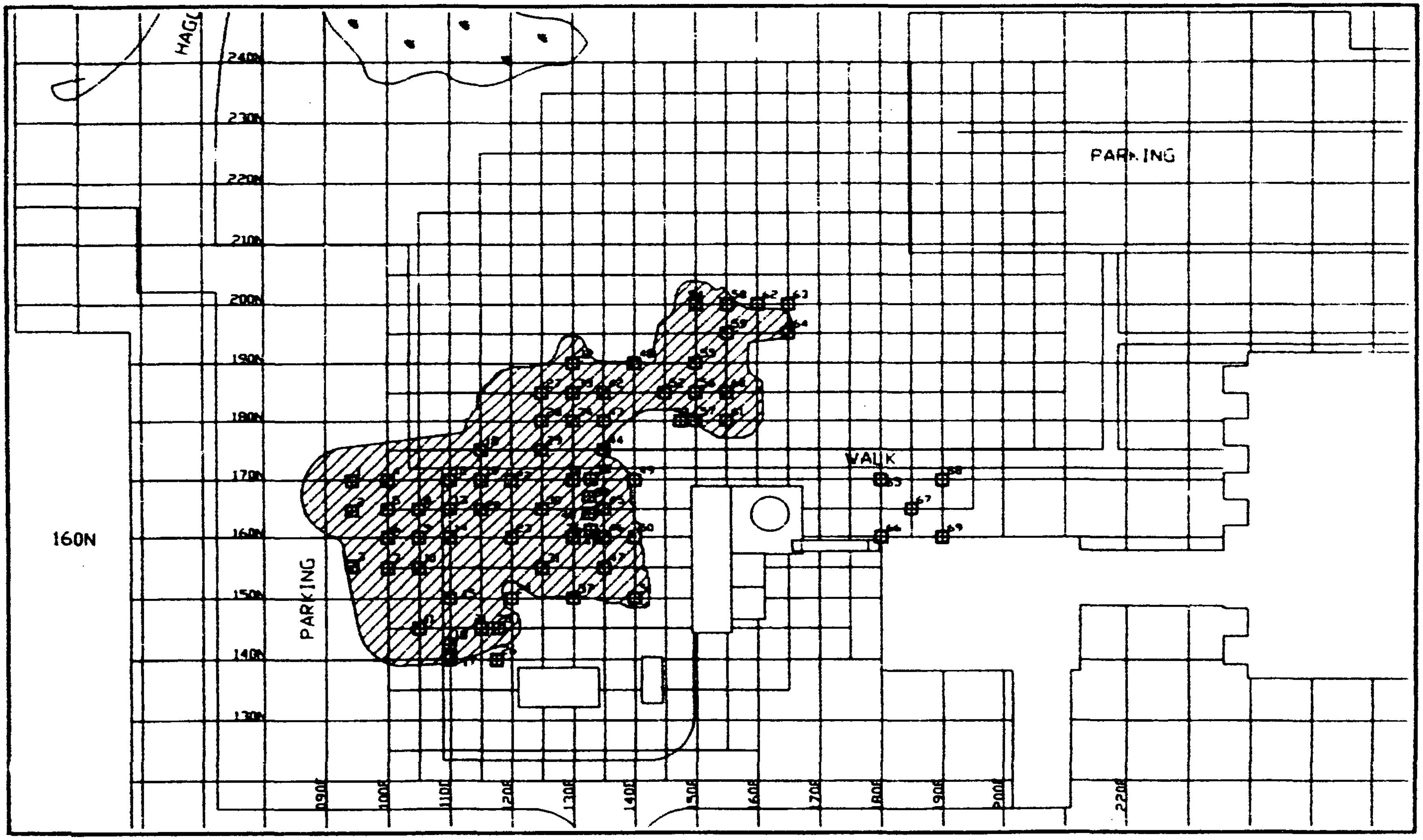


Figure 5.2
Location of Samples from the Floor of Excavated Area



Appendix A

Health and Safety Activities During Remediation of the Texas Instruments Incorporated Attleboro Site

Contents

Appendix A1

Health and Safety Plan

RADIOLOGICAL HEALTH AND SAFETY PLAN

Developed for Texas Instruments Incorporated
Materials and Controls Group

By

Creative Pollution Solutions, Inc.

Modified
September 1, 1992

RADIOLOGICAL HEALTH AND SAFETY PLAN

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remediation work to be performed on the former burial site (between buildings 11 and 12) at the Texas Instruments Incorporated facility in Attleboro, Massachusetts. In part, this plan will be based, when applicable, on the USNRC license SNM-23 Health and Safety Plan and incorporating relevant sections by inclusion or reference to the generic health and safety plan developed by Franklin Environmental Services.

This health and safety plan details the site specific requirements for radiation protection purposes only. General health and safety considerations, including chemical and physical hazards, are addressed in the general health and safety plan developed by Franklin Environmental Services

II. Site History and Description

History

In 1952, the General Plate Division of Metals & Controls, Incorporated (M&C) became involved in the nuclear materials field to fabricate enriched uranium into thin foils for use in reactor experiments. In 1956, M&C received a contract form the Federal Government to manufacture the fuel core of the submarine "Triton". Additional contracts for Triton refuelings were completed by January 1959.

In 1959, M&C merged with Texas Instruments Incorporated, Materials and Control Group (TI) and continued processing nuclear materials. TI's involvement in the nuclear business, including the fabrication of High Flux Isotope Reactors (HFIR), extended to 1981.

The A.E.C. approved the burial of low level contaminated construction materials and refuse in the disposal area east of building 10 (see site map appendix B). It is TI's belief that only low level scrap waste was disposed of on site. TI has indicated that there is no evidence, documentation, or records of any source material being disposed of on-site.

In 1982 decontamination and decommissioning activities in the area within building 10 were conducted. Having met the established standards for decommissioning work on the interior of the buildings, the NRC then dictated that TI would have to meet acceptable health and safety levels for residual radiation with regard to the grounds outside the buildings. In particular, the former on-site disposal area between buildings 11 and 12 was the primary area of concern.

Subsequently, TI performed a radiological survey and Oak Ridge Associated Universities (ORAU) performed a verification study (published 12 February 1985), and CPS performed a pilot excavation/sampling study (June 1992). These studies helped to identify the areas for excavation between buildings 11 and 12. (see Attachment A)

Description

The Texas Instruments Incorporated, Materials and Controls Group, Attleboro, Massachusetts, site is located in Attleboro, approximately 48 kilometers south of Boston on Route 123. The area of concern for this pilot study has been identified as the burial site which is located to the southwest of Building 12 .

III. Responsible Organizations and Key Personnel

Specific individuals specified within the organizations shall be identified by the site access log detailed in appendix B.

A. Organizations

1. Texas Instruments Incorporated

   Texas Instruments Incorporated by virtue of ownership is responsible for all aspects of the project scope. Departments involved include: Environmental Health and Safety, Security, Medical, and Facilities.

2. Franklin Environmental Services

   Franklin Environmental Services is responsible for the physical excavation, preparation and packaging of materials for disposition. Personnel involved include operations and health and safety.

3. Creative Pollution Solutions, Inc.

   Creative Pollution Solutions, Inc. will provide the Site Specific Radiological Health and Safety Plan, radiation protection and controls during site activity, and recommendations to Texas Instruments Incorporated regarding radiation protection

B. Key Personnel

1. Texas Instruments Inc.
   Project Manger Environmental
   Health and Safety
   Site Security
   Facilities
   Transportation
   Communications

2. Franklin Environmental Services
   - Project Manager
   - Operations Manager
   - Safety and Compliance Officer
   - Screen Operator
   - Machine Operator
   - Field workers

3. Creative Pollution Solutions, Inc.
   - Project Manager
   - Certified Health Physicist
   - Health Physicists

Telephone contact list posted in trailer.

IV. Work Stop Authority

Any individual or organization has the right to shut down the operations on the site. In the event of a disagreement, the most conservative approach shall be taken. A meeting shall be convened by identified representatives of each organization to assess the decision at hand.

V. Site Radiological Characteristics

Radiological hazards associated with this site are the result of previous NRC licensed activities which involved the manufacturing and processing of uranium. Hence, site radiological hazards are those associated with this material. Concentrations of radioactive materials and site assessment is detailed within the Oak Ridge Associated Universities report (Report # RSAP / SMPB-8). According to the Oak Ridge report the radionuclides of interest include: U-238, U-235, Th-232, and Ra-226.

<u>Concentrations of Radionuclides in Surface Soil (Grid Intersections)</u>

The concentration of U-238 in soil ranges from < 0.38 - 44.9 pCi/g. U-235 concentrations ranged from < 0.11 to 8.15 pCi/g. Th-232 concentrations ranged from 0.13 - 3.56 pCi/g. Ra-226 concentrations ranged from 0.11 - 1.86 pCi/g.

<u>Concentrations of Radionuclides Surface Soil (Elevated Contact Radiation Levels)</u>

The concentration of U-238 in sub-surface soil ranged from < 46.6 - 887 pCi/g; U-235 ranged from <1.78 - 590 pCi/g; Th-232 ranged from 1.04 - 10.2 pCi/g; and Ra-226 concentrations were found not to be significantly greater than background.

Concentrations of Radionuclides Sub-Surface Soil

Radionuclide concentrations in the sub-surface soil did not depart significantly from surface soil concentrations.

External Exposure Rates (Grid Intersections)

External Exposure Rates ranged from 10 - 14 μR/h.

External Exposure Rates (Elevated Readings)

At numerous locations within the site elevated exposure rates ranged from 16 - 200 μR/h.

Verification Surveys

Verification external exposure rate and soil sampling surveys conducted by Creative Pollution Solutions, Inc. were consistent with the ORAU report mentioned above. This verification survey combined with the more extensive ORAU report were used to determine soil sample locations and excavation areas (Radiological Characterization report, CPS, July 1992).

VI. Personnel Training Requirements

All site personnel will have received training consistent with that required under the general health and safety plan developed by Franklin Environmental Services Site specific training regarding radiation protection and control will be conducted. An outline of the radiological control training is as follows:

1. Organization
2. Health and Safety Plan
3. Responsibilities
4. Site Characteristics
5. Radiation Properties (site specific)
6. Contamination Controls
7. Frisking Procedures
8. Dose Control
9. Personnel Access
10. Work Stop Authority

VII. Site Control

The site will be broken down into three primary zones: the Exclusion Zone, the Contamination Reduction Zone and the Support Zone. These zones are all to be considered part of the larger Restricted Area. Only authorized personnel will be allowed within the Restricted Area. See Attachment A for locations of zones within the site map.

control point will be established to control access to the Exclusion Zone. A personnel decontamination area and an equipment area will also be established.

Support Zone -- The support zone will include a command center, equipment and supplies.

Franklin Environmental personnel will assure that only authorized personnel are allowed into the Restricted Area without an escort. All visitors allowed into the Restricted Area must be with a TI escort and must remain in pre-established visitor areas within the support zone.

VIII. Personnel Protective Equipment

Personnel in the Exclusion Area will maintain, as a minimum, level D protective equipment. The minimum protective equipment required includes: hard hat, steel toed safety shoes, and dosimetry. Additional protective equipment may be required as conditions warrant. Decisions to upgrade or downgrade protective equipment at any time during the site operation will be made jointly by Texas Instruments Incorporated, Materials and Control Group personnel and Creative Pollution Solutions, Inc. personnel.

IX. Monitoring and Sampling

This section describes the radiological sampling and monitoring to be done during site operations in order to protect site personnel and the community. Action Levels have been established for certain aspects of sampling and monitoring (Attachment D).

Area Air Sampling

Area air sampling will be performed during site operations at perimeter locations and work areas. Perimeter locations will be based on prevailing conditions.

Personnel Breathing Zone Air Samples

Personnel BZA's will be provided to a representative number of workers based on job task.

Dose Rate Monitoring

Direct Reading

Direct reading dose rate monitoring will be performed during all site operations. This monitoring will be performed to assess direct worker exposure levels.

Personnel Dosimetry

Personnel dosimetry shall be worn by all personnel entering the exclusion zone. Personnel dosimetry shall include thermoluminescent dosimeters (Landaeur).

Bioassay Measurements

In-vitro bioassay monitoring will be performed on all personnel working in the exclusion zone. Urinalysis samples will be analyzed for total u[illegible]ium via flourometric techniques by an identified outside laboratory.

Personnel Contamination Monitoring

Frisking of personnel and equipment shall be performed prior to exit from the contamination reduction zone. Frisking will be done to assure personnel and equipment are not contaminated.

X. Decontamination

Personnel Decontamination

Personnel decontamination will be performed in accordance with standard decontamination practices as outlined in the "Occupational Safety and Health Manual for Hazardous Waste Site Activities". In addition to standard waste site procedures frisking out of all personnel will take place prior to exiting the contamination reduction zone.

Equipment Decontamination

All equipment shall be surveyed to determine disposition. Disposition shall include decontamination for free release (see Attachment D) or disposed of as appropriate.

XI. Medical Surveillance

Medical surveillance shall be performed for all personnel working in the exclusion zone. Medical surveillance shall be in accordance with the general health and safety plan developed by Franklin Environmental Services In addition, for this site, a bioassay analysis for the assessment of intakes of radionuclides shall be performed pre and post site work.

XII. Informational Programs

Informational programs are the responsibility of Texas Instruments Incorporated, Materials and Control Group. These programs will inform TI employees and the community of the site work as necessary.

XIII. Record Keeping

Site records will be kept including but not limited to: Site log, site sampling and monitoring, personnel dosimetry records, and bioassay results.

XIV. Emergency Response Contingency Plan

Emergency procedures will be consistent with those outlined in the general health and safety plan developed by Franklin Environmental Services and Texas Instruments Incorporated, Materials and Control Group Disaster Emergency Management Plan.

Attachment A

Site Map and Zone Description

Site Map and Zone Layout

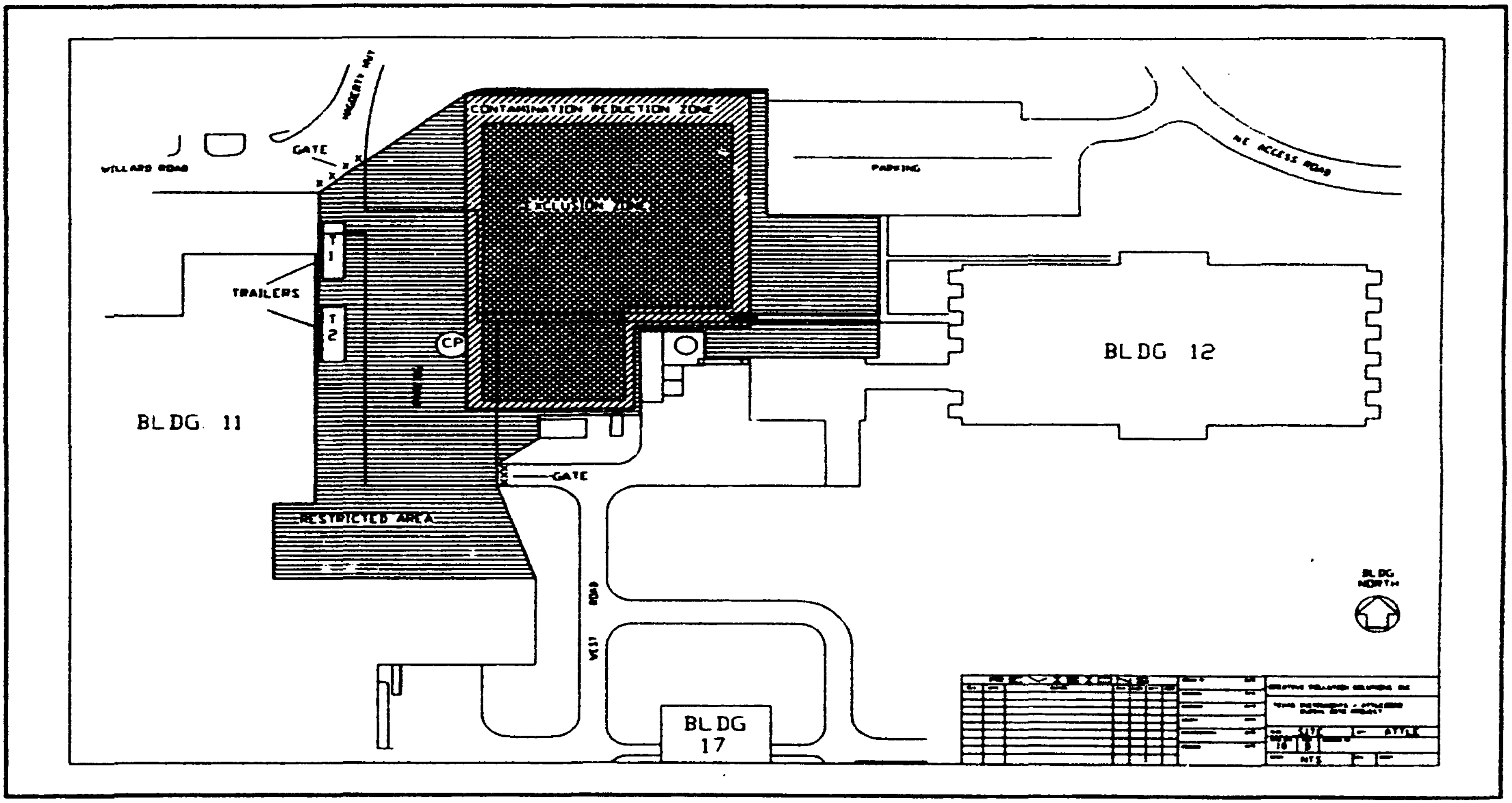
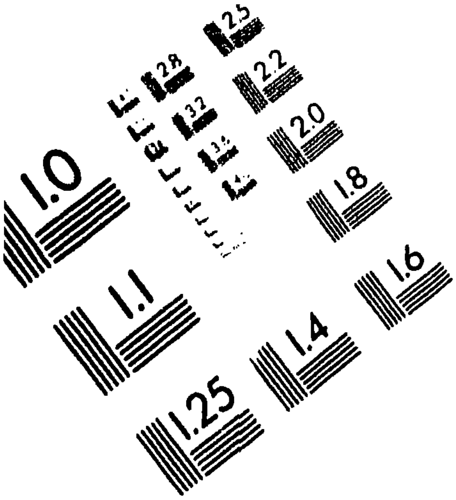
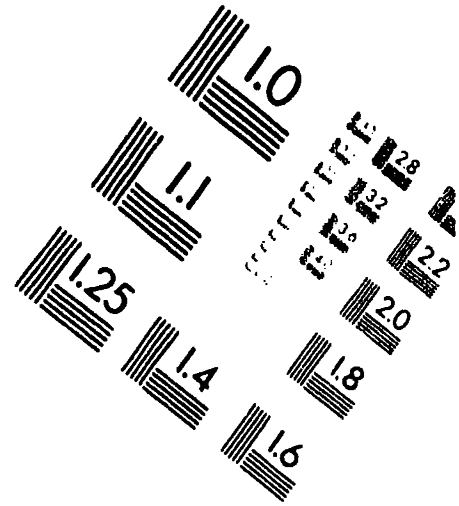
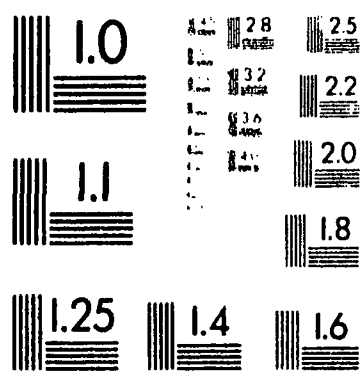
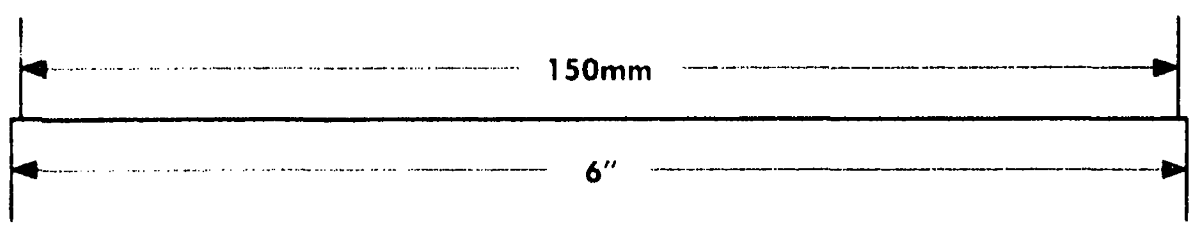
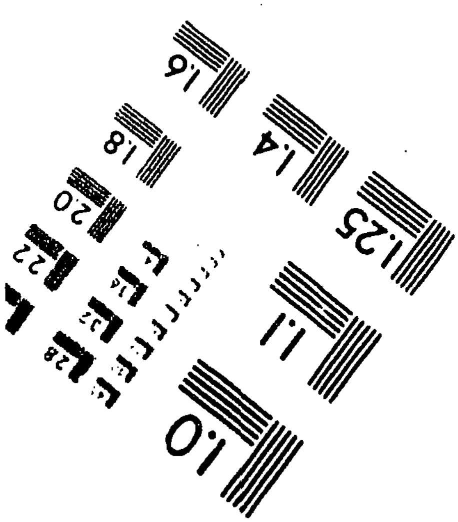
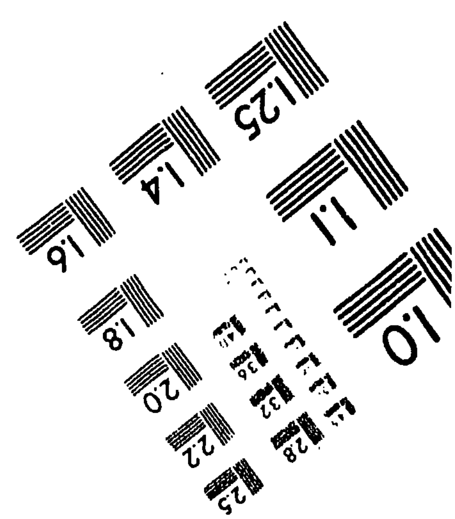


IMAGE EVALUATION TEST TARGET (MT-3)



PHOTOGRAPHIC SCIENCES CORPORATION
770 BASKET ROAD
P.O. BOX 338
WEBSTER, NEW YORK 14580

IMAGE EVALUATION TEST TARGET (MT-3)

150mm

6″

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770 BASKET ROAD
P.O. BOX 338
WEBSTER, NEW YORK 14580

IMAGE EVALUATION TEST TARGET (MT-3)

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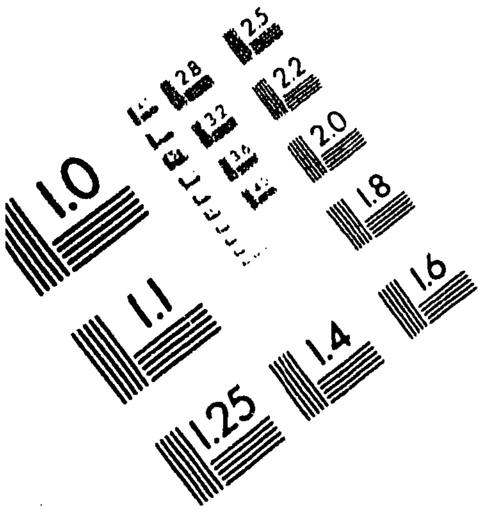
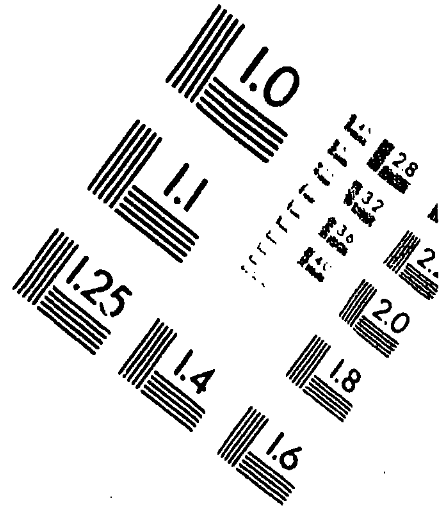

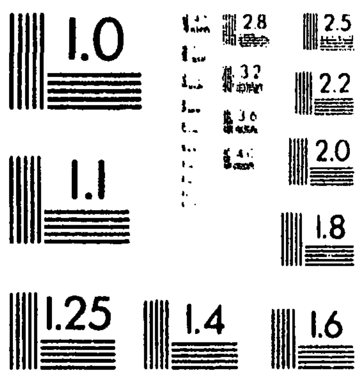

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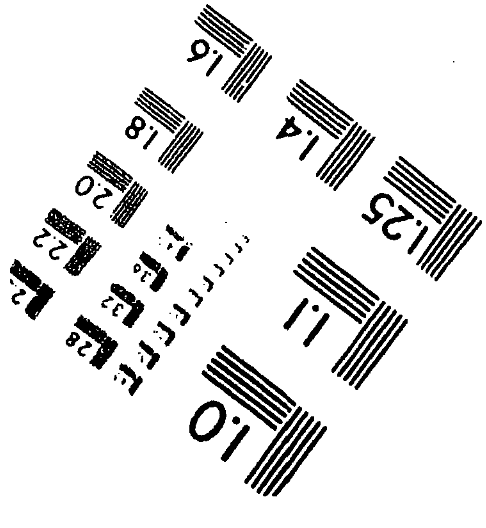
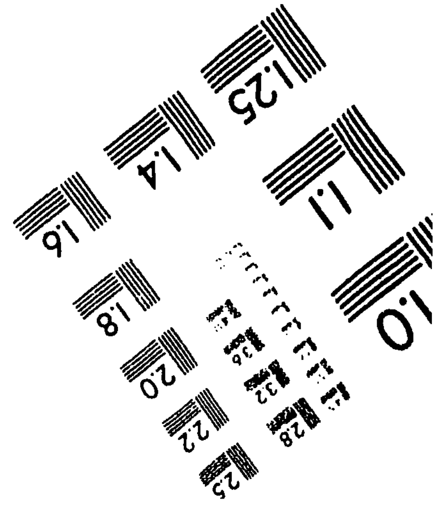

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IMAGE EVALUATION
TEST TARGET (MT-3)

150mm

6"

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Attachment B

Site Access Log

Example Site Access Log

Name	Date	Company	Position/Purpose

Attachment C

Dosimetry Assignment Log

Example TLD Issuance

Name	SS #	Date	Badge #

Attachment D

Action Limits

Air Sample (General Area)

General Area Air Sampling is performed to assess airborne concentrations of radionuclides. Action Limits are established in accordance with NRC published concentration limits.

Concentration	Action
< 25%	No Action
25% > X < 75 %	Investigate and notify radiation protection supervision
75% > X < 100%	Stop work. Notify radiation protection supervision.

Personnel Exposure

External Dose

Thermoluminescent Dosimetry (TLDs) shall be the dose of record for those issued. Self reading pocket dosimeters are for exposure control purposes, dose of record for those not issued TLDs, and to serve as a backup to TLDs. Action limits are established for dose control purposes using the self reading pocket dosimeters.

SRD Reading	Action
< 20 mR	No Action
20 mR > X < 100 mR	Notify Radiation Protection Supervision for Investigation
> 100 mR	Remove worker from area and notify and notify Radiation Protection Supervision.

Breathing Zone Air Samples (BZA)

BZAs are worn by a representative group of workers based on job function. BZAs are used to assess potential intakes of radionuclides. Action Limits are as follows:

< 150 dpm	No action
> 150 dpm	Investigation level. Verify by bioassay

protection. Bioassay results are reported in the units of pCi/l. The results are compared to baseline values and to Investigation/Action levels.

Bioassay results	Action
< 45 pCi/l	No action
> 45 pCi/l	Investigation

Contamination Levels

In accordance with USNRC guidelines for "Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material", Dated November 1976, the following is established:

Area	Alpha		Beta	
	fixed	removable	fixed	removable
Clean areas	2000	200	20,000	2000
Equipment	2000	200	20,000	2000

Exposure Rates

Action Limits for external exposure rates are specified as follows:

Exposure Rate	Action
Background < X < 1 mR/h	No Action
1 mR/h < X < 10mR/h	Stop work and Radiation Protection Supervision Notified for Investigation
10 mR/h < X < 100 mR/h	Stop Work. Personnel retire to area of exposure rate less than 1 mR/h. Radiation protection supervision notified for investigation.
> 100 mR/h	Stop work. evacuate to control point and exit to command center. Radiation Protection supervision notified.

Attachment E

Training Log

Example Training Log

Description of Training:

Date:

Attendees:

Appendix A2

Air Sampling Methodology and Analysis

Air Sampling Methodology and Analysis

Air sampling was established for general area and perimeter locations about the excavation site to assess the potential for airborne radioactivity generated from the physical intrusion into the affected area. The location of the air sampling systems were varied dependent upon the prevailing conditions at the time. Examples of locations included general area, control point area, building 12 air intake, railhead during soil transfers, and public access pathway along the north east boundary.

The air sampling systems were comprised of a rotary vane pump with a restricted orifice to maintain an established flow rate of 22 l/m. The air sampling media was glass fiber contained within a 2" open filter head coupled to the pump system with a polyethylene tube.

During the radiological characterization phase of the project air samples were analyzed within the field using a two count method to discriminate against radon progeny for initial assessment. These were then analyzed later at a time sufficiently long to allow the radon progeny to decay for final assessment of the airborne radioactivity. The results during this phase indicated that the air samples were at the minimum detectable levels. Accordingly, it was decided that the analysis method should be the latter method described unless on-site conditions dictated otherwise. No such conditions arose.

Counting of air samples was conducted on a Ludlum model 43-10-1 ZnS/Plastic Scintillating detector arrangement coupled to a Ludlum model 2200 Scaler/Ratemeter or on a ZnS screen coupled to a photomultiplier tube arrangement connected to a model 2200 Scaler/Ratemeter. Results of counting are presented in the attached tables for the area and date specified. The airborne concentration was determined as follows:

$$C(\mu Ci/ml) = \frac{\dfrac{C_{s+b}(counts)}{t_{s+b}(\mathrm{min})} - \dfrac{C_b(counts)}{t_b(\mathrm{min})}}{\epsilon(c/d) * 2.22E6(dpm/\mu Ci) * F(lpm) * 1000(cm^3/l) * R * \tau(\mathrm{min})}$$

Where:

	U	is the airborne concentration (μCi/ml),
	C_{s+b}	is the sample count (counts),
	C_b	is the background count (counts),
	t_{s+b}	is the sample count time (min),
	t_b	is the background count time (min),
	ε	is the system counting efficiency (counts/disintegration),
	F	is the flow Rate (lpm),
	R	is the filter retention (unitless), and
	τ	is the sampling time (min).

The values of 2.22E6 dpm/μCi and 1000 cm^3/l represent unit conversions.

those associated with counting errors.

$$\sigma_U = [\sigma_\epsilon^2 + \sigma_{R_{s+b}}{}^2 + \sigma_{R_b}{}^2]^{1/2}$$

Where:

- σ_U is the standard error in the concentration,
- $\sigma_{R_{s+b}}$ is the standard error in the counting rate of the sample plus background,
- σ_{R_b} is the standard error in the background counting rate, and
- σ_ϵ is the standard error in the efficiency.

$$\sigma_U = [\sigma_\epsilon{}^2 + \frac{C_{s+b}}{t_{s+b}{}^2} + \frac{C_b}{t_b^2}]^{1/2}$$

When the sample counts do not differ significantly from background it is appropriate to evaluate the sample with regards to a statistical evaluation for which at a given count above background, activity is said to be present with a specified degree of confidence. Those counts less than this value is said to below the minimum detectable activity or extended to the minimum detectable concentration.

The formula for minimum detectable activity/concentration can be developed as follows:

$$LLD = \frac{k^2}{T_{s+b}} + 2k\sigma_b\left(1 + \frac{T_b}{T_{s+b}}\right)^{\frac{1}{2}}$$

Where:

- LLD is the Lower Level of Detection,
- k is defined for a 95% confidence interval of a one tail test and is equal to 1.65, and
- σ_b is the standard deviation in the background count.

If T_b and T_{s+b} are equal (i.e., $T_b = T_{s+b} = T$), then

$$LLD=\frac{k^2}{T}+2\sqrt{2}k\sigma_b$$

The minimum detectable activity would then follow as:

$$MDA=K\frac{(LLD)}{\epsilon T}$$

Where: MDA is the minimum detectable activity,
ε is the counting efficiency,
T is the counting time, and
K is a conversion constant.

It would follow then that the minimum concentration would be developed from the MDA as it was from activity previously as follows:

$$MDC=\frac{MDA}{V}$$

Where: MDC is the minimum detectable concentration and
V is the volume of air sample.

The results presented within the follow tables indicate that all values are well below the minimum detectable activity and hence the minimum detectable concentration.

Air Sampling Data and Analysis

Location	Date	Flow Rate lpm	Time Start	Time Stop	Sample Time min	Volume ml	Eff. c/d	Gross Cts counts	Bkg. Cts. counts	Bkg. Count Time (min.)	Sample C Time (n
Control Point	9/2/92	25	13:35	15:30	115	2.88E+06	0.23	2	0	5	10
Parking Lot	9/2/92	25	13:40	15:30	110	2.75E+06	0.23	8	0	10	10
Job Site	9/2/92	25	13:40	15:35	115	2.88E+06	0.23	10	0	10	10
Intake	9/2/92	25	13:40	15:30	110	2.75E+06	0.23	9	0	10	10
Pkg Lot/ Flag Pole	9/4/92	25	6:15	14:20	485	1.21E+07	0.23	0	0	1	1
Dig Site	9/4/92	25	6:15	14:20	485	1.21E+07	0.23	1	0	1	1
Access Point	9/4/92	25	6:15	14:20	485	1.21E+07	0.23	0	0	1	1
Air Intake	9/4/92	25	6:15	14:20	485	1.21E+07	0.23	3	0	1	1
Dig Site	9/15/92	25	6:30	14:00	450	1.13E+07	0.23	0	4	5	1
Intake Structure	9/15/92	25	6:30	14:00	450	1.13E+07	0.23	3	4	5	1
Control Point	9/15/92	25	6:30	14:15	465	1.16E+07	0.23	0	4	5	5
Intake Structure	9/16/92	25	6:30	15:00	510	1.28E+07	0.23	1	4	5	1
Parking Lot	9/16/92	25	6:30	15:00	510	1.28E+07	0.23	0	4	5	1
Control Point	9/16/92	25	6:30	15:00	510	1.28E+07	0.23	6	5	5	5
Intake Structure	9/17/92	25	6:30	15:00	510	1.28E+07	0.23	5	5	5	5
Dig Site	9/17/92	25	6:30	15:00	510	1.28E+07	0.23	3	5	5	5
Parking Lot	9/17/92	25	6:30	15:00	510	1.28E+07	0.23	4	5	5	5
Control Point	9/17/92	25	6:30	15:00	510	1.28E+07	0.23	1	5	5	5
Parking Lot	9/18/92	25	6:30	15:00	510	1.28E+07	0.23	0	5	5	5
Intake Structure	9/18/92	25	6:30	15:00	510	1.28E+07	0.23	8	5	5	5
Control Point	9/18/92	25	6:30	15:00	510	1.28E+07	0.23	3	5	5	5
Dig Site	9/18/92	25	6:30	15:00	510	1.28E+07	0.23	3	5	5	5
Intake	9/21/92	25	6:30	15:15	525	1.31E+07	0.23	4	4	5	5
Dig Site	9/21/92	25	6:30	15:15	525	1.31E+07	0.23	4	4	5	5
Control Point	9/21/92	25	6:30	15:15	525	1.31E+07	0.23	17	4	5	5
Parking Lot	9/21/92	25	6:30	14:00	450	1.13E+07	0.23	16	5	5	5
Control Point	9/22/92	25	7:00	14:00	420	1.05E+07	0.23	0	5	5	1
Control Point	9/22/92	25	7:00	14:00	420	1.05E+07	0.23	37	4	5	5
Dig Site	9/22/92	25	6:30	15:00	510	1.28E+07	0.23	2	4	5	5
Intake Structure	9/22/92	25	7:00	14:00	420	1.05E+07	0.23	0	5	5	5
Control Point	9/23/92	25	6:30	15:00	510	1.28E+07	0.23	0	5	5	5

Table A2-1-1

Air Sampling Data and Analysis

Location	Date	Flow Rate lpm	Time Start	Time Stop	Sample Time min	Volume ml	Eff. c/d	Gross Cts counts	Bkg. Cts. counts	Bkg. Count Time (min.)	Sample C Time (
Control Point	9/23/92	25	6:30	15:00	510	1.28E+07	0.23	1	4	5	5
Intake	9/23/92	25	6:30	15:00	510	1.28E+07	0.23	4	5	5	5
Intake	9/23/92	25	6:30	15:00	510	1.28E+07	0.23	0	4	5	5
Dig Site	9/23/92	25	6:30	15:00	510	1.28E+07	0.23	1	5	5	5
Dig Site	9/23/92	25	6:30	15:00	510	1.28E+07	0.23	1	4	5	5
Parking Lot	9/23/92	25	6:30	15:00	510	1.28E+07	0.23	0	5	5	5
Parking Lot	9/23/92	25	6:30	15:00	510	1.28E+07	0.23	1	4	5	5
Intake Structure	9/24/92	25	6:30	17:30	660	1.65E+07	0.23	6	0	5	5
Dig Site	9/24/92	25	7:30	17:30	600	1.50E+07	0.23	0	0	5	5
Control Point	9/24/92	25	7:30	17:30	600	1.50E+07	0.23	0	0	5	5
Parking Lot	9/24/92	25	6:30	17:30	660	1.65E+07	0.23	3	0	5	5
Intake Structure	9/25/92	25	6:30	18:00	690	1.73E+07	0.23	0	4	5	5
Control Point	9/25/92	25	6:30	18:00	690	1.73E+07	0.23	1	4	5	5
North Walkway	9/25/92	25	6:30	18:00	690	1.73E+07	0.23	0	4	5	5
Control Point	9/26/93	25	6:30	11:15	285	7.13E+06	0.23	2	0	5	5
Intake Structure	9/26/92	25	6:30	11:15	285	7.13E+06	0.23	1	0	5	5
North Walkway	9/26/92	25	6:30	11:15	285	7.13E+06	0.23	3	0	5	5
North Walkway	9/27/92	25	7:00	14:00	420	1.05E+07	0.23	4	1	5	5
Dig Site	9/27/92	25	6:30	14:00	450	1.13E+07	0.23	1	1	5	5
Control Point	9/27/92	25	7:00	14:00	420	1.05E+07	0.23	0	1	5	5
Intake	9/30/92	25	6:30	18:00	690	1.73E+07	0.23	23	0	5	5
North Walkway	9/30/92	25	6:30	18:00	690	1.73E+07	0.23	17	0	5	5
Control Point	9/30/92	25	6:30	18:00	690	1.73E+07	0.23	18	0	5	5
North Walkway	10/1/92	25	7:30	17:00	570	1.43E+07	0.23	19	0	5	5
West Boundry	10/1/92	25	7:30	17:00	570	1.43E+07	0.23	13	0	5	5
Control Point	10/1/92	25	7:30	17:00	570	1.43E+07	0.23	18	0	5	5
North Walkway	10/2/92	25	7:00	17:00	600	1.50E+07	0.23	18	0	5	5
Control Point	10/2/92	25	7:00	13:00	360	9.00E+06	0.23	30	0	5	5
West Boundry	10/2/92	25	7:00	16:00	540	1.35E+07	0.23	13	0	5	5
West Boundry	10/3/92	25	6:30	15:30	540	1.35E+07	0.23	25	0	5	5
North Walkway	10/3/92	25	6:30	15:30	540	1.35E+07	0.23	21	0	5	5

Table A2-1-2

Air Sampling Data and Analysis

Location	Date	Flow Rate lpm	Time Start	Time Stop	Sample Time min	Volume ml	Eff. c/d	Gross Cts counts	Bkg. Cts. counts	Bkg. Count Time (min.)	Sample Time
Fence Near Trailers	10/3/92	25	7:30	15:30	480	1.20E+07	0.23	17	0	5	5
Cooling Tower	10/3/92	25	7:30	15:30	480	1.20E+07	0.23	13	0	5	5
Control Point	10/3/92	25	6:30	15:30	540	1.35E+07	0.23	15	0	5	5
Reed Screen	10/4/92	25	7:30	16:00	510	1.28E+07	0.23	18	0	5	5
Fence Bldg. 12	10/4/92	25	7:00	16:00	540	1.35E+07	0.23	14	0	5	5
Control Point	10/4/92	25	7:00	16:00	540	1.35E+07	0.23	14	0	5	5
Access Point	10/5/92	25	7:00	17:00	600	1.50E+07	0.23	25	0	5	5
Screener Fence	10/5/92	25	7:00	17:00	600	1.50E+07	0.23	26	0	5	5
North Walkway	10/5/92	25	7:00	17:00	600	1.50E+07	0.23	1	0	5	1
Access Point	10/6/92	25	6:30	17:00	630	1.58E+07	0.23	18	0	5	5
Screener Fence	10/6/92	25	6:30	17:00	630	1.58E+07	0.23	22	0	5	5
North Sidewalk	10/6/92	25	6:30	17:00	630	1.58E+07	0.23	19	0	5	5
Access Area	10/7/92	25	6:30	17:00	630	1.58E+07	0.23	2	0	5	1
North Walkway	10/7/92	25	6:30	17:00	630	1.58E+07	0.23	0	0	5	1
Screener Fence	10/7/92	25	6:30	17:00	630	1.58E+07	0.23	1	0	5	1
North Walkway	10/8/92	25	6:30	16:45	615	1.54E+07	0.23	13	0	5	5
Access Point	10/8/92	25	6:30	16:45	615	1.54E+07	0.23	14	0	5	5
Screener Fence	10/8/92	25	6:30	16:45	615	1.54E+07	0.23	23	0	5	5
Control Point	10/10/92	25	7:30	15:00	450	1.13E+07	0.23	1	0	5	1
Roll Off Area	10/10/92	25	7:30	15:00	450	1.13E+07	0.23	1	0	5	1
Control Point	10/11/92	25	7:00	15:00	480	1.20E+07	0.23	0	0	5	1
Trailer Corner	10/11/92	25	7:00	15:00	480	1.20E+07	0.23	0	0	5	1
Trailer Fence	10/12/92	25	6:30	15:30	540	1.35E+07	0.23	0	0	5	1
Control Point	10/12/92	25	6:30	15:30	540	1.35E+07	0.23	1	0	5	1
Trailer Fence	10/13/92	25	6:30	15:00	510	1.28E+07	0.23	1	0	5	1
Control Point	10/13/92	25	6:30	15:00	510	1.28E+07	0.23	0	0	5	1
North Walkway	10/14/92	25	7:00	16:00	540	1.35E+07	0.23	4	0	5	1
Access Point	10/14/92	25	7:00	16:00	540	1.35E+07	0.23	1	0	5	1
Trailer Fence	10/14/92	25	7:00	16:00	540	1.35E+07	0.23	1	0	5	1
Access Point	10/15/92	25	7:00	16:00	540	1.35E+07	0.23	2	0	5	1
Trailer Fence	10/15/92	25	7:00	16:00	540	1.35E+07	0.23	1	0	5	1

Table A2-1-3

Air Sampling Data and Analysis

Location	Date	Flow Rate lpm	Time Start	Time Stop	Sample Time min	Volume ml	Eff. c/d	Gross Cts counts	Bkg. Cts. counts	Bkg. Count Time (min.)	Sample (Time (
Control Point	10/16/92	25	7:00	12:30	330	8.25E+06	0.23	1	0	5	1
North Walkway	10/16/92	25	7:00	12:30	330	8.25E+06	0.23	1	0	5	1
Trailer Corner	10/17/92	25	7:00	14:30	450	1.13E+07	0.23	2	0	5	1
North Walkway	10/17/92	25	7:00	14:30	450	1.13E+07	0.23	0	0	5	1
Access Point	10/17/92	25	7:00	14:30	450	1.13E+07	0.23	0	0	5	1
Trailer Fence	10/18/92	25	7:00	16:30	570	1.43E+07	0.23	1	0	5	1
Access Point	10/18/92	25	7:00	16:30	570	1.43E+07	0.23	1	0	5	1
Rail Head	10/19/92	25	8:00	9:00	60	1.50E+06	0.23	1	0	5	1
Access Point	10/19/92	25	7:00	14:30	450	1.13E+07	0.23	2	0	5	1
Trailer Fence	10/19/92	25	7:00	14:30	450	1.13E+07	0.23	2	0	5	1
Fence Area	10/20/92	25	7:00	11:30	270	6.75E+06	0.23	1	0	5	1
Trailer Fence	10/21/92	25	7:00	12:00	300	7.50E+06	0.23	0	0	5	1
Trailer Fence	10/23/92	25	7:00	15:45	525	1.31E+07	0.23	0	0	5	1
Trailer Fence	10/24/92	25	6:30	11:45	315	7.88E+06	0.23	0	0	5	1
Trailer Fence	10/26/92	25	7:00	15:15	495	1.24E+07	0.23	0	0	5	1
Trailer Fence	10/27/92	25	6:30	15:00	510	1.28E+07	0.23	0	0	5	1
Trailer Fence	10/28/92	25	6:30	15:30	540	1.35E+07	0.23	4	0	5	1

Table A2-1-4

Air Sampling Data and Analysis

Location	Net Cts counts	Net Ct Rate cpm	Std. Dev. cpm	Activity uCi	Concentration uCi/ml	MDA dpm	MDA uCi	MDC uCi/mL
Control Point	2	0.2	0.45	3.92E-07	1.36E-13	7.57	3.41E-06	1.19E-12
Parking Lot	8	0.8	0.89	1.57E-06	5.70E-13	13.97	6.29E-06	2.29E-12
Job Site	10	1	1.00	1.96E-06	6.81E-13	15.48	6.97E-06	2.43E-12
Intake	9	0.9	0.95	1.76E-06	6.41E-13	14.75	6.64E-06	2.42E-12
Pkg Lot/ Flag Pole	0	0	0.00	0.00E+00	0.00E+00	11.77	5.30E-06	4.37E-13
Dig Site	1	1	1.00	1.96E-06	1.62E-13	26.07	1.17E-05	9.68E-13
Access Point	0	0	0.00	0.00E+00	0.00E+00	11.77	5.30E-06	4.37E-13
Air Intake	3	3	1.73	5.88E-06	4.85E-13	36.54	1.65E-05	1.36E-12
Dig Site	-4	-0.8	0.89	-1.57E-06	-1.39E-13	24.56	1.11E-05	9.83E-13
Intake Structure	-1	2.2	1.95	4.31E-06	3.83E-13	39.65	1.79E-05	1.59E-12
Control Point	-4	-0.8	0.89	-1.57E-06	-1.35E-13	15.15	6.82E-06	5.87E-13
Intake Structure	-3	0.2	1.34	3.92E-07	3.07E-14	30.96	1.39E-05	1.09E-12
Parking Lot	-4	-0.8	0.89	-1.57E-06	-1.23E-13	24.56	1.11E-05	8.68E-13
Control Point	1	0.2	1.48	3.92E-07	3.07E-14	23.57	1.06E-05	8.33E-13
Intake Structure	0	0	1.41	0.00E+00	0.00E+00	22.58	1.02E-05	7.98E-13
Dig Structure	-2	-0.4	1.26	-7.83E-07	-6.14E-14	20.45	9.21E-06	7.22E-13
Parking Lot	-1	-0.2	1.34	-3.92E-07	-3.07E-14	21.54	9.70E-06	7.61E-13
Control Point	-4	-0.8	1.10	-1.57E-06	-1.23E-13	18.02	8.12E-06	6.37E-13
Parking Lot	-5	-1	1.00	-1.96E-06	-1.54E-13	16.66	7.50E-06	5.88E-13
Intake Structure	3	0.6	1.61	1.18E-06	9.22E-14	25.42	1.14E-05	8.98E-13
Control Point	-2	-0.4	1.26	-7.83E-07	-6.14E-14	20.45	9.21E-06	7.22E-13
Dig Site	-2	-0.4	1.26	-7.83E-07	-6.14E-14	20.45	9.21E-06	7.22E-13
Intake	0	0	1.26	0.00E+00	0.00E+00	20.45	9.21E-06	7.02E-13
Dig Site	0	0	1.26	0.00E+00	0.00E+00	20.45	9.21E-06	7.02E-13
Control Point	13	2.6	2.05	5.09E-06	3.88E-13	31.67	1.43E-05	1.09E-12
Parking Lot	11	2.2	2.05	4.31E-06	3.83E-13	31.67	1.43E-05	1.27E-12
Control Point	-5	-1	1.00	-1.96E-06	-1.87E-13	26.07	1.17E-05	1.12E-12
Control Point	33	6.6	2.86	1.29E-05	1.23E-12	43.31	1.95E-05	1.86E-12
Dig Site	-2	-0.4	1.10	-7.83E-07	-6.14E-14	18.02	8.12E-06	6.37E-13
Intake Structure	-5	-1	1.00	-1.96E-06	-1.87E-13	16.66	7.50E-06	7.15E-13
Control Point	-5	-1	1.00	-1.96E-06	-1.54E-13	16.66	7.50E-06	5.88E-13

Table A2-1-5

Air Sampling Data and Analysis

Location	Net Cts counts	Net Ct Rate cpm	Std. Dev. cpm	Activity uCi	Conc. uCi/ml	MDA dpm	MDA uCi	MDC uCi/mL
Control Point	-3	-0.6	1.00	-1.18E-06	-9.22E-14	16.66	7.50E-06	5.88E-13
Intake	-1	-0.2	1.34	-3.92E-07	-3.07E-14	21.54	9.70E-06	7.61E-13
Intake	-4	-0.8	0.89	-1.57E-06	-1.23E-13	15.15	6.82E-06	5.35E-13
Dig Site	-4	-0.8	1.10	-1.57E-06	-1.23E-13	18.02	8.12E-06	6.37E-13
Dig Site	-3	-0.6	1.00	-1.18E-06	-9.22E-14	16.66	7.50E-06	5.88E-13
Parking Lot	-5	-1	1.00	-1.96E-06	-1.54E-13	16.66	7.50E-06	5.88E-13
Parking Lot	-3	-0.6	1.00	-1.18E-06	-9.22E-14	16.66	7.50E-06	5.88E-13
Intake Structure	6	1.2	1.10	2.35E-06	1.42E-13	18.02	8.12E-06	4.92E-13
Dig Site	0	0	0.00	0.00E+00	0.00E+00	2.35	1.06E-06	7.07E-14
Control Point	0	0	0.00	0.00E+00	0.00E+00	2.35	1.06E-06	7.07E-14
Parking Lot	3	0.6	0.77	1.18E-06	7.12E-14	13.43	6.05E-06	3.67E-13
Intake Structure	-4	-0.8	0.89	-1.57E-06	-9.08E-14	15.15	6.82E-06	3.96E-13
Control Point	-3	-0.6	1.00	-1.18E-06	-6.81E-14	16.66	7.50E-06	4.35E-13
North Walkway	-4	-0.8	0.89	-1.57E-06	-9.08E-14	15.15	6.82E-06	3.96E-13
Control Point	2	0.4	0.63	7.83E-07	1.10E-13	11.40	5.14E-06	7.21E-13
Intake Structure	1	0.2	0.45	3.92E-07	5.50E-14	8.75	3.94E-06	5.53E-13
North Walkway	3	0.6	0.77	1.18E-06	1.65E-13	13.43	6.05E-06	8.49E-13
North Walkway	3	0.6	1.00	1.18E-06	1.12E-13	16.66	7.50E-06	7.15E-13
Dig Site	0	0	0.63	0.00E+00	0.00E+00	11.40	5.14E-06	4.56E-13
Control Point	-1	-0.2	0.45	-3.92E-07	-3.73E-14	8.75	3.94E-06	3.75E-13
Intake	23	4.6	2.14	9.01E-06	5.22E-13	33.03	1.49E-05	8.63E-13
North Walkway	17	3.4	1.84	6.66E-06	3.86E-13	28.73	1.29E-05	7.50E-13
Control Point	18	3.6	1.90	7.05E-06	4.09E-13	29.49	1.33E-05	7.70E-13
North Walkway	19	3.8	1.95	7.44E-06	5.22E-13	30.24	1.36E-05	9.56E-13
West Boundry	13	2.6	1.61	5.09E-06	3.57E-13	25.42	1.14E-05	8.03E-13
Control Point	18	3.6	1.90	7.05E-06	4.95E-13	29.49	1.33E-05	9.32E-13
North Walkway	18	3.6	1.90	7.05E-06	4.70E-13	29.49	1.33E-05	8.86E-13
Control Point	30	6	2.45	1.18E-05	1.31E-12	37.39	1.68E-05	1.87E-12
West Boundry	13	2.6	1.61	5.09E-06	3.77E-13	25.42	1.14E-05	8.48E-13
West Boundry	25	5	2.24	9.79E-06	7.25E-13	34.34	1.55E-05	1.15E-12
North Walkway	21	4.2	2.05	8.23E-06	6.09E-13	31.67	1.43E-05	1.06E-12

Table A2-1-6

Air Sampling Data and Analysis

Location	Net Cts counts	Net Ct Rate cpm	Std. Dev. cpm	Activity uCi	Conc. uCi/ml	MDA dpm	MDA uCi	MDC uCi/mL
Fence Near Trailers	17	3.4	1.84	6.66E-06	5.55E-13	28.73	1.29E-05	1.08E-12
Cooling Tower	13	2.6	1.61	5.09E-06	4.24E-13	25.42	1.14E-05	9.54E-13
Control Point	15	3	1.73	5.88E-06	4.35E-13	27.13	1.22E-05	9.05E-13
Reed Screen	18	3.6	1.90	7.05E-06	5.53E-13	29.49	1.33E-05	1.04E-12
Fence Bldg. 12	14	2.8	1.67	5.48E-06	4.06E-13	26.29	1.18E-05	8.77E-13
Control Point	14	2.8	1.67	5.48E-06	4.06E-13	26.29	1.18E-05	8.77E-13
Access Point	25	5	2.24	9.79E-06	6.53E-13	34.34	1.55E-05	1.03E-12
Screener Fence	26	5.2	2.28	1.02E-05	6.79E-13	34.97	1.58E-05	1.05E-12
North Walkway	1	1	1.00	1.96E-06	1.31E-13	26.07	1.17E-05	7.83E-13
Access Point	18	3.6	1.90	7.05E-06	4.48E-13	29.49	1.33E-05	8.44E-13
Screener Fence	22	4.4	2.10	8.62E-06	5.47E-13	32.36	1.46E-05	9.25E-13
North Sidewalk	19	3.8	1.95	7.44E-06	4.73E-13	30.24	1.36E-05	8.65E-13
Access Area	2	2	1.41	3.92E-06	2.49E-13	31.99	1.44E-05	9.15E-13
North Walkway	0	0	0.00	0.00E+00	0.00E+00	11.77	5.30E-06	3.36E-13
Screener Fence	1	1	1.00	1.96E-06	1.24E-13	26.07	1.17E-05	7.46E-13
North Walkway	13	2.6	1.61	5.09E-06	3.31E-13	25.42	1.14E-05	7.45E-13
Access Point	14	2.8	1.67	5.48E-06	3.57E-13	26.29	1.18E-05	7.70E-13
Screener Fence	23	4.6	2.14	9.01E-06	5.86E-13	33.03	1.49E-05	9.68E-13
Control Point	1	1	1.00	1.96E-06	1.74E-13	26.07	1.17E-05	1.04E-12
Roll Off Area	1	1	1.00	1.96E-06	1.74E-13	26.07	1.17E-05	1.04E-12
Control Point	0	0	0.00	0.00E+00	0.00E+00	11.77	5.30E-06	4.42E-13
Trailer Corner	0	0	0.00	0.00E+00	0.00E+00	11.77	5.30E-06	4.42E-13
Trailer Fence	0	0	0.00	0.00E+00	0.00E+00	11.77	5.30E-06	3.93E-13
Control Point	1	1	1.00	1.96E-06	1.45E-13	26.07	1.17E-05	8.70E-13
Trailer Fence	1	1	1.00	1.96E-06	1.54E-13	26.07	1.17E-05	9.21E-13
Control Point	0	0	0.00	0.00E+00	0.00E+00	11.77	5.30E-06	4.16E-13
North Walkway	4	4	2.00	7.83E-06	5.80E-13	40.37	1.82E-05	1.35E-12
Access Point	1	1	1.00	1.96E-06	1.45E-13	26.07	1.17E-05	8.70E-13
Trailer Fence	1	1	1.00	1.96E-06	1.45E-13	26.07	1.17E-05	8.70E-13
Access Point	2	2	1.41	3.92E-06	2.90E-13	31.99	1.44E-05	1.07E-12
Trailer Fence	1	1	1.00	1.96E-06	1.45E-13	26.07	1.17E-05	8.70E-13

Table A2-1-7

Air Sampling Data and Analysis

Location	Net Cts counts	Net Ct Rate cpm	Std. Dev. cpm	Activity uCi	Conc. uCi/ml	MDA dpm	MDA uCi	MDC uCi/mL
Control Point	1	1	1.00	1.96E-06	2.37E-13	26.07	1.17E-05	1.42E-12
North Walkway	1	1	1.00	1.96E-06	2.37E-13	26.07	1.17E-05	1.42E-12
Trailer Corner	2	2	1.41	3.92E-06	3.48E-13	31.99	1.44E-05	1.28E-12
North Walkway	0	0	0.00	0.00E+00	0.00E+00	11.77	5.30E-06	4.71E-13
Access Point	0	0	0.00	0.00E+00	0.00E+00	11.77	5.30E-06	4.71E-13
Trailer Fence	1	1	1.00	1.96E-06	1.37E-13	26.07	1.17E-05	8.24E-13
Access Point	1	1	1.00	1.96E-06	1.37E-13	26.07	1.17E-05	8.24E-13
Rail Head	1	1	1.00	1.96E-06	1.31E-12	26.07	1.17E-05	7.83E-12
Access Point	2	2	1.41	3.92E-06	3.48E-13	31.99	1.44E-05	1.28E-12
Trailer Fence	2	2	1.41	3.92E-06	3.48E-13	31.99	1.44E-05	1.28E-12
Fence Area	1	1	1.00	1.96E-06	2.90E-13	26.07	1.17E-05	1.74E-12
Trailer Fence	0	0	0.00	0.00E+00	0.00E+00	11.77	5.30E-06	7.07E-13
Trailer Fence	0	0	0.00	0.00E+00	0.00E+00	11.77	5.30E-06	4.04E-13
Trailer Fence	0	0	0.00	0.00E+00	0.00E+00	11.77	5.30E-06	6.73E-13
Trailer Fence	0	0	0.00	0.00E+00	0.00E+00	11.77	5.30E-06	4.28E-13
Trailer Fence	0	0	0.00	0.00E+00	0.00E+00	11.77	5.30E-06	4.16E-13
Trailer Fence	4	4	2.00	7.83E-06	5.80E-13	40.37	1.82E-05	1.35E-12

Table A2-1-8

Appendix A3

Breathing Zone Air Sampling

Breathing Zone Air Sampling

Breathing zone air (BZA) samplers were assigned to representative workers within the field to assess worker exposures. Breathing zone air samples provide better estimates of worker exposures due to proximity of the workers breathing zone to the locally generated sources than would general air sampling which are generally fixed at a prescribed location. These BZA's were assigned to individuals working in the dig site, reed screen operation, packaging and loading operations and etc. As previously identified in the pilot excavation study no significant exposures were identified and as a result none were expected during actual remediation activities. The data presented within the attached tables demonstrates the validity of this assumption.

Interpretation of BZA results is on the basis of comparing activity deposition on the BZA filter compared to the intake retention function (IRF) for an individual. An estimate of the exposure an individual receives based on BZA results can be developed as follows:

$$E = I\left(\frac{2000MPC\text{-}h}{AIL}\right)$$

Where:	E	is the exposure (MPC-h),
	I	is the intake corresponding to the exposure, E,
	AIL	is the annual intake limit based on a continuous exposure to 2000 MPC-h in any year of practice, and
	MPC	is the maximum permissible concentration defined within 10CFR20.

The intake can be represented by the ration of the activity deposition and the intake retention function represented by:

$$I = \frac{A}{IRF}$$

Where: A is the activity deposited on the filter and all other parameters are as previously defined.

The intake retention function defined here for the use of a BZA is simply the flow rate of the BZA (F_{BZA}) as compared to breathing rate of reference man (F_{RM}). In the case depicted here the IRF can be written as follows:

$$IRF = \frac{F_{BZA}}{F_{RM}}$$

Substituting and combining the various equations, yields the following relationship for exposure: The reference man breathing rate is 20 lpm; the breathing zone air samplers were calibrated to 2 lpm with an electronic soap bubble calibration; the activity is the activity on the filter; and the

$$E = \left(\frac{A}{AIL}\right)\left(\frac{F_{RM}}{F_{BZA}}\right)(2000MPC\text{-}h)$$

annual intake limit is based on reference man inhaled volume in an occupational year and the MPC as follows:

$$AIL(\mu Ci) = 2.5E9(ml) * MPC(\mu Ci)$$

The numerical values for MPC are obtained from 10CFR20 appendix B and the AIL's are calculated for the insoluble case and presented.

Nuclide	AIL(μCi)
^{235}U	0.25
^{238}U	0.25

Substituting the numerical values in the preceding equations, the interpretation of exposure may be represented as follows:

$$E(MPC\text{-}h) = 8E4 * A$$

Analysis of the BZA filters was performed in the method presented in Appendix A2 of this section. Statistical interpretation is the same and is extended here for the Minimum Detectable Exposure of BZA data.

$$MDE = 8E4 * MDA$$

The data is presented within the attached tables. These tables present all information with regards to the counting and analysis of BZA results. Two observations can be readily made from this data. These are that all results are below the minimum detectable exposure which are well below the 2 MPC-h reporting criteria established within 10CFR20 and the sample ID refers to individuals or to locations for individuals being representative of worker population exposures.

The general conclusion is that their were no detectable exposures to the worker population during any phase of physical intrusion (excavation), processing or packaging for transport the site material.

To Be
Withheld from Public Disclosure

Pursuant to
Privacy Act of 1974

(Privacy Act of 1974, Public Law 93-579, 5 U.S.C 552a)

1 1 8 9 4 5

Breathing Zone Air Sampling Data

Sample ID	Dig Site	Screener	Area	Kevin- Dig Sit	Dig Site	Dig Site	Dig Site	Page, D.
Sample Date	9/1/92	9/2/92	9/2/92	9/3/92	9/4/92	9/9/92	9/9/92	9/10/92
Count System	43-10-1	B	A	C	43-10-1	43-10-1	43-10-1	C
Count Date	9/1/92	9/2/92	9/3/92	9/3/92	9/4/92	9/22/93	9/22/93	9/22/93
System Eff. (C/d)	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Stand. Error. - Eff. (c/d)	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03
Bkg Counts (counts)	0	0	0	0	0	0	0	4
Bkg Ct Time (min)	10	10	10	10	10	10	10	5
Samp Ct (counts)	1	1	1	3	0	0	0	0
Samp Ct Time (min)	10	10	10	10	10	10	10	5
Net Ct Rate (cpm)	0.1	0.1	0.1	0.3	0	0	0	0
Stand. Error - Ct Rate (cpm)	0.1	0.1	0.1	0.17320508	0	0	0	0.4
Activity (uCi)	1.96E-07	1.96E-07	1.96E-07	5.88E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Stand. Error - Act. (uCi)	4.52E-08	4.52E-08	4.52E-08	7.81E-08	3.97E-09	3.97E-09	3.97E-09	1.80E-07
Exposure (MPC-hrs)	1.57E-02	1.57E-02	1.57E-02	4.70E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std. Error - Exp. (MPC-Hrs)	3.62E-03	3.62E-03	3.62E-03	6.25E-03	3.17E-04	3.17E-04	3.17E-04	1.44E-02
MDA (uCi)	2.65E-06	2.65E-06	2.65E-06	2.65E-06	2.65E-06	2.65E-06	2.65E-06	2.09E-05
MDE (MPC-hrs)	2.12E-01	2.12E-01	2.12E-01	2.12E-01	2.12E-01	2.12E-01	2.12E-01	1.67E+00

Table A3 - 1

Breathing Zone Air Sampling Data

Sample ID	Looker, J.	Looker, J.	Page, D.	Page, D.	Looker, J.	Page, D.	Page, D.	F
Sample Date	9/10/92	9/11/92	9/11/92	9/15/92	9/17/92	9/17/92	9/18/92	9
Count System	C	43-10-1	43-10-1	C	43-10-1	43-10-1	43-10-1	4
Count Date	9/22/93	9/23/92	9/27/93	9/23/92	9/23/92	9/23/92	9/23/92	9
System Eff. (C/d)	0.23	0.23	0.23	0.23	0.23	0.23	0.23	
Stand. Error. - Eff. (c/d)	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8
Bkg Counts (counts)	1	5	0	1	5	5	5	
Bkg Ct Time (min)	1	5	5	1	5	5	5	
Samp Ct (counts)	0	0	0	1	6	2	0	
Samp Ct Time (min)	1	5	5	1	5	5	5	
Net Ct Rate (cpm)	0	0	0	0	0.2	0	0	
Stand. Error - Ct Rate (cpm)	1.00E+00	4.47E-01	0.00E+00	1.41E+00	6.63E-01	5.29E-01	4.47E-01	6
Activity (uCi)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.92E-07	0.00E+00	0.00E+00	0.
Stand. Error - Act. (uCi)	4.50E-07	2.01E-07	3.97E-09	6.37E-07	2.99E-07	2.38E-07	2.01E-07	2
Exposure (MPC-hrs)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.13E-02	0.00E+00	0.00E+00	0.
Std. Error - Exp. (MPC-Hrs)	3.60E-02	1.61E-02	3.17E-04	5.10E-02	2.39E-02	1.91E-02	1.61E-02	2
MDA (uCi)	1.18E-05	2.30E-05	2.65E-06	1.37E-05	3.28E-05	3.28E-05	2.30E-05	3
MDE (MPC-hrs)	9.41E-01	1.84E+00	2.12E-01	1.10E+00	2.63E+00	2.63E+00	1.84E+00	2.

Breathing Zone Air Sampling Data

Sample ID	Looker, J.	Haley, J.	Townsend, S	Townsend, S.	Haley, J.	Haley, J.	Fairchild, B.	Fairchild, B.
Sample Date	9/24/92	9/25/92	9/25/92	9/26/92	9/26/92	9/30/92	10/1/92	10/2/92
Count System	43-10-1	43-10-1	43-10-1	43-10-1	43-10-1	43-10-1	43-10-1	43-10-1
Count Date	9/27/92	9/27/92	9/27/92	9/27/92	9/27/92	10/6/92	10/2/92	
System Eff. (C/d)	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Stand. Error. - Eff. (c/d)	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03
Bkg Counts (counts)	0	4	0	0	0	2	0	1
Bkg Ct Time (min)	5	5	5	5	5	5	5	1
Samp Ct (counts)	0	0	0	1	1	2	7	0
Samp Ct Time (min)	5	5	5	5	5	5	5	1
Net Ct Rate (cpm)	0	0	0	0.2	0.2	0	1.4	0
Stand. Error - Ct Rate (cpm)	0	0.4	0	0.2	0.2	0.4	0.52915	1
Activity (uCi)	0.00E+00	0.00E+00	0.00E+00	3.92E-07	3.92E-07	0.00E+00	2.74E-06	0.00E+00
Stand. Error - Act. (uCi)	3.97E-09	1.80E-07	3.97E-09	9.02E-08	9.02E-08	1.80E-07	2.38E-07	4.50E-07
Exposure (MPC-hrs)	0.00E+00	0.00E+00	0.00E+00	3.13E-02	3.13E-02	0.00E+00	2.19E-01	0.00E+00
Std. Error - Exp. (MPC-Hrs)	3.17E-04	1.44E-02	3.17E-04	7.21E-03	7.21E-03	1.44E-02	1.91E-02	3.60E-02
MDA (uCi)	2.65E-06	2.09E-05	2.65E-06	2.65E-06	2.65E-06	1.95E-05	2.65E-06	1.18E-05
MDE (MPC-hrs)	2.12E-01	1.67E+00	2.12E-01	2.12E-01	2.12E-01	1.56E+00	2.12E-01	9.41E-01

Breathing Zone Air Sampling Data

Sample ID	Solowey, J.	Haley, J.	Lorenzon, R	Fairchild, B.	Haley, J.	Haley, J.	Fairchild, B.	Fairchild, B.
Sample Date	10/3/92	10/4/92	10/4/92	10/5/92	10/5/92	10/6/92	10/6/92	10/7/92
Count System	43-10-1	43-10-1	43-10-1	43-10-1	43-10-1	43-10-1	43-10-1	43-10-1
Count Date	10/6/92	10/6/92	10/6/92	10/6/92	10/6/92	10/22/92	10/22/92	10/22/92
System Eff. (C/d)	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Stand. Error. - Eff. (c/d)	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03
Bkg Counts (counts)	2	2	2	2	2	0	0	0
Bkg Ct Time (min)	5	5	5	5	5	1	1	1
Samp Ct (counts)	4	6	5	2	3	0	0	0
Samp Ct Time (min)	5	5	5	5	5	1	1	1
Net Ct Rate (cpm)	0.4	0.8	0.6	0	0.2	0	0	0
Stand. Error - Ct Rate (cpm)	4.90E-01	5.66E-01	5.29E-01	4.00E-01	4.47E-01	0.00E+00	0.00E+00	0.00E+00
Activity (uCi)	7.83E-07	1.57E-06	1.18E-06	0.00E+00	3.92E-07	0.00E+00	0.00E+00	0.00E+00
Stand. Error - Act. (uCi)	2.21E-07	2.55E-07	2.38E-07	1.80E-07	2.01E-07	3.97E-09	3.97E-09	3.97E-09
Exposure (MPC-hrs)	6.27E-02	1.25E-01	9.40E-02	0.00E+00	3.13E-02	0.00E+00	0.00E+00	0.00E+00
Std. Error - Exp. (MPC-Hrs)	1.77E-02	2.04E-02	1.91E-02	1.44E-02	1.61E-02	3.17E-04	3.17E-04	3.17E-04
MDA (uCi)	1.95E-05	1.95E-05	1.95E-05	1.95E-05	1.95E-05	2.65E-06	2.65E-06	2.65E-06
MDE (MPC-hrs)	1.56E+00	1.56E+00	1.56E+00	1.56E+00	1.56E+00	2.12E-01	2.12E-01	2.12E-01

Breathing Zone Air Sampling Data

Sample ID	Haley, J.	Fairchild, B.	Haley, J.	Renfro, W.	Looker, J.	Looker, J.	Bagnoche	Slowey, J
Sample Date	10/7/92	10/8/92	10/8/92	10/11/92	10/12/92	10/11/92	10/13/92	10/13/92
Count System	43-10-1	43-10-1	43-10-1	43-10-1	43-10-1	43-10-1	43-10-1	43-10-1
Count Date	10/22/92	10/22/92	10/22/92	10/22/92	10/22/92	10/22/92	10/22/92	10/22/92
System Eff. (C/d)	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Stand. Error. - Eff. (c/d)	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03
Bkg Counts (counts)	0	0	0	1	1	1	1	1
Bkg Ct Time (min)	1	1	1	1	1	1	1	1
Samp Ct (counts)	0	0	0	0	0	0	0	0
Samp Ct Time (min)	1	1	1	1	1	1	1	1
Net Ct Rate (cpm)	0	0	0	0	0	0	0	0
Stand. Error - Ct Rate (cpm)	0	0	0	1	1	1	1	1
Activity (uCi)	0	0	0	0	0	0	0	0
Stand. Error - Act. (uCi)	3.97E-09	3.97E-09	3.97E-09	4.50E-07	4.50E-07	4.50E-07	4.50E-07	4.50E-07
Exposure (MPC-hrs)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std. Error - Exp. (MPC-Hrs)	3.17E-04	3.17E-04	3.17E-04	3.60E-02	3.60E-02	3.60E-02	3.60E-02	3.60E-02
MDA (uCi)	2.65E-06	2.65E-06	2.65E-06	1.18E-05	1.18E-05	1.18E-05	1.18E-05	1.18E-05
MDE (MPC-hrs)	2.12E-01	2.12E-01	2.12E-01	9.41E-01	9.41E-01	9.41E-01	9.41E-01	9.41E-01

Breathing Zone Air Sampling Data

Sample ID	Begnoche	Procida, T.	Haley, J.	Fairchild, B.	Slowey, J.	Looker, J.	Haley, J.	Haley, J.
Sample Date	10/14/92	10/14/92	10/16/92	10/16/92	10/16/92	10/6/92	10/16/92	10/18/92
Count System	43-10-1	43-10-1	43-10-1	43-10-1	43-10-1	43-10-1	43-10-1	43-10-1
Count Date	10/22/92	10/22/92	10/22/92	10/22/92	10/22/92	10/22/92	10/22/92	10/22/92
System Eff. (C/d)	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Stand. Error. - Eff. (c/d)	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03
Bkg Counts (counts)	1	1	1	1	1	1	1	0
Bkg Ct Time (min)	1	1	1	1	1	1	1	1
Samp Ct (counts)	0	0	1	0	0	0	0	0
Samp Ct Time (min)	1	1	1	1	1	1	1	1
Net Ct Rate (cpm)	0	0	0	0	0	0	0	0
Stand. Error - Ct Rate (cpm)	1	1	1.414214	1	1	1	1	0
Activity (uCi)	0	0	0	0	0	0	0	0
Stand. Error - Act. (uCi)	4.50E-07	4.50E-07	6.37E-07	4.50E-07	4.50E-07	4.50E-07	4.50E-07	3.97E-09
Exposure (MPC-hrs)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std. Error - Exp. (MPC-Hrs)	3.60E-02	3.60E-02	5.10E-02	3.60E-02	3.60E-02	3.60E-02	3.60E-02	3.17E-04
MDA (uCi)	1.18E-05	1.18E-05	1.37E-05	1.18E-05	1.18E-05	1.18E-05	1.18E-05	2.65E-06
MDE (MPC-hrs)	9.41E-01	9.41E-01	1.10E+00	9.41E-01	9.41E-01	9.41E-01	9.41E-01	2.12E-01

Breathing Zone Air Sampling Data

Sample ID	Fairchild, B.	Haley, J.	Rail Head	Rail Head
Sample Date	10/18/92	10/19/92	10/23/92	10/24/92
Count System	43-10-1	43-10-1	43-10-1	43-10-1
Count Date	10/22/92	10/22/92	10/26/92	10/26/92
System Eff. (C/d)	0.23	0.23	0.23	0.23
Stand. Error. - Eff. (c/d)	8.81E-03	8.81E-03	8.81E-03	8.81E-03
Bkg Counts (counts)	0	1	0	0
Bkg Ct Time (min)	1	1	1	1
Samp Ct (counts)	0	0	0	1
Samp Ct Time (min)	1	1	1	1
Net Ct Rate (cpm)	0	0	0	1
Stand. Error - Ct Rate (cpm)	0	1	0	1
Activity (uCi)	0.00E+00	0.00E+00	0.00E+00	1.96E-06
Stand. Error - Act. (uCi)	3.97E-09	4.50E-07	3.97E-09	4.50E-07
Exposure (MPC-hrs)	0.00E+00	0.00E+00	0.00E+00	1.57E-01
Std. Error - Exp. (MPC-Hrs)	3.17E-04	3.60E-02	3.17E-04	3.60E-02
MDA (uCi)	2.65E-06	1.18E-05	2.65E-06	2.65E-06
MDE (MPC-hrs)	2.12E-01	9.41E-01	2.12E-01	2.12E-01

Appendix A4

Bioassay

Bioassay

In vitro bioassay was provided on all site personnel requiring access to the exclusion zone during excavation. The bioassay process involved flourometric analysis of uranium within urine. The analysis was performed by Bolton and Galanek, Inc.

At no time did the bioassay results exceed action levels specified within the Health and Safety Plan. All reported values were less than 4 $\mu g/l$ total uranium. These results are considered normal for the non-exposed populations.

Appendix A5

Personnel Dosimetry

Personnel Dosimetry

Personnel dosimetry was issued to each individual associated with site activities. The dosimetry chosen were TLD devices from Landauer having NVLAP accreditation Although dose rate surveys conducted during the pilot excavation and during the remediation activities did not indicate the need for personnel dosimetry (i.e., < 25% quarterly limit), the placement of personnel dosimetry was nonetheless performed. As was the case with the pilot excavation survey, most all personnel dosimetry results were minimum. Those personnel dosimetry results indicating positive values were presumably associated with statistical errors in control badge subtraction. Independent of this presumption, these positive results were small representing 2 cases with a maximum exposure of 30 mrem. This exposure is considered well within established guidelines (Health and Safety Plan) and regulations. The following tables presents dosimetry issuance and summary results.

To Be
Withheld from Public Disclosure

Pursuant to
Privacy Act of 1974

(Privacy Act of 1974, Public Law 93-579, 5 U.S.C 552a)

Appendix A6

Radiological Surveys

Radiological Surveys

Radiological surveys consisted of direct radiation measurements as well as contamination surveys of onsite facilities and for the release of equipment and materials. Radiological surveys were also conducted for the transportation of waste from the site. Routine surveys of trailer areas were conducted on a daily bases and all other areas on a needs based criteria (i.e., clearance of equipment). No cases of contamination were identified in the unrestricted areas, nor within the site trailers. Most equipment was decontaminated prior to survey in preparation for site release and were found to be free from contamination.

Appendix A-7

Training Records

PERSONNEL TRAINING

I. Radiation Basics

Type of source (alpha, beta, gamma)
Units of measure
Half Life
Site specific radionuclides of interest
(U-238, U-234, U-235)

II. Biological Effect of Radiation

Acute Effects
Chronic Effects
Routes of entry
Exposure limits
Medical Surveillance

III. Measurement of radiation

Hand held instruments
Dosimeters
Surveying
Sampling

IV. Radiation Protection

Established work zones
Air sampling/ Contamination control
BZA's
Decontamination/ Contamination control
Protective gear required

V. Site specific work plan

Standard Operating Procedures
Chain of Command
Access Control
Personnel monitoring
Eating, drinking, and smoking in work area
Handling of radioactive material
Exiting area if injured

To Be
Withheld from Public Disclosure

Pursuant to
Privacy Act of 1974

(Privacy Act of 1974, Public Law 93-579, 5 U.S.C 552a)

Appendix B

Waste Characterization, Manifesting, and Disposal

Waste Characterization, Manifesting, and Disposal

Table of Contents

List of Tables

List of Attachments

Waste Characterization, Manifesting, and Disposal

1.0 Physical Description of Waste

The material designated for disposal as radioactive waste was comprised of soils, building debris, and other solids. Early within the excavation, considerable number of solids were identified for disposal such as graphite crucibles, zirconium, and aluminum rods/plates, metallurgical specimens, derbies, machining fines, and similar items associated with a metallurgical laboratory. Later, the contaminants were principally associated with the excavated soils.

The excavated soils were reed screened to remove rock aggregate in order to minimize waste volumes, whereas the excavated materials containing crucibles and the such were directly loaded for disposal. In some instances, the soil required stabilization to treat moisture content in order to ensure a less than 1% water volume per container volume as required under 10CFR61.

2.0 Waste Site Requirements:

EnviroCare of Utah, Inc. was chosen for the disposal site. This waste site is particularly suited for this material since this facility was designed in part to receive uranium contaminated materials. In addition, the availability of rail heads at both Envirocare of Utah, Inc. and Texas Instruments Incorporated permitted box loading and bulk loading of railcars for transport and disposal thereby reducing transportation costs. The only significant disadvantage associated with rail shipments were the availability of rail cars, the need to construct rail car covers, and the scheduling for transport and receipt at the EnviroCare of Utah, Inc. site (Envirocare of Utah requires a 72 hour notice).

Each waste disposal facility has site specific requirements and EnviroCare is no exception. Requirements for disposal are specified within Envirocare of Utah, Inc. agreement state license, DRC-03 (August 1989). Specific implementing documents include the Waste Characterization Plan, Low Activity Waste Characterization Plan (form EC-0200), Physical properties Evaluation for Disposal at the Envirocare of Utah (form EC-0500), and Radiological Evaluation for Disposal at the Envirocare of Utah Facility (form EC-0650). The requirements are for the most part universal to all waste sites and conform to 10CFR61 for radioactive material disposal at low level waste sites and RCRA requirements for toxicity characteristic leaching properties (TCLP 40CFR261.24). Attachment 1 presents the specific EnviroCare license and site requirements and attachment presents the waste profile analysis performed to meet these conditions.

3.0 Waste Characterization:

Materials, soils and debris were analyzed with regard to the quantities of radionuclides and relative concentration. This analysis incorporated Alpha Spectroscopy and Gamma spectroscopy performed by independent laboratories. These results were correlated to alpha screening methods presented in greater detail within Appendix C. From these results scaling factors were established to generate the activity concentration for each radionuclide of interest. From the weight of each container the total gram quantity of material was established and the total activity calculated for each radionuclide. Analysis of material with respect to enrichment indicated that a overly conservative value of 20% material as SNM could be assumed. This scaling factor was used to determine gram quantities of SNM and Source Material. Specific analysis of Uranium alumide plates, derbies and other solid materials indicated that these materials were depleted or of natural enrichments (reference memorandum dated 10/29/92; to Mike Elliott and Frank Veale from Mark Griffon as Attachment 3).

TCLP analysis was performed by Texas Instruments Incorporated with duplicate samples sent to Envirocare of Utah, Inc. as required by Envirocare. The results of this analysis indicated a waste stream that was acceptable for disposition at the Envirocare of Utah, Clive facility.

4.0 Packaging, Marking, Labeling, Shipping, and Manifesting:

All packaging, marking, labeling, shipping, and manifesting was performed in accordance with applicable DOT and NRC regulations. Shipments included rail shipments of LSA type boxes, bulk loaded rail shipments, and truck shipments of LSA type boxes. A summary of shipments made are presented within Table 1. This summary table presents the volume, weight, mode, and number of rail cars and/or trucks shipped as well as the numbers per shipment.

All shipments were made pursuant to the provisions of 49CFR173.425, "Transport Requirements for Low Specific Activity (LSA) Radioactive Materials". Additional requirements for unpackaged bulk shipments were made under the provision set forth within subparagraph c (iii) of this section. All shipments were less than RQ values. All boxes packaged for shipment were labeled as LSA, and all rail cars and/or trucks were placarded as required for the shipment of LSA radioactive Materials.

Specific requirements established by the rail carrier, CONRAIL, were followed pursuant the directions issued October 1, 1992 and provided as Attachment 4.

Manifesting of each shipment was performed in the manner established by Envirocare of Utah, Inc. and 10CFR61. Each Radioactive Shipment Record/Manifest was prepared from a detailed spread sheet generated for each shipment. Copies of the spread sheets are provided as Attachment 5 to this appendix.

Surveys were conducted of all packaging and transport modes and were found to be well within the limits established for vehicles consigned as exclusive use. Contingency plans were developed for the mode of transportation and driver instructions established for trucks consigned as exclusive use. These instructions are provided as Attachment 6 to this appendix. It should be noted that the values for the volume shipped differs from the volume disposed since the densities used in the calculations represent excavated soil versus compacted soil (25 vs. 19.42 ft^3/ton).

Summary of Waste Shipments (Number, Volume, Weight, and Mode)

Shipment Number	Mode	Comment			Data per Car/Truck						Totals
1	Rail	Box (14/car)	Car/Truck #		1	2	3	4	5	6	6
			Volume	Cu.ft	1120	1120	1120	1120	1120	1120	6720
			Weight	Tons	56	56	56	56	56	56	336
2	Rail	Box (14/car)	Car/Truck #		1	2	3	4	5	6	6
			Volume	Cu.ft	1120	1120	1120	1120	1120	1120	6720
			Weight	Tons	61.1	58.9	63.1	62.6	67.6	61.2	374.5
3	Rail	Bulk	Car/Truck #		1	2	3	4	5	6	6
			Volume	Cu.ft	1350	1350	1350	1350	1350	1350	8100
			Weight	Tons	52.45	53.65	52.55	57.35	58.98	54.05	329.03
4	Rail	Bulk	Car/Truck #		1	2	3	4	5	-	5
			Volume	Cu.ft	1670	1390	1560	1380	1430	-	7430
			Weight	Tons	66.7	55.7	62.5	55.15	57.25	-	297.3
5	Rail	Bulk	Car/Truck #		1	2	3	4	5	6	6
			Volume	Cu.ft	1411	1396	1491	1403	1510	1515	8726
			Weight	Tons	56.45	55.85	59.65	56.1	60.35	60.6	349
6	Rail	Bulk	Car/Truck #		1	2	3	4	5	6	6
			Volume	Cu.ft	1448	1475	1505	1485	1441	1449	8803
			Weight	Tons	57.9	59	60.2	59.3	57.65	57.95	352
7	Rail	Bulk	Car/Truck #		1	2	3	4	5	6	6
			Volume	Cu.ft	1441	1348	1499	1391	1513	1501	8693
			Weight	Tons	57.65	53.9	59.95	55.65	60.5	60.05	347.7
8	Rail	Bulk	Car/Truck #		1	2	3	4	5	6	6
			Volume	Cu.ft	1508	1483	1524	1533	1423	1536	9007
			Weight	Tons	60.3	59.3	60.95	61.3	56.9	61.5	360.25
9	Rail	Bulk	Car/Truck #		1	2	3	4	5	6	6
			Volume	Cu.ft	1497	1484	1476	1478	1480	1441	8856
			Weight	Tons	58.89	59.35	59.05	59.1	59.2	57.65	353.24
10	Truck	Box	Car/Truck #		1	2	3	4	5	-	5
			Volume	Cu.ft	485.625	425.625	413.75	391.668	330	-	2046.67
			Weight	Tons	19.425	17.025	16.55	15.67	13.2	-	81.87
			# Boxes		4	3	3	3	4	-	17

Total Weight Shipped	**3180.99 Tons**
Total Volume Shipped	**75101.67 Cubic Feet**
Total Number of Rail Cars	**53**
Total Number of Trucks	**5**
Number of Boxes Shipped by Rail	**168**
Boxes Shipped by Truck	**17**
Number of Bulk Rail Cars	**41**

Attachment 1

Envirocare License and Site Requirements

DRC-03
August 1989

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE

Pursuant to Section 19-3-104 of the Utah Code Annotated 1953, and the Utah Department of Environmental Quality Rules for the Control of Ionizing Radiation, and in reliance of statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing such licensee to transfer, receive, possess and use the radioactive material designated below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, and orders now or hereafter in effect and to any conditions specified below.

LICENSEE		
1. Name	Envirocare of Utah, Inc.	3. License Number UT 2300249 Amendment #11, in its entirety
2. Address	215 South State Street Suite 1160 Salt Lake City, Utah 84111	4. Expiration Date February 28, 1996
		5. License Category 4-a

Radioactive Material (Element and Mass Number)	7. Chemical and/or Physical Form	8. Maximum Concentration In Waste for Disposal
A. Silver-110m	A. Volumetric bulky materials or structural debris	A. 5.6E+02 pCi/g
B. Americium-241	B. Volumetric bulky materials or structural debris	B. 2.3E+02 pCi/g
C. Americium-243	C. Volumetric bulky materials or structural debris	C. 1.7E+03 pCi/g
D. Beryllium-7	D. Volumetric bulky materials or structural debris	D. 3.5E+04 pCi/g
E. Calcium-45	E. Volumetric bulky materials or structural debris	E. 4.0E+08 pCi/g
F. Cadmium-109	F. Volumetric bulky materials or structural debris	F. 4.6E+04 pCi/g
G. Cobalt-56	G. Volumetric bulky materials or structural debris	G. 3.6E+02 pCi/g
H. Cobalt-57	H. Volumetric bulky materials or structural debris	H. 1.9E+04 pCi/g

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6. Radioactive Material (Element and Mass Number)	7. Chemical and/or Physical Form	8. Maximum Concentration In Waste for Disposal
I. Cobalt-58	I. Volumetric bulky materials or structural debris	I. 1.6E+03 pCi/g
J. Cobalt-60	J. Volumetric bulky materials or structural debris	J. 3.6E+02 pCi/g
K. Chromium-51	K. Volumetric bulky materials or structural debris	K. 6.8E+04 pCi/g
L. Cesium-134	L. Volumetric bulky materials or structural debris	L. 1.2E+03 pCi/g
M. Cesium-137	M. Volumetric bulky materials or structural debris	M. 5.6E+02 pCi/g
N. Europium-152	N. Volumetric bulky materials or structural debris	N. 1.7E+03 pCi/g
O. Europium-154	O. Volumetric bulky materials or structural debris	O. 1.4E+03 pCi/g
P. Iron-55	P. Volumetric bulky materials or structural debris	P. 1.8E+06 pCi/g
Q. Mercury-203	Q. Volumetric bulky materials or structural debris	Q. 1.0E+04 pCi/g
R. Potassium-40	R. Volumetric bulky materials or structural debris	R. 1.0E+04 pCi/g
S. Iridium-192	S. Volumetric bulky materials or structural debris	S. 2.5E+03 pCi/g
T. Manganese-54	T. Volumetric bulky materials or structural debris	T. 5.6E+03 pCi/g

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6. Radioactive Material (Element and Mass Number)		7. Chemical and/or Physical Form		8. Maximum Concentration In Waste for Disposal	
U.	Niobium-94	U.	Volumetric bulky materials or structural debris	U.	1.6E+02 pCi/g
V.	Nickel-59	V.	Volumetric bulky materials or structural debris	V.	7.0E+02 pCi/g
W.	Nickel-63	W.	Volumetric bulky materials or structural debris	W.	2.0E+06 pCi/g
X.	Lead-210	X.	Volumetric bulky materials or structural debris	X.	2.3E+05 pCi/g*
Y.	Polonium-210	Y.	Volumetric bulky materials or structural debris	Y.	2.0E+04 pCi/g
Z.	Radium-226	Z.	Volumetric bulky materials or structural debris	Z.	2.0E+03 pCi/g*
AA.	Radium-228	AA.	Volumetric bulky materials or structural debris	AA.	1.8E+03 pCi/g
BB.	Radium-228 1 year	BB.	Volumetric bulky materials or structural debris	BB.	1.2E+03 pCi/g*
CC.	Radium-228 5 years	CC.	Volumetric bulky materials or structural debris	CC.	6.7E+02 pCi/g*
DD.	Radium-228 10 years	DD.	Volumetric bulky materials or structural debris	DD.	5.6E+02 pCi/g*
EE.	Ruthenium-106	EE.	Volumetric bulky materials or structural debris	EE.	1.9E+04 pCi/g*
FF.	Antimony-124	FF.	Volumetric bulky materials or structural debris	FF.	7.9E+02 pCi/g

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Radioactive Material (Element and Mass Number)		7. Chemical and/or Physical Form		8. Maximum Concentration In Waste for Disposal	
GG.	Antimony-125	GG.	Volumetric bulky materials or structural debris	GG.	5.3E+03 pCi/g
HH.	Tin-113	HH.	Volumetric bulky materials or structural debris	HH.	7.3E+05 pCi/g
II.	Strontium-90	II.	Volumetric bulky materials or structural debris	II.	2.0E+04 pCi/g
JJ.	Thorium-230	JJ.	Volumetric bulky materials or structural debris	JJ.	1.5E+04 pCi/g
KK.	Thorium-232	KK.	Volumetric bulky materials or structural debris	KK.	6.8E+02 pCi/g*
LL.	Uranium-234	LL.	Volumetric bulky materials or structural debris	LL.	3.7E+04 pCi/g
MM.	Uranium-235	MM.	Volumetric bulky materials or structural debris	MM.	7.7E+02 pCi/g
NN.	Uranium-236	NN.	Volumetric bulky materials or structural debris	NN.	3.6E+04 pCi/g
OO.	Uranium-238	OO.	Volumetric bulky materials or structural debris	OO.	2.8E+04 pCi/g
PP.	Uranium-natural	PP.	Volumetric bulky materials or structural debris	PP.	1.8E+04 pCi/g
QQ.	Uranium-depleted	QQ.	Volumetric bulky materials or structural debris	QQ.	1.1E+05 pCi/g
RR.	Zinc-65	RR.	Volumetric bulky materials or structural debris	RR.	1.1E+04 pCi/g

Daughters are assumed to be present at same concentrations in equilibrium.

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AUTHORIZED USE

Radioactive material as radioactive waste may be received, stored and disposed of by land burial. The licensee shall not accept low-level radioactive waste generated outside the region comprised of the party states to the Northwest Interstate Compact on Low-Level Radioactive Waste Management ("Compact") namely Alaska, Hawaii, Idaho, Montana, Oregon, Utah and Washington, unless the provisions of Articles IV and V of the Compact are met. Prior to receiving any such shipments, the licensee shall submit to the Utah Division of Radiation Control documentation evidencing compliance with these Compact provisions.

ONDITIONS

0. Licensed material shall be used at the licensee's facility located in Section 32 of Township 1 South and Range 11 West, Tooele County, Utah.

1. The licensee shall not possess at any time, more than 300,000 cubic yards of radioactive waste material which is not disposed of in accordance with the finished design requirements. This includes all wastes in storage or active processing.

2. Pursuant to R447-12-54(1), the licensee is granted as exemption to R447-25-9, as it relates to land ownership and assumption of ownership.

3. The maximum quantity of special nuclear material which the licensee may possess, undisposed of, at any one time shall not exceed 350 grams of U-235.

4. Licensed material specified in Item 6.A through 6.RR shall not be placed in a disposal cell unless it has been determined that the concentration of radionuclides is appropriately homogeneous within the physical form of the waste. This does not pertain to structural debris superficially contaminated with licensed materials.

5. A. If a mixture of radionuclides a, b, and c are present in the waste in the concentrations C_a, C_b, and C_c and if the applicable maximum waste concentrations from Item 8 of this license are MWC_a, MWC_b, and MWC_c respectively, then the concentration in the waste shall be limited so that the following relationship exists.

$$\frac{C_a}{MWC_a} + \frac{C_b}{MWC_b} + \frac{C_c}{MWC_c} \leq 1$$

B. If a single radionuclide is present in the waste, the concentration shall not exceed the applicable value found in Item 8 of this license.

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16. A. The licensee may receive for treatment, storage, and disposal any radioactive waste as authorized by this license that contains hazardous constituents as permitted by the "RCRA Hazardous Waste Operations Permit" issued by the Executive Secretary, Utah Solid and Hazardous Waste Committee and "HWSA Permit" issued by the U.S. Environmental Protection Agency.

    B. The licensee shall dispose of these wastes in the "mixed waste" disposal embankment only.

17. Sealed sources as defined in R447-12-3(64) shall not be accepted for disposal.

18. Radioactive waste containing liquid, shall not be accepted for disposal except as provided by the Ground Water Discharge Permit, number UGW 450005, issued by the Executive Secretary of the Utah Water Quality Board.

19. The licensee shall comply with the provisions of Chapter R447-18, "Notices, Instructions and Reports to Workers by Licensees or Registrants, Inspections" and Chapter R447-15, "Standards for Protection Against Radiation".

20. The licensee may transport licensed material or deliver licensed material to a carrier for transport in accordance with the provisions of R447-19-100 "Transportation".

21. Written procedures shall be maintained and available at the disposal facility for operations involving radioactive materials. The procedures shall incorporate operating instructions and appropriate safety precautions for the work. The employee training program shall include detailed review of the operating procedures applicable to the employee's assignments. The requirement for written procedures shall include establishment of procedures for conduct of the radiation safety and environmental monitoring programs, including analytical procedures and instrument calibration requirements. Written procedures and subsequent changes to the procedure shall be reviewed and approved by the Corporate Radiation Safety Officer and the Project Manager. At least annually, all procedures shall be reviewed to assure continued applicability.

22. The Corporation Radiation Safety Officer shall perform and document weekly inspections of the facility and report any findings of non-compliance, affecting radiological safety, to the Project Manager. Items for inspection include: operating procedures, license requirements and safety practices.

23. The licensee shall conduct contamination surveys in accordance with Table 7.2 of the license amendment application dated September 20, 1990.

24. The licensee shall conduct a bioassay and occupational airborne radioactive contamination monitoring program in accordance with Section 7.4.8.3 of the license amendment application dated September 20, 1990.

5. The use of respirators shall be controlled by a respiratory protection program as stipulated in R447-15-103.

6. The licensee shall calibrate air sampling equipment at intervals not to exceed six months.

7. The operational environmental monitoring program shall be conducted in accordance with Section 4.5, Table 4.7 and Figure 4.6 of the license amendment application dated September 20, 1990.

8. Vehicles, facilities, equipment or other items for unrestricted use shall not be released from the licensee's control if contamination measurements exceed the following limits:

Nuclide[a]	Column I Average [b,c,f]	Column II Maximum [b,d,f]	Column III Removable [b,e,f]
U-nat, U-235, U-238, and associated decay products	5,000 dpm alpha/100 cm^2	15,000 dpm alpha/100 cm^2	1,000 dpm alpha/100 cm^2
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm^2	300 dpm/100 cm^2	20 dpm/100 cm^2
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100 cm^2	3,000 dpm/100 cm^2	200 dpm/100 cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emissions or spontaneous fission) except Sr-90 and other noted above.	5,000 dpm beta, gamma/100 cm^2	15,000 dpm beta-gamma/100 cm^2	1,000 dpm beta-gamma/100 cm^2

Where surface contamination by both alpha- and beta-gamma emitting nuclides exists, the limits established for alpha- and beta-gamma emitting nuclides should apply independently.

As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

Measurements of average contaminant should not be averaged over more than one square meter. For objects of less surface area, the average should be derived for each such object.

The maximum contamination level applies to an area of not more than 100 cm^2.

The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping the area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of know efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters shall not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

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29. A quarterly report shall be prepared by the Corporate Radiation Safety Officer for the Project Manager and Company President evaluating employee exposures, effluent releases and environmental data to determine:

    A. If there are any upward trends in personnel exposures for identifiable categories of workers or types of operations or in effluent releases;

    B. If exposures and effluents might be lowered under the concept of maintaining exposures and effluents as low as reasonably achievable; and

    C. If equipment for exposure and effluent control is being properly used and maintained.

30. In accordance with R447-25-33, the licensee shall submit annual reports to the Division of Radiation Control by the end of the first calendar quarter of each year for the preceding year. The reports shall include:

    A. Specification of the quantity of each of the principal contaminants released to unrestricted areas in liquid and in airborne effluents during the preceding year.

    B The results of the environmental monitoring program;

    C. A summary of licensee disposal unit survey and maintenance activities; and

    D. A summary of the volume, radioisotopes and their activities for materials disposed of.

31. Except as provided by this condition, the licensee shall maintain the results of sampling, analyses, surveys, and instrument calibration, reports on inspections and audits, employee training records as well as any related reviews, investigations and corrective actions, for five (5) years. The licensee shall maintain personnel exposure records in accordance with R447-15-401.

32. Operations shall be conducted by or under the supervision of Vernon E. Andrews, Corporate Radiation Safety Officer, or other individuals designated by the Corporate Radiation Safety Officer upon successful completion of the licensee's training program.

33. The licensee shall staff the operations of the facility in accordance with the organization chart (Figure 8.1) of the license amendment application dated September 20, 1990.

34. The licensee staff shall meet the qualifications as described in Section 8.2 and shall have the responsibilities as described in Section 8.1.2 of the license amendment application dated September 20, 1990.

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5. The licensee shall not initiate disposal operations in newly excavated areas until the Division of Radiation Control has inspected and approved the cell/embankment liner.

6. The licensee shall provide "as built drawings" of the facility, at intervals not to exceed six (6) months. Drawings shall be submitted by February 1 and August 1 of each year. The drawings shall show conditions on the site as they existed no earlier than thirty (30) days prior to the submittal of the drawings to the Division of Radiation Control. Drawings submitted as, "as built drawings" will be marked as such, and will be marked in the same place on each drawing. Record drawings showing approved future designs, final or finished conditions at the site may be included in the "as built drawings", but shall be marked as "record drawings".

7. Radioactive waste which have been off loaded shall be placed in the appropriate disposal embankment and stored in a manner approved by the Division of Radiation Control.

8. For the purpose of this license, debris is defined as any radioactive waste for disposal other than soils. Compactible debris is defined as: (A) having a gradation that will pass through a four inch (4") grizzly and; (B) as having a density greater than seventy pounds per cubic foot dry weight in accordance with ASHTO T-99. Contaminated materials, other than soil, not meeting these criteria are defined as noncompactible debris.

9. The licensee shall place bulk radioactive materials in twelve inch (12") uncompacted lifts.

0. In-place bulk radioactive waste shall be compacted at a moisture content of zero percent (0%) to three percent (3%) of optimum as determined by the Standard Proctor Method ASTM D-698.

1. The licensee shall compact each lift to not less than ninety percent (90%) of optimum density as determined by Standard Proctor Method ASTM D-698. Sampling points for compaction testing shall include locations immediately adjacent to debris when debris is included in the lift.

2. All debris shall be less than ten inches (10") in at least one (1) dimension, and no longer than eight feet (8') in any dimension.

3. The final 24 inches of the radioactive waste material embankment, within the side slopes and the top surface, shall be free of debris.

4. A lift or any portion of a lift shall be limited to less than ten percent (10%) by volume of noncompactible debris and the debris shall be uniformly distributed throughout the lift. However, noncompactible debris in the form of concrete, stone or solid metal may be placed in the lift up to twenty-five percent (25%) by volume, of the total lift if uniformly distributed throughout the lift.

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5. The licensee shall excavate the disposal cell liner, consisting of native materials, to a depth of twenty-four inches (24") and replace it with imported clay in six inch (6") uncompacted lifts. Each lift shall be compacted to not less than ninety-five percent (95%) optimum density as determined by ASTM D-698 and field permeability of 1.0×10^{-7} cm/sec.

6. The licensee shall not place, compactible nor non-compactible debris, in the first lift.

7. The disposal cell liner and radon barrier shall be constructed with a moisture content of zero percent (0%) to three percent (3%) of optimum moisture as determined by Standard Proctor Method ASTM D-698.

8. The licensee shall compact the radon barrier to not less than 95 percent of optimum density as determined by Standard Proctor Method ASTM D-698 and a field permeability of 1.0×10^{-7} cm/sec.

9. The licensee shall record, at the time of acceptance, the date and time of day that any lift or portion of a lift has been accepted by the licensee as finished in accordance with all specifications and license conditions.

0. The licensee shall use rock filter zone and rock erosion barrier that has been sized and graded in accordance with Section 3.1.1.2 and 9.2.5 of the license amendment application dated September 20, 1990.

1. The licensee shall test rock erosion barrier and filter zone rock in accordance with the provisions found in Section 9 of the license amendment application dated September 20, 1990.

2. The licensee shall utilize a manifest ("Radioactive Waste Shipment and Disposal Record," Envirocare Form E-100) containing the information required in R447-15-311(2) and (3) including:

   A. Specification of any solidification agents utilized;

   B. Identification of wastes containing more than 0.1% by weight of chelating agents. Chelating agents means amine polycarboxylic acids, hydroxyl-carboxylic acids, gluconic acids and polycarboxylic acids;

   C. An estimate of the weight percentage of any chelating agents in waste.

3. The licensee shall not accept radioactive waste for storage and disposal unless the licensee has received a complete "Radioactive Waste Shipment and Disposal Record" (Form #E-100) from the shipper.

4. The licensee shall maintain copies of complete manifests or equivalent documentation until the Division of Radiation Control authorizes their disposition.

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55. The licensee shall immediately notify the Division of Radiation Control or the Division's on-site representative of any waste shipment where a violation of applicable regulations or license conditions has been found.

56. The licensee shall require anyone who transfers radioactive waste to the facility comply with the requirements in R447-15-311(4)(a) through (h).

57. The licensee shall acknowledge receipt of the waste within one (1) week of receipt by returning a signed copy of the manifest or equivalent documentation to the shipper. The shipper to be notified is the licensee who last possessed the waste and transferred the waste to the licensee. The returned copy of the manifest or equivalent documentation shall indicate any discrepancies between materials listed on the manifest and materials received.

58. The licensee shall notify the shipper (i.e., the generator, the collector, or processor) and the Division of Radiation Control when any shipment or part of a shipment has not arrived within 60 days after the advance manifest was received.

59. The licensee shall maintain a record for each shipment of waste disposed of at the site. As a minimum, the record shall include:

    A. The date of disposal of the waste;

    B. The location of waste in the disposal site;

    C. The condition of the waste packages received;

    D. Any discrepancy between the waste listed on the shipment manifest or shipping papers and the waste received in the shipment.

    E. A description of any evidence of leaking or damaged packages or radiation or contamination in excess of applicable regulatory limits; and

    D. A description of any repackaging operations of any of the waste packages in the shipment.

60. In accordance with R447-25-31 the licensee shall maintain a Utah Division of Radiation Control Surety (Trust) Agreement adequate to fund the decommissioning and reclamation of the grounds, equipment and facilities. These costs, identified in Section 10 of the license amendment application dated September 20, 1990, shall be reviewed and updated annually and a report submitted to the Utah Division of Radiation Control within 60 days after July 1, of each year. The survey arrangement shall be updated as necessary to reflect decommissioning and reclamation costs.

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1. Truck, railcar, waste hauling and other earth moving equipment washdown (decontamination) facilities, including evaporation ponds, shall be controlled and fenced to prevent intrusion.

2. All burial embankments and waste storage areas, including immediately adjacent drainage structures, shall be controlled areas, surrounded by a six foot (6') high, chain link fence, topped with twisted selvedge. All permanent fence shall be chain link, six feet (6') high, topped with three strand barbed wire, top tension wire and twisted selvedge.

3. The licensee shall fulfill and maintain compliance with all conditions and shall meet all compliance schedules stipulated in the Ground Water Discharge Permit, number UGW 450005, issued by the Executive Secretary of the Utah Water Quality Board.

4. One (1) year prior to the anticipated closure of the site, the licensee shall submit a final version of the site closure, decontamination and decommissioning plan. As part of this plan, the licensee shall demonstrate by measurements and/or modeling that concentrations of radioactive materials which may be released to the general environment, after site closure, will not result in an annual dose exceeding 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public.

5. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Item 6, 7, and 8 of this license and conduct site operations in accordance with statements, representations, operating procedures, and disposal criteria, heretofore made by the licensee or his authorized representative in application for and subsequent to issuance of Utah Radioactive Material License No. UT 2300249 and amendments thereto.

March 16, 1992
Date

Larry F Anderson
Larry F. Anderson, Executive Secretary, Utah Radiation Control Board

This plan describes the procedures for characterizing, sampling, and accepting incoming waste at the Envirocare South Clive facility.

This plan is a requirement of Envirocare's Ground Water Quality Discharge Permit. The plan is designed to identify and characterize wastes destined for disposal at the Envirocare South Clive Facility and to ensure that wastes accepted for management are characterized and controlled.

Implementation of this plan will aid in ensuring that wastes with radioactive, organic and inorganic characteristics and constituents are identified as such and are managed in a way that is within the limits of the license and protective of the site ground water.

This plan applies to the radioactive component of all waste destined for disposal at the Envirocare of Utah, Inc., South Clive facility and to the chemical component of wastes destined for Envirocare's non-RCRA facilities.

The chemical components of wastes destined for the mixed waste management are accepted to the mixed waste facility according to waste analysis plans administered by the U.S. Environmental Protection Agency and by the Utah Division of Solid and Hazardous Waste. Therefore, the requirements of this plan for chemical-screening analyses do not apply to pre-shipment characterization or to the analysis of incoming shipments for the chemical and physical characteristics of wastes destined for management as mixed waste.

Outline of Waste Characterization Plan Procedures.

There are three critical steps that are taken during the incoming shipment procedures.

The first is a characterization of the waste by the generator. The characterization procedures are described below in the Pre-shipment Waste Characterization Procedures of this plan.

In the second step, Envirocare will sample and analyze the incoming waste shipments for radiological and chemical screening analyses. The requirements for the radiological and chemical screening analysis are outlined in the Acceptance Sampling and Analysis Procedures of this plan.

The third step is a decision to accept or reject the material following its arrival at the South Clive site. This determination is made according to the Procedures for Accepting or Rejecting a Shipment outlined below.

STEP 1 -- Pre-shipment Waste Characterization Procedures.

Prior to shipment, Envirocare must obtain a description of the material to be managed at the Envirocare facility. This characterization is documented using forms EC-0200 and EC-0650. (See Exhibits 1 and 2.) The characterization of the waste includes the following items:

- A determination by the generator that the radioactive characteristics of the material are within those limits outlined in the license.
- A determination by the generator that the material is not a liquid waste and does not contain free liquids.
- A determination by the generator that the material is not a hazardous waste[1] subject to RCRA regulation.

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1 Hazardous wastes are wastes which:

(a) exhibit one or more of the hazardous waste characteristics outlined in 40 CFR 261 Subpart C. The four hazardous waste characteristics are:

- Ignitability (FP ≤ 140 F, or an oxidizer.)
- Corrosivity (pH ≥ 12.5 or pH ≤2.)
- Reactivity (Air- or water-reactive, unstable or liberates cyanide or sulfide gases in excessive quantities.)
- Toxicity The toxicity characteristic is based on the results of the Toxicity Characteristic Leaching Procedure (TCLP) outlined in 40 CFR 268 Appendix I. The procedure includes the organic and inorganic hazardous constituent parameters listed below. A waste is a hazardous waste when any of these constituents exceed the limits specified in Table 1 in 40 CFR 261.24:

Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver
Endrin(1,2,3,4,10,10-hexachloro-1,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo,endo-5,8-dimethano naphthalene)
Lindane (1,2,3,4,5,6, hexa-chloro-cyclohexane, gamma isomer)
Methoxychlor (1,1,1-Trichloro-2,2-bis(p-methoxyphenyl]ethane)
Toxaphene ($C_{10}H_{10}Cl_8$, technical chlorinated camphene, 67-69 percent chlorine)
2,4-D (2,4-dichlorophenoxyacetic acid)
2,4,5-TP (Silvex) (2,4,5-trichloro-phenoxypropionic acid)
Benzene, Carbon Tetrachloride, Chlordane, Chlorobenzene, Chloroform
o-Cresol, m-Cresol, p-Cresol, Cresol, 1,4-Dichlorobenzene, 1,2-Dichloroethane
1,1-Dichloroethylene, 2,4-Dinitrotoluene, Heptachlor (and its hydroxide)
Hexachlorobenzene, Hexachlorobutadiene, Hexachloroethane, Methyl Ethyl Ketone
Nitrobenzene, Pentachlorophenol, Pyridine, Tetrachloroethylene, Trichloroethylene
2,4,5-Trichlorophenol, 2,4,6-Trichlorophenol, Vinyl Chloride

(b) are listed in 40 CFR 261.31-33.

Listed wastes include the F-, K-, P-, and U-listed wastes. There are 23 F-listed wastes, 101 K-listed wastes, and more than 200 P- and U-listed wastes.

This characterization takes place before a waste arrives at the Envirocare facility for management. Envirocare reviews these documents and provides a notice to the generator that the pre-shipment waste characterization requirements of this plan have been met by issuing a "Notice to Transport", form EC-1800, to the generator or owner of the waste. (See Exhibit 3.)

Should a generator or waste owner send a shipment of waste to the Envirocare facility prior to receiving a Notice to Transport from Envirocare, Envirocare must reject the shipment and provide immediate (24-hour) notice of the shipment to the Utah Division of Radiation Control.

As part of the characterization, where possible[2], the following analytical results must be included for each waste stream -- Soil pH, Cyanide Reactivity, Sulfide Reactivity, TCLP (8 metals and 32 organics), Radionuclides.

Envirocare must not accept wastes for management in non-RCRA units which are identified by generators as hazardous waste. Wastes excluded from RCRA regulations that otherwise exhibit hazardous waste characteristics pursuant to the regulatory levels of the Toxicity Characteristic Leaching Procedure (TCLP, 40 CFR 261.24, Table 1) or that would otherwise be regulated as listed RCRA wastes are referred to by Envirocare as "exempt" waste. Envirocare must receive a written variance on a case-by-case basis from the Executive Secretary of the Utah Water Quality Board before exempt waste streams can be shipped to the facility.

In addition to the informational and analytical requirements outlined above, the generator must send a sample or a number of samples of the waste to Envirocare during the pre-shipment characterization period. These pre-shipment samples are to be analyzed to establish parameter-specific incoming-shipment acceptance tolerances for several parameters.

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2 It is noted that some wastes do not lend themselves to sampling or to the analyses required in this plan. Examples of these wastes are (incomplete list):

Lead Bricks	Tree Stumps
Wood	Lead Shielding
Concrete	Construction Debris
Building Debris	Other Debris
Bricks	Sheet Metal
Discarded Containers	Metal (Rebar, frames, equipment)
Dry Wall (Sheet Rock)	Soft Waste (Gloves, Suits, Boots, Paper Towels)
Wire	Plastic Waste
Wood Pallets	Glass

When a waste is being characterized or when an incoming shipment arrives with such waste, alternative sampling methods may be used to obtain, samples for analysis. Where analytical methods do not lend themselves to the waste being characterized or to the waste contained in a shipment, the analyses may be waived by the generator (for characterization) or by Envirocare (for incoming shipments) after receipt of written approval from the Executive Secretary of the Water Quality Board.

The parameters[3] for the pre-shipment sample analysis are:

- Solid/Soil pH, Method EC-0700
- Paint Filter Liquids Test or visual assurance, Method EC-0725
- Oxidizer/Reducer Test, Method EC-0750
- Cyanide/Sulfide Test, Method EC-0775
- Photoionizer "sniffer" Test, Method EC-0800
- Pyrophoricity, Method EC-1350
- Shock Sensitivity, Method EC-1375
- Air Reactivity, Method EC-1400
- Water Reactivity, Method EC-1425

When these pre-shipment sample analyses are completed, the results and incoming-shipment tolerances are recorded on form EC-1775, Exhibit 4. The tolerances are established according to the ranges in Table 1.

Envirocare must keep a copy of the completed forms EC-0200 and EC-0650 and the pre-shipment analyses on form EC-1775 for a period of five (5) years.

STEP 2 -- Acceptance Sampling and Analysis Procedures.

During the acceptance procedures for a waste, Envirocare must obtain samples from incoming shipments of the waste. There are two types of analyses to be performed on samples collected for these procedures -- chemical screening analyses and third-party radiologic analyses. The samples for these analyses must be representative samples of the incoming waste material.

The radiologic analysis of samples must be completed by an independent organization or "third party" to confirm that the waste is within the parameters of the license. The chemical screening analysis may be completed either by Envirocare or by an off-site laboratory to ensure that the disposal of hazardous constituents is controlled.

Off-site analytical laboratories used for purposes of this plan must hold a current certification from the generator's state -- OR -- must meet the requirements of the generator's state for chemical or radiological laboratories -- OR -- must hold a current certification for the applicable chemical or radiologic analytes from the Utah Department of Health insofar as such official certifications are given.

[3] The EC methods are attached to the plan.

PARAMETER	ACCEPTABLE TOLERANCES
Solid/Soil pH	Range of the mean +/- 2 std. deviations of the pre-shipment sample results
Paint Filter Liquids Test	Pass paint filter or visually assured of no liquids
Oxidizer/Reducer Test	Must match initial sample result or must be neither oxidizer or reducer
Cyanide/Sulfide Test	Must match initial sample result or be not detectable
Photoionizer "sniffer" Test	Range from not detectable up to mean + 2 std. dev. or within range of 5 samples
Pyrophoricity	Pass pyrophoricity
Shock Sensitivity	Pass shock sensitivity
Air Reactive	Pass air reactivity
Water Reactive	Pass water reactivity

Envirocare must take chemical-screening samples of incoming shipments according to the frequencies outlined in the Frequency of Analyses and Sample Collection Requirements section. Chemical-screening sample parameters are listed below. There are two categories of chemical-screening parameters (1) immediate and (2) deferred.

Immediate Chemical Screening Parameters[4]:

- Solid/Soil pH
- Paint Filter Liquids Test or visual assurance
- Oxidizer/Reducer Test
- Cyanide/Sulfide Test
- Photoionizer "sniffer" Test
- Pyrophoricity
- Shock Sensitivity
- Air Reactivity
- Water Reactivity

[4] These are the same tests used in Envirocare's RCRA Waste Analysis Plan.

Deferred Chemical Screening Parameters:

- TCLP (8 Metals and 32 Organics)

The immediate chemical-screening parameters must be analyzed before the shipment may be accepted. The deferred chemical-screening parameters may be analyzed within the time frames established for obtaining results outlined in Step 3. The results of these analyses are provided on form EC-1775.

The required radiological analytical parameters from the independent, third-party analytical laboratory are:

- Gamma scan. The laboratory must identify and quantify each observed peak.

- Quantify each non-gamma emitting radionuclide identified by the generator on the RSR.

Envirocare documents that the required samples for radiological and deferred chemical-screening parameters have been taken and that the immediate chemical-screening parameters have been analyzed and determined to be within acceptable parameters by signing the Radioactive Waste Shipment and Disposal form (RSR)[5]. The RSR will not be signed until Envirocare has obtained the samples for the radiological and chemical screening analyses.

STEP 3 -- Procedures for Accepting or Rejecting a Shipment

Envirocare must receive laboratory results within 90 days of the applicable shipment's arrival, showing that the material was within the parameters of the license. (When ^{90}Sr is required, the time period is 120 days.) For the immediate chemical-screening parameters, the results must be obtained before the shipment is moved for further management.

Should the results from the immediate chemical-screening parameters be beyond the tolerances, the shipment must be rejected and Envirocare must make notice of this rejection to the generator. Such a shipment may be accepted when a sample of the shipment is analyzed for the characteristic in question and when that characteristic is within the limits for non-hazardous waste.

Should the results from the independent, third-party analytical laboratory for radiologic parameters or from the deferred chemical screening analysis show that the waste was beyond the limits of the license, Envirocare must follow the Contingency Plan for Non-Conforming Results outlined below. Additionally,

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5 The RSR is a manifest for shipments of radioactive waste.

Envirocare will not place another generator's waste on top of the waste until the laboratory results have been received and the results show that the waste is conforming.

This acceptance or rejection is based on the immediate chemical-screening parameters and is documented by completing form EC-1775. (See Exhibit 4.)

As a result of the radiological and chemical-screening procedures taken as outlined above, Envirocare will either accept or reject a shipment. Additionally, the following guidelines will be used to accept or reject a shipment:

If the waste is found to contain free liquids as a result of inspection or the Paint Filter Liquids Test, Envirocare must either:

- reject the waste from management at the site, or
- solidify and accept or reject after a retest of the waste for liquids as per the approved Ground-Water Discharge Minimization and Control Plan.

Results of tests will be recorded and maintained in the site files for a minimum period of five (5) years.

Frequency of Analyses and Sample Collection Requirements.

For ease in counting, one rail car (any type) will represent 100 cubic yards and one highway shipment (any type) will represent 20 cubic yards.

Radiological Analysis. For each waste stream, the minimum number of samples to be analyzed for the independent, third-party laboratory radiological analyses is:

- One sample for each of the first ten (10) shipments (rail or highway) -- OR -- One sample for each of the first 100 cubic yards (yd^3) up to 1,000 yd^3

-- THEREAFTER --

- One sample for each additional 500 yd^3 following the first ten (10) shipments or following the first 1,000 yd^3

Immediate Chemical Screening Parameters Analysis. For each waste stream, the minimum number of samples to be analyzed for the immediate chemical screening parameters is:

- One sample for each shipment (rail or highway) for the first 1,000 yd3.

-- THEREAFTER --

- One sample for each set of ten (10) shipments following the first 1,000 yd^3

Deferred Chemical Screening Parameters Analysis. For each waste stream, the minimum number of samples to be analyzed for the deferred chemical screening parameters is:

- One sample for the first set of ten (10) shipments (rail or highway).

-- THEREAFTER --

- One sample for each 1,000 yd^3 following the first ten (10) shipments.

In order to collect a more representative sample for verification of radionuclide content and deferred chemical-screening parameters, the following procedure for sample collection is provided according to the applicable frequencies. Although minimum numbers of aliquots are provided, the samplers should collect enough aliquots as appropriate to ensure that all portions of the corresponding waste volume are represented.

- Bulk Rail Shipments. The sample shall be a composite sample consisting of six aliquots from different locations.

- Bulk Highway Shipments. The sample shall be a composite sample consisting of two aliquots from different locations.

- 20-yd^3 Boxes. The sample shall be a composite sample consisting of two aliquots from different locations in the box.

- B-25 Boxes (3.5-yd^3). The sample shall be a composite sample consisting of one aliquot from each of six boxes. Where there is less than six boxes, the requirement is a minimum of 6 aliquots different locations ensuring that at least one aliquot is taken from each box.

- Drums, Barrels and Smaller Containers (Drums). The sample shall be a composite sample consisting of one aliquot from each drum. Where the shipment contains more than six drums, a total of six aliquots will be taken from different drums to form the composite sample.

Contingency Plan for Non-Conforming Results

If the results from the independent, third-party laboratory or from the deferred chemical screening parameters analysis show that the waste is beyond the limits of the license, Envirocare must follow the procedure below:

(1) Within 24 hours of discovering that non-conforming[6] material had been disposed, Envirocare must notify the Utah Division of Water Pollution Control of the situation.
(2) Within 7 calendar days of the notice, Envirocare must provide the Utah Division of Water Pollution Control with a written description of the situation. The following information must be included in the written description:

- Name of Generator
- Name of Non-Conforming Waste Stream
- Amount of Non-Conforming Disposed Waste
- Location of Non-Conforming Waste in the Disposal Cell
- Date Non-Conforming Waste was Accepted
- Date Non-Conforming Waste was Placed in Disposal Cell
- Description of Waste Placed on and Around Non-Conforming Waste

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[6] Non-Conforming Waste is a waste that (1) exceeds the limits of the radioactive material disposal license or (2) exhibits hazardous waste characteristics and which has not been granted a case-by-case variance as an exempt material to the prohibited waste requirements of Part I D 6 of the permit by the Executive Secretary of the Utah Water Quality Board, prior to shipment of the waste to the facility.

WASTE NAME: Each waste stream must have a separate form completed. Enter here the descriptive name of the waste stream.

NAME AND FIRM OF PERSON COMPLETING FORM:
TITLE:
PHONE: Self-explanatory; this person may be a consultant; however, the generator must sign the form.

1. GENERATOR INFORMATION: This information pertains to the original generator of the waste and to the location where the waste was generated. Where the generator is not the person completing the form, a contact person for the generator must be provided.

2. ADDITIONAL REMARKS OR DESCRIPTIONS: Use as necessary.

3. WASTE STREAM INFORMATION: Each waste stream requires, as a minimum, gamma spectral analysis for all naturally occurring and all manmade radionuclides. In the waste stream is known to contain radionuclides which cannot be readily quantitated by gamma spectral analysis - for example, Sr-90 or Th-232 - it must also be analyzed by radiochemical analysis for the radionuclides expected.

Envirocare's license permits acceptance of several radionuclides in equilibrium with their daughter products. For Th-232 ,Ra-226 and Ru-106 it is not necessary to report the concentrations of their daughters. If Ra-228 is present in equilibrium with its daughters they need not be reported; however, if the daughters are not in equilibrium with the Ra-228 and the concentration limits for freshly separated Ra-228 or at 1 or 5 years is to be used, the daughter concentrations determined from gamma spectroscopy must also be listed.

Uranium is acceptable, at appropriate concentrations, in several forms. Natural uranium should be analyzed and reported only as U-Nat - not as U-234, U-235 and U-238. Depleted uranium should be reported as the total uranium activity concentration as DU or U-Dep. Because DU contains some of all the original uranium isotopes, the analysis should reflect the total activity of the three nuclides. If the waste is known to contain natural uranium (U-Nat) it should be analyzed by an appropriate method - such as fluorometry - and reported accordingly.

Only a few nuclides are listed in item 3 for examples. use the blank line or an additional page, properly identified as such, to list additional nuclide information. If you have any questions, please contact Envirocare prior to sample analysis.

4. LICENSED MATERIAL: Self-explanatory

5. RESULTS PROVIDED: A copy of the laboratory results <u>must</u> accompany this form for Envirocare's evaluation.

GENERATOR'S CERTIFICATION OF WASTE: This form must be signed by the generator, testifying to the completeness and accuracy of information provided.

INSTRUCTIONS FOR FORM EC-0200
LOW ACTIVITY WASTE PROFILE RECORD

PURPOSE. The Low Activity Waste Profile Record provides certified documentation from the generator of the properties of the waste to be disposed of at Envirocare. This information is very important -- not only for waste management purposes but also for compliance with the waste analysis plans in Envirocare's licenses and permits, and for references in the disposal agreement or contract. Therefore, please fill out Form EC-0200 as completely as possible.

IN COMPLETING THE FORM, IT IS VERY IMPORTANT THAT ALL APPLICABLE ASPECTS OF THE WASTE IN TERMS OF WHETHER THE WASTE WOULD BE CONSIDERED A HAZARDOUS WASTE AS DEFINED BY 40 CFR 261. (See the instructions - Item Number 7.)

SIGNATORY REQUIREMENTS. After completion of Form EC-0200, the generator of the waste must sign and initial the form in the spaces provided. The person who signs as the generator should have signature approval for the organization and should have overall responsibility for the management of the waste in question. Although the generator may enlist the help of brokers, consultants or others outside of the generator's organization, it is the generator who must sign and initial the completed form -- even when the waste has been manifested and transported to a permitted storage facility at a different location. The purpose of initialing each page of the form is to document that the generator has reviewed the requirements of the form and the responses provided for completion.

CERTIFYING SIGNATURE. The signature of the generator at the bottom of the first page of the form corresponds to the form and to the certifications preceding the signature. Before signing the completed form, the generator should read and understand these certifications.

ITEMS NOT APPLICABLE. When an item in the form is not applicable, the generator should place N/A or a similar expression as a response. Additionally, for items not applicable, an explanation of the non-applicability should be provided or justified in the description in Item Number 7 on page 2 of the form.

***** INSTRUCTIONS FOR PAGE 1 OF EC-0200 *****

DATE OF COMPLETION, ORIGINAL SUBMISSION (Y/N), REVISION NUMBER. These items help differentiate final and draft versions. Additionally, if the waste stream is to arrive at Envirocare over a period of one year or more, as a requirement of Envirocare's permit, soon after the anniversary date of the first shipment, the generator will need to update form EC-0200. The update may be a letter of update or a renewed profiling of the waste.

Letter of Update. This letter is a written statement to Envirocare to the effect that the previously-submitted Low Activity Waste Profile Record is still representative of the waste, that the process generating the waste has not changed, and that the Low Activity Waste Profile Record is still representative of the generator's waste.

Renewed Profiling of the Waste. A renewed profiling of the waste means that the a new Low Activity Waste Profile Record is completed for the waste, new analytical results are provided with the Low Activity Waste Profile Record, five new pre-shipment samples are sent to the facility for analysis, and new incoming-shipment tolerances are established. Additionally, the generator must submit to Envirocare a renewed profiling in the following circumstances:

1. When the process generating the waste has changed.

2. When Envirocare has reason to suspect that the process generating the waste has changed.

NAME, TITLE AND FIRM OF PERSON COMPLETING FORM. This item should reflect such information for the person providing the information for the form. This person may be a consultant. However, the generator is the one to sign and initial the form.

ITEM NUMBER 1 -- GENERATOR INFORMATION. This information is applicable to the initial generator of the waste and to the location that the waste was generated. Where the generator is not the person completing the form, a contact person for the generator must be provided. If the waste has been moved from the location of generation, the waste's current location must also be provided in the description in Item Number 7 on page 2 of the form.

ITEM NUMBER 2 -- WASTE STREAM INFORMATION. This item provides Envirocare with general information about the waste. The name of the waste provided in this space should be the name which will be used to refer to the waste in conversations and correspondence between Envirocare and the generator or others. The name should be as concise as possible, descriptive of the waste and recognizable to the generator. Envirocare will be using this waste name to refer to this waste. General information as to the waste's color and any distinctive odors should also be provided, where applicable. The total amount of waste to be delivered to Envirocare should be estimated or stated as part of the waste stream information. Unless otherwise specified, the contract refers to this amount of waste as the amount of waste specified for the disposal contract, so this amount can be important.

ITEM NUMBER 3 -- WASTE PHYSICAL PROPERTIES. Place an "X" or otherwise indicate which of these categories most accurately describes the waste stream.

ITEM NUMBER 4 -- DENSITY. Please provide the value or an estimate for the density of the waste. This value may be provided as a result of analysis or through knowledge of the waste. Also, circle the appropriate dimensions. (S.G. is for specific gravity where water at 4°C is 1 g/ml.)

ITEM NUMBER 5 -- IGNITABILITY. Please indicate the flash point, if applicable, of the waste. Also indicate whether the waste is an oxidizer as defined by 40 CFR 261.21(a)(4).

ITEM NUMBER 6 -- CHEMICAL COMPOSITION. Many generators know the composition of their waste through material balance knowledge, analysis, inherent composition or otherwise. Where chemicals or constituents of the waste is known, please indicate the component and its concentration.

This space is also appropriate for estimates of composition (e.g. 98% soil and debris). It is not required to conduct additional analyses of the waste solely to complete this item.

Knowledge of the waste may be used or chemical composition may be addressed in the description of the waste in Item Number 7 on page 2 of the form. However, where concentrations of constituents are known, please provide this information in this item.

***** INSTRUCTIONS FOR PAGE 2 OF EC-0200 *****

ITEM NUMBER 7 -- DESCRIPTION OF THE WASTE. In this item, the generator is to provide a comprehensive description of the waste along with explanations and justifications of other responses provided in the form. The generator should fully describe the waste as instructed.

Additionally, any other items in the form determined to be non-applicable or otherwise incompletely described should be fully justified or described in Item Number 7. Many of the items in the form direct that additional descriptions be provided in Item Number 7, including an explanation of any item marked "Y" in Items 10, 11, or 12, and any item without a corresponding laboratory analysis in Item 15.

A detailed visual description of the waste is to be provided in this item so that any portion of the waste stream in a shipment which is visually inspected at Envirocare's site during the required incoming-shipment procedures may have a corresponding description reflected in this item. If such description is not provided, the shipment may be rejected.

Often, a generator will need to use additional space or will need to attach additional material, lists, safety sheets, analytical results, etc., to provide this comprehensive description of the waste and its history.

Where the results of analyses provided with the form indicate the possibility of any EPA Hazardous Waste Codes or Numbers, the generator should explain why the Codes or Numbers are or are not applicable. Where the regulations provide an exclusion or exemption for the waste, the generator should explain that the exclusion or exemption is applicable to the waste and cite the regulation.

***** VERY IMPORTANT ***** Any applicable EPA Hazardous Waste Codes or Numbers should be listed in the space provided. Should the waste contain any additional hazardous constituents or chemicals beyond those for which the generator has determined that EPA Hazardous Waste Numbers or Codes are applicable, please provide or attach a justification or a determination as to the generator's decision that such numbers or codes are not applicable. For example, if a waste is analyzed to contain trace quantities of benzene, and if the generator determines the waste to have EPA Hazardous Waste Numbers or Codes other than those applicable to benzene (i.e., U019, D018, and/or F005), then the generator should provide a corresponding justification or statement as to why any of the benzene-related codes or numbers are not applicable.

Therefore, a discussion should be provided which addresses all hazardous waste constituents including their concentrations, how they became a constituent in the waste, their use elsewhere in the generator's operations, whether and why the generator determines to categorize (or not categorize) any corresponding EPA Hazardous Waste Number or Code for the constituent.

ITEM NUMBER 8 -- ANALYTICAL RESULTS FOR CHARACTERISTIC HEAVY METALS. The generator should provide the results of total or TCLP heavy metals analyses in the appropriate spaces.

ITEM NUMBER 9 -- OTHER POSSIBLE CHEMICAL COMPONENTS OR HAZARDOUS WASTE CHARACTERISTICS. This item requires the generator to perform a checklist of known or possible components of the waste. Although a laboratory analysis is not required for each element in this item, the person completing this item should complete an appropriate level of research to determine whether the element in question is associated (commingled, mixed, contaminated, derived from, wasted to, or otherwise) with this waste.

While completing this item, file reviews of operations associated with the waste, review of analytical results of samples of the waste, and interviews of individuals who have managed those operations, analyses or the generation of this waste should be made. Where known or possible association or composition with regard to these elements can be made, the response should be checked or under the "Y" column and an explanation of this indication should be made as part of the description in Item Number 7 on page 2 of the form.

If, as a result of this exercise, additional known or possible chemical components are identified, those should be noted and described in Item Number 7.

***** INSTRUCTIONS FOR PAGE 3 OF EC-0200 *****

ITEM NUMBERS 10, 11, AND 12 -- HISTORY OF WASTE SINCE GENERATION. The completion of these items helps Envirocare to better determine and understand the waste and its history. It is very important that wastes that have been transported or manifested from their initial generation location be noted as such in the responses to these questions. These questions will help to determine the extent of the applicable EPA Hazardous Waste Codes or Numbers for the waste.

ITEM NUMBER 13 -- SAMPLE OF WASTE TO ENVIROCARE. For the 2 or more representative samples, please send samples that separately represent the diversity, possible extremes, and average of the waste stream. These samples will be analyzed for the 10 incoming-shipment parameters for which samples of the incoming-shipments of this waste will be analyzed. The 10 incoming-shipment parameters are the following:

- Solid/Soil pH
- Paint Filter Liquid Test or visual assurance
- Oxidizer/Reducer Test
- Cyanide Test
- Sulfide Test
- Photoionizer "sniffer" Test
- Pyrophoricity
- Air Reactivity
- Water Reactivity
- Shock Sensitivity

Results of the on-site analyses of the preliminary samples will be used to establish the range of tolerances for the results of analyses of samples from the incoming shipments. Therefore, if a shipment of the waste stream arrives and the results of an analysis of that sample is beyond this range, the shipment may be rejected or an additional Low-Activity Waste Profile Record form EC-0200 may be required to be completed before the waste may be accepted. THIS ISSUE IS VERY IMPORTANT since the delay required to obtain samples and analytical results to fully correct the problem may take weeks and may necessitate a return of the shipment to the shipper.

ITEM NUMBER 14 -- CHEMICAL LABORATORY ANALYSES. Item Number 14 provides a reminder and caution to the generator as to the issue of certified laboratories. Please read and understand these items.

ITEM NUMBER 15 -- REQUIRED CHEMICAL LABORATORY ANALYSIS CHECKLIST. Sample results for a full TCLP analysis (metals, organics, volatiles, semi-volatiles, herbicides and pesticides -- D004 through D043) of the waste must be submitted to complete this form.

8 METALS (D004-D011): D004 Arsenic (As), D005 Barium (Ba), D006 Cadmium (Cd), D007 Chromium (Cr), D008 Lead (Pb), D009 Mercury (Hg), D010 Selenium (Se), and D011 Silver (Ag)

32 ORGANICS: (D012 - D043) May be generally categorized as follows (some categories overlap, others may fit another category than listed below or in the list following Item 9 of the form):

HERBICIDES AND PESTICIDES: (D012 - D017, D020, AND D031)

D012 Endrin, D013 Lindane,
D014 Methoxychlor, D015 Toxaphene,
D016 2,4-D (2,4-Dichlorophenoxyacetic acid),
D017 2,4,5-TP (2,4,5-Trichlorophenoxypropionic acid),
D020 Chlordane,
D031 Heptachlor (and its epoxide).

VOLATILES: (D018, D019, D021, D022, D027, D028, D029, D033, D035, D038, D039, D040, D043)

D018 Benzene, D019 Carbon Tetrachloride,
D021 Chlorobenzene, D022 Chloroform,
D027 1,4-Dichlorobenzene, D028 1,2-Dichloroethane,
D029 1,1-Dichloroethylene, D033 Hexachlorobutadiene,
D035 Methyl Ethyl Ketone, D038 Pyridine,
D039 Tetrachloroethylene, D040 Trichloroethylene,
D043 Vinyl Chloride.

SEMI-VOLATILES: (D023, D024, D025, D026, D030, D032, D033, D034, D036, D037, D038, D041, D042)

D023 o-Cresol, D024 m-Cresol,
D025 p-Cresol, D026 Cresols,
D030 2,4-Dinitrotoluene,
D032 Hexachlorobenzene, D033 Hexachlorobutadiene,
D034 Hexachloroethane, D036 Nitrobenzene,
D037 Pentachlorophenol, D038 Pyridine
D041 2,4,5-Trichlorophenol, D042 2,4,6-Trichlorophenol.

Where a parameter or class of analysis does not apply, an indication of non-applicability should be made with a corresponding justification in Item Number 7 on page 2. However, it should be noted that, in most instances, analytical results for 15A, 15B, 15C, and 15D are required. Where such analyses are not available are not applicable, a waiver approval from the Utah Board of Water Quality is required prior for Envirocare to be able to accept the waste.

All analytical results should be submitted with the completed form.

Please read the caution which addresses Utah-certified laboratories and in Item Number 14. There are additional quality-assurance package requirements for data from other-than-Utah-certified laboratories.

Please address all items by attaching analytical results or by providing an appropriate justification for non-applicability in Item Number 7 on page 2.

Attachment 2

Waste Profile Analysis

ENVIROCARE OF UTAH INC

NOTICE TO TRANSPORT
(EC-1800)

Envirocare has reviewed completed forms EC-0200 and EC-0650. Based on our review of the information and certifications provided in those forms, Envirocare hereby issues notice that the following waste may be scheduled for transport and delivery to the Envirocare South Clive facility.

Contaminated Soil/ Debris

WASTE NAME

Texas Instruments

GENERATOR

Susan P. Rice — 10-13-92

Signature — Date

NOTICE: Transport and delivery of the material are to be done in accordance with a signed Disposal Agreement. Approved Radioactive Waste Shipment and Disposal Record forms (RSR's) must accompany the shipment(s). Upon arrival at the facility, the shipment will be made subject to incoming-shipment procedures and may be accepted or rejected by Envirocare for management at the facility.

INSTRUMENTS

October 1, 1992

Ms. Susan Rice
ENVIROCARE OF UTAH, INC.
215 S. State Street
Suite 1160
Salt Lake City, Utah 84111

Dear Ms. Rice:

Please find attached the waste profile sheets and associated analytical results to describe the contaminated soil and debris which originated at the property of Texas Instruments Incorporated (TI) in Attleboro, Massachusetts.

Forms EC-0200, EC-0500, and EC-0650 were completed as requested. The chemical and physical characteristics were analyzed by a laboratory certified in the State of Utah. The radiological analyses were performed by a certified lab for such services.

Please feel free to call me if there are any questions about these forms or the material.

Sincerely,

Michael J. Elliott

Michael J. Elliott
Environmental Engineering Manager

MJE/la

Enclosures

ENVIROCARE OF UTAH

LOW-ACTIVITY WASTE PROFILE RECORD

EC-0200

(Rev. December 1991)

Date of Completion: September 22, 1992

Original Submission: Y N

Name, Title and Firm of Person Completing form: Michael J. Elliott

Manager, Environmental Dept., Texas Instruments

Revision Number: ______

Phone #: (508) 699-1809

Generators of solid waste are required to determine whether their wastes are hazardous waste as defined by 40 CFR 261. Please complete a copy of this form for each waste to provide the information on which this determination is based. Should you have any questions while completing this form, contact Envirocare at (801) 532-1330. **WASTES CANNOT BE ACCEPTED AT ENVIROCARE OF UTAH UNLESS THIS FORM IS COMPLETED.** If a category does not apply, please indicate.

1. GENERATOR INFORMATION

EPA ID #: MAD007325814

Name of Firm: Texas Instruments Incorporated

Location: 34 Forest Street
Attleboro, MA 02703

Phone: (508) 699-1809

Mailing Address: Same

Firm Contact: Mike Elliott

Title: Manager, Environmental Eng.

Phone: (508) 699-1809

2. WASTE STREAM INFORMATION

Waste Name: Uranium contamination (soil and debris)

Color: brown Odor: none

Generation Rate or Total Amount: 40,000-60,000 cu. ft.

3. WASTE PHYSICAL PROPERTIES

___ Liquid X Solid

___ Sludge ___ Powder/Dust

4. DENSITY (indicate dimensions)

1.51g/cc S.G. lb./ft^3 Kg/m^3

5. IGNITABILITY (40 CFR 262.21(a)(2),(4).)

Flash Point: > 160° F °F °C

Oxidizer(s): Y N

6. CHEMICAL COMPOSITION (List known chemical or other constituents and circle the applicable concentration dimensions.)

Chemical Component	Concentration	
Please see attached analysis.		% ppm
		% ppm
		% ppm
		% ppm
		% ppm
		% ppm

GENERATOR'S CERTIFICATION OF NON-HAZARDOUS WASTE: As the generator of this waste, I certify to Envirocare of Utah, Inc., that the statements made in this LARW Waste Profile Record are complete, true and correct to the best of my knowledge. I further certify and warrant to Envirocare of Utah, Inc., that the waste represented in this LARW Waste Profile Record is not a hazardous waste as defined by 40 CFR 261. I believe the results reported herein to be representative of the waste. Where the information provided herein is based upon generator's (certifier's) knowledge, I have included or attached all of the documentation and descriptions on which that knowledge is based.

Generator's Signature: Michael J. Elliott Title: Env. Eng. Mgr. Date: Sept 22, 1992
(Sign for the above certification. Please initial each page.)

7. **DESCRIPTION OF WASTE:** (Briefly describe the waste. Include a description of the process in which it was generated. List the chemicals and materials used in or commingled with the waste. List any associated EPA Hazardous Waste Numbers and all of the applicable exclusions, delistings or exemptions. Attach any product information or Material Safety Data Sheets for the products from which the waste is derived.)

Uranium contaminated soils and debris material generated during D and D of facility. Material recovered as part of site remediation.

EPA Hazardous Waste Number(s) None

8. **TOXICITY CHARACTERISTIC FOR HEAVY METALS** (Indicate Toxicity Characteristic [TCLP] concentrations in mg/liter in the extract.) Mg/L

Arsenic	ND	Lead	ND
Barium	ND	Mercury	ND
Cadmium	ND	Selenium	ND
Chromium	ND	Silver	ND

9. **OTHER POSSIBLE CHEMICAL COMPONENTS/CHARACTERISTICS**

	(Y)	(N)		(Y)	(N)		(Y)	(N)
Cyanides		X	Sulfides		X	Dioxins		X
Pesticides		X	Herbicides		X	PCBs		X
Explosives		X	Pyrophorics		X	Solvents		X
Organics		X	Phenolics		X	Infectious		X
Ignitable		X	Corrosive		X	Reactive		X
Antimony		X	Beryllium		X	Copper		X
Nickel		X	Strontium		X	Thallium		X
Vanadium		X	Zinc		X	Alcohols		X
*TCLP Volatiles		X	**TCLP Organics		X	***TCLP Semi-volatiles		X

*TCLP Volatiles include benzene, carbon tetrachloride, chlorobenzene, chloroform, 1,2-dichloroethane, 1,1-dichloroethylene, methyl ethyl ketone, tetrachloroethylene, trichloroethylene, vinyl chloride.

**TCLP Organics include 2,4-D, heptachlor hydroxide, pyridine, 2,4,5-TP (Silvex).

***TCLP Semi-volatiles include chlordane, o-cresol, m-cresol, p-cresol, cresol, 1,4-dichlorobenzene, 2,4-dinitrotoluene, Endrin, heptachlor, hexachlorobenzene, hexachlorobutadiene, hexachloroethane, lindane, methoxychlor, nitrobenzene, pentachlorophenol, toxaphene, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol.

(NOTE: ATTACH RESULTS FROM LABORATORY ANALYSES, MATERIAL SAFETY DATA SHEETS, ALL OTHER ADDITIONAL INFORMATION AND CONTINUATIONS OF ABOVE DESCRIPTIONS.)

Initials

Was this waste derived from (or is the waste a residue of) the treatment, storage, and/or disposal of hazardous waste defined by 40 CFR 261?

SAMPLES OF WASTE TO ENVIROCARE

13. X **Please send two or more representative samples of your waste to Envirocare.** These samples will used to establish the waste's incoming shipment acceptance parameter tolerances and may be analyzed for additional parameters. Send at least 1-kg. (2-lb.) for each sample in an air-tight clean glass container to:

Envirocare of Utah, Inc.
215 South State Street
Suite 1160
Salt Lake City, Utah 84111

14. **CHEMICAL LABORATORY ANALYSES.** Although Envirocare does not require results from a Utah-certified laboratory, generator is cautioned as follows:

a. **Utah Certified or EPA CLP Laboratories.** During the process of appealing a notice of violation or other enforcement actions, the Utah Department of Environmental Quality will not admit laboratory data which is not from a Utah-certified laboratory. Utah certification is obtained through the Utah Bureau of Laboratory Improvement (801) 584-8400.

b. **Utah Certification is Parameter-Specific.** Laboratories are certified by parameter. One should not assume that every result from a "Utah-certified" laboratory is acceptable for a compliance appeal. A laboratory may certify for some parameters and not for others. It is a good practice to check with a laboratory to ensure parameter certification. A laboratory's certification is dynamic. A laboratory may lose certification or may not renew their certification for parameters from one compliance period to the next.

c. **Approved Sampling.** For all sampling, the analytical method's sampling procedures must be followed.

d. **Generators Determine Whether a Waste is Hazardous.** The requirements of 40 CFR 262.11 state that it is the generator's responsibility to determine whether his(her) waste is hazardous. This determination must be made by the generator.

e. **Generator's Waste may be Sampled at the Disposal Facility by Envirocare or by Environmental Regulators.** Should the results of subsequent analysis of a waste show that the waste is hazardous for additional EPA hazardous waste numbers and corresponding treatment standards which were not identified by the generator, then the waste may be removed, refused, and may be returned to the generator pursuant to the terms of the disposal agreement.

f. **Envirocare Accepts Waste According to a Waste Characterization Plan. Envirocare does not assume or accept any responsibility imposed on the generator by law or the disposal agreement.**

15. **REQUIRED LABORATORY WASTE ANALYSES AND CHECKLIST.** Generator must submit results of analyses of samples of the waste. Results are required from a qualified laboratory for the following analytical parameters unless nonapplicability of the analysis for the waste can be stated and justified in attached statements or in 7. above. Attach all analytical results and QA/QC documentation. **(CAUTION: PRIOR TO ARRANGING FOR LABORATORY ANALYSES, REFER TO 14 REGARDING UTAH-CERTIFIED AND EPA CLP LABORATORIES.)**

X A. Toxicity Characteristic Leaching Procedure (TCLP) from 40 CFR 268 Appendix I for 8 metals and 32 organic analysis.

X B. Soil pH and Paint Filter Liquids Test, SW-846 Methods 9045 and 9095, respectively.

X C. Test Method (from SW-846 Chapter 7) to Determine Hydrogen Cyanide Released from Wastes.

X D. Test Method (from SW-846 Chapter 7) to Determine Hydrogen Sulfide Released from Wastes.

___ E. Other analyses may be required after Envirocare has reviewed this document. These may include results of other SW-846 analytical methods.

Initials [handwritten initials]

ENVIROCARE
...

PHYSICAL PROPERTIES EVALUATION FOR DISPOSAL AT THE ENVIROCARE OF UTAH FACILITY (EC-0500)

(Rev. July 1990)

DATE OF COMPLETION: September 22, 1992

NAME AND FIRM OF PERSON COMPLETING FORM: Michael J. Elliott

TITLE: Environmental Engineering Manager PHONE # (508) 699-1809

In order to comply with Envirocare's radioactive material disposal license #2300249 issued by the Utah Bureau of Radiation Control, Envirocare requires generators to provide the following physical properties information. Should you have any questions while completing this form, contact Envirocare's Vice President of Operations at (801) 532-1330. WASTE CANNOT BE ACCEPTED AT ENVIROCARE OF UTAH UNLESS THIS FORM IS COMPLETE AND A SAMPLE OF THE WASTE SUBMITTED.

1. GENERATOR INFORMATION

Name of Firm: Texas Instruments Incorporated

Location: 34 Forest Street
Attleboro, MA 02703

Phone: (508) 699-18C9

Mailing Address: Same

Firm Contact: Michael J. Elliott

Title: Environmental Engineering Mgr.

Phone: (508) 699-1809

2. MOISTURE CONTENT

Optimum Moisture Content: (Use Method ASTM D-698) 8.8 %

Average Moisture Content: 9.70 %

Moisture Content Range: 9.23-10.16 %

3. SAMPLE OF WASTE (Please send a 3-gallon sample of the waste material to Envirocare of Utah, Inc.

X Sample has been sent

4. GENERAL CHARACTERISTICS (% of each)

50%	Soil	10%	Building Debris
20%	Rubble		Pipe Scale
	Tailings	20%	Process Waste
	Concrete		Plastic/Resin

5. GRADATION OF MATERIAL (Please indicate the percentage of the material that would pass through the following sizes of screen.)

12"	80	%
4"	80	%
1"	80	%
1/4"	50	%
1/40"	5	%
1/200"	0	%

6. TRANSPORTATION MODES (Please indicate the option(s) for delivery to the site. Check all that apply.)

	Highway	X	Railroad
	B-12 Boxes	X	B-25 Boxes
	Bulk Shipment	X	Gondola
	55-Gal. Drums		Bags (Specify)
	Other (Specify)		

7. DESCRIPTION OF WASTE (Please describe the waste in the space below with respect to its physical composition and characteristics. Note any items of concern.)

Solids, soils, and debris. Solids and debris consists of graphite crucibles, metal trimmings, and scrap metal (i.e. exhaust duct work)

GENERATOR'S CERTIFICATION OF WASTE: As the generator of this waste, I certify to Envirocare of Utah that the information provided on this form is complete, true and correct to the best of my knowledge. I believe the results reported herein and the sample provided to Envirocare of Utah, Inc., to be representative of the waste material.

Signature for above certification: Michael J. Elliott DATE September 22, 1992

ENVIROCARE

RADIOLOGICAL EVALUATION
FOR DISPOSAL AT THE ENVIROCARE OF UTAH FACILITY
(EC-0650)

(Rev. March 1992)

WASTE NAME: Contaminated soil debris and material

DATE OF COMPLETION: September 22, 1992

NAME AND FIRM OF PERSON COMPLETING FORM: Michael J. Elliott - Texas Instruments Incorporated

TITLE: Environmental Engineering Manager

PHONE: (508) 699-1809

In order to comply with Envirocare's NORM license #2300249 issued by the State Of Utah Department of Environmental Quality, Division of Radiation Control, Envirocare requires generators to provide the following radiological information. Should you have any questions while completing this form, contact Envirocare's Radiation Safety Officer at (801) 532-1330. **WASTE CANNOT BE ACCEPTED AT ENVIROCARE OF UTAH UNLESS THIS FORM IS COMPLETED AND A LABORATORY ANALYSIS IS SUBMITTED.**

1. GENERATOR INFORMATION

EPA ID # MAD007325814

NAME OF FIRM: Texas Instruments Incorporated

LOCATION: Attleboro, MA 02703

PHONE: (508) 699-1809

MAILING ADDRESS: 34 Forest Street
Attleboro, MA 02703

FIRM CONTACT: Michael J. Elliott

TITLE: Environmental Eng. Mgr.

PHONE: (508) 699-1809

2. ADDITIONAL REMARKS OR DESCRIPTIONS.

None.

3. WASTE STREAM INFORMATION For each radioactive isotope associated with the waste, please list the following information (use additional copies of this form if necessary.)

	ISOTOPES	WEIGHT PERCENT	CONCENTRATION pCi/g
a.	Ra-226		
b.	Ra-228		
c.	U-Nat		
d.	DU		
e.	Th-232		
f.	Th-230		
g.	238U		2000
h.	235U		100
i.	234U		1000
j.	Total U Avg.		3000
k.	Range of U		30-10,000
l.			

4. (Y) N **LICENSED MATERIAL** Is the waste material listed or included on an active Nuclear Regulatory Commission or Agreement State license? (Please circle)

5. (Y) N **RESULTS PROVIDED.** Are the laboratory results attached to this form?

GENERATOR'S CERTIFICATION OF WASTE: As generator of this waste, I certify to Envirocare of Utah that the information provided on this form is complete, true and correct to the best of my knowledge. I believe the results reported herein to be representative of the waste.

Generator's Signature for certification [signature] Date September 22, 1992

RADIOLOGICAL EVALUATION
FOR DISPOSAL AT THE ENVIROCARE OF UTAH FACILITY
(EC-0650) (Rev. March 1992)

WASTE NAME: Contaminated soil debris and material DATE OF COMPLETION: September 22, 1992

NAME AND FIRM OF PERSON COMPLETING FORM: Michael J. Elliott - Texas Instruments Incorporated

TITLE: Environmental Engineering Manager PHONE: (508) 699-1809

In order to comply with Envirocare's NORM license #2300249 issued by the State Of Utah Department of Environmental Quality, Division of Radiation Control, Envirocare requires generators to provide the following radiological information. Should you have any questions while completing this form, contact Envirocare's Radiation Safety Officer at (801) 532-1330. WASTE CANNOT BE ACCEPTED AT ENVIROCARE OF UTAH UNLESS THIS FORM IS COMPLETED AND A LABORATORY ANALYSIS IS SUBMITTED.

1. **GENERATOR INFORMATION**

EPA ID # MAD007325814

NAME OF FIRM Texas Instruments Incorporated

LOCATION Attleboro, MA 02703

PHONE (508) 699-1809

MAILING ADDRESS 34 Forest Street
Attleboro, MA 02703

FIRM CONTACT Michael J. Elliott

TITLE Environmental Eng. Mgr.

PHONE (508) 699-1809

2. **ADDITIONAL REMARKS OR DESCRIPTIONS.**

None.

3. **WASTE STREAM INFORMATION** for each radioactive isotope associated with the waste, please list the following information (use additional copies of this form if necessary.)

	ISOTOPES	WEIGHT PERCENT	CONCENTRATION pCi/g
a.	Ra-226		
b.	Ra-228		
c.	U-Nat		
d.	DU		
e.	Th-232		2 Range 0.5-10
f.	Th-230		1.7 Range 0.5-18.
g.	238U		2000
h.	235U		100
i.	234U		1000
j.	Total U Avg.		3000
k.	Range of U		30-10,000
l.	Th-228		2.6 Range 0.5-24

4. (Y) N **LICENSED MATERIAL** Is the waste material listed or included on an active Nuclear Regulatory Commission or Agreement State license? (Please circle)

5. (Y) N **RESULTS PROVIDED.** Are the laboratory results attached to this form?

GENERATOR'S CERTIFICATION OF WASTE: As generator of this waste, I certify to Envirocare of Utah that the information provided on this form is complete, true and correct to the best of my knowledge. I believe the results reported herein to be representative of the waste.

Generator's Signature for certification [signature] Date September 22, 1992

Values for Thorium were added on 10/06/92 [initials]

TEXAS
INSTRUMENTS

FACIMILE COVER SHEET

DATE: October 6, 1992

PLEASE DELIVER THE FOLLOWING PAGE(S) TO:

NAME: Kent Parker

FIRM: Envirocare

LOCATION: SLC, UT

FAX NO. 801 - 537 - 7345

FROM:

SENDER: Mike Elliott

FIRM: TEXAS INSTRUMENTS INCORPORATED
MATERIALS & CONTROLS GROUP
ENVIRONMENTAL, SAFETY & HEALTH DEPARTMENT

TELEPHONE: (508) 699-1809

MAIL STATION 10-04

FAX NO. (508) 699-1819

NUMBER OF PAGES INCLUDING COVER SHEET: 2

IF YOU DO NOT RECEIVE ALL OF THE PAGES, PLEASE CALL THE SENDER AS SOON AS POSSIBLE.

COMMENTS: Kent, as requested, I am forwarding the updated Radiological Evaluation (EC-0650). A hard copy will follow in the mail addressed to Ms. Susan Rice.

TRANSMISSION REPORT

TTI NO.	801 537 7345
DATE AND TIME	10.06.92 04:54 PM
DURATION	01:12
MODE	
PAGE	02
RESULT	GOOD

Attachment A

Sample of Contaminated Soil
and Debris from Excavation

September 11, 1992

* * * *

Radiological Analysis

Lockheed Analytical Laboratory

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

SAMPLE ANALYSIS
SUMMARY PACKAGE

FOR

GAMMA SPECTRUM ANALYSIS, THORIUM-ISOTOPIC, AND URANIUM-ISOTOPIC

JOB NAME: MIT-RAD-09112

QUOTATION NUMBER: Q216101

DOCUMENT FILE NUMBER: 0911319

COPY

Lockheed
Environmental Systems & Technologies Co.

Lockheed Analytical Services
975 Kelly Johnson Drive
Las Vegas, Nevada 89119-3705

Phone: (800) 582-7605
Fax: (702) 361-8146

September 16, 1992

Mr. Fred McWilliams
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
138 Albany Street
Cambridge, MA 02139

RE: Job Name: MIT-RAD-09112
Quotation No.: Q216101
Document File No.: 0911319

The attached data package contains the results of analyses on samples that were submitted to the Lockheed Analytical Laboratory on September 11, 1992. The samples were received in good condition.

SUMMARY ANALYSIS STATEMENT:

Sample Preparation -

The sample seems to consist of a homogeneous soil. The sample was dried and sieved. The sample contained 11.3% moisture. Results are reported on an as received basis.

Gamma Spectrum Analysis -

A 200 mL sample of the dried sieved soil was counted for gamma spectrum analysis using LAL-91-SOP-0064. There were no problems with the analysis. Both analysis are included with the data package. All QC were within acceptance limits.

Sample Dissolution -

duplicate 1 g samples were dissolved using LAL-92-SOP-0198, which is a microwave assisted dissolution. A complete dissolution was achieved which was diluted to 800 mL. A 4 mL aliquot was taken for uranium analysis and a 40 mL aliquot was taken for the uranium analysis.

Thorium - Isotopic -

The isotopic thorium analysis was performed using LAL-91-SOP-0108, which is an ion exchange separation for thorium. The chemical yield of the separation is traced with Th-229. There were no problems with the analysis. The results of both analysis are included with the data package. All QC data were within acceptance limits.

Uranium - Isotopic -

The isotopic uranium analysis was performed using LAL-91-SOP-0108, which is an ion exchange separation for uranium. The chemical yield of the separation is traced with U-232. The duplicate analyses do not agree. The isotopic ratio on the two aliquots do not agree. We believe that "hot particles" of uranium from two or more sources are included in this sample. Results of both analysis are included in the data package. The LCS and blank are within limits.

If you have any questions concerning the analysis or the data please do not hesitate to contact Mary Ford, (702) 361-3955.

Release of this data report has been authorized by the Laboratory Director or the Director's designee as evidenced by the following signature.

Sincerely,

Mary B. Ford
for
Michael J. Butler, Ph.D.
Client Services Manager

MB/jsf

cc: Client Services
Document Control Department

DATA QUALIFIERS FOR RADIOCHEMICAL ANALYSES

[Revised 08/28/92]

For Use on the Analytical Data Reporting Forms	
B	Any constituent that was also detected in the associated blank whose concentration was greater than the reporting detection limit (RDL) and/or minimum detectable activity (MDA).
C	Presence of high TDS in sample required reduction of sample size which increased the MDA.
D	Constituent detected in the diluted sample.
E	Constituent concentration exceeded the calibration or attenuation curve range.
F	*For Alpha Spectrometry Only--* FWHM exceeded acceptance limits.
H	Sample analysis performed outside of method-specified maximum holding time requirement.
Y	Chemical yield exceeded acceptance limits.
For Use on the QC Data Reporting Forms	
*****	QC data (i.e., percent recovery data for laboratory control standard and matrix spike; and RPD for replicate analyses) exceeded acceptance limits.
a[1]	The spike recovery and/or RPD for matrix spike and duplicates cannot be evaluated due to insufficient spiking level compared to the elevated sample analyte concentration.
b[1]	The RPD cannot be computed because the sample and/or duplicate concentration was below the MDA.

[1] Used as foot note designations on the QC summary form.

lient Sample ID: TI RO #152 — LAL Sample ID: A26126
ate Collected: 08-SEP-92 — Date Received: 11-SEP-92
ix: SOIL — Job Name: MIT-RAD-.....09112

Constituent	Batch	Activity	Estimated Uncertainty	MDA	Data Qual	Units
amma Spec Analysis	R0064_21	see attach				pCi/g
h-228	R0108T_5	14.0	3.0	1.0	D	pCi/g
h-230	R0108T_5	13.0	2.0	0.47	D	pCi/g
h-232	R0108T_5	21.0	3.0	0.47	D	pCi/g
-233/4	R0108U_7	1290	140.	15.	D	pCi/g
-235	R0108U_7	122	30.	4.0	D	pCi/g
-238	R0108U_7	3590	340.	11.	D	pCi/g

omments on Data Qualifiers:
- Constituent detected in the diluted sample.

EG&G ORTEC OMNIGAM (191)   13.02.42 14-SEP-92 12:58:48   Page   1
Spectrum name: AA2983.SPC

Sample description
MIT soil   TI RO #152   Tuna can AA2983   269.8gms (wet)
LAL parent A26126   Batch R0064_21

***** S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E *****

NUCLIDE		TIME OF COUNT ACTIVITY pCi/g	UNCERTAINTY 2 SIGMA COUNTING pCi/g	TOTAL pCi/g
Am-241	<	3.45E+00		
TH-234		1.8366E+03	13.64	439.49
RA-226	<	2.31E+01		
PB-214		8.0157E-01	.46	.47
BI-214		8.4563E-01	.46	.47
PB-210	<	2.12E+01		
U-235		6.9549E+01	.64	5.46
AC-228		1.5983E+01	1.01	1.66
PB-212		1.5870E+01	.53	1.38
BI-212		1.7914E+01	4.17	4.41
TL-208		5.0107E+00	.31	.50
K-40		1.5957E+01	1.92	2.29
Ce-144	<	2.41E+00		
CO-60	<	8.17E-02		
CS-134	<	4.33E-01		
CS-137	<	2.89E-01		
Zn-65	<	5.54E-01		
MN-54	<	3.40E-01		
EU-152	<	1.16E+00		
EU-154	<	6.68E-01		
EU-155	<	1.45E+00		
Ru-106	<	1.32E+00		
Ag-108M	<	6.46E+00		
AG-110M	<	3.21E-01		
SB-125	<	6.00E-01		

ıtrix: SOIL Job Name: MIT-RAD-.....09112

Constituent	Batch	Activity	Estimated Uncertainty	MDA	Data Qual	Units
ımma Spec Analysis	R0064_21	see attach	0	0		pCi/g

ımments on Data Qualifiers:

Spectrum name: AA2984.SPC

Sample description
MIT soil   TI RO #152   DUPLICATE   Tuna can AA2984
LAL parent AA2587 DUP   Batch R006._21

***** S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E *****

NUCLIDE		TIME OF COUNT ACTIVITY pCi/g	UNCERTAINTY 2 SIGMA COUNTING pCi/g	TOTAL pCi/g
Am-241	<	3.56E+00		
TH-234		2.3447E+03	15.82	561.16
RA-226	<	2.32E+01		
PB-214		8.6496E-01	.48	.49
BI-214		7.6329E-01	.47	.47
PB-210	<	2.22E+01		
U-235		7.9336E+01	.66	6.24
AC-228		1.7236E+01	.83	1.63
PB-212		1.7726E+01	.55	1.52
BI-212		1.7335E+01	4.15	4.37
TL-208		5.8783E+00	.32	.55
K-40		1.3838E+01	2.48	2.70
Ce-144		2.6248E+00	2.17	2.18
CO-60	<	1.09E-01		
CS-134	<	4.47E-01		
CS-137	<	4.31E-01		
Zn-65	<	5.32E-01		
MN-54		2.4894E-01	.21	.21
EU-152	<	1.26E+00		
EU-154	<	7.93E-01		
EU-155	<	4.43E+00		
Ru-106	<	2.17E+00		
Ag-108M		7.0944E+01	15.11	16.03
AG-110M	<	4.60E-01		
SB-125	<	6.88E-01		

atrix: SOIL Job Name: MIT-RAD-.....09112

Constituent	Batch	Activity	Estimated Uncertainty	MDA	Data Qual	Units
h-228	R0108T_5	15.0	3.0	1.0	D	pCi/g
h-230	R0108T_5	13.0	2.0	0.65	D	pCi/g
h-232	R0108T_5	21.0	3.0	0.25	D	pCi/g
-233/4	R0108U_7	3740	270.	9.0	D	pCi/g
-235	R0108U_7	270	36.	5.0	D	pCi/g
-238	R0108U_7	2970	220.	7.0	D	pCi/g

omments on Data Qualifiers:
- Constituent detected in the diluted sample.

Reagent Blank Analysis

MIT-RAD-09112

Analyte	Batch ID	MDA	Acceptance Limit	Date Analyzed	MBB result	Data Qualifier
Gamma Spec						
Th-234	R0064_21			9-14-92		
K-40	R0064_21			9-14-92		
U-234	R0108U_7	0.02	0.3	9-16-92	0.18	
U-235	R0108U_7	0.02	0.3	9-16-92	0.02	
U-238	R0108U_7	0.01	0.3	9-16-92	0.26	
Th-230	R0108T_5	0.03	0.6	9-16-92	0.41	
Th-232	R0108T_5	0.03	0.6	9-16-92	0.13	
Th-228	R0108T_5	0.08	0.6	9-16-92	0.15	

Duplicate Sample Analysis

MIT-RAD-09112

Analyte	Batch ID	Client ID	LAL ID	Date Analyzed	Sample Result	Error 2 sigma	Duplicate Result	Error 2 sigma	RER	RPD	Data Qualifier
Gamma Spec											
Th-234	R0064_21	TI RO #152	A26126	9-14-92	1837	439	2345	561	0.5	24	
K-40	R0064_21	TI RO #152	A26126	9-14-92	16	2	14	3	0.4	14	
U-234	R0108U_7	TI RO #152	A26126	9-16-92	1290	137	3740	269	6.0	97	*
U-235	R0108U_7	TI RO #152	A26126	9-16-92	122	30	270	36	2.2	76	*
U-238	R0108U_7	TI RO #152	A26126	9-16-92	3590	335	2970	220	1.1	19	
Th-230	R0108T_5	TI RO #152	A26126	9-16-92	13	2	13	2	0.0	0	
Th-232	R0108T_5	TI RO #152	A26126	9-16-92	21	3	21	3	0.1	2	
Th-228	R0108T_5	TI RO #152	A26126	9-16-92	14	3	15	3	0.3	9	

Laboratory Control Sample Analysis

MIT-RAD-09112

Analyte	Batch ID	Date Analyzed	Error 2 sigma	True Value	Percent Recovery	Data Qualifier
Gamma Spec						
Cs-137	R0064_21	9-14-92	19	195	77	
K-40	R0064_21	9-14-92	140	450	124	
U-234	R0108U_7	9-16-92	0.30	5.41	89	
U-235	R0108U_7	9-16-92	NA			
U-238	R0108U_7	9-16-92	0.40	5.41	96	
Th-230	R0108T_5	9-16-92	NA			
Th-232	R0108T_5	9-16-92	0.39	5.43	101	
Th-228	R0108T_5	9-16-92	NA			

- [ ] SCRAP SALES
- [ ] SALE OF ASSETS
- [ ] OUTSIDE PROCESSING
- [ ] TRANSFERS BETWEEN TI LOCATIONS
- [ ] EXPENSE MATERIAL
- [ ] OTHER, EXPLAIN: ______

DIV/ACCT. # 50 CC: 516

QUANTITY	DESCRIPTION/PART #/PC	UNIT PRICE	TOTAL
1	Environmental Container w/samples surveyed + Received 1 TAPE sealed Box [signature] 911192 0900 3E3	[redacted]	[redacted]

WEIGHT	NO. OF CONTAINERS	ORIGINATOR'S NAME (TYPED)	ORIGINATOR'S SIGNATURE
5	1	Michael J. Elliott	Michael J. Elliott

148 5/84

145845

PACKING SLIP COPY

0911319

Attachment B

Sample of Contaminated Soil

from Excavation

September 9, 1992

* * * *

Radiological Analysis

Lockheed Analytical Laboratory

TEXAS INSTRUMENTS

SAMPLE ANALYSIS
SUMMARY PACKAGE

FOR

GAMMA SPECTROMETRY, THORIUM-ISOTOPIC, AND URANIUM-ISOTOPIC

JOB NAME: MIT-RAD-09092

QUOTATION NUMBER: Q216101

DOCUMENT FILE NUMBER: 0909280

COPY

Lockheed
Environmental Systems & Technologies Co.

Lockheed Analytical Services
975 Kelly Johnson Drive
Las Vegas, Nevada 89119-3705

Phone: (800) 582-7605
Fax: (702) 361-8146

September 15, 1992

Mr. Fred McWilliams
TEXAS INSTRUMENTS
138 Albany Street
Cambridge, MA 02139

RE: Job Name: MIT-RAD-09092
Quotation No.: Q216101
Document File No.: 0909280

The attached data package contains the results of analyses on samples that were submitted to the Lockheed Analytical Laboratory on September 9, 1992. The samples were received in good condition.

SUMMARY ANALYSIS STATEMENT:

Sample Preparation and Screening -

The sample consisted of damp soil. The sample was dried at 103°c overnight, sieved through a 4 mm sieve to remove gravel and other large particles. The material which was sieved through the 4 mm sieve was used for analysis. The gamma scan was performed on the dried screened sample. For alpha spectroscopy one gram was dissolved using a microwave dissolution technique. An aliquot of the dissolved material was taken for analysis. The aliquot chosen was based on the Th-234 result from the gamma spectrum analysis. All results are reported on an as delivered weight basis. The percent moisture of the sample was 11%.

Thorium Isotopic Analysis -

The aliquot size for the thorium samples should have been larger. There were no problems with the thorium analysis. All QC data was within limits.

Uranium Isotopic Analysis -

The U-235 duplicate analysis was not within limits. The U-233/4 and U-238 duplicates showed good agreement. There were no other problems with the uranium analysis. The blank and laboratory control samples were within limits.

Gamma Spectrum Analysis -

The samples were sealed in aluminum cans then counted. All gamma detector QC was within limits.

If you have any questions concerning the analysis or the data please do not hesitate to contact Mary Ford, (702) 361-3955.

Release of this data report has been authorized by the Laboratory Director or the Director's designee as evidenced by the following signature.

Sincerely,

Mary B Ford for

Michael J. Butler, Ph.D.
Client Services Manager

MB/jsf

cc: Client Services
Document Control Department

Lockheed Analytical Laboratory

DATA QUALIFIERS FOR RADIOCHEMICAL ANALYSES

[Revised 08/28/92]

For Use on the Analytical Data Reporting Forms	
B	Any constituent that was also detected in the associated blank whose concentration was greater than the reporting detection limit (RDL) and/or minimum detectable activity (MDA).
C	Presence of high TDS in sample required reduction of sample size which increased the MDA.
D	Constituent detected in the diluted sample.
E	Constituent concentration exceeded the calibration or attenuation curve range.
F	*For Alpha Spectrometry Only*-- FWHM exceeded acceptance limits.
H	Sample analysis performed outside of method-specified maximum holding time requirement.
Y	Chemical yield exceeded acceptance limits.
For Use on the QC Data Reporting Forms	
*	QC data (i.e., percent recovery data for laboratory control standard and matrix spike; and RPD for replicate analyses) exceeded acceptance limits.
a[1]	The spike recovery and/or RPD for matrix spike and duplicates cannot be evaluated due to insufficient spiking level compared to the elevated sample analyte concentration.
b[1]	The RPD cannot be computed because the sample and/or duplicate concentration was below the MDA.

[1] Used as foot note designations on the QC summary form.

ent Sample ID: TI
e Collected: 09-SEP-92
rix: SOIL

LAL Sample ID: A26110
Date Received: 09-SEP-92
Job Name: MIT-RAD-.....09092

onstituent	Batch	Activity	Estimated Uncertainty	MDA	Data Qual	Units
na Spec Analysis	R0064_20	attached				pCi/g
228	R0108T_4	34.0	8.0	8.0	D	pCi/g
230	R0108T_4	7.8	3.2	2.2	D	pCi/g
232	R0108T_4	10.0	4.0	2.0	D	pCi/g
33/4	R0108U_6	1040	63.	5.0	D	pCi/g
35	R0108U_6	69	11.	1.0	D	pCi/g
38	R0108U_6	1930	110.	4.0	D	pCi/g

nents on Data Qualifiers:
 Constituent detected in the diluted sample.

EG&G ORTEC OMNIGAM (191)   13.02.42 10-SEP-92 13:30:07   Page   1
Spectrum name: AA2969.SPC

Sample description
MIT-TI soil "TI" tuna can AA2969 293.0gms
326.3gms as delivered LAL parent A26110 Batch R0064_20

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

NUCLIDE		TIME OF COUNT ACTIVITY pCi/g	TIME CORRECTED ACTIVITY pCi/g	UNCERTAINTY 2 SIGMA COUNTING pCi/g	TOTAL pCi/g
Am-241	<	2.80E+00	2.80E+00		
TH-234		1.2010E+03	1.2010E+03	9.25	287.41
RA-226	<	2.55E+01	2.55E+01		
PB-214		5.9823E-01	5.9824E-01	.30	.30
BI-214		6.8829E-01	6.8830E-01	.36	.36
PB-210	<	1.15E+01	1.15E+01		
U-235		1.0677E+02	1.0677E+02	.68	8.35
AC-228		8.4437E+00	8.4437E+00	.84	1.09
PB-212		8.1198E+00	8.1198E+00	.44	.78
BI-212		8.4239E+00	8.4239E+00	3.12	3.19
TL-208		2.6149E+00	2.6149E+00	.23	.31
K-40		1.5217E+01	1.5217E+01	1.65	2.03
Ce-144	<	2.52E+00	2.53E+00		
CO-60	<	8.77E-02	8.78E-02		
CS-134	<	3.50E-01	3.51E-01		
CS-137	<	2.28E-01	2.28E-01		
Zn-65	<	3.68E-01	3.70E-01		
MN-54	<	2.00E-01	2.00E-01		
EU-152	<	1.12E+00	1.12E+00		
EU-154	<	6.58E-01	6.58E-01		
EU-155	<	1.17E+00	1.17E+00		
Ru-106	<	1.58E+00	1.59E+00		
Ag-108M	<	1.10E+01	1.10E+01		
AG-110M	<	2.71E-01	2.72E-01		
SB-125	<	5.07E-01	5.08E-01		

Reagent Blank Analysis

MIT-RAD-09092

Analyte	Batch ID	MDA	Acceptance Limit	Date Analyzed	MBB result	Data Qualifier
Gamma Spec						
Th-234	R0064_20			9-10-92		
K-40	R0064_20			9-10-92		
U-234	R0108U_6	0.01	0.3	9-12-92	0.22	
U-235	R0108U_6	0.01	0.3	9-12-92	0.01	
U-238	R0108U_6	0.01	0.3	9-12-92	0.12	
Th-230	R0108T_4	0.03	0.6	9-12-92	0.03	
Th-232	R0108T_4	0.01	0.6	9-12-92	0.01	
Th-228	R0108T_4	0.08	0.6	9-12-92	0.56	

Duplicate Sample Analysis

MIT-RAD-09092

Analyte	Batch ID	Client ID	LAL ID	Date Analyzed	Sample Result	Error 2 sigma	Duplicate Result	Error 2 sigma	RER	RPD	Data Qualifier
Gamma Spec											
Th-234	R0064_20 TI		A26110	9-10-92	1201	287	1493	357	0.5	22	
K-40	R0064_20 TI		A26110	9-10-92	15	2	16	2	0.1	4	
U-234	R0108U_6 TI		A26110	9-12-92	1040	63	998	66	0.3	4	
U-235	R0108U_6 TI		A26110	9-12-92	69	11	101	15	1.2	38	*
U-238	R0108U_6 TI		A26110	9-12-92	1928	105	2310	134	1.6	18	
Th-230	R0108T_4 TI		A26110	9-12-92	8	3	5	3	0.4	38	
Th-232	R0108T_4 TI		A26110	9-12-92	10	4	9	3	0.2	15	
Th-228	R0108T_4 TI		A26110	9-12-92	34	8	26	7	0.5	24	

Laboratory Control Sample Analysis

MIT-RAD-09092

Analyte	Batch ID	Date Analyzed	LCS Result	Error 2 sigma	True Value	Percent Recovery	Data Qualifier
Gamma Spec							
Cs-137	R0064_20	9-10-92	169	24	195	87	
K-40	R0064_20	9-10-92	500	162	450	111	
U-234	R0108U_6	9-12-92	5.51	0.31	5.41	102	
U-235	R0108U_6	9-12-92	NA				
U-238	R0108U_6	9-12-92	5.59	0.31	5.41	103	
Th-230	R0108T_4	9-12-92	NA				
Th-232	R0108T_4	9-12-92	5.70	0.31	5.43	105	
Th-228	R0108T_4	9-12-92	NA				

JOHNSON CITY, TN 37601 ☐ CENTRAL LAKE, MI 49622

Lockheed
Engineering & Sciences Company
975 Kelly Johnson Drive
Las Vegas, NV 89119-3705

RGE

SHIPPED VIA: Overnight FED EXPRESS PQ

USE (CHECK ONE)

- ☐ SCRAP SALES
- ☐ SALE OF ASSETS
- ☐ OUTSIDE PROCESSING
- ☐ TRANSFERS BETWEEN TI LOCATIONS
- ☐ EXPENSE MATERIAL
- ☐ OTHER, EXPLAIN:

DIV/ACCT. # 50 CC: 516

QUANTITY	DESCRIPTION/PART #/PC	UNIT PRICE	TOTAL
1	Envelope containing samples	[redacted]	[redacted]

surveyed + Received 1 Tape Sealed Envelope
919192 0900
3E3

GROSS WEIGHT	NO. OF CONTAINERS	ORIGINATOR'S NAME (TYPED)	ORIGINATOR'S SIGNATURE
3	1	Michael J. Elliott	Michael J. Elliott

015140 5/84

0909250

Attachment C

5 Samples of Contaminated Soil for

Pre-excavation Survey

August 5, 1992

* * * *

Radiological Analysis

Lockheed Analytical Laboratory

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

SAMPLE ANALYSIS
SUMMARY PACKAGE

FOR

RADIOCHEMISTRY

JOB NAME: M-I-T-NRL-08052

QUOTATION NUMBER: NA

DOCUMENT FILE NUMBER: 0805319

Lockheed
Engineering & Sciences Company

ANALYTICAL LABORATORY
975 Kelly Johnson Drive, Las Vegas, Nevada 89119-3705

August 14, 1992

Mr. Frank Williams
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
138 Albany Street
Cambridge, MA 02139

RE:	Job Name:	M-I-T-NRL-08052
	Quotation No.:	NA
	Document File No.:	0805319

The attached data package contains the results of analyses on samples that were submitted to the Lockheed Analytical Laboratory on August 5, 1992. The samples were received in good condition.

SUMMARY ANALYSIS STATEMENT:

Sample Preperation

All of the samples were soil with some rocks, sticks and clumps. Obvious non-representative material such as rocks and sticks were removed prior to analysis. All samples, except for 165N 122.5 B which did not require sieving, were sieved prior to analysis. All results are reported on a dry weight basis.

Thorium Isotopic Analysis

The samples were analyzed using LAL-91-SOP-0108 which is an ion exchange separation for thorium. The yield is traced with Th-229. There were no problems with the sample analysis. The Method Blank analyzed with the samples had a low yield. The Th-232 activity which is tracked in the blank was within limits. All other QC was also within limits.

Uranium Isotopic Analysis

The samples were analyzed using LAL-91-SOP-0108 which is a two column ion exchange separation for uranium, followed by alpha spectroscopy. The chemical yield is traced using U-232. Sample number 165N 122.5 B had a low chemical yield. We feel that the analytical result is accurate. A comparison of the U-238 and U_235 from the alpha spectrometric analysis and the Th-234 and U-235 from the Gamma spectrum analysis showed reasonable agreement considering that this is a soil sample with a 1 g aliquot used for alpha spectroscopic analysis and a 250 g aliquot used for gamma spectroscopic analysis.

Gamma Spectrum Analysis

The Samples were analyzed using LAL-91-SOP-0064 which describes analysis of solids using gamma spectroscopy. There were no problems with the sample analysis. All Gamma Detector QC data was within limits. Duplicate samples were analyzed on sample 182.5N 150E T with all major analytes showing good agreement. Both results are supplied.

Cross Comparisons

A comparison of the U-238 and U-235 from the uranium isotopic analysis with the Th-234 and the U-235 from the gamma spectrum analysis showed reasonable agreement considering that a 1 g aliquot was used for the uranium isotopic analysis and that the sample seems to have some degree of inhomogeneity.

If you have any questions concerning the analysis or the data please do not hesitate to contact Mary Ford, (702) 361-3955.

Release of this data report has been authorized by the Laboratory Director or the Director's designee as evidenced by the following signature.

Sincerely,

Michael J. Butler

Michael J. Butler, Ph.D.
Client Services Manager

MB/jsf

cc: Client Services
Document Control Department

LAL Data Qualifiers

Quality Assurance Department

B - Any constituent that was also detected in the blank whose concentration was greater than the method detection limit (MDL) and contributed greater than 20 percent to the sample concentration.

D - Constituent detected in the diluted sample.

E - Constituent concentration exceeded the calibration/linear range.

H - Sample analysis performed outside of method-specified maximum holding time requirement.

J - Constituent detected at a level less than the reporting detection limit (RDL) and greater than or equal to the MDL (CLP data packages only).

P - Relative percent difference (RPD) for replicate analysis exceeded acceptance limits.

R - Data obtained from reanalysis.

S - Matrix spike recovery outside of acceptance limits.

X - Constituent confirmed by GC/MS or by second column organic analysis (CLP data packages only).

lient Sample ID: 165N 122.5 B
ate Collected: 05-AUG-92
latrix: SOIL

LAL Sample ID: A29339
Date Received: 05-AUG-92
Job Name: M-I-T-NRL-08052

Constituent	Batch	Activity	Estimated Uncertainty	MDA	Data Qual	Units
amma Spec Analysis	R0064_11	attached				pCi/g
'h-228	R0108T_1	3.68	0.26	0.040		pCi/g
'h-230	R0108T_1	1.21	0.13	0.004		pCi/g
h-232	R0108T_1	3.25	0.24	0.014		pCi/g
-233/4	R0108U_3	47.7	5.9	0.18		pCi/g
!-235	R0108U_3	2.20	0.47	0.085		pCi/g
'-238	R0108U_3	117	14.	0.025		pCi/g

'omments on Data Qualifiers:

e Collected: 05-AUG-92 Date Received: 05-AUG-92
rix: SOIL Job Name: M-I-T-NRL-08052

onstituent	Batch	Activity	Estimated Uncertainty	MDA	Data Qual	Units
ma Spec Analysis	R0064_11	attached	0	0		pCi/g
228	R0108T_1	1.33	0.15	0.036		pCi/g
230	R0108T_1	1.53	0.16	0.014		pCi/g
232	R0108T_1	0.80	0.11	0.018		pCi/g
33/4	R0108U_3	38.8	3.1	0.020		pCi/g
35	R0108U_3	1.87	0.28	0.010		pCi/g
38	R0108U_3	36.7	3.0	0.010		pCi/g

ments on Data Qualifiers:

:rix: SOIL Job Name: M-I-T-NRL-08052

:onstituent	Batch	Activity	Estimated Uncertainty	MDA	Data Qual	Units
ma Spec Analysis	R0064_11	attached	0	0		pCi/g
228	R0108T_1	1.61	0.18	0.051		pCi/g
230	R0108T_1	1.84	0.19	0.016		pCi/g
232	R0108T_1	1.06	0.14	0.016		pCi/g
:33/4	R0108U_3	9.62	0.59	0.025		pCi/g
:35	R0108U_3	0.567	0.089	0.012		pCi/g
:38	R0108U_3	7.77	0.49	0.012		pCi/g

ments on Data Qualifiers:

rix: SOIL Job Name: M-I-T-NRL-08052

onstituent	Batch	Activity	Estimated Uncertainty	MDA	Data Qual	Units
ma Spec Analysis	R0064_11	attached	0	0		pCi/g
228	R0108T_1	2.81	0.28	0.065		pCi/g
230	R0108T_1	2.39	0.25	0.020		pCi/g
232	R0108T_1	2.60	0.27	0.020		pCi/g
33/4	R0108U_3	77.3	6.2	0.082		pCi/g
35	R0108U_3	3.57	0.44	0.011		pCi/g
38	R0108U_3	40.3	3.3	0.011		pCi/g

ments on Data Qualifiers:

atrix: SOIL Job Name: M-I-T-NRL-08052

Constituent	Batch	Activity	Estimated Uncertainty	MDA	Data Qual	Units
amma Spec Analysis	R0064_11	attached	0	0		pCi/g
h-228	R0108T_1	1.52	0.20	0.062		pCi/g
h-230	R0108T_1	1.75	0.21	0.008		pCi/g
h-232	R0108T_1	1.00	0.15	0.020		pCi/g
-233/4	R0108U_3	1.16	0.12	0.007		pCi/g
-235	R0108U_3	0.076	0.028	0.004		pCi/g
-238	R0108U_3	0.89	0.10	0.004		pCi/g

omments on Data Qualifiers:

EG&G ORTEC OMNIGAM (191)   13.02.42 14-AUG-92 11:52:15   Page   1
Spectrum name: AA0302.SPC

Sample description
165N, 122.5 E, MIT soil (not sieved), in tuna can, no. AA0302
Parent #A29339; Batch R0064_11; 249.71 g

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

NUCLIDE		TIME OF COUNT ACTIVITY pCi/g	UNCERTAINTY 2 SIGMA COUNTING pCi/g	TOTAL pCi/g
TH-234		1.3423E+02	2.69	31.62
RA-226	<	3.17E+00		
PB-214		6.9121E-01	.09	.10
BI-214		5.3139E-01	.09	.10
PB-210	<	3.95E+00		
U-235		3.3579E+00	.09	.23
AC-228		1.1348E+00	.18	.19
PB-212		1.0623E+00	.09	.12
BI-212		1.0584E+00	.55	.55
TL-208		3.0311E-01	.06	.06
K-40		1.6894E+01	.99	1.44
CO-60	<	2.98E-02		
CS-134	<	9.73E-02		
CS-137		6.6780E-02	.04	.04
MN-54	<	3.86E-02		
EU-152	<	1.91E-01		
EU-154	<	1.21E-01		
EU-155	<	6.79E-01		
RU-106	<	4.33E-01		
AG-110M	<	7.26E-02		
SB-125	<	1.36E-01		

-------------------------- S U M M A R Y --------------------------

EG&G ORTEC OMNIGAM (191)   13.02.42 14-AUG-92 11:53:19   Page   1
Spectrum name: AA0303.SPC

Sample description
165N 185E B, MIT soil (sieved) tuna can AA0303
LAL parent AA29340   Batch R0064_11

***** S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E *****

NUCLIDE		TIME OF COUNT ACTIVITY pCi/g	UNCERTAINTY 2 SIGMA COUNTING pCi/g	TOTAL pCi/g
TH-234		4.7362E+01	1.34	11.20
RA-226	<	2.67E+00		
PB-214		5.2856E-01	.08	.09
BI-214		4.3875E-01	.07	.08
PB-210	<	2.56E+00		
U-235		2.7025E+00	.08	.19
AC-228		9.4794E-01	.12	.13
PB-212		8.6022E-01	.07	.09
BI-212		9.3667E-01	.40	.41
TL-208		2.8897E-01	.05	.05
K-40		1.7895E+01	.99	1.48
CO-60	<	1.93E-02		
CS-134	<	7.67E-02		
CS-137		7.8499E-02	.04	.04
MN-54	<	3.84E-02		
EU-152	<	1.17E-01		
EU-154	<	7.50E-02		
EU-155	<	4.08E-01		
Ru-106	<	3.49E-01		
AG-110M	<	6.42E-02		
SB-125	<	8.21E-02		

EG&G ORTEC OMNIGAM (191) I3.02.42 14-AUG-92 12:01:29 Page 1
Spectrum name: AA0304.SPC

Sample description
175N, 130E Bottom, MIT soil (sieved), in tuna can, no. AA0304
Parent #A29341; Batch R0064_11; 220.98 g

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

NUCLIDE		TIME OF COUNT ACTIVITY pCi/g	UNCERTAINTY 2 SIGMA COUNTING pCi/g	TOTAL pCi/g
TH-234		8.3127E+00	.95	2.18
RA-226	<	1.19E+00		
PB-214		8.8499E-01	.07	.10
BI-214		8.6841E-01	.07	.09
PB-210	<	2.86E+00		
U-235		4.8227E-01	.04	.05
AC-228		1.0172E+00	.10	.12
PB-212		1.0759E+00	.07	.10
BI-212		1.0139E+00	.42	.43
TL-208		3.5638E-01	.03	.04
K-40	#	2.3270E+01	.82	1.74
CO-60	<	2.52E-02		
CS-134	<	6.92E-02		
CS-137	<	2.97E-02		
MN-54	<	3.96E-02		
EU-152	<	8.58E-02		
EU-154	<	5.77E-02		
EU-155	<	2.34E-01		
RU-106	<	3.02E-01		
AG-110M	<	2.94E-02		
SB-125	<	7.13E-02		

All peaks for activity calculation had bad shape.

Spectrum name: AA0305.SPC

Sample description
182.5N, 150E T, soil (sieved) in tuna can no. AA0305
251.01 g, Parent #AA29342, Batch R0064_11

***** S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E *****

NUCLIDE		TIME OF COUNT ACTIVITY pCi/g	UNCERTAINTY 2 SIGMA COUNTING pCi/g	TOTAL pCi/g
TH-234		3.8284E+01	1.55	9.12
RA-226	<	2.75E+00		
PB-214		7.8590E-01	.09	.11
BI-214		6.7465E-01	.09	.10
PB-210		8.9845E-01	.88	.88
U-235		2.5490E+00	.08	.18
AC-228		2.0994E+00	.24	.28
PB-212		2.1231E+00	.10	.17
BI-212		1.9559E+00	.92	.93
TL-208		6.5614E-01	.06	.07
K-40		1.7159E+01	.98	1.45
CO-60	<	3.64E-02		
CS-134	<	9.07E-02		
CS-137		2.1793E-01	.04	.04
MN-54	<	6.88E-02		
EU-152	<	2.04E-01		
EU-154	<	1.32E-01		
EU-155	<	3.89E-01		
Ru-106	<	3.35E-01		
AG-110M	<	7.99E-02		
SB-125	<	9.31E-02		

[illegible]G ORTEC OMNIGAM (191)   13.02.42   14-AUG-92 11:19:21   Page   1
Spectrum name: AA0306.SPC

Sample description
182.5N, 150E T, DUPLICATE, MIT soil (sieved) in tuna can
LAL Parent #AA5061, Batch R0064_11, Tuna Can #AA0306

***** S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E *****

NUCLIDE		TIME OF COUNT ACTIVITY pCi/g	UNCERTAINTY 2 SIGMA COUNTING pCi/g	UNCERTAINTY 2 SIGMA TOTAL pCi/g
TH-234		4.2607E+01	1.50	10.11
RA-226	<	2.91E+00		
PB-214		7.1977E-01	.09	.10
BI-214		6.4755E-01	.10	.11
PB-210	<	1.87E+00		
U-235		3.1854E+00	.08	.22
AC-228		2.4086E+00	.21	.27
PB-212		2.2438E+00	.10	.18
BI-212		2.3376E+00	.58	.60
TL-208		7.7360E-01	.06	.07
K-40		1.6502E+01	.97	1.41
CO-60	<	3.11E-02		
CS-134	<	9.50E-02		
CS-137		2.7562E-01	.04	.05
MN-54	<	3.57E-02		
EU-152	<	1.60E-01		
EU-154	<	9.70E-02		
[illegible]-155	<	4.05E-01		
[illegible]-106	<	2.58E-01		
AG-110M	<	8.60E-02		
SB-125	<	8.28E-02		

Spectrum name: AA0307.SPC

Sample description
240N, 180E T - MIT soil (sieved), in tuna can no. AA0307
Parent #A29343; Batch R0064_11; 263.43 g

***** SUMMARY OF NUCLIDES IN SAMPLE *****

NUCLIDE		TIME OF COUNT ACTIVITY pCi/g	UNCERTAINTY 2 SIGMA COUNTING pCi/g	TOTAL pCi/g
TH-234		1.5963E+00	.34	.51
RA-226		7.6939E-01	.39	.39
PB-214		6.9619E-01	.06	.08
BI-214		6.4407E-01	.06	.07
PB-210	<	2.30E+00		
U-235		5.8909E-02	.02	.02
AC-228		8.8911E-01	.08	.10
PB-212		8.6670E-01	.05	.08
BI-212		7.1304E-01	.36	.36
TL-208		2.9833E-01	.04	.04
K-40		1.8697E+01	.67	1.41
CO-60	<	1.68E-02		
CS-134	<	5.57E-02		
CS-137		4.4012E-02	.02	.02
MN-54	<	1.97E-02		
EU-152	<	7.35E-02		
EU-154	<	4.37E-02		
EU-155	<	1.41E-01		
Ru-106	<	2.02E-01		
AG-110M	<	3.50E-02		
SB-125	<	3.49E-02		

Reagent Blank Analysis

Analyte	Batch ID	Minimum Detectable Activity pCi/g	Acceptance Limit pCi/g	Date Analyzed	Reagent Blank Result pCi/g
U-234	R0108U_3	0.01	0.3	8-14-92	0.1
U-238	R0108U_3	0.02	0.3	8-14-92	0.1
Th-232	R0108T_1	0.12	0.14	8-14-92	0.02

Duplicate Sample Analysis

Analyte	Batch ID	Client Sample ID	LAL Sample ID	Date Analyzed	QC Sample Analyses			
					Sample Result pCi/L	Duplicate Result pCi/L	Relative Percent Difference (%)	Data Qualifier
U-234	R0108U_3	240N 180E T	A29343	8-14-92	1.16	1.50	26	*
U-238	R0108U_3	240N 180E T	A29343	8-14-92	0.89	1.28	36	*
Th-232	R0108T_1	240N 180E T	A29343	8-14-92	1.00	0.97	3	

Laboratory Control Sample

Analyte	Batch	Date Analyzed	QC Sample Analyses			
			Laboratory Control Sample Result pCi/L	Laboratory Control Sample Value pCi/L	(%) Recovery	Data Qualifier
U-234	R0108U_3	8-14-92	5.43	5.40	101	
U-238	R0108U_3	8-14-92	5.74	5.40	106	
Th-232	R0108T_1	8-14-92	11.0	10.9	101	

COMMENTS:

- The Replicates on the uranium are not within limits. This is believed to be due to micro-inhonogenieties in the samples. A hot particle in the sample could account for this difference.

Attachment D

4 Composite Soil Samples from

Pilot Excavation

June 10, 1992

* * * *

Radiological Analysis

Lockheed Analytical Laboratory

TEXAS INSTRUMENTS

SAMPLE ANALYSIS
SUMMARY PACKAGE

FOR

TOTAL URANIUM, THORIUM ISOTOPIC,
URANIUM ISOTOPIC, AND GAMMA SPECTRUM
ANALYSIS FOR RADIUM-226

JOB NAME: TEX-INST-06102

QUOTATION NUMBER: Q216101

DOCUMENT FILE NUMBER: 0610280

Lockheed
Engineering & Sciences Company

ANALYTICAL LABORATORY
975 Kelly Johnson Drive, Las Vegas, Nevada 89119-3705

July 8, 1992

Mr. Fred McWilliams
Texas Instruments
138 Albany Street
Cambridge, MA 02139

RE:	Job Name:	TEX-INST-06102
	Quotation No.:	Q216101
	Document File No.:	0610280

The attached data package contains the results of analyses on samples that were submitted to the Lockheed Analytical Laboratory on June 10, 1992. The samples were received in good condition.

SUMMARY ANALYSIS STATEMENT:

Sample Preparation and Screening.

The samples consisted of wet soil and gravel. The samples were dried at 103°C overnight, sieved through a 4 mm sieve to remove gravel and other large particles. Composite numbers 1-3 showed little or no activity on the material on the top of the 4 mm screen. The material which was sieved through the 4 mm sieve was used for analysis. Composite Number 4 was sieved in the same manner. Metal turnings and shavings were evident in the material on the top of the 4 mm sieve. The metal shavings exhibited a significant portion of the activity of the sample. The metal shavings were added back to the sieved sample in the same ratio as they were taken out. As composite number 4 was obviously not homogeneous, duplicate aliquots of this sample were prepared for dissolution with the sample size doubled to help achieve a representative sub-sample for analysis. An aliquot of the dissolved material was taken for analysis. All results are reported on a dry weight basis.

Total Uranium Analysis.

There were no problems with the total uranium analysis. All QC met criteria.

Thorium isotopic Analysis.

Two different aliquot sizes were taken for Thorium analysis on the composite four sample. The larger sample size resulted in an unacceptable sample to spike ratio and the data is unacceptable. The data reported is on the smaller sample portion as the spike to sample was in the acceptable range. The blank showed a small amount of natural thorium contamination, which is not significant for the thorium levels determined in the samples. The Laboratory Control Sample and the Duplicate samples were within acceptance criteria.

Uranium Isotopic Analysis.

The Uranium analysis were repeated. The yields on the repeat samples were in the acceptable range except for the Composite four sample. The composite four sample was analyzed in duplicate. The duplicate results for the composite four sample are within the acceptance limits. The blank showed a trace of natural uranium contamination, which is usual for samples which require dissolution with mineral acids. The amount of background uranium present is not significant in comparison to the amount of uranium determined in the samples. The LCS is within QC limits.

Gamma Spectrum Analysis for Radium-226

The samples were sealed in aluminum cans and allowed to ingrow for at least 21 days. The density of the samples was less than the density of the corresponding calibration standard. At the energy of the gamma rays used for calculation, a positive bias of less than 5% is expected. All gama detector QC was within limits.

If you have any questions concerning the analysis or the data please do not hesitate to contact Linda Cardenas, (702) 361-3955, ext. 273.

Release of this data report has been authorized by the Laboratory Director or the Director's designee as evidenced by the following signature.

Sincerely,

Michael J. Butler

Michael J. Butler, Ph.D.
Client Services Manager

MB/at

cc: Client Services
Document Control Department

Client Sample ID: COMPOSITE #1 | LAL Sample ID: A25476
Date Collected: 07-JUN-92 | Date Received: 10-JUN-92
Matrix: SOIL | Job Name: TEX-INST-....06102

Constituent	Batch	Activity	Estimated Uncertainty	MDA	Data Qual	Units
Radium-226	R0064_8	1.6	0.13	0.11		pCi/g
U-234	R0108_2	11	0.15	0.014		pCi/g
U-235	R0108_2	0.91	0.042	0.005		pCi/g
U-238	R0108_2	4.3	0.090	0.018		pCi/g
Th-228	R0108_2	1.3	0.050	0.030		pCi/g
Th-230	R0108_2	1.6	0.050	0.005		pCi/g
Th-232	R0108_2	1.1	0.040	0.010		pCi/g
Uranium - KPA	R0168_10	9.1	0.31	0.097		ug/g

Comments on Data Qualifiers:

ate Collected: 07-JUN-92 Date Received: 10-JUN-92
atrix: SOIL Job Name: TEX-INST-....06102

Constituent	Batch	Activity	Estimated Uncertainty	MDA	Data Qual	Units
adium-226	R0064_8	1.2	0.090	0.050		pCi/g
-234	R0108_2	20	0.23	0.019		pCi/g
-235	R0108_2	1.6	0.064	0.019		pCi/g
-238	R0108_2	7.0	0.13	0.007		pCi/g
h-228	R0108_2	0.90	0.043	0.033		pCi/g
h-230	R0108_2	1.2	0.050	0.020		pCi/g
h-232	R0108_2	0.69	0.040	0.010		pCi/g
ranium	R0168_10	14	0.47	0.099		ug/g

omments on Data Qualifiers:

ıte Collected: 07-JUN-92 Date Received: 10-JUN-92
ıtrix: SOIL Job Name: TBX-INST-....06102

Constituent	Batch	Activity	Estimated Uncertainty	MDA	Data Qual	Units
ıdium-226	R0064_8	1.7	0.17	0.17		pCi/g
234	R0108_2	16	0.32	0.017		pCi/g
235	R0108_2	1.8	0.11	0.046		pCi/g
238	R0108_2	32	0.45	0.017		pCi/g
ı-228	R0108_2	1.5	0.070	0.030		pCi/g
ı-230	R0108_2	1.7	0.070	0.020		pCi/g
ı-232	R0108_2	1.8	0.070	0.030		pCi/g
'anium	R0168_10	55	1.9	0.099		ug/g

ımments on Data Qualifiers:

)ate Collected: 07-JUN-92 Date Received: 10-JUN-92
łatrix: SOIL Job Name: TEX-INST-....06102

Constituent	Batch	Activity	Estimated Uncertainty	MDA	Data Qual	Units
ładium-226	R0064_8	1.6	0.28	0.51		pCi/g
]-234	R0108_2	1100	26.	1.7		pCi/g
]-235	R0108_2	79	7.0	1.7		pCi/g
]-238	R0108_2	3200	45.	1.7		pCi/g
'h-228	R0108_2	110	2.6	0.70		pCi/g
'h-230	R0108_2	4.8	0.55	0.45		pCi/g
'h-232	R0108_2	110	2.6	0.20		pCi/g
]ranium	R0168_10	800	27.	0.36		ug/g

'omments on Data Qualifiers:

118945

Reagent Blank Analysis

Analyte	Batch ID	Minimum Detectable Activity pCi/g	Acceptance Limit pCi/g	Date Analyzed	Reagent Blank Result pCi/g
U-234	R0108_2	.012	0.6	6-18-92	0.4
U-238	R0108_2	0.005	0.6	6-18-91	0.08
Th-232	R0108_2	0.004	0.1	6-18-92	0.000
U-Total μg/g	R0168_10	0.1	0.1	6-13-92	0.009

Duplicate Sample Analysis

Analyte	Batch ID	Client Sample ID	LAL Sample ID	Date Analyzed	QC Sample Analyses			
					Sample Result pCi/L	Duplicate Result pCi/L	Relative Percent Difference (%)	Data Qualifier
Ra-226	R0064_8	Comp 2	A25477	7-3-92	1.19	1.45	20	
U-234	R0108_2	Comp 4	A25479	6-18-92	1120	967	14	
U-238	R0108_2	Comp 4	A25479	6-18-92	3210	2780	13	
Th-232	R0108_2	Comp 4	A25479	6-18-92	112	108	4	
U-Total μg/g	R0168_10	Comp 4	A25479	6-18-92	802	740	8	

Laboratory Control Sample

Analyte	Batch	Date Analyzed	QC Sample Analyses			
			Laboratory Control Sample Result pCi/L	Laboratory Control Sample Value pCi/L	(%) Recovery	Data Qualifier
U-234	R0108_2	6-18-92	5.55	5.4	103	
U-236	R0108_2	6-18-92	5.50	5.40	102	
Th-232	R0108_2	6-18-92	5.31	5.45	97	
U-total μg/g	R0168_10	6-13-92	34	36.6	93	

COMMENTS:

Attachment E

Composite Sample of Contaminated Soils

from Pilot Excavation

August 17, 1992

*** * * ***

TCLP Analysis

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: SREAC-SPEC-S Matrix: SOIL QC Lot: 02 SEP 92-9A QC Run: 02 SEP 92-9A			
Sulfide, Reactive	ND	mg/kg	0.50
Test: CNREAC-TEC-S Matrix: SOIL QC Lot: 02 SEP 92-9A QC Run: 02 SEP 92-9A			
Cyanide, Reactive	ND	mg/kg	0.10

QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
024553-0002-SA	SOIL	SR-S	02 SEP 92-9A	02 SEP 92-9A
024553-0002-SA	SOIL	CNR-S	02 SEP 92-9A	02 SEP 92-9A
024553-0002-SA	AQUEOUS	PH-A	31 AUG 92-9A	-

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Category: SR-S
Matrix: SOIL
QC Lot: 02 SEP 92-9A
Concentration Units: mg/kg

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precisi (RPD) DCS	Lim
Sulfide, Reactive	100.0	ND	ND	NC	NC	0-200	NC	2

Category: CNR-S
Matrix: SOIL
QC Lot: 02 SEP 92-9A
Concentration Units: mg/kg

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precisi (RPD) DCS	Lim
Cyanide, Reactive	100	ND	ND	NC	NC	0-100	NC	2

Category: PH-A
Matrix: AQUEOUS
QC Lot: 31 AUG 92-9A
Concentration Units: units

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precisi (RPD) DCS	Lim
pH	9.0	9.07	9.07	9.07	101	98-102	0.0	

ND = Not detected
NC = Not calculated, calculation not applicable
NA = Not applicable

Calculations are performed before rounding to avoid round-off errors in calculated results

METHOD BLANK REPORT
Metals Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: ICP-OTC-TCLP-L			
Matrix: SOIL			
QC Lot: 25 AUG 92-9A QC Run: 25 AUG 92-9A			
Arsenic	ND	mg/L	1.0
Barium	0.17	mg/L	0.10
Cadmium	ND	mg/L	0.050
Chromium	ND	mg/L	0.10
Lead	ND	mg/L	0.50
Silver	ND	mg/L	0.10
Test: HG-CVAA-TCLP-L			
Matrix: SOIL			
QC Lot: 27 AUG 92-4A QC Run: 27 AUG 92-4A			
Mercury	ND	mg/L	0.0020
Test: SE-FAA-TCLP-L			
Matrix: SOIL			
QC Lot: 25 AUG 92-9X QC Run: 25 AUG 92-9X			
Selenium	ND	mg/L	0.050

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Category: ICP-TL
Matrix: LEACHATE
QC Lot: 25 AUG 92-9A
Concentration Units: mg/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precisio(n) (RPD) Limi(ts)
Aluminum	20.0	20.4	19.7	20.1	100	75-125	3.8	2
Antimony	5.0	4.76	4.94	4.85	97	75-125	3.7	2
Arsenic	5.0	4.94	4.76	4.85	97	75-125	3.7	2
Barium	20	19.3	18.6	18.9	95	75-125	3.2	2
Beryllium	0.5	0.532	0.512	0.522	104	75-125	3.7	2
Cadmium	0.50	0.520	0.497	0.508	102	75-125	4.4	2
Chromium	2.0	1.89	1.96	1.93	96	75-125	3.6	2
Cobalt	5.0	4.74	4.61	4.67	93	75-125	2.7	2
Copper	2.5	2.82	2.60	2.71	109	75-125	8.1	2
Iron	10.0	10.5	10.2	10.3	103	75-125	2.8	2
Lead	5.0	4.89	4.72	4.80	96	75-125	3.4	2
Manganese	5.0	4.77	4.63	4.70	94	75-125	3.0	2
Nickel	5.0	4.85	4.77	4.81	96	75-125	1.7	2
Silver	0.50	0.486	0.500	0.493	99	75-125	2.7	2
Vanadium	5.0	4.87	4.73	4.80	96	75-125	3.0	2
Zinc	5.0	5.12	5.03	5.07	101	75-125	1.7	2

Category: HG-CVAA-TL
Matrix: LEACHATE
QC Lot: 27 AUG 92-4A
Concentration Units: mg/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precisio(n) (RPD) Limi(ts)
Mercury	0.010	0.00934	0.00954	0.00944	94	75-125	2.1	2

Category: GFAA-TL
Matrix: LEACHATE
QC Lot: 25 AUG 92-9X
Concentration Units: mg/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precisio(n) (RPD) Limi(ts)
Selenium	0.30	0.284	0.284	0.284	95	75-125	0.0	2

Calculations are performed before rounding to avoid round-off errors in calculated results.

QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
024553-0002-SA	LEACHATE	ICP-TL	25 AUG 92-9A	25 AUG 92-9A
024553-0002-SA	LEACHATE	HG-CVAA-TL	27 AUG 92-4A	27 AUG 92-4A
024553-0002-SA	LEACHATE	GFAA-TL	25 AUG 92-9X	25 AUG 92-9X

METHOD BLANK REPORT
Semivolatile Organics by GC

Analyte	Result	Units	Reporting Limit
Test: 8080CP-OTC-TL			
Matrix: SOIL			
QC Lot: 25 AUG 92-9A QC Run: 25 AUG 92-9A			
gamma-BHC (Lindane)	ND	mg/L	0.00050
Chlordane	ND	mg/L	0.0050
Endrin	ND	mg/L	0.0010
Heptachlor (and its epoxide)	ND	mg/L	0.00050
Methoxychlor	ND	mg/L	0.0050
Toxaphene	ND	mg/L	0.050
Test: 8150-OTC-TCLP-L			
Matrix: SOIL			
QC Lot: 21 AUG 92-4A QC Run: 26 AUG 92-4A			
2,4-D	ND	mg/L	0.0050
2,4,5-TP (Silvex)	ND	mg/L	0.0010

SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: OCP-TL Matrix: LEACHATE QC Lot: 25 AUG 92-9A QC Run: 25 AUG 92-9A Concentration Units: mg/L				
Dibutyl chlorendate	0.0100	0.0107	107	41-135
Category: HERB-TL Matrix: LEACHATE QC Lot: 21 AUG 92-4A QC Run: 26 AUG 92-4A Concentration Units: mg/L				
DCAA	0.0500	0.0302	60	51-138

Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precisi (RPD) DCS	Lin
Category: OCP-TL								
Matrix: LEACHATE								
QC Lot: 25 AUG 92-9A								
Concentration Units: mg/L								
gamma-BHC (Lindane)	0.002	0.00163	0.00156	0.00160	80	56-111	4.4	
Heptachlor	0.002	0.00168	0.00164	0.00166	83	50-121	2.4	
Aldrin	0.002	0.00139	0.00137	0.00138	69	49-109	1.4	
Dieldrin	0.005	0.00383	0.00373	0.00378	76	47-111	2.6	
Endrin	0.005	0.00403	0.00392	0.00398	80	50-123	2.8	
4,4'-DDT	0.005	0.00425	0.00413	0.00419	84	45-117	2.9	
Category: HERB-TL								
Matrix: LEACHATE								
QC Lot: 21 AUG 92-4A								
Concentration Units: mg/L								
2,4-D	0.050	ND	ND	NC	NC	36-126	NC	
2,4,5-TP (Silvex)	0.010	ND	ND	NC	NC	52-135	NC	
2,4,5-T	0.010	ND	ND	NC	NC	41-158	NC	

ND = Not detected
NC = Not calculated, calculation not applicable
NA = Not applicable

Calculations are performed before rounding to avoid round-off errors in calculated results

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
024553-0002-SA	LEACHATE	OCP-TL	25 AUG 92-9A	25 AUG 92-9A
024553-0002-SA	LEACHATE	HERB-TL	21 AUG 92-4A	26 AUG 92-4A

METHOD BLANK REPORT
Semivolatile Organics by GC/MS (cont.)

Test: 8270-TCL-TCLP-L
Matrix: SOIL
QC Lot: 23 AUG 92-9A QC Run: 23 AUG 92-9A

Analyte	Result	Units	Reporting Limit
2,6-Dinitrotoluene	ND	mg/L	0.050
Diethyl phthalate	ND	mg/L	0.050
4-Chlorophenyl phenyl ether	ND	mg/L	0.050
Fluorene	ND	mg/L	0.050
4-Nitroaniline	ND	mg/L	0.25
4,6-Dinitro-2-methylphenol	ND	mg/L	0.25
N-Nitrosodiphenylamine	ND	mg/L	0.050
4-Bromophenyl phenyl ether	ND	mg/L	0.050
Hexachlorobenzene	ND	mg/L	0.050
Pentachlorophenol	ND	mg/L	0.25
Phenanthrene	ND	mg/L	0.050
Anthracene	ND	mg/L	0.050
Di-n-butyl phthalate	ND	mg/L	0.050
Fluoranthene	ND	mg/L	0.050
Pyrene	ND	mg/L	0.050
Butyl benzyl phthalate	ND	mg/L	0.050
3,3'-Dichlorobenzidine	ND	mg/L	0.10
Benzo(a)anthracene	ND	mg/L	0.050
bis(2-Ethylhexyl) phthalate	ND	mg/L	0.050
Chrysene	ND	mg/L	0.050
Di-n-octyl phthalate	ND	mg/L	0.050
Benzo(b)fluoranthene	ND	mg/L	0.050
Benzo(k)fluoranthene	ND	mg/L	0.050
Benzo(a)pyrene	ND	mg/L	0.050
Indeno(1,2,3-cd)pyrene	ND	mg/L	0.050
Dibenz(a,h)anthracene	ND	mg/L	0.050
Benzo(g,h,i)perylene	ND	mg/L	0.050

METHOD BLANK REPORT
Semivolatile Organics by GC/MS

Test: 8270-TCL-TCLP-L
Matrix: SOIL
QC Lot: 23 AUG 92-9A QC Run: 23 AUG 92-9A

Analyte	Result	Units	Reporting Limit
Phenol	ND	mg/L	0.050
bis(2-Chloroethyl) ether	ND	mg/L	0.050
2-Chlorophenol	ND	mg/L	0.050
1,3-Dichlorobenzene	ND	mg/L	0.050
1,4-Dichlorobenzene	ND	mg/L	0.050
Benzyl alcohol	ND	mg/L	0.050
1,2-Dichlorobenzene	ND	mg/L	0.050
2-Methylphenol	ND	mg/L	0.050
bis(2-Chloroisopropyl)-ether	ND	mg/L	0.050
4-Methylphenol	ND	mg/L	0.050
N-Nitroso-di-n-propylamine	ND	mg/L	0.050
Hexachloroethane	ND	mg/L	0.050
Nitrobenzene	ND	mg/L	0.050
Isophorone	ND	mg/L	0.050
2-Nitrophenol	ND	mg/L	0.050
2,4-Dimethylphenol	ND	mg/L	0.050
Benzoic acid	ND	mg/L	0.25
bis(2-Chloroethoxy)-methane	ND	mg/L	0.050
2,4-Dichlorophenol	ND	mg/L	0.050
1,2,4-Trichlorobenzene	ND	mg/L	0.050
Naphthalene	ND	mg/L	0.050
4-Chloroaniline	ND	mg/L	0.050
Hexachlorobutadiene	ND	mg/L	0.050
4-Chloro-3-methylphenol	ND	mg/L	0.050
2-Methylnaphthalene	ND	mg/L	0.050
Hexachlorocyclopentadiene	ND	mg/L	0.050
2,4,6-Trichlorophenol	ND	mg/L	0.050
2,4,5-Trichlorophenol	ND	mg/L	0.25
2-Chloronaphthalene	ND	mg/L	0.050
2-Nitroaniline	ND	mg/L	0.25
Dimethyl phthalate	ND	mg/L	0.050
Acenaphthylene	ND	mg/L	0.050
3-Nitroaniline	ND	mg/L	0.25
Acenaphthene	ND	mg/L	0.050
2,4-Dinitrophenol	ND	mg/L	0.25
4-Nitrophenol	ND	mg/L	0.25
Dibenzofuran	ND	mg/L	0.050
2,4-Dinitrotoluene	ND	mg/L	0.050

SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Category: BNA-TL
Matrix: LEACHATE
QC Lot: 23 AUG 92-9A QC Run: 23 AUG 92-9A
Concentration Units: mg/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Nitrobenzene-d5	0.500	0.406	81	44-103
2-Fluorobiphenyl	0.500	0.418	84	41- 99
Terphenyl-d14	0.500	0.590	118	41-126
Phenol-d5	1.00	0.759	76	25-112
2-Fluorophenol	1.00	0.692	69	37-100
2,4,6-Tribromophenol	1.00	0.860	86	40-115

Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Category: BNA-TL
Matrix: LEACHATE
QC Lot: 23 AUG 92-9A
Concentration Units: mg/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limi
Phenol	0.50	0.361	0.355	0.358	72	42-109	1.7	3
2-Chlorophenol	0.50	0.376	0.364	0.370	74	50-104	3.2	3
1,4-Dichlorobenzene	0.25	0.165	0.163	0.164	66	31-101	1.2	3
N-Nitroso-di-n-propylamine	0.25	0.182	0.185	0.184	73	49-109	1.6	3
1,2,4-Trichlorobenzene	0.25	0.168	0.176	0.172	69	29-100	4.7	3
4-Chloro-3-methylphenol	0.50	0.419	0.414	0.416	83	48-112	1.2	3
Acenaphthene	0.25	0.201	0.212	0.206	83	48- 99	5.3	2
4-Nitrophenol	0.50	0.481	0.501	0.491	98	29-124	4.1	5
2,4-Dinitrotoluene	0.25	0.212	0.214	0.213	85	52-104	0.9	2
Pentachlorophenol	0.50	0.463	0.474	0.468	94	25-132	2.3	4
Pyrene	0.25	0.242	0.246	0.244	98	51-116	1.6	2

Calculations are performed before rounding to avoid round-off errors in calculated results.

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
024553-0002-SA	LEACHATE	BNA-TL	23 AUG 92-9A	23 AUG 92-9A

METHOD BLANK REPORT
Volatile Organics by GC/MS

Test: 8240-TCL-TCLP-L
Matrix: SOIL
QC Lot: 25 AUG 92-J QC Run: 25 AUG 92-J

Analyte	Result	Units	Reporting Limit	
Chloromethane	ND	mg/L	0.050	
Bromomethane	ND	mg/L	0.050	
Vinyl chloride	ND	mg/L	0.050	
Chloroethane	ND	mg/L	0.050	
Methylene chloride	ND	mg/L	0.025	
Acetone	ND	mg/L	0.050	
Carbon disulfide	ND	mg/L	0.025	
1,1-Dichloroethene	ND	mg/L	0.025	
1,1-Dichloroethane	ND	mg/L	0.025	
1,2-Dichloroethene (cis/trans)	ND	mg/L	0.025	
Chloroform	ND	mg/L	0.025	
1,2-Dichloroethane	ND	mg/L	0.025	
2-Butanone	0.0080	mg/L	0.050	J
1,1,1-Trichloroethane	ND	mg/L	0.025	
Carbon tetrachloride	ND	mg/L	0.025	
Vinyl acetate	ND	mg/L	0.050	
Bromodichloromethane	ND	mg/L	0.025	
1,2-Dichloropropane	ND	mg/L	0.025	
trans-1,3-Dichloropropene	ND	mg/L	0.025	
Trichloroethene	ND	mg/L	0.025	
Dibromochloromethane	ND	mg/L	0.025	
1,1,2-Trichloroethane	ND	mg/L	0.025	
Benzene	ND	mg/L	0.025	
cis-1,3-Dichloropropene	ND	mg/L	0.025	
2-Chloroethyl vinyl ether	ND	mg/L	0.050	
Bromoform	ND	mg/L	0.025	
4-Methyl-2-pentanone	ND	mg/L	0.050	
2-Hexanone	ND	mg/L	0.050	
1,1,2,2-Tetrachloroethane	ND	mg/L	0.025	
Tetrachloroethene	ND	mg/L	0.025	
Toluene	ND	mg/L	0.025	
Chlorobenzene	ND	mg/L	0.025	
Ethylbenzene	ND	mg/L	0.025	
Styrene	ND	mg/L	0.025	
Xylenes (total)	ND	mg/L	0.025	

J = Result is detected below the reporting limit or is an estimated concentration.

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Category: VOA-MS-TL
Matrix: LEACHATE
QC Lot: 25 AUG 92-J QC Run: 25 AUG 92-J
Concentration Units: mg/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
1,2-Dichloroethane-d4	0.250	0.240	96	82-112
4-Bromofluorobenzene	0.250	0.242	97	83-123
Toluene-d8	0.250	0.266	106	84-128

Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Category: VOA-MS-TL
Matrix: LEACHATE
QC Lot: 25 AUG 92-J
Concentration Units: mg/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precisi (RPD) DCS	Precisi (RPD) Limi
1,1-Dichloroethene	0.250	0.275	0.230	0.252	101	56-138	18	[illegible]
Trichloroethene	0.250	0.247	0.246	0.246	99	76-109	0.4	[illegible]
Benzene	0.250	0.242	0.246	0.244	98	78-119	1.6	[illegible]
Toluene	0.250	0.240	0.230	0.235	94	82-114	4.3	[illegible]
Chlorobenzene	0.250	0.274	0.283	0.278	111	84-117	3.2	[illegible]

Calculations are performed before rounding to avoid round-off errors in calculated results.

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
024553-0001-SA	LEACHATE	VOA-MS-TL	25 AUG 92-J	25 AUG 92-J

All samples analyzed concurrently by the same test are assigned the same QC lot number. Projects which contain numerous samples, analyzed over several days, may have multiple QC lot numbers associated with each test. The QC information which follows includes a listing of the QC lot numbers associated with each of the samples reported, DCS and SCS (where applicable) recoveries from the QC lots associated with the samples, and control limits for these lots. The QC data is reported by test code, in the order that the tests are reported in the analytical results section of this report.

The Enseco QC program is based upon monitoring the precision and accuracy of an analytical method by analyzing a set of Duplicate Control Samples (DCS) at frequent, well-defined intervals. Each DCS is a well-characterized matrix which is spiked with target compounds at 5-100 times the reporting limit, depending upon the methodology being monitored. The purpose of the DCS is not to duplicate the sample matrix, but rather to provide an interference-free, homogeneous matrix from which to gather data to establish control limits. These limits are used to determine whether data generated by the laboratory on any given day is in control.

Control limits for accuracy (percent recovery) are based on the average, historical percent recovery +/- 3 standard deviation units. Control limits for precision (relative percent difference) range from 0 (identical duplicate DCS results) to the average, historical relative percent difference + 3 standard deviation units. These control limits are fairly narrow based on the consistency of the matrix being monitored and are updated on a quarterly basis.

For each batch of samples analyzed, an additional control measure is taken in the form of a Single Control Sample (SCS). The SCS consists of a control matrix that is spiked with surrogate compounds appropriate to the method being used. In cases where no surrogate is available, (e.g., metals or conventional analyses) a single DCS serves as the control sample. An SCS is prepared for each sample lot for which the DCS pair are not analyzed. The recovery of the SCS is charted in exactly the same manner as described for the DCS, and provides a daily check on the performance of the method.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\%\ \text{Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{|\text{Measured Concentration DCS1} - \text{Measured Concentration DCS2}|}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

IV. QUALITY CONTROL REPORT

The Enseco laboratories operate under a vigorous QA/QC program designed to ensure the generation of scientifically valid, legally defensible data by monitoring every aspect of laboratory operations. Routine QA/QC procedures include the use of approved methodologies, independent verification of analytical standards, use of duplicate Laboratory Control Samples to assess the precision and accuracy of the methodology on a routine basis, and a rigorous system of data review.

In addition, the Enseco laboratories maintain a comprehensive set of certifications from both state and federal governmental agencies which require frequent analyses of blind audit samples. Enseco - Rocky Mountain Analytical Laboratory is certified by the EPA under the EPA/CLP program for Organic analyses, under the USATHAMA (U.S. Army) program, by the Army Corps of Engineers, and the states of Colorado, New Jersey, Utah, and Florida, among others.

The standard laboratory QC package is designed to:

1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data,

2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix,

3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench, and

4) provide a standard set of reportables which assures the client of the quality of his data.

Client Name: Texas Instruments, Incorporated
Client ID: LOW LEVEL FOR TCLP
Lab ID: 024553-0002-SA
Matrix: SOIL   Sampled: 14 AUG 92   Received: 17 AUG 92
Authorized: 17 AUG 92   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Free Liquid	ND	%	0.1	9095	NA	09 SEP 92
Cyanide, Reactive	ND	mg/kg	0.10	EPA/OSW	NA	02 SEP 92
Ignitability	>160	deg. F	--	1010	NA	28 AUG 92
pH	6.7	units	--	9045	NA	31 AUG 92
Sulfide, Reactive	ND	mg/kg	0.50	EPA/OSW	NA	02 SEP 92

ND = Not detected
NA = Not applicable

Reported By: Kirsten Meier   Approved By: Julie Martinez

Client Nam xas Instruments, Incorporated
Client ID: W LEVEL FOR TCLP
Lab ID: ..553-0001-SA
Matrix: SOIL Sampled: 14 AUG 92 Received: 17 AUG 92
Authorized: 17 AUG 92 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Bulk Density	ND	g/cc	--	ASTM D70	NA	10 SEP 92
Specific Gravity	ND	g/cc		ASTM D1429	NA	10 SEP 92

ND = Not detected
NA = Not applicable

Reported By: John Laferty Approved By: John Laferty

Total Metals

TCLP Leachate

Client Name: Texas Instruments, Incorporated
Client ID: LOW LEVEL FOR TCLP
Lab ID: 024553-0002-SA
Matrix: SOIL

Sampled: 14 AUG 92
Received: 17 AUG 92
Authorized: 17 AUG 92

Leached: 20 AUG 92
Prepared: See Below
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	1.0	6010	25 AUG 92	25 AUG 92
Barium	0.30	mg/L	0.10	6010	25 AUG 92	25 AUG 92
Cadmium	ND	mg/L	0.050	6010	25 AUG 92	25 AUG 92
Chromium	ND	mg/L	0.10	6010	25 AUG 92	25 AUG 92
Lead	ND	mg/L	0.50	6010	25 AUG 92	25 AUG 92
Mercury	ND	mg/L	0.0020	7470	27 AUG 92	31 AUG 92
Selenium	ND	mg/L	0.050	7740	25 AUG 92	26 AUG 92
Silver	ND	mg/L	0.10	6010	25 AUG 92	25 AUG 92

ND = Not detected
NA = Not applicable

Reported By: Harold Borquez

Approved By: Richard Murphy

OIC Herbicides
TCLP Leachate
Method 8150

Client Name: Texas Instruments, Incorporated
Client ID: LOW LEVEL FOR TCLP
Lab ID: 024553-0002-SA
Matrix: SOIL

Sampled: 14 AUG 92
Received: 17 AUG 92
Authorized: 17 AUG 92

Leached: 20 AUG 92
Prepared: 26 AUG 92
Analyzed: 28 AUG 92

Parameter	Result	Units	Reporting Limit
2,4-D	ND	mg/L	0.0050
2,4,5-TP (Silvex)	ND	mg/L	0.0010
Surrogate	**Recovery**		
DCAA	59	%	

ND = Not detected
NA = Not applicable

Reported By: William Sullivan

Approved By: Mike Hoffman

Chlorinated Pesticides - Toxicity Characteristic List
TCLP Leachate
Method 8080

Client Name: Texas Instruments, Incorporated
Client ID: LOW LEVEL FOR TCLP
Lab ID: 024553-0002-SA
Matrix: SOIL

Sampled: 14 AUG 92
Received: 17 AUG 92
Authorized: 17 AUG 92

Leached: 20 AUG 92
Prepared: 25 AUG 92
Analyzed: 03 SEP 92

Parameter	Result	Units	Reporting Limit
gamma-BHC (Lindane)	ND	mg/L	0.00050
Chlordane	ND	mg/L	0.0050
Endrin	ND	mg/L	0.0010
Heptachlor (and its epoxide)	ND	mg/L	0.00050
Methoxychlor	ND	mg/L	0.0050
Toxaphene	ND	mg/L	0.050

Surrogate	Recovery	
Dibutyl chlorendate	113	%

ND = Not detected
NA = Not applicable

Reported By: William Sullivan

Approved By: Mike Hoffman

TCL Semivolatile Organics
TCLP Leachate (CONT.)
Method 8270

Client Name: Texas Instruments, Incorporated
Client ID: LOW LEVEL FOR TCLP
Lab ID: 024553-0002-SA   Sampled: 14 AUG 92   Leached: 20 AUG 92
Matrix: SOIL   Received: 17 AUG 92   Prepared: 25 AUG 92
Authorized: 17 AUG 92   Analyzed: 26 AUG 92

Parameter	Result	Units	Reporting Limit
2,6-Dinitrotoluene	ND	mg/L	0.050
Diethyl phthalate	ND	mg/L	0.050
4-Chlorophenyl phenyl ether	ND	mg/L	0.050
Fluorene	ND	mg/L	0.050
4-Nitroaniline	ND	mg/L	0.25
4,6-Dinitro-2-methylphenol	ND	mg/L	0.25
N-Nitrosodiphenylamine	ND	mg/L	0.050
4-Bromophenyl phenyl ether	ND	mg/L	0.050
Hexachlorobenzene	ND	mg/L	0.050
Pentachlorophenol	ND	mg/L	0.25
Phenanthrene	ND	mg/L	0.050
Anthracene	ND	mg/L	0.050
Di-n-butyl phthalate	ND	mg/L	0.050
Fluoranthene	ND	mg/L	0.050
Pyrene	ND	mg/L	0.050
Butyl benzyl phthalate	ND	mg/L	0.050
3,3'-Dichlorobenzidine	ND	mg/L	0.10
Benzo(a)anthracene	ND	mg/L	0.050
bis(2-Ethylhexyl) phthalate	ND	mg/L	0.050
Chrysene	ND	mg/L	0.050
Di-n-octyl phthalate	ND	mg/L	0.050
Benzo(b)fluoranthene	ND	mg/L	0.050
Benzo(k)fluoranthene	ND	mg/L	0.050
Benzo(a)pyrene	ND	mg/L	0.050
Indeno(1,2,3-cd)pyrene	ND	mg/L	0.050
Dibenz(a,h)anthracene	ND	mg/L	0.050
Benzo(g,h,i)perylene	ND	mg/L	0.050

Surrogate	Recovery	
Nitrobenzene-d5	71	%
2-Fluorobiphenyl	65	%
Terphenyl-d14	89	%
Phenol-d5	67	%
2-Fluorophenol	60	%
2,4,6-Tribromophenol	70	%

ND = Not detected
NA = Not applicable

Reported By: Paul Smith   Approved By: Shawn Kassner

TCL Semivolatile Organics
TCLP Leachate
Method 8270

Client Name: Texas Instruments, Incorporated
Client ID: LOW LEVEL FOR TCLP
Lab ID: 024553-0002-SA
Matrix: SOIL

Sampled: 14 AUG 92
Received: 17 AUG 92
Authorized: 17 AUG 92

Leached: 20 AUG 92
Prepared: 25 AUG 92
Analyzed: 26 AUG 92

Parameter	Result	Units	Reporting Limit
Phenol	ND	mg/L	0.050
bis(2-Chloroethyl) ether	ND	mg/L	0.050
2-Chlorophenol	ND	mg/L	0.050
1,3-Dichlorobenzene	ND	mg/L	0.050
1,4-Dichlorobenzene	ND	mg/L	0.050
Benzyl alcohol	ND	mg/L	0.050
1,2-Dichlorobenzene	ND	mg/L	0.050
2-Methylphenol	ND	mg/L	0.050
bis(2-Chloroisopropyl)-ether	ND	mg/L	0.050
4-Methylphenol	ND	mg/L	0.050
N-Nitroso-di-n-propylamine	ND	mg/L	0.050
Hexachloroethane	ND	mg/L	0.050
Nitrobenzene	ND	mg/L	0.050
Isophorone	ND	mg/L	0.050
2-Nitrophenol	ND	mg/L	0.050
2,4-Dimethylphenol	ND	mg/L	0.050
Benzoic acid	ND	mg/L	0.25
bis(2-Chloroethoxy)-methane	ND	mg/L	0.050
2,4-Dichlorophenol	ND	mg/L	0.050
1,2,4-Trichlorobenzene	ND	mg/L	0.050
Naphthalene	ND	mg/L	0.050
4-Chloroaniline	ND	mg/L	0.050
Hexachlorobutadiene	ND	mg/L	0.050
4-Chloro-3-methylphenol	ND	mg/L	0.050
2-Methylnaphthalene	ND	mg/L	0.050
Hexachlorocyclopentadiene	ND	mg/L	0.050
2,4,6-Trichlorophenol	ND	mg/L	0.050
2,4,5-Trichlorophenol	ND	mg/L	0.25
2-Chloronaphthalene	ND	mg/L	0.050
2-Nitroaniline	ND	mg/L	0.25
Dimethyl phthalate	ND	mg/L	0.050
Acenaphthylene	ND	mg/L	0.050
3-Nitroaniline	ND	mg/L	0.25
Acenaphthene	ND	mg/L	0.050
2,4-Dinitrophenol	ND	mg/L	0.25
4-Nitrophenol	ND	mg/L	0.25
Dibenzofuran	ND	mg/L	0.050
2,4-Dinitrotoluene	ND	mg/L	0.050

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Paul Smith

Approved By: Shawn Kassner

Client Name: Texas Instruments, Incorporated
Client ID: LOW LEVEL FOR TCLP
Lab ID: 024553-0001-SA
Matrix: SOIL

Sampled: 14 AUG 92
Received: 17 AUG 92
Authorized: 17 AUG 92

Leached: 19 AUG 92
Prepared: 19 AUG 92
Analyzed: 25 AUG 92

Surrogate	Recovery	
1,2-Dichloroethane-d4	95	%

ND = Not detected
NA = Not applicable

Reported By: Stephanie Boehnke   Approved By: Shawn Kassner

TCL Volatile Organics
TCLP Leachate
Method 8240

Client Name: Texas Instruments, Incorporated
Client ID: LOW LEVEL FOR TCLP
Lab ID: 024553-0001-SA   Sampled: 14 AUG 92   Leached: 19 AUG 92
Matrix: SOIL   Received: 17 AUG 92   Prepared: 19 AUG 92
Authorized: 17 AUG 92   Analyzed: 25 AUG 92

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	mg/L	0.050
Bromomethane	ND	mg/L	0.050
Vinyl chloride	ND	mg/L	0.050
Chloroethane	ND	mg/L	0.050
Methylene chloride	ND	mg/L	0.025
Acetone	ND	mg/L	0.050
Carbon disulfide	ND	mg/L	0.025
1,1-Dichloroethene	ND	mg/L	0.025
1,1-Dichloroethane	ND	mg/L	0.025
1,2-Dichloroethene (cis/trans)	ND	mg/L	0.025
Chloroform	ND	mg/L	0.025
1,2-Dichloroethane	ND	mg/L	0.025
2-Butanone	ND	mg/L	0.050
1,1,1-Trichloroethane	ND	mg/L	0.025
Carbon tetrachloride	ND	mg/L	0.025
Vinyl acetate	ND	mg/L	0.050
Bromodichloromethane	ND	mg/L	0.025
1,2-Dichloropropane	ND	mg/L	0.025
trans-1,3-Dichloropropene	ND	mg/L	0.025
Trichloroethene	ND	mg/L	0.025
Dibromochloromethane	ND	mg/L	0.025
1,1,2-Trichloroethane	ND	mg/L	0.025
Benzene	ND	mg/L	0.025
cis-1,3-Dichloropropene	ND	mg/L	0.025
2-Chloroethyl vinyl ether	ND	mg/L	0.050
Bromoform	ND	mg/L	0.025
4-Methyl-2-pentanone	ND	mg/L	0.050
2-Hexanone	ND	mg/L	0.050
1,1,2,2-Tetrachloroethane	ND	mg/L	0.025
Tetrachloroethene	ND	mg/L	0.025
Toluene	ND	mg/L	0.025
Chlorobenzene	ND	mg/L	0.025
Ethylbenzene	ND	mg/L	0.025
Styrene	ND	mg/L	0.025
Xylenes (total)	ND	mg/L	0.025

Surrogate	Recovery	
Toluene-d8	101	%
4-Bromofluorobenzene	99	%

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Stephanie Boehnke   Approved By: Shawn Kassner

III. ANALYTICAL RESULTS

The analytical results for this project are presented in the following data tables. Each data table includes sample identification information, and when available and appropriate, dates sampled, received, authorized, prepared and analyzed. The authorization data is the date when the project was defined by the client such that laboratory work could begin. The date prepared is typically the date an extraction or digestion was initiated. For volatile organic compounds in water, the date prepared is the date the screening of the sample was performed.

Data sheets contain a listing of the parameters measured in each test, the analytical results and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e., no correction is made for moisture content.

In addition, surrogate recovery data is presented for all GC/MS analyses. The surrogate recovery is an indication of the effect of the sample matrix on the performance of the method. The results from the Standard Enseco QA/QC Program, which generates data which are independent of matrix effects, are given in Section IV.

The analytical data reported are subject to the following limitations of the analytical methodology:

ANALYTICAL TEST REQUESTS
for
Texas Instruments, Incorporated

Lab ID: 024553	Group Code	Analysis Description	Custom Test?
0001	A	TCL Volatile Organics	N
		Prep-Volatile Organics /API	N
		TCLP Extraction / Purgeable Volatile Organics	N
		Bulk Density	N
		Specific Gravity	N
0002	B	TCL Semivolatile Organics	N
		Prep - Semivolatile Organics by GC/MS, TCLP Leachate	N
		TCLP Extraction / Extractable Organics & Metals	N
		Toxicity Characteristic Metals	N
		Digestion for Metals from a TCLP leachate	N
		Mercury, Cold Vapor AA TCLP Leachate	N
		Mercury, Cold Vapor AA from a TCLP Leachate	N
		Selenium, Furnace AA TCLP Leachate	N
		Digestion for Metals from a TCLP leachate	N
		Chlorinated Pesticides - Toxicity Characteristic List	N
		Prep for OCP/PCB's by GC for TCLP Leachates	N
		TCLP Extraction / Extractable Organics Aliquot	N
		Ignitability, Closed Cup	N
		Sulfide, Reactive	N
		Cyanide, Reactive	N
		pH	N
		OTC Herbicides	N
		Prep - Herbicides by GC / TCLP Leachate	N
		% Free liquid, paint filter test	N

SAMPLE DESCRIPTION INFORMATION
for
Texas Instruments, Incorporated

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
024553-0001-SA	LOW LEVEL FOR TCLP	SOIL	14 AUG 92		17 AUG 92
024553-0002-SA	LOW LEVEL FOR TCLP	SOIL	14 AUG 92		17 AUG 92

II. SAMPLE DESCRIPTION INFORMATION/ANALYTICAL TEST REQUESTS

Sample Description Information

The Sample Description Information lists all of the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

Sample 024553-0002 was originally analyzed for Method 8150 within holding time. All target analytes were found to be not detected with surrogate recoveries within the advisory acceptance criteria; however, due to laboratory error the corresponding Duplicate Control Samples (DCS) were not spiked. A reprep was performed on the TCLP extract and reanalysis outside of the holding time confirmed the original results with surrogate recoveries and DCSs within acceptable limits. The original data performed within holding time have been reported. Listed below are the Duplicate Control Sample recoveries for the analytical run for which the reanalysis was performed (QC Lot 29 AUG 92-4A):

	Concentration Spiked	Result 1	Result 2	% Recovery 1	% Recovery 2	RPD
2,4-D	0.05	0.0314	0.0311	63	62	1
Silvex	0.01	0.0074	0.0075	74	75	2
2,4,5-T	0.01	0.0073	0.0073	73	73	1

TCLP Prep Blank contamination was noted for Barium. RMAL has observed this to be a consistent artifact of the TCLP filter media and is within the tolerances of the RMAL Quality Assurance Program Plan.

The Bulk Density and Specific Gravity analyses were performed by Hazen Research, Inc. 4601 Indiana Street, Golden, Colorado 80403.

I. OVERVIEW

On August 17, 1992, Enseco-Rocky Mountain Analytical Laboratory received two soil samples from Texas Instruments, Inc.

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

I. Overview
II. Sample Description Information/Analytical Test Requests
III. Analytical Results
IV. Quality Control Report

Samples within this project have been analyzed for TCLP as finalized in the June 29, 1990 Federal Register (p. 26986 - 26998). TCLP leachates are prepared using Method 1311 and analyzed using Methods 6010, 7470, and 7740 for metals, 8240 for volatiles, 8270 for semivolatiles, 8080 for pesticides, and 8150 for herbicides. Every effort was made to achieve reporting limits below the regulated limit on each sample. However, as with all environmental analyses, matrix interferences or target compounds may be present in some samples which limit the effectiveness of the analytical method to achieve these limits.

The final TCLP rule contains a requirement that a matrix spike be analyzed for each analytical batch and that the bias determined from the matrix spike be used to correct the measured values. Enseco disagrees with the requirement to adjust sample results using spike recovery data and furthermore believes that if correction of data is to be performed, it should not be performed by the laboratory. Enseco has submitted formal comments to EPA concerning recovery correction (copies are available on request). Results are reported uncorrected for spike recoveries. The results from the QC sample analyses (surrogates, lab controls, and matrix spikes) are contained in the report, should these data be of interest in adjusting reported values. As stated in Method 1311, use of alternate methods may be needed when the recovery of the matrix spike is below the expected analytical performance.

Attachment F

Composite Sample of
Contaminated Soil from
Pilot Excavation

August 17, 1992

* * * *

% Soil Moisture

Enseco Mixed Waste Lab

for Sample 24553 - Texas Instruments

% Moisture:

Dried Sample Oversight at 105 °C

	Empty Dish	Moist Sample	Dry Sample & Dish	Dry Sample Only
1.	2.7023 g	15.09 g	16.2585 g	13.56562 g
2.	2.6763 g	15.18 g	16.4558 g	13.7795 g

1. $\frac{13.5562 \text{ g}}{15.09 \text{ g}}$ = 89.84% solids, 10.16% moisture

2. $\frac{13.7795 \text{ g}}{15.18 \text{ g}}$ = 90.77% solids, 9.23% moisture

Average : 9.7% moisture

Attachment G

Laboratory Report

Moisture-Density Relationship

of Compacted Soil

Lvms

TEC **tibbetts engineering corp.**

710 COUNTY STREET, TAUNTON, MASSACHUSETTS 02780
TELEPHONE (508) 829-6934

CLIENT: Texas Instruments
PROJECT: Burial Site Remediation
CONTRACTOR: –

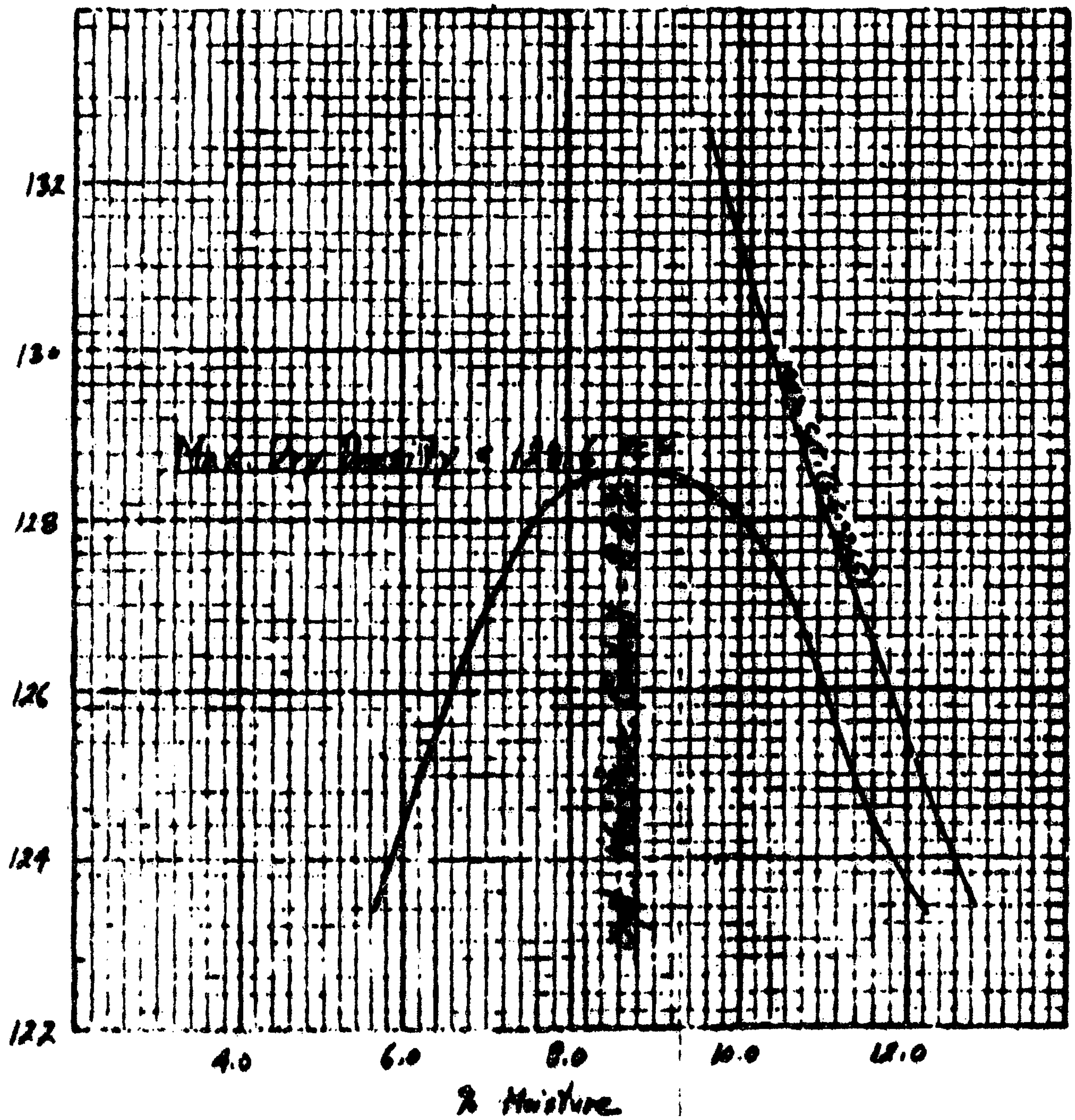
JOB NO: Test. 63-92
DATE: 9/28/92

LABORATORY REPORT

MOISTURE-DENSITY RELATIONSHIP OF COMPACTED SOIL

Maximum Dry Density: 128.6 PCF
Optimum Moisture Content: 8.8 %
Sample Description: Silty Sand & Gravel

Sample Identification: PR2269A
Test Method: ASTM D-698 - Procedure C
(Dry Prep.; manual Rammer)



Attachment 3

Memorandum Regarding Waste Classification Dated 10/29/92

MEMORANDUM

DATE: 10/29/92

TO: Mike Elliott
Frank Vaele
Texas Instruments Incorporated

FROM: Mark Griffon
Creative Pollution Solutions

SUBJECT: Recommendations for the classification of waste

The following memo presents the arguement for considering a fraction of the waste, from the Building 12 Burial site, to be disposed of at EnviroCare of Utah as source material.

The arguement is based primarily on analysis of alpha spectroscopy data along with knowledge of past disposal practices on the site. The basic arguement is that the waste found on the site is composed of both depleted uranium (source material) as well as a small fraction of enriched uranium (special nuclear material). The alpha spectroscopy data which was used to estimate the fractional breakdown are taken from the samples found in the area on the site which had the most contamination. Site history seems to indicate that this area of high contamination should be representative of the entire site.

The following arguements seem to indicate that it would be conservative to assume that 20% of the waste could be manifested as SNM material:

. Babcock and Wilcox analysis of sample number TI-2904 on 9/4/92 which indicated that the sample was of a depleted nature (this sample was from the high contamination area)

. Assay analysis of representative debris found on the site which indicated either natural or depleted enrichments

. Thomas Gutman's independent assessment of the analytical data which concluded that the waste consisted mostly of depleted uranium

. Vern Andrew's of EnviroCare of Utah assessment of the data which also concluded that 20% SNM would be a conservative estimate

. The alpha spectroscopy data from Lockheed Analytical Laboratories shown in table 1 and the estimation of % SNM based on that data and shown below.

Calculation of the fraction of SNM

The following calculation is based on the following assumptions:

1) the waste in question is composed of a mixture of depleted uranium and enriched uranium

2) the depleted uranium is 0.45% U-235 by weight

3) the enriched uranium which may exist on the site is 1.5% U-235. It is believed that this is a very conservative assumption since the history of the site shows that highly enriched materials were used on site. If the following calculation were to be based on the assumption that the enriched material were of high enrichments the fraction of SNM approaches zero.

Average of alpha spec samples = .5375% by weight U-235

Using simple algebra:

$$0.45(x) + 1.5(1-x) = .63$$

x = 17% (which equals the % SNM)

In the above calculation estimates of percent enrichment were made based on alpha spectroscopy. Similar calculations could be made based on gamma spectroscopy data, however, gamma spectroscopy relies on inference and interference corrections from other isotopes and therefore contain greater uncertainty. Conversly, alpha spectroscopy is based on aliquot sampling and representative sampling may introduce errors. Regardless, the alpha spectroscopy method is the most generally accepted for this type of analysis.

While it may beassumed that this percentage of the waste is SNM material,it should be noted that this percentage was based on a limited amount of sample information and there may be variation within boxes within each shipment. The isotopic data of each box is not available.

It should also be noted that the individual boxes were analyzed using alpha screening and an average percentage was used to estimate the isotopic concentrations within each box. For this reason caution should be used in approaching the 350 gram site limit. It would be prudent not to closely approach this limit based on the manifested quantities.

TABLE I
ALPHA SPEC DATA OF REPRESENTATIVE SAMPLES

SAMPLE ID	ISOTOPES	CONCENTRATION (pCi/g)	WT% U-235
RO #152	U-235	122	0.52%
	U-238	3590	
RO #152(dup)	U-235	270	1.40%
	U-238	2970	
TI	U-235	69	0.55%
	U-238	1930	
composite 4	U-235	79	0.38%
	U-238	3200	

Note : the average of the above wt.% was done by first averaging the two different weight percents from RO# 152 and then averaging that number with the other two samples. The average obtained was 0.63%.

Attachment 4

Conrail Instructions
Dated October 1, 1992

F A X   T R A N S M I S S I O N   C O V E R

DATE: 10/01/92 TIME: 11:29:39

TO: TOM CHAPPUT

FROM: M.T. MRUGAL
RM 919, ONE LIBERTY PLACE
PHILA. PA

SUBJECT: GONDOLA SHIPMENT INSTRUCTIONS

NUMBER OF PAGES (NOT INCLUDING COVER): 2

C O N R A I L

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***********************************************************************
***********************************************************************
***     E L E C T R O N I C   M E S S A G E   S Y S T E M         ***
***********************************************************************
***********************************************************************
```

TO: TOM CHAPPUT

TEXAS INSTRUMENTS
ATTLEBORO MA

FROM: M.T. MRUGAL

RM 919, ONE LIBERTY PLACE
PHILA. PA

SUBJECT: GONDOLA SHIPMENT INSTRUCTIONS

TOM, BELOW ARE MOVEMENT INSTRUCTIONS FOR THE ATTLEBORO PROJECT:

1) ORDER EMPTY GONDOLA CARS INTO JOB SITE BY CONTACTING CONRAIL'S CUSTOMER OPERATIONS CENTER:
   TELEPHONE: 1-800-456-3115
   FAX: 1-800-456-4115

2) AFTER CARS ARE LOADED INSURE ALL LINERS, TARPS, TIE DOWNS, ARE CLEAR OF SAFETY APPLIANCES (LADDERS, HAND BRAKE ETC.)

3) COMPLETE MANIFEST AND LIST CONRAIL AS TRANSPORTER NUMBER ONE. THE FOLLOWING INFORMATION MUST BE DETAILED ON THE MANIFEST:
   A. EPA ID NUMBER - PAD030298400
   B. EMERGENCY TELEPHONE NUMBER - (215) 977-1832
   C. CAR INITIAL AND NUMBER
   D. CONTRACT NUMBER (UNDER SPECIAL INSTR/ADD INFO SECTION)

4) FOR SIGNATURE, HAVE YOUR PROJECT COORDINATOR CONTACT THE TRAIN CREW UPON ARRIVAL AND OBTAIN SIGNATURES AS TRANSPORTER #1 FOR CONRAIL.

5) WHEN CARS ARE READY TO BE RELEASED, FAX BILL OF LADING AND PHOTO-COPY OF SIGNED AND COMPLETED MANIFEST TO CONRAIL'S OPERATIONS CENTER.
   TELEPHONE: 1-800-456-3115
   FAX: 1-800-456-4115

6) FEDERAL EXPRESS ORIGINAL MANIFESTS TO CLIVE, UT. DO NOT GIVE CON-RAIL ORIGINAL MANIFESTS FOR TRANSPORTATION.

7) FORECAST EMPTY GONDOLA REQUIREMENTS EACH WEEK FOR THE FOLLOWING WEEKS LOADING SCHEDULE. *THIS MUST BE DONE IN ADDITION TO CONTACT ING THE CUSTOMER OPERATIONS CENTER FOR DAILY ORDER/RELEASE OF CARS TO INSURE ADEQUATE EMPTY CAR SUPPLY FOR THE PROJECT*
   CONTACT: CAR MANAGEMENT CTR- 1-800-222-2103
   DENNIS MCGETTIGAN

YOUR ASSIGNED CUSTOMER SERVICE REPRESENTATIVE IS:
JACKIE LYONS
1-800-228-4661 EXT 45

* NOTE: MANIFEST PROCEDURES APPLY IF MANIFESTS ARE REQUIRED BY STATE FEDERAL REGULATION

** A TRANSPORTATION SERVICE CONTRACT WILL BE SENT VIA OVERNIGHT

TO: TOM CHAPPUT

TEXAS INSTRUMENTS
ATTLEBORO MA

FROM: M.T. MRUGAL

RM 919, ONE LIBERTY PLACE
PHILA. PA

SUBJECT: GONDOLA SHIPMENT INSTRUCTIONS

CURRIER TODAY.

*** PLEASE CALL ME IF YOU HAVE ANY QUESTIONS. THANK YOU FOR THE OPPORTUNITY TO PROVIDE TRANSPORTATION SERVICES ON THIS PROJECT.

CC: R.L. PULEO
P.W. BUXTON

END MSG. M.T. MRUGAL 8 333 7281 10/01/92 11:29

Attachment 5

Spreadsheets Used for the Generation

of

Radioactive Shipment Records

Attachment 5-1

Spreadsheet for Radioactive Shipment Record

Shipment 1

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Rail Car Destination
1	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-576195
49	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-576195
50	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-576195
52	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-576195
55	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-576195
56	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-576195
57	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-576195
64	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-576195
65	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-576195
66	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-576195
67	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-576195
77	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-576195
78	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-576195
79	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-576195
Totals	112000							
Averages								

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
1	57	57	1.17E-01	5.36E-03	8.45E-02	4.31E-03	3.23E-03	2.50E+00
49	48	48	9.87E-02	4.52E-03	7.12E-02	3.63E-03	2.72E-03	2.11E+00
50	43	43	8.84E-02	4.04E-03	6.38E-02	3.25E-03	2.44E-03	1.89E+00
52	59	59	1.21E-01	5.55E-03	8.75E-02	4.46E-03	3.34E-03	2.59E+00
55	43	43	8.84E-02	4.04E-03	6.38E-02	3.25E-03	2.44E-03	1.89E+00
56	53	53	1.09E-01	4.99E-03	7.86E-02	4.00E-03	3.00E-03	2.32E+00
57	55	55	1.13E-01	5.17E-03	8.16E-02	4.16E-03	3.12E-03	2.41E+00
64	70	70	1.44E-01	6.58E-03	1.04E-01	5.29E-03	3.97E-03	3.07E+00
65	51	51	1.05E-01	4.80E-03	7.56E-02	3.85E-03	2.89E-03	2.24E+00
66	62	62	1.27E-01	5.83E-03	9.19E-02	4.68E-03	3.51E-03	2.72E+00
67	66	66	1.36E-01	6.21E-03	9.79E-02	4.99E-03	3.74E-03	2.90E+00
77	80	80	1.64E-01	7.53E-03	1.19E-01	6.04E-03	4.53E-03	3.51E+00
78	60	60	1.23E-01	5.64E-03	8.90E-02	4.53E-03	3.40E-03	2.63E+00
79	73	73	1.50E-01	6.87E-03	1.08E-01	5.51E-03	4.14E-03	3.20E+00
			1.69E+00	7.71E-02	1.22E+00	6.19E-02	4.65E-02	3.60E+01

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Concentration	Total Activity
1	3.23E+01	1.48E+00	2.33E+01	1.19E+00	9.06E-01		
49	2.72E+01	1.24E+00	1.96E+01	9.98E-01	7.63E-01		
50	2.43E+01	1.11E+00	1.76E+01	8.94E-01	6.84E-01	1.02E+01	5.57E-01
52	3.34E+01	1.53E+00	2.41E+01	1.23E+00	9.38E-01		
55	2.43E+01	1.11E+00	1.76E+01	8.94E-01	6.84E-01		
56	3.00E+01	1.37E+00	2.16E+01	1.10E+00	8.43E-01	1.07E+01	5.84E-01
57	3.11E+01	1.42E+00	2.25E+01	1.14E+00	8.75E-01		
64	3.96E+01	1.81E+00	2.86E+01	1.46E+00	1.11E+00		
65	2.89E+01	1.32E+00	2.08E+01	1.06E+00	8.11E-01	1.22E+01	6.63E-01
66	3.51E+01	1.61E+00	2.53E+01	1.29E+00	9.86E-01		
67	3.74E+01	1.71E+00	2.69E+01	1.37E+00	1.05E+00		
77	4.53E+01	2.07E+00	3.27E+01	1.66E+00	1.27E+00	1.44E+01	7.83E-01
78	3.40E+01	1.56E+00	2.45E+01	1.25E+00	9.54E-01		
79	4.13E+01	1.89E+00	2.98E+01	1.52E+00	1.16E+00	1.38E+01	5.01E-01
	3.32E+01	1.52E+00	2.39E+01	1.22E+00	9.31E-01		

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box #	Weight	Date Filled	Contamination dpm/100^2 cm	Contamination dpm/100^2 cm	Radiation mR/h	Radiation mR/h	Labels Affixed	Rail Car Destination
	Pounds		Alpha	Beta	Contact	1 meter		
44	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577700
45	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577700
46	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577700
47	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577700
48	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577700
51	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577700
53	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577700
74	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577700
75	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577700
76	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577700
80	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577700
81	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577700
82	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577700
83	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577700
Totals	112000							
Averages								

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
44	99	99	2.04E-01	9.31E-03	1.47E-01	7.48E-03	5.61E-03	4.34E+00
45	31	31	6.37E-02	2.92E-03	4.60E-02	2.34E-03	1.76E-03	1.36E+00
46	48	48	9.87E-02	4.52E-03	7.12E-02	3.63E-03	2.72E-03	2.11E+00
47	48	48	9.87E-02	4.52E-03	7.12E-02	3.63E-03	2.72E-03	2.11E+00
48	43	43	8.84E-02	4.04E-03	6.38E-02	3.25E-03	2.44E-03	1.89E+00
51	55	55	1.13E-01	5.17E-03	8.16E-02	4.16E-03	3.12E-03	2.41E+00
53	40	40	8.22E-02	3.76E-03	5.93E-02	3.02E-03	2.27E-03	1.75E+00
74	92	92	1.89E-01	8.65E-03	1.36E-01	6.95E-03	5.21E-03	4.04E+00
75	94	94	1.93E-01	8.84E-03	1.39E-01	7.10E-03	5.33E-03	4.12E+00
76	79	79	1.62E-01	7.43E-03	1.17E-01	5.97E-03	4.48E-03	3.47E+00
80	53	53	1.09E-01	4.99E-03	7.86E-02	4.00E-03	3.00E-03	2.32E+00
81	51	51	1.05E-01	4.80E-03	7.56E-02	3.85E-03	2.89E-03	2.24E+00
82	71	71	1.46E-01	6.68E-03	1.05E-01	5.36E-03	4.02E-03	3.11E+00
83	58	58	1.19E-01	5.46E-03	8.60E-02	4.38E-03	3.29E-03	2.54E+00
			1.77E+00	8.11E-02	1.28E+00	6.51E-02	4.88E-02	3.78E+01

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Conc.	Total Activity
44	5.60E+01	2.56E+00	4.04E+01	2.06E+00	1.57E+00		
45	1.75E+01	8.03E-01	1.27E+01	6.45E-01	4.93E-01		
46	2.72E+01	1.24E+00	1.96E+01	9.98E-01	7.63E-01	1.23E+01	6.70E-01
47	2.72E+01	1.24E+00	1.96E+01	9.98E-01	7.63E-01		
48	2.43E+01	1.11E+00	1.76E+01	8.94E-01	6.84E-01		
51	3.11E+01	1.42E+00	2.25E+01	1.14E+00	8.75E-01	1.01E+01	5.50E-01
53	2.26E+01	1.04E+00	1.63E+01	8.32E-01	6.36E-01		
74	5.21E+01	2.38E+00	3.76E+01	1.91E+00	1.46E+00		
75	5.32E+01	2.43E+00	3.84E+01	1.96E+00	1.49E+00	1.56E+01	8.51E-01
76	4.47E+01	2.05E+00	3.23E+01	1.64E+00	1.26E+00		
80	3.00E+01	1.37E+00	2.16E+01	1.10E+00	8.43E-01		
81	2.89E+01	1.32E+00	2.08E+01	1.06E+00	8.11E-01	1.27E+01	6.89E-01
82	4.02E+01	1.84E+00	2.90E+01	1.48E+00	1.13E+00		
83	3.28E+01	1.50E+00	2.37E+01	1.21E+00	9.22E-01	1.34E+01	4.86E-01
	3.48E+01	1.59E+00	2.51E+01	1.28E+00	9.79E-01		

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Rail Car Destination
29	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577729
30	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577729
31	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577729
32	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577729
33	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577729
34	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577729
36	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577729
37	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577729
38	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577729
39	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577729
40	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577729
41	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577729
42	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577729
43	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-577729
Total	112000							
Average								

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
29	44	44	9.05E-02	4.14E-03	6.52E-02	3.32E-03	2.49E-03	1.93E+00
30	35	35	7.19E-02	3.29E-03	5.19E-02	2.64E-03	1.98E-03	1.54E+00
31	58	58	1.19E-01	5.46E-03	8.60E-02	4.38E-03	3.29E-03	2.54E+00
32	39	39	8.02E-02	3.67E-03	5.78E-02	2.95E-03	2.21E-03	1.71E+00
33	91	91	1.87E-01	8.56E-03	1.35E-01	6.87E-03	5.16E-03	3.99E+00
34	53	53	1.09E-01	4.99E-03	7.86E-02	4.00E-03	3.00E-03	2.32E+00
36	44	44	9.05E-02	4.14E-03	6.52E-02	3.32E-03	2.49E-03	1.93E+00
37	52	52	1.07E-01	4.89E-03	7.71E-02	3.93E-03	2.95E-03	2.28E+00
38	49	49	1.01E-01	4.61E-03	7.27E-02	3.70E-03	2.78E-03	2.15E+00
39	40	40	8.22E-02	3.76E-03	5.93E-02	3.02E-03	2.27E-03	1.75E+00
40	35	35	7.19E-02	3.29E-03	5.19E-02	2.64E-03	1.98E-03	1.54E+00
41	58	58	1.19E-01	5.46E-03	8.60E-02	4.38E-03	3.29E-03	2.54E+00
42	62	62	1.27E-01	5.83E-03	9.19E-02	4.68E-03	3.51E-03	2.72E+00
43	39	39	8.02E-02	3.67E-03	5.78E-02	2.95E-03	2.21E-03	1.71E+00
			1.44E+00	6.58E-02	1.04E+00	5.28E-02	3.96E-02	3.07E+01

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Conc.	Total Activity
29	2.49E+01	1.14E+00	1.80E+01	9.15E-01	7.00E-01		
30	1.98E+01	9.07E-01	1.43E+01	7.28E-01	5.57E-01		
31	3.28E+01	1.50E+00	2.37E+01	1.21E+00	9.22E-01	9.47E+00	5.16E-01
32	2.21E+01	1.01E+00	1.59E+01	8.11E-01	6.20E-01		
33	5.15E+01	2.36E+00	3.72E+01	1.89E+00	1.45E+00		
34	3.00E+01	1.37E+00	2.16E+01	1.10E+00	8.43E-01	1.27E+01	6.89E-01
36	2.49E+01	1.14E+00	1.80E+01	9.15E-01	7.00E-01		
37	2.94E+01	1.35E+00	2.12E+01	1.08E+00	8.27E-01		
38	2.77E+01	1.27E+00	2.00E+01	1.02E+00	7.79E-01	1.00E+01	5.46E-01
39	2.26E+01	1.04E+00	1.63E+01	8.32E-01	6.36E-01		
40	1.98E+01	9.07E-01	1.43E+01	7.28E-01	5.57E-01		
41	3.28E+01	1.50E+00	2.37E+01	1.21E+00	9.22E-01	9.19E+00	5.01E-01
42	3.51E+01	1.61E+00	2.53E+01	1.29E+00	9.86E-01		
43	2.21E+01	1.01E+00	1.59E+01	8.11E-01	6.20E-01	1.05E+01	3.80E-01
	2.83E+01	1.29E+00	2.04E+01	1.04E+00	7.94E-01		

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Rail Car Destina
15	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-579005
16	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-579005
17	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-579005
18	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-579005
20	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-579005
21	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-579005
22	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-579005
23	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-579005
24	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-579005
25	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-579005
26	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-579005
27	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-579005
28	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-579005
35	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-579005
Total	112000							
Average								

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
15	57	57	1.17E-01	5.36E-03	8.45E-02	4.31E-03	3.23E-03	2.50E+00
16	48	48	9.87E-02	4.52E-03	7.12E-02	3.63E-03	2.72E-03	2.11E+00
17	73	73	1.50E-01	6.87E-03	1.08E-01	5.51E-03	4.14E-03	3.20E+00
18	57	57	1.17E-01	5.36E-03	8.45E-02	4.31E-03	3.23E-03	2.50E+00
20	42	42	8.63E-02	3.95E-03	6.23E-02	3.17E-03	2.38E-03	1.84E+00
21	29	29	5.96E-02	2.73E-03	4.30E-02	2.19E-03	1.64E-03	1.27E+00
22	62	62	1.27E-01	5.83E-03	9.19E-02	4.68E-03	3.51E-03	2.72E+00
23	40	40	8.22E-02	3.76E-03	5.93E-02	3.02E-03	2.27E-03	1.75E+00
24	60	60	1.23E-01	5.64E-03	8.90E-02	4.53E-03	3.40E-03	2.63E+00
25	35	35	7.19E-02	3.29E-03	5.19E-02	2.64E-03	1.98E-03	1.54E+00
26	59	59	1.21E-01	5.55E-03	8.75E-02	4.46E-03	3.34E-03	2.59E+00
27	44	44	9.05E-02	4.14E-03	6.52E-02	3.32E-03	2.49E-03	1.93E+00
28	34	34	6.99E-02	3.20E-03	5.04E-02	2.57E-03	1.93E-03	1.49E+00
35	46	46	9.46E-02	4.33E-03	6.82E-02	3.48E-03	2.61E-03	2.02E+00
			1.41E+00	6.45E-02	1.02E+00	5.18E-02	3.89E-02	3.01E+01

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Conc.	Total Activity
15	3.23E+01	1.48E+00	2.33E+01	1.19E+00	9.06E-01		
16	2.72E+01	1.24E+00	1.96E+01	9.98E-01	7.63E-01		
17	4.13E+01	1.89E+00	2.98E+01	1.52E+00	1.16E+00	1.23E+01	6.70E-01
18	3.23E+01	1.48E+00	2.33E+01	1.19E+00	9.06E-01		
20	2.38E+01	1.09E+00	1.71E+01	8.74E-01	6.68E-01		
21	1.64E+01	7.51E-01	1.18E+01	6.03E-01	4.61E-01	8.85E+00	4.82E-01
22	3.51E+01	1.61E+00	2.53E+01	1.29E+00	9.86E-01		
23	2.26E+01	1.04E+00	1.63E+01	8.32E-01	6.36E-01		
24	3.40E+01	1.55E+00	2.45E+01	1.25E+00	9.54E-01	1.12E+01	6.10E-01
25	1.98E+01	9.07E-01	1.43E+01	7.28E-01	5.57E-01		
26	3.34E+01	1.53E+00	2.41E+01	1.23E+00	9.38E-01		
27	2.49E+01	1.14E+00	1.80E+01	9.15E-01	7.00E-01	9.54E+00	5.20E-01
28	1.92E+01	8.81E-01	1.39E+01	7.07E-01	5.41E-01		
35	2.60E+01	1.19E+00	1.88E+01	9.57E-01	7.31E-01	8.30E+00	3.01E-01
	2.77E+01	1.27E+00	2.00E+01	1.02E+00	7.79E-01		

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box #	Weight	Date Filled	Contamination dpm/100^2 cm	Contamination dpm/100^2 cm	Radiation mR/h	Radiation mR/h	Labels Affixed	Rail Car Destinat
	Pounds		Alpha	Beta	Contact	1 meter		
54	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-580604
58	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-580604
59	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-580604
60	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-580604
61	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-580604
62	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-580604
63	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-580604
68	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-580604
69	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-580604
70	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-580604
71	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-580604
72	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-580604
73	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-580604
84	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	CR-580604
Total	112000							
Average								

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
54	53	53	1.09E-01	4.99E-03	7.86E-02	4.00E-03	3.00E-03	2.32E+00
58	62	62	1.27E-01	5.83E-03	9.19E-02	4.68E-03	3.51E-03	2.72E+00
59	85	85	1.75E-01	8.00E-03	1.26E-01	6.42E-03	4.82E-03	3.73E+00
60	93	93	1.91E-01	8.75E-03	1.38E-01	7.03E-03	5.27E-03	4.08E+00
61	31	31	6.37E-02	2.92E-03	4.60E-02	2.34E-03	1.76E-03	1.36E+00
62	68	68	1.40E-01	6.40E-03	1.01E-01	5.14E-03	3.85E-03	2.98E+00
63	65	65	1.34E-01	6.11E-03	9.64E-02	4.91E-03	3.68E-03	2.85E+00
68	64	64	1.32E-01	6.02E-03	9.49E-02	4.83E-03	3.63E-03	2.81E+00
69	44	44	9.05E-02	4.14E-03	6.52E-02	3.32E-03	2.49E-03	1.93E+00
70	84	84	1.73E-01	7.90E-03	1.25E-01	6.35E-03	4.76E-03	3.68E+00
71	101	101	2.08E-01	9.50E-03	1.50E-01	7.63E-03	5.72E-03	4.43E+00
72	69	69	1.42E-01	6.49E-03	1.02E-01	5.21E-03	3.91E-03	3.03E+00
73	46	46	9.46E-02	4.33E-03	6.82E-02	3.48E-03	2.61E-03	2.02E+00
84	75	75	1.54E-01	7.06E-03	1.11E-01	5.67E-03	4.25E-03	3.29E+00
			1.93E+00	8.84E-02	1.39E+00	7.10E-02	5.33E-02	4.12E+01

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Conc.	Total Activity
54	3.00E+01	1.37E+00	2.16E+01	1.10E+00	8.43E-01		
58	3.51E+01	1.61E+00	2.53E+01	1.29E+00	9.86E-01		
59	4.81E+01	2.20E+00	3.47E+01	1.77E+00	1.35E+00	1.38E+01	7.53E-01
60	5.26E+01	2.41E+00	3.80E+01	1.93E+00	1.48E+00		
61	1.75E+01	8.03E-01	1.27E+01	6.45E-01	4.93E-01		
62	3.85E+01	1.76E+00	2.78E+01	1.41E+00	1.08E+00	1.33E+01	7.23E-01
63	3.68E+01	1.68E+00	2.65E+01	1.35E+00	1.03E+00		
68	3.62E+01	1.66E+00	2.61E+01	1.33E+00	1.02E+00		
69	2.49E+01	1.14E+00	1.80E+01	9.15E-01	7.00E-01	1.20E+01	6.51E-01
70	4.75E+01	2.18E+00	3.43E+01	1.75E+00	1.34E+00		
71	5.72E+01	2.62E+00	4.12E+01	2.10E+00	1.61E+00		
72	3.91E+01	1.79E+00	2.82E+01	1.44E+00	1.10E+00	1.76E+01	9.56E-01
73	2.60E+01	1.19E+00	1.88E+01	9.57E-01	7.31E-01		
84	4.25E+01	1.94E+00	3.06E+01	1.56E+00	1.19E+00	1.25E+01	4.56E-01
	3.80E+01	1.74E+00	2.74E+01	1.40E+00	1.07E+00		

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Rail Car Destination
2	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	RDG-38891
3	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	RDG-38891
4	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	RDG-38891
5	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	RDG-38891
6	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	RDG-38891
7	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	RDG-38891
8	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	RDG-38891
9	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	RDG-38891
10	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	RDG-38891
11	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	RDG-38891
12	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	RDG-38891
13	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	RDG-38891
14	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	RDG-38891
19	8000	10/3/92	<220	<2200	<0.02	<0.02	Yes/No	RDG-38891
Total	112000							
Average								

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
2	58	58	1.19E-01	5.46E-03	8.60E-02	4.38E-03	3.29E-03	2.54E+00
3	67	67	1.38E-01	6.30E-03	9.94E-02	5.06E-03	3.80E-03	2.94E+00
4	40	40	8.22E-02	3.76E-03	5.93E-02	3.02E-03	2.27E-03	1.75E+00
5	53	53	1.09E-01	4.99E-03	7.86E-02	4.00E-03	3.00E-03	2.32E+00
6	81	81	1.67E-01	7.62E-03	1.20E-01	6.12E-03	4.59E-03	3.55E+00
7	46	46	9.46E-02	4.33E-03	6.82E-02	3.48E-03	2.61E-03	2.02E+00
8	37	37	7.61E-02	3.48E-03	5.49E-02	2.80E-03	2.10E-03	1.62E+00
9	51	51	1.05E-01	4.80E-03	7.56E-02	3.85E-03	2.89E-03	2.24E+00
10	53	53	1.09E-01	4.99E-03	7.86E-02	4.00E-03	3.00E-03	2.32E+00
11	37	37	7.61E-02	3.48E-03	5.49E-02	2.80E-03	2.10E-03	1.62E+00
12	46	46	9.46E-02	4.33E-03	6.82E-02	3.48E-03	2.61E-03	2.02E+00
13	41	41	8.43E-02	3.86E-03	6.08E-02	3.10E-03	2.32E-03	1.80E+00
14	111	111	2.28E-01	1.04E-02	1.65E-01	8.39E-03	6.29E-03	4.87E+00
19	59	59	1.21E-01	5.55E-03	8.75E-02	4.46E-03	3.34E-03	2.59E+00
			1.60E+00	7.34E-02	1.16E+00	5.89E-02	4.42E-02	3.42E+01

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Conc.	Total Activity
2	3.28E+01	1.50E+00	2.37E+01	1.21E+00	9.22E-01		
3	3.79E+01	1.74E+00	2.74E+01	1.39E+00	1.07E+00		
4	2.26E+01	1.04E+00	1.63E+01	8.32E-01	6.36E-01	1.14E+01	6.21E-01
5	3.00E+01	1.37E+00	2.16E+01	1.10E+00	8.43E-01		
6	4.58E+01	2.10E+00	3.31E+01	1.68E+00	1.29E+00		
7	2.60E+01	1.19E+00	1.88E+01	9.57E-01	7.31E-01	1.24E+01	6.78E-01
8	2.09E+01	9.58E-01	1.51E+01	7.70E-01	5.88E-01		
9	2.89E+01	1.32E+00	2.09E+01	1.06E+00	8.11E-01		
10	3.00E+01	1.37E+00	2.16E+01	1.10E+00	8.43E-01	9.75E+00	5.31E-01
11	2.09E+01	9.58E-01	1.51E+01	7.70E-01	5.88E-01		
12	2.60E+01	1.19E+00	1.88E+01	9.57E-01	7.31E-01		
13	2.32E+01	1.06E+00	1.67E+01	8.53E-01	6.52E-01	8.57E+00	4.67E-01
14	6.28E+01	2.87E+00	4.53E+01	2.31E+00	1.76E+00		
19	3.34E+01	1.53E+00	2.41E+01	1.23E+00	9.38E-01	1.76E+01	6.40E-01
	3.15E+01	1.44E+00	2.27E+01	1.16E+00	8.86E-01		

Attachment 5-2

Spreadsheet for Radioactive Shipment Record

Shipment 2

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Rail Car Destination
85	10600	10/10/92	<220	<2200	<0.02	<0.02	Yes/No	CR-587074
86	9200	10/10/92	<220	<2200	0.6	0.05	Yes/No	CR-587074
90	8100	10/10/92	<220	<2200	0.3	0.04	Yes/No	CR-587074
91	8800	10/10/92	<220	<2200	1	0.05	Yes/No	CR-587074
93	9100	10/10/92	<220	<2200	0.6	<0.02	Yes/No	CR-587074
96	9000	10/10/92	<220	<2200	0.3	<0.02	Yes/No	CR-587074
103	8700	10/10/92	<220	<2200	0.03	<0.02	Yes/No	CR-587074
104	9400	10/10/92	<220	<2200	0.03	<0.02	Yes/No	CR-587074
110	8400	10/10/92	<220	<2200	0.03	<0.02	Yes/No	CR-587074
113	9200	10/10/92	<220	<2200	0.03	<0.02	Yes/No	CR-587074
132	10400	10/11/92	<220	<2200	0.13	0.03	Yes/No	CR-587074
146	6900	10/13/92	<220	<2200	0.8	0.04	Yes/No	CR-587074
160	7800	10/13/92	<220	<2200	0.03	<0.02	Yes/No	CR-587074
173	6500	10/13/92	<220	<2200	<0.02	<0.02	Yes/No	CR-587074
Totals	121700							
Averages								

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
85	70	320	8.72E-01	3.99E-02	6.29E-01	3.20E-02	2.40E-02	1.86E+01
86	301	551	1.30E+00	5.96E-02	9.40E-01	4.79E-02	3.59E-02	2.76E+01
90	264	514	1.07E+00	4.90E-02	7.72E-01	3.93E-02	2.95E-02	2.28E+01
91	467	717	1.58E+00	7.25E-02	1.14E+00	5.82E-02	4.37E-02	3.36E+01
93	543	793	1.85E+00	8.49E-02	1.34E+00	6.81E-02	5.11E-02	3.96E+01
96	512	762	1.76E+00	8.06E-02	1.27E+00	6.48E-02	4.86E-02	3.76E+01
103	1647	1897	4.24E+00	1.94E-01	3.06E+00	1.56E-01	1.17E-01	9.05E+01
104	566	816	1.97E+00	9.02E-02	1.42E+00	7.24E-02	5.43E-02	4.21E+01
110	350	600	1.30E+00	5.93E-02	9.34E-01	4.76E-02	3.57E-02	2.76E+01
113	242	492	1.16E+00	5.32E-02	8.39E-01	4.27E-02	3.21E-02	2.48E+01
132	356	606	1.62E+00	7.41E-02	1.17E+00	5.95E-02	4.46E-02	3.46E+01
146	70	320	5.67E-01	2.60E-02	4.09E-01	2.09E-02	1.56E-02	1.21E+01
160	86	336	6.56E-01	3.00E-02	4.73E-01	2.41E-02	1.81E-02	1.40E+01
173	46	296	4.94E-01	2.26E-02	3.57E-01	1.82E-02	1.36E-02	1.06E+01
			2.05E+01	9.36E-01	1.48E+01	7.52E-01	5.64E-01	4.36E+02

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Concentration	Total Activity
85	1.81E+02	8.29E+00	1.31E+02	6.66E+00	5.09E+00		
86	3.12E+02	1.43E+01	2.25E+02	1.15E+01	8.76E+00		
90	2.91E+02	1.33E+01	2.10E+02	1.07E+01	8.17E+00	9.57E+01	5.94E+00
91	4.06E+02	1.86E+01	2.93E+02	1.49E+01	1.14E+01		
93	4.49E+02	2.05E+01	3.24E+02	1.65E+01	1.26E+01		
96	4.31E+02	1.97E+01	3.11E+02	1.58E+01	1.21E+01	1.57E+02	9.53E+00
103	1.07E+03	4.91E+01	7.75E+02	3.95E+01	3.02E+01		
104	4.62E+02	2.11E+01	3.33E+02	1.70E+01	1.30E+01		
110	3.40E+02	1.55E+01	2.45E+02	1.25E+01	9.54E+00	2.29E+02	1.37E+01
113	2.78E+02	1.27E+01	2.01E+02	1.02E+01	7.82E+00		
132	3.43E+02	1.57E+01	2.47E+02	1.26E+01	9.64E+00		
146	1.81E+02	8.29E+00	1.31E+02	6.66E+00	5.09E+00	9.80E+01	6.14E+00
160	1.90E+02	8.70E+00	1.37E+02	6.99E+00	5.34E+00		
173	1.68E+02	7.67E+00	1.21E+02	6.16E+00	4.71E+00	6.55E+01	2.11E+00
	3.65E+02	1.67E+01	2.63E+02	1.34E+01	1.02E+01		

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Rail Car Destination
112	10200	10/13/92	<220	<2200	0.9	0.03	Yes/No	CR-587104
147	8500	10/13/92	<220	<2200	<0.02	<0.02	Yes/No	CR-587104
148	9300	10/13/92	<220	<2200	0.03	<0.02	Yes/No	CR-587104
149	8700	10/13/92	<220	<2200	0.04	<0.02	Yes/No	CR-587104
150	7900	10/13/92	<220	<2200	17	0.7	Yes/No	CR-587104
159	8800	10/13/92	<220	<2200	6	0.05	Yes/No	CR-587104
161	9600	10/13/92	<220	<2200	0.7	0.03	Yes/No	CR-587104
168	7400	10/13/92	<220	<2200	<0.02	<0.02	Yes/No	CR-587104
169	7500	10/13/92	<220	<2200	0.03	<0.02	Yes/No	CR-587104
172	7200	10/13/92	<220	<2200	<0.02	<0.02	Yes/No	CR-587104
174	7600	10/13/92	<220	<2200	11	0.03	Yes/No	CR-587104
175	9000	10/13/92	<220	<2200	0.04	<0.02	Yes/No	CR-587104
177	9000	10/13/92	<220	<2200	0.2	0.03	Yes/No	CR-587104
178	6600	10/13/92	<220	<2200	5	0.05	Yes/No	CR-587104
Totals	117300							
Averages								

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
112	1002	1252	3.28E+00	1.50E-01	2.37E+00	1.21E-01	9.04E-02	7.00E+01
147	55	305	6.66E-01	3.05E-02	4.81E-01	2.45E-02	1.84E-02	1.42E+01
148	73	323	7.72E-01	3.53E-02	5.57E-01	2.84E-02	2.13E-02	1.65E+01
149	77	327	7.31E-01	3.35E-02	5.27E-01	2.69E-02	2.01E-02	1.56E+01
150	46	296	6.01E-01	2.75E-02	4.33E-01	2.21E-02	1.66E-02	1.28E+01
159	1568	1818	4.11E+00	1.88E-01	2.97E+00	1.51E-01	1.13E-01	8.77E+01
161	811	1061	2.62E+00	1.20E-01	1.89E+00	9.62E-02	7.21E-02	5.59E+01
168	51	301	5.72E-01	2.62E-02	4.13E-01	2.10E-02	1.58E-02	1.22E+01
169	50	300	5.78E-01	2.65E-02	4.17E-01	2.12E-02	1.59E-02	1.23E+01
172	97	347	6.42E-01	2.94E-02	4.63E-01	2.36E-02	1.77E-02	1.37E+01
174	46	296	5.78E-01	2.65E-02	4.17E-01	2.12E-02	1.59E-02	1.23E+01
175	65	315	7.28E-01	3.33E-02	5.26E-01	2.68E-02	2.01E-02	1.55E+01
177	947	1197	2.77E+00	1.27E-01	2.00E+00	1.02E-01	7.63E-02	5.91E+01
178	46	296	5.02E-01	2.30E-02	3.62E-01	1.84E-02	1.38E-02	1.07E+01
			1.91E+01	8.76E-01	1.38E+01	7.04E-01	5.28E-01	4.09E+02

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Conc.	Total Activity
112	7.09E+02	3.24E+01	5.11E+02	2.60E+01	1.99E+01		
147	1.73E+02	7.90E+00	1.25E+02	6.34E+00	4.85E+00		
148	1.83E+02	8.37E+00	1.32E+02	6.72E+00	5.14E+00	1.30E+02	8.64E+00
149	1.85E+02	8.47E+00	1.34E+02	6.80E+00	5.20E+00		
150	1.68E+02	7.67E+00	1.21E+02	6.16E+00	4.71E+00		
159	1.03E+03	4.71E+01	7.42E+02	3.78E+01	2.89E+01	1.69E+02	9.97E+00
161	6.01E+02	2.75E+01	4.33E+02	2.21E+01	1.69E+01		
168	1.70E+02	7.80E+00	1.23E+02	6.26E+00	4.79E+00		
169	1.70E+02	7.77E+00	1.22E+02	6.24E+00	4.77E+00	1.15E+02	6.90E+00
172	1.96E+02	8.99E+00	1.42E+02	7.22E+00	5.52E+00		
174	1.68E+02	7.67E+00	1.21E+02	6.16E+00	4.71E+00		
175	1.78E+02	8.16E+00	1.29E+02	6.55E+00	5.01E+00	6.62E+01	3.57E+00
177	6.78E+02	3.10E+01	4.89E+02	2.49E+01	1.90E+01		
178	1.68E+02	7.67E+00	1.21E+02	6.16E+00	4.71E+00	1.55E+02	5.99E+00
	3.41E+02	1.56E+01	2.46E+02	1.25E+01	9.58E+00		

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box #	Weight	Date Filled	Contamination dpm/100^2 cm	Contamination dpm/100^2 cm	Radiation mR/h	Radiation mR/h	Labels Affixed	Rail Car Destination
	Pounds		Alpha	Beta	Contact	1 meter		
109	9800	10/10/92	<220	<2200	0.03	<0.02	Yes/No	CR-587191
123	8900	10/10/92	<220	<2200	0.2	<0.02	Yes/No	CR-587191
126	6400	10/11/92	<220	<2200	0.07	0.04	Yes/No	CR-587191
127	8400	10/11/92	<220	<2200	0.04	0.03	Yes/No	CR-587191
135	10000	10/11/92	<220	<2200	0.03	<0.02	Yes/No	CR-587191
136	9300	10/11/92	<220	<2200	3.5	0.1	Yes/No	CR-587191
139	9000	10/11/92	<220	<2200	0.05	0.03	Yes/No	CR-587191
154	8000	10/11/92	<220	<2200	1	0.06	Yes/No	CR-587191
155	8700	10/11/92	<220	<2200	0.8	0.03	Yes/No	CR-587191
156	9200	10/11/92	<220	<2200	0.15	0.03	Yes/No	CR-587191
157	9200	10/11/92	<220	<2200	0.5	0.04	Yes/No	CR-587191
158	9500	10/11/92	<220	<2200	0.1	0.04	Yes/No	CR-587191
170	9700	10/11/92	<220	<2200	0.03	<0.02	Yes/No	CR-587191
171	9600	10/11/92	<220	<2200	0.03	<0.02	Yes/No	CR-587191
Total	125700							
Average								

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
109	318	568	1.43E+00	6.55E-02	1.03E+00	5.26E-02	3.94E-02	3.05E+01
123	4717	4967	1.14E+01	5.20E-01	8.19E+00	4.17E-01	3.13E-01	2.42E+02
126	504	754	1.24E+00	5.67E-02	8.95E-01	4.56E-02	3.42E-02	2.65E+01
127	1916	2166	4.68E+00	2.14E-01	3.37E+00	1.72E-01	1.29E-01	9.98E+01
135	1453	1703	4.38E+00	2.00E-01	3.16E+00	1.61E-01	1.21E-01	9.34E+01
136	2372	2622	6.27E+00	2.87E-01	4.52E+00	2.30E-01	1.73E-01	1.34E+02
139	2389	2639	6.10E+00	2.79E-01	4.40E+00	2.24E-01	1.68E-01	1.30E+02
154	3610	3860	7.94E+00	3.63E-01	5.72E+00	2.92E-01	2.19E-01	1.69E+02
155	3268	3518	7.86E+00	3.60E-01	5.67E+00	2.89E-01	2.17E-01	1.68E+02
156	2984	3234	7.65E+00	3.50E-01	5.52E+00	2.81E-01	2.11E-01	1.63E+02
157	2848	3098	7.32E+00	3.35E-01	5.28E+00	2.69E-01	2.02E-01	1.56E+02
158	1167	1417	3.46E+00	1.58E-01	2.50E+00	1.27E-01	9.53E-02	7.38E+01
170	606	856	2.13E+00	9.76E-02	1.54E+00	7.84E-02	5.88E-02	4.55E+01
171	1030	1280	3.16E+00	1.44E-01	2.28E+00	1.16E-01	8.70E-02	6.74E+01
			7.50E+01	3.43E+00	5.41E+01	2.76E+00	2.07E+00	1.60E+03

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Conc.	Total Activity
109	3.21E+02	1.47E+01	2.32E+02	1.18E+01	9.03E+00		
123	2.81E+03	1.29E+02	2.03E+03	1.03E+02	7.90E+01		
126	4.27E+02	1.95E+01	3.08E+02	1.57E+01	1.20E+01	4.35E+02	2.57E+01
127	1.23E+03	5.61E+01	8.84E+02	4.51E+01	3.44E+01		
135	9.64E+02	4.41E+01	6.95E+02	3.54E+01	2.71E+01		
136	1.48E+03	6.79E+01	1.07E+03	5.45E+01	4.17E+01	4.49E+02	2.81E+01
139	1.49E+03	6.84E+01	1.08E+03	5.49E+01	4.20E+01		
154	2.18E+03	1.00E+02	1.58E+03	8.03E+01	6.14E+01		
155	1.99E+03	9.11E+01	1.44E+03	7.32E+01	5.59E+01	6.92E+02	4.01E+01
156	1.83E+03	8.38E+01	1.32E+03	6.73E+01	5.14E+01		
157	1.75E+03	8.02E+01	1.26E+03	6.44E+01	4.93E+01		
158	8.02E+02	3.67E+01	5.79E+02	2.95E+01	2.25E+01	5.36E+02	3.38E+01
170	4.84E+02	2.22E+01	3.50E+02	1.78E+01	1.36E+01		
171	7.24E+02	3.32E+01	5.23E+02	2.66E+01	2.04E+01	2.21E+02	9.69E+00
	1.32E+03	6.05E+01	9.53E+02	4.86E+01	3.71E+01		

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Rail Car Destination
87	9700	10/10/92	<220	<2200	0.5	0.04	Yes/No	CR-587517
92	9400	10/10/92	<220	<2200	0.8	0.05	Yes/No	CR-587517
100	8000	10/10/92	<220	<2200	0.03	<0.02	Yes/No	CR-587517
102	9200	10/10/92	<220	<2200	0.03	<0.02	Yes/No	CR-587517
111	8600	10/10/92	<220	<2200	0.03	<0.02	Yes/No	CR-587517
114	9000	10/10/92	<220	<2200	0.03	<0.02	Yes/No	CR-587517
115	9000	10/10/92	<220	<2200	0.04	<0.02	Yes/No	CR-587517
116	8200	10/10/92	<220	<2200	0.05	0.03	Yes/No	CR-587517
125	8900	10/10/92	<220	<2200	0.05	0.03	Yes/No	CR-587517
128	9200	10/11/92	<220	<2200	0.04	0.03	Yes/No	CR-587517
129	9100	10/11/92	<220	<2200	0.03	<0.02	Yes/No	CR-587517
131	9900	10/11/92	<220	<2200	0.03	<0.02	Yes/No	CR-587517
133	8500	10/11/92	<220	<2200	<0.02	<0.02	Yes/No	CR-587517
142	8000	10/11/92	<220	<2200	<0.02	<0.02	Yes/No	CR-587517
Total	124700							
Average								

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
87	1256	1506	3.75E+00	1.72E-01	2.71E+00	1.38E-01	1.03E-01	8.01E+01
92	413	663	1.60E+00	7.33E-02	1.16E+00	5.89E-02	4.41E-02	3.42E+01
100	3000	3250	6.68E+00	3.06E-01	4.82E+00	2.46E-01	1.84E-01	1.43E+02
102	306	556	1.31E+00	6.01E-02	9.48E-01	4.83E-02	3.62E-02	2.80E+01
111	281	531	1.17E+00	5.37E-02	8.47E-01	4.31E-02	3.23E-02	2.50E+01
114	332	582	1.35E+00	6.16E-02	9.71E[illegible]	[illegible].95E-02	3.71E-02	2.87E+01
115	1161	1411	3.26E+00	1.49E-01	2.35E+00	1.20E-01	8.99E-02	6.96E+01
116	539	789	1.66E+00	7.61E-02	1.20E+00	6.11E-02	4.58E-02	3.55E+01
125	1007	1257	2.87E+00	1.32E-01	2.07E+00	1.06E-01	7.92E-02	6.13E+01
128	224	474	1.12E+00	5.13E-02	8.08E-01	4.12E-02	3.09E-02	2.39E+01
129	2338	2588	6.05E+00	2.77E-01	4.37E+00	2.22E-01	1.67E-01	1.29E+02
131	1200	1450	3.69E+00	1.69E-01	2.66E+00	1.36E-01	1.02E-01	7.87E+01
133	1534	1784	3.90E+00	1.78E-01	2.81E+00	1.43E-01	1.07E-01	8.32E+01
142	1608	1858	3.82E+00	1.75E-01	2.76E+00	1.40E-01	1.05E-01	8.15E+01
			4.22E+01	1.93E+00	3.05E+01	1.55E+00	1.16E+00	9.02E+02

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Conc.	Total Activity
87	8.52E+02	3.90E+01	6.15E+02	3.13E+01	2.39E+01		
92	3.75E+02	1.72E+01	2.71E+02	1.38E+01	1.05E+01		
100	1.84E+03	8.42E+01	1.33E+03	6.76E+01	5.17E+01	3.75E+02	2.20E+01
102	3.15E+02	1.44E+01	2.27E+02	1.16E+01	8.84E+00		
111	3.01E+02	1.38E+01	2.17E+02	1.10E+01	8.44E+00		
114	3.29E+02	1.51E+01	2.38E+02	1.21E+01	9.25E+00	1.15E+02	7.02E+00
115	7.99E+02	3.65E+01	5.76E+02	2.93E+01	2.24E+01		
116	4.47E+02	2.04E+01	3.22E+02	1.64E+01	1.25E+01		
125	7.11E+02	3.26E+01	5.13E+02	2.61E+01	2.00E+01	2.39E+02	1.43E+01
128	2.68E+02	1.23E+01	1.94E+02	9.86E+00	7.54E+00		
129	1.46E+03	6.70E+01	1.06E+03	5.38E+01	[illegible]11E+01		
131	8.21E+02	3.76E+01	5.92E+02	3.02E+01	2.31E+01	3.12E+02	1.99E+01
133	1.01E+03	4.62E+01	7.28E+02	3.71E+01	2.84E+01		
142	1.05E+03	4.81E+01	7.59E+02	3.86E+01	2.95E+01	3.78E+02	1.41E+01
	7.56E+02	3.46E+01	5.45E+02	2.78E+01	2.12E+01		

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box #	Weight	Date Filled	Contamination dpm/100^2 cm	Contamination dpm/100^2 cm	Radiation mR/h	Radiation mR/h	Labels Affixed	Rail Car Destination
	Pounds		Alpha	Beta	Contact	1 meter		
88	9800	10/10/92	<220	<2200	0.07	0.04	Yes/No	CR-587518
89	10100	10/10/92	<220	<2200	0.03	<0.02	Yes/No	CR-587518
94	10200	10/10/92	<220	<2200	<0.02	<0.02	Yes/No	CR-587518
98	10300	10/10/92	<220	<2200	0.03	<0.02	Yes/No	CR-587518
105	9200	10/10/92	<220	<2200	8	0.06	Yes/No	CR-587518
106	9200	10/10/92	<220	<2200	3	0.05	Yes/No	CR-587518
108	10500	10/10/92	<220	<2200	0.05	0.03	Yes/No	CR-587518
117	9500	10/10/92	<220	<2200	0.5	0.05	Yes/No	CR-587518
118	8700	10/10/92	<220	<2200	0.05	0.03	Yes/No	CR-587518
119	10400	10/10/92	<220	<2200	0.05	0.03	Yes/No	CR-587518
120	8300	10/10/92	<220	<2200	5	0.05	Yes/No	CR-587518
138	9400	10/11/92	<220	<2200	<0.02	<0.02	Yes/No	CR-587518
140	9700	10/11/92	<220	<2200	<0.02	<0.02	Yes/No	CR-587518
145	8400	10/11/92	<220	<2200	<0.02	<0.02	Yes/No	CR-587518
Total	133700							
Average								

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
88	60	310	7.81E-01	3.57E-02	5.63E-01	2.87E-02	2.15E-02	1.67E+01
89	963	1213	3.15E+00	1.44E-01	2.27E+00	1.16E-01	8.68E-02	6.72E+01
94	968	1218	3.19E+00	1.46E-01	2.30E+00	1.17E-01	8.80E-02	6.81E+01
98	1007	1257	3.33E+00	1.52E-01	2.40E+00	1.22E-01	9.17E-02	7.10E+01
105	1605	1855	4.39E+00	2.01E-01	3.16E+00	1.61E-01	1.21E-01	9.36E+01
106	1751	2001	4.73E+00	2.16E-01	3.41E+00	1.74E-01	1.30E-01	1.01E+02
108	1036	1286	3.47E+00	1.59E-01	2.50E+00	1.28E-01	9.56E-02	7.40E+01
117	1648	1898	4.63E+00	2.12E-01	3.34E+00	1.70E-01	1.28E-01	9.89E+01
118	3048	3298	7.37E+00	3.37E-01	5.32E+00	2.71E-01	2.03E-01	1.57E+02
119	3504	3754	1.00E+01	4.59E-01	7.24E+00	3.69E-01	2.77E-01	2.14E+02
120	3546	3796	8.10E+00	3.70E-01	5.84E+00	2.98E-01	2.23E-01	1.73E+02
138	2141	2391	5.78E+00	2.64E-01	4.17E+00	2.12E-01	1.59E-01	1.23E+02
140	730	980	2.44E+00	1.12E-01	1.76E+00	8.98E-02	6.73E-02	5.21E+01
145	1153	1403	3.03E+00	1.39E-01	2.18E+00	1.11E-01	8.35E-02	6.46E+01
			6.44E+01	2.95E+00	4.65E+01	2.37E+00	1.78E+00	1.37E+03

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Conc.	Total Activity
88	1.75E+02	8.03E+00	1.27E+02	6.45E+00	4.93E+00		
89	6.87E+02	3.14E+01	4.95E+02	2.52E+01	1.93E+01		
94	6.89E+02	3.15E+01	4.97E+02	2.53E+01	1.94E+01	1.89E+02	1.30E+01
98	7.11E+02	3.26E+01	5.13E+02	2.61E+01	2.00E+01		
105	1.05E+03	4.80E+01	7.57E+02	3.86E+01	2.95E+01		
106	1.13E+03	5.18E+01	8.17E+02	4.16E+01	3.18E+01	3.53E+02	2.28E+01
108	7.28E+02	3.33E+01	5.25E+02	2.67E+01	2.04E+01		
117	1.07E+03	4.92E+01	7.75E+02	3.95E+01	3.02E+01		
118	1.87E+03	8.54E+01	1.35E+03	6.86E+01	5.24E+01	4.48E+02	2.83E+01
119	2.12E+03	9.72E+01	1.53E+03	7.81E+01	5.97E+01		
120	2.15E+03	9.83E+01	1.55E+03	7.90E+01	6.04E+01		
138	1.35E+03	6.19E+01	9.76E+02	4.97E+01	3.80E+01	6.87E+02	4.38E+01
140	5.55E+02	2.54E+01	4.00E+02	2.04E+01	1.56E+01		
145	7.94E+02	3.63E+01	5.73E+02	2.92E+01	2.23E+01	2.47E+02	1.00E+01
	1.08E+03	4.93E+01	7.78E+02	3.96E+01	3.03E+01		

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Rail Car Destination
95	9500	10/10/92	<220	<2200	0.03	<0.02	Yes/No	CR-587519
97	8800	10/10/92	<220	<2200	0.03	<0.02	Yes/No	CR-587519
99	8500	10/10/92	<220	<2200	0.05	0.03	Yes/No	CR-587519
101	9800	10/10/92	<220	<2200	0.03	<0.02	Yes/No	CR-587519
107	9300	10/10/92	<220	<2200	0.04	<0.02	Yes/No	CR-587519
121	9200	10/10/92	<220	<2200	0.05	0.03	Yes/No	CR-587519
122	9200	10/10/92	<220	<2200	0.07	0.04	Yes/No	CR-587519
124	9200	10/10/92	<220	<2200	0.04	<0.02	Yes/No	CR-587519
130	8100	10/11/92	<220	<2200	<0.02	<0.02	Yes/No	CR-587519
134	8300	10/11/92	<220	<2200	0.03	<0.02	Yes/No	CR-587519
137	8800	10/11/92	<220	<2200	<0.02	<0.02	Yes/No	CR-587519
141	4600	10/11/92	<220	<2200	0.4	<0.02	Yes/No	CR-587519
143	9300	10/11/92	<220	<2200	<0.02	<0.02	Yes/No	CR-587519
144	9200	10/11/92	<220	<2200	<0.02	<0.02	Yes/No	CR-587519
Total	121800							
Average								

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
95	1568	1818	4.44E+00	2.03E-01	3.20E+00	1.63E-01	1.22E-01	9.47E+01
97	478	728	1.65E+00	7.53E-02	1.19E+00	6.05E-02	4.54E-02	3.51E+01
99	3103	3353	7.32E+00	3.35E-01	5.28E+00	2.69E-01	2.02E-01	1.56E+02
101	584	834	2.10E+00	9.61E-02	1.52E+00	7.72E-02	5.79E-02	4.48E+01
107	207	457	1.09E+00	5.00E-02	7.88E-01	4.01E-02	3.01E-02	2.33E+01
121	2389	2639	6.24E+00	2.85E-01	4.50E+00	2.29E-01	1.72E-01	1.33E+02
122	2169	2419	5.72E+00	2.62E-01	4.13E+00	2.10E-01	1.58E-01	1.22E+02
124	1860	2110	4.99E+00	2.28E-01	3.60E+00	1.83E-01	1.37E-01	1.06E+02
130	927	1177	2.45E+00	1.12E-01	1.77E+00	9.00E-02	6.75E-02	5.23E+01
134	1773	2023	4.31E+00	1.97E-01	3.11E+00	1.59E-01	1.19E-01	9.21E+01
137	1588	1838	4.16E+00	1.90E-01	3.00E+00	1.53E-01	1.15E-01	8.87E+01
141	1625	1875	2.22E+00	1.01E-01	1.60E+00	8.14E-02	6.11E-02	4.73E+01
143	592	842	2.01E+00	9.21E-02	1.45E+00	7.39E-02	5.55E-02	4.29E+01
144	1538	1788	4.23E+00	1.93E-01	3.05E+00	1.55E-01	1.17E-01	9.02E+01
			5.29E+01	2.42E+00	3.82E+01	1.94E+00	1.46E+00	1.13E+03

Texas Instruments Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Conc.	Total Activity
95	1.03E+03	4.71E+01	7.42E+02	3.78E+01	2.89E+01		
97	4.12E+02	1.89E+01	2.97E+02	1.51E+01	1.16E+01		
99	1.90E+03	8.68E+01	1.37E+03	6.97E+01	5.33E+01	4.08E+02	2.46E+01
101	4.72E+02	2.16E+01	3.41E+02	1.73E+01	1.33E+01		
107	2.59E+02	1.18E+01	1.87E+02	9.51E+00	7.27E+00		
121	1.49E+03	6.84E+01	1.08E+03	5.49E+01	4.20E+01	2.72E+02	1.73E+01
122	1.37E+03	6.27E+01	9.88E+02	5.03E+01	3.85E+01		
124	1.19E+03	5.46E+01	8.62E+02	4.39E+01	3.35E+01		
130	6.66E+02	3.05E+01	4.81E+02	2.45E+01	1.87E+01	3.94E+02	2.41E+01
134	1.15E+03	5.24E+01	8.26E+02	4.21E+01	3.22E+01		
137	1.04E+03	4.76E+01	7.50E+02	3.82E+01	2.92E+01		
141	1.06E+03	4.86E+01	7.66E+02	3.90E+01	2.98E+01	3.97E+02	1.96E+01
143	4.77E+02	2.18E+01	3.44E+02	1.75E+01	1.34E+01		
144	1.01E+03	4.63E+01	7.30E+02	3.72E+01	2.84E+01	2.73E+02	1.14E+01
	9.66E+02	4.42E+01	6.97E+02	3.55E+01	2.71E+01		

Attachment 5-3

Spreadsheet for Radioactive Shipment Record

Shipment 3

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Rail Car Destination
1	104900	10/3/92	<220	<2200	<0.03	<0.02	Yes/No	CR-578498
2	107300	10/3/92	<220	<2200	<0.03	<0.02	Yes/No	CR-576789
3	105100	10/3/92	<220	<2200	<0.03	<0.02	Yes/No	CR-578520
4	114700	10/3/92	<220	<2200	<0.03	<0.02	Yes/No	CR-576526
5	117900	10/3/92	<220	<2200	<0.03	<0.02	Yes/No	CR-578043
6	108100	10/3/92	<220	<2200	<0.03	<0.02	Yes/No	CR-587309

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
1	197	197	5.31E+00	2.43E-01	3.83E+00	1.95E-01	1.46E-01	1.13E+02
2	300	300	8.27E+00	3.79E-01	5.97E+00	3.04E-01	2.28E-01	1.77E+02
3	100	100	2.70E+00	1.24E-01	1.95E+00	9.92E-02	7.44E-02	5.76E+01
4	103	103	3.04E+00	1.39E-01	2.19E+00	1.12E-01	8.37E-02	6.48E+01
5	153	153	4.64E+00	2.12E-01	3.34E+00	1.70E-01	1.28E-01	9.89E+01
6	197	197	5.47E+00	2.50E-01	3.95E+00	2.01E-01	1.51E-01	1.17E+02

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Concen	Total Activity
1	1.12E+02	5.10E+00	8.04E+01	4.10E+00	3.13E+00	4.09E+01	9.73E+00
2	1.70E+02	7.77E+00	1.22E+02	6.24E+00	4.77E+00	6.22E+01	1.51E+01
3	5.66E+01	2.59E+00	4.08E+01	2.08E+00	1.59E+00	2.07E+01	4.95E+00
4	5.83E+01	2.67E+00	4.21E+01	2.14E+00	1.64E+00	2.14E+01	5.56E+00
5	8.66E+01	3.96E+00	6.25E+01	3.18E+00	2.43E+00	3.17E+01	8.49E+00
6	1.12E+02	5.10E+00	8.04E+01	4.10E+00	3.13E+00	4.09E+01	1.00E+01
							5.39E+01

Attachment 5-4

Spreadsheet for Radioactive Shipment Record

Shipment 4

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Rail Car Destination
1	133400		<220	<2200	<0.03	<0.03	Yes/No	CR-577962
2	111400		<220	<2200	<0.03	<0.03	Yes/No	CR-587029
3	125000		<220	<2200	<0.03	<0.03	Yes/No	CR-587376
4	110300		<220	<2200	<0.03	<0.03	Yes/No	CR-587067
5	114500		<220	<2200	<0.03	<0.03	Yes/No	CR-587020
6	111500		<220	<2200	<0.03	<0.03	Yes/No	CR-587097

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
1	157	157	5.38E+00	2.46E-01	3.88E+00	1.98E-01	1.48E-01	1.15E+02
2	106	106	3.03E+00	1.39E-01	2.19E+00	1.11E-01	8.35E-02	6.47E+01
3	138	138	4.43E+00	2.03E-01	3.20E+00	1.63E-01	1.22E-01	9.45E+01
4	157	157	4.45E+00	2.04E-01	3.21E+00	1.64E-01	1.23E-01	9.50E+01
5	155	155	4.56E+00	2.09E-01	3.29E+00	1.68E-01	1.26E-01	9.73E+01
6	123	123	3.52E+00	1.61E-01	2.54E+00	1.29E-01	9.70E-02	7.51E+01

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Concen	Total Activity
1	8.88E+01	4.06E+00	6.41E+01	3.26E+00	2.50E+00	3.25E+01	9.85E+00
2	5.99E+01	2.74E+00	4.32E+01	2.20E+00	1.68E+00	2.20E+01	5.55E+00
3	7.81E+01	3.57E+00	5.63E+01	2.87E+00	2.19E+00	2.86E+01	8.11E+00
4	8.89E+01	4.07E+00	6.41E+01	3.27E+00	2.50E+00	3.26E+01	8.15E+00
5	8.77E+01	4.01E+00	6.33E+01	3.22E+00	2.46E+00	3.21E+01	8.35E+00
6	6.95E+01	3.18E+00	5.02E+01	2.56E+00	1.95E+00	2.55E+01	6.45E+00
							4.65E+01

Attachment 5-5

Spreadsheet for Radioactive Shipment Record

Shipment 5

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Rail Car Destination
1	112900		<220	<2200	<0.03	<0.03	Yes/No	CR-587488
2	111700		<220	<2200	<0.03	<0.03	Yes/No	CR-587489
3	119300		<220	<2200	<0.03	<0.03	Yes/No	CR-587490
4	112200		<220	<2200	<0.03	<0.03	Yes/No	CR-587491
5	120700		<220	<2200	<0.03	<0.03	Yes/No	CR-587050
6	121200		<220	<2200	<0.03	<0.03	Yes/No	CR-587119

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
1	78	78	2.26E+00	1.03E-01	1.63E+00	8.31E-02	6.23E-02	4.82E+01
2	156	156	4.48E+00	2.05E-01	3.23E+00	1.65E-01	1.23E-01	9.56E+01
3	62	62	1.90E+00	8.69E-02	1.37E+00	6.98E-02	5.24E-02	4.05E+01
4	62	62	1.79E+00	8.19E-02	1.29E+00	6.58E-02	4.93E-02	3.82E+01
5	83	83	2.57E+00	1.18E-01	1.85E+00	9.44E-02	7.08E-02	5.48E+01
6	314	314	9.78E+00	4.48E-01	7.06E+00	3.59E-01	2.70E-01	2.09E+02

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Concen	Total Activity
1	4.41E+01	2.02E+00	3.18E+01	1.62E+00	1.24E+00	1.62E+01	4.14E+00
2	8.83E+01	4.04E+00	6.37E+01	3.25E+00	2.48E+00	3.24E+01	8.20E+00
3	3.51E+01	1.61E+00	2.53E+01	1.29E+00	9.85E-01	1.29E+01	3.48E+00
4	3.51E+01	1.61E+00	2.53E+01	1.29E+00	9.87E-01	1.29E+01	3.28E+00
5	4.69E+01	2.15E+00	3.38E+01	1.72E+00	1.32E+00	1.72E+01	4.71E+00
6	1.78E+02	8.13E+00	1.28E+02	6.53E+00	4.99E+00	6.51E+01	1.79E+01
							4.17E+01

Attachment 5-6

Spreadsheet for Radioactive Shipment Record

Shipment 6

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Rail Car Destination
1	115800		<220	<2200	<0.03	<0.03	Yes/No	CR-587197
2	118000		<220	<2200	<0.03	<0.03	Yes/No	CR-587342
3	120400		<220	<2200	<0.03	<0.03	Yes/No	CR-587396
4	118600		<220	<2200	<0.03	<0.03	Yes/No	CR-587188
5	115300		<220	<2200	<0.03	<0.03	Yes/No	CR-587186
6	115900		<220	<2200	<0.03	<0.03	Yes/No	CR-587363

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
1	70	70	2.08E+00	9.52E-02	1.50E+00	7.64E-02	5.73E-02	4.44E+01
2	86	86	2.61E+00	1.19E-01	1.88E+00	9.59E-02	7.19E-02	5.57E+01
3	67	67	2.07E+00	9.47E-02	1.49E+00	7.61E-02	5.71E-02	4.42E+01
4	62	62	1.89E+00	8.65E-02	1.36E+00	6.95E-02	5.21E-02	4.03E+01
5	75	75	2.22E+00	1.02E-01	1.60E+00	8.16E-02	6.12E-02	4.74E+01
6	76	76	2.26E+00	1.03E-01	1.63E+00	8.31E-02	6.23E-02	4.82E+01

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Concen	Total Activity
1	3.96E+01	1.81E+00	2.85E+01	1.45E+00	1.11E+00	1.45E+01	3.81E+00
2	4.87E+01	2.23E+00	3.51E+01	1.79E+00	1.37E+00	1.79E+01	4.78E+00
3	3.79E+01	1.73E+00	2.73E+01	1.39E+00	1.06E+00	1.39E+01	3.79E+00
4	3.51E+01	1.61E+00	2.53E+01	1.29E+00	9.86E-01	1.29E+01	3.46E+00
5	4.24E+01	1.94E+00	3.06E+01	1.56E+00	1.19E+00	1.55E+01	4.07E+00
6	4.30E+01	1.97E+00	3.10E+01	1.58E+00	1.21E+00	1.57E+01	4.14E+00
							2.40E+01

Attachment 5-7

Spreadsheet for Radioactive Shipment Record

Shipment 7

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Rail Car Destination
1	115300		<220	<2200	<0.03	<0.03	Yes/No	CR-587327
2	107800		<220	<2200	<0.03	<0.03	Yes/No	CR-587412
3	119900		<220	<2200	<0.03	<0.03	Yes/No	CR-587444
4	111300		<220	<2200	<0.03	<0.03	Yes/No	CR-587152
5	121000		<220	<2200	<0.03	<0.03	Yes/No	CR-587441
6	120100		<220	<2200	<0.03	<0.03	Yes/No	CR-587440

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
1	120	120	3.55E+00	1.62E-01	2.56E+00	1.30E-01	9.78E-02	7.58E+01
2	47	47	1.30E+00	5.95E-02	9.38E-01	4.78E-02	3.58E-02	2.77E+01
3	63	63	1.94E+00	8.88E-02	1.40E+00	7.13E-02	5.35E-02	4.14E+01
4	55	55	1.57E+00	7.18E-02	1.13E+00	5.77E-02	4.33E-02	3.35E+01
5	54	54	1.68E+00	7.69E-02	1.21E+00	6.17E-02	4.63E-02	3.58E+01
6	141	141	4.36E+00	2.00E-01	3.15E+00	1.60E-01	1.20E-01	9.30E+01

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Concen	Total Activity
1	6.78E+01	3.10E+00	4.89E+01	2.49E+00	1.91E+00	2.48E+01	6.50E+00
2	2.66E+01	1.22E+00	1.92E+01	9.76E-01	7.46E-01	9.73E+00	2.38E+00
3	3.56E+01	1.63E+00	2.57E+01	1.31E+00	1.00E+00	1.31E+01	3.55E+00
4	3.11E+01	1.42E+00	2.24E+01	1.14E+00	8.73E-01	1.14E+01	2.88E+00
5	3.06E+01	1.40E+00	2.21E+01	1.12E+00	8.59E-01	1.12E+01	3.08E+00
6	8.00E+01	3.66E+00	5.77E+01	2.94E+00	2.25E+00	2.93E+01	7.99E+00
							2.64E+01

Attachment 5-8

Spreadsheet for Radioactive Shipment Record

Shipment 8

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Rail Car Destination
1	120600		<220	<2200	<0.03	<0.03	Yes/No	CR-587820
2	118600		<220	<2200	<0.03	<0.03	Yes/No	CR-587821
3	121900		<220	<2200	<0.03	<0.03	Yes/No	CR-587822
4	122600		<220	<2200	<0.03	<0.03	Yes/No	CR-587823
5	113800		<220	<2200	<0.03	<0.03	Yes/No	CR-587497
6	123000		<220	<2200	<0.03	<0.03	Yes/No	CR-587819

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
1	177	177	5.49E+00	2.51E-01	3.96E+00	2.02E-01	1.51E-01	1.17E+02
2	225	225	6.86E+00	3.14E-01	4.95E+00	2.52E-01	1.89E-01	1.46E+02
3	225	225	7.05E+00	3.23E-01	5.09E+00	2.59E-01	1.94E-01	1.50E+02
4	225	225	7.09E+00	3.24E-01	5.11E+00	2.61E-01	1.95E-01	1.51E+02
5	102	102	2.98E+00	1.36E-01	2.15E+00	1.10E-01	8.21E-02	6.36E+01
6	165	165	5.22E+00	2.39E-01	3.77E+00	1.92E-01	1.44E-01	1.11E+02

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Concen	Total Activity
1	1.00E+02	4.59E+00	7.23E+01	3.68E+00	2.82E+00	3.67E+01	1.01E+01
2	1.27E+02	5.83E+00	9.19E+01	4.68E+00	3.58E+00	4.67E+01	1.26E+01
3	1.27E+02	5.83E+00	9.19E+01	4.68E+00	3.58E+00	4.67E+01	1.29E+01
4	1.27E+02	5.83E+00	9.19E+01	4.68E+00	3.58E+00	4.67E+01	1.30E+01
5	5.77E+01	2.64E+00	4.16E+01	2.12E+00	1.62E+00	2.11E+01	5.46E+00
6	9.35E+01	4.28E+00	6.74E+01	3.44E+00	2.63E+00	3.42E+01	9.56E+00
							6.35E+01

Attachment 5-9

Spreadsheet for Radioactive Shipment Record

Shipment 9

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box #	Weight	Date Filled	Contamination dpm/100^2 cm	Contamination dpm/100^2 cm	Radiation mR/h	Radiation mR/h	Labels Affixed	Rail Car Destination
	Pounds		Alpha	Beta	Contact	1 meter		
1	119780		<220	<2200	<0.03	<0.02	Yes/No	CR-587150
2	118700		<220	<2200	<0.03	<0.02	Yes/No	CR-587315
3	118100		<220	<2200	<0.03	<0.02	Yes/No	CR-587354
4	118200		<220	<2200	<0.03	<0.02	Yes/No	CR-587472
5	118400		<220	<2200	<0.03	<0.02	Yes/No	CR-587704
6	115300		<220	<2200	<0.03	<0.02	Yes/No	CR-587705

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms
1	150	150	4.62E+00	2.11E-01	3.33E+00	1.70E-01	1.27E-01	9.86E+01
2	90	90	2.75E+00	1.26E-01	1.98E+00	1.01E-01	7.58E-02	5.87E+01
3	226	226	6.86E+00	3.14E-01	4.95E+00	2.52E-01	1.89E-01	1.46E+02
4	95	95	2.89E+00	1.32E-01	2.08E+00	1.06E-01	7.97E-02	6.17E+01
5	87	87	2.65E+00	1.21E-01	1.91E+00	9.74E-02	7.30E-02	5.65E+01
6	250	250	7.41E+00	3.39E-01	5.35E+00	2.72E-01	2.04E-01	1.58E+02

Texas Instruments Bulk Soil Shipment Information Sorted By Rail Car

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Concen	Total Activity
1	8.50E+01	3.89E+00	6.13E+01	3.12E+00	2.39E+00	3.11E+01	8.46E+00
2	5.10E+01	2.34E+00	3.68E+01	1.88E+00	1.43E+00	1.87E+01	5.04E+00
3	1.28E+02	5.85E+00	9.23E+01	4.70E+00	3.59E+00	4.69E+01	1.26E+01
4	5.39E+01	2.46E+00	3.88E+01	1.98E+00	1.51E+00	1.97E+01	5.29E+00
5	4.93E+01	2.26E+00	3.56E+01	1.81E+00	1.38E+00	1.81E+01	4.85E+00
6	1.42E+02	6.48E+00	1.02E+02	5.20E+00	3.98E+00	5.19E+01	1.36E+01
							4.98E+01

Attachment 5-10

Spreadsheet for Radioactive Shipment Record

Shipment 10

Texas Instruments Soil Shipment Information Sorted By B-25 Box

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Truck Designation
1	11050	6/1/93	<220	<2200	<0.03	<0.02	Yes/No	1
8	9880	6/1/93	<220	<2200	<0.03	<0.02	Yes/No	1
9	9920	6/1/93	<220	<2200	<0.03	<0.02	Yes/No	1
11	8000	6/1/93	<220	<2200	<0.03	<0.02	Yes/No	1
	38850							

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Truck Designation
2	11150	6/1/93	<220	<2200	<0.03	<0.02	Yes/No	2
3	10950	6/1/93	<220	<2200	<0.03	<0.02	Yes/No	2
4	11950	6/1/93	<220	<2200	<0.03	<0.02	Yes/No	2
	34050							

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Truck Designation
5	10900	6/1/93	<220	<2200	<0.03	<0.02	Yes/No	3
6	11200	6/1/93	<220	<2200	<0.03	<0.02	Yes/No	3
7	11000	6/1/93	<220	<2200	<0.03	<0.02	Yes/No	3
	33100							

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Truck Designation
10	10300	6/1/93	<220	<2200	<0.03	<0.02	Yes/No	4
12	10500	6/1/93	<220	<2200	<0.03	<0.02	Yes/No	4
13	10535	6/1/93	<220	<2200	<0.03	<0.02	Yes/No	4
	31335							

Box #	Weight Pounds	Date Filled	Contamination dpm/100^2 cm Alpha	Contamination dpm/100^2 cm Beta	Radiation mR/h Contact	Radiation mR/h 1 meter	Labels Affixed	Truck Designation
14	10025	6/1/93	<220	<2200	<0.03	<0.02	Yes/No	5
15	875	6/1/93	<220	<2200	<0.03	<0.02	Yes/No	5
16	6500	6/1/93	<220	<2200	<0.03	<0.02	Yes/No	5
17	9000	6/1/93	<220	<2200	<0.03	<0.02	Yes/No	5
	26400							

Texas Instruments Soil Shipment Information Sorted By B-25 Box

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms	SNM kg	Source Material Kg
1	390	390	1.11E+00	5.07E-02	7.99E-01	4.07E-02	3.05E-02	2.36E+01	4.73E-03	1.89E-02
8	120	120	3.05E-01	1.39E-02	2.20E-01	1.12E-02	8.40E-03	6.50E+00	1.30E-03	5.20E-03
9	259	259	6.60E-01	3.02E-02	4.76E-01	2.43E-02	1.82E-02	1.41E+01	2.82E-03	1.13E-02
11	302	302	6.21E-01	2.84E-02	4.48E-01	2.28E-02	1.71E-02	1.32E+01	2.65E-03	1.06E-02
			2.69E+00	1.23E-01	1.94E+00	9.90E-02	7.42E-02		11.4936	

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms	SNM kg	Source Material Kg
2	162	162	4.64E-01	2.12E-02	3.35E-01	1.71E-02	1.28E-02	9.90E+00	1.98E-03	7.92E-03
3	416	416	1.17E+00	5.36E-02	8.44E-01	4.30E-02	3.23E-02	2.50E+01	5.00E-03	2.00E-02
4	221	221	6.79E-01	3.11E-02	4.90E-01	2.49E-02	1.87E-02	1.45E+01	2.90E-03	1.16E-02
			2.31E+00	1.06E-01	1.67E+00	8.50E-02	6.38E-02	4.94E+01	9.8728	

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms	SNM kg	Source Material Kg
5	136	136	3.81E-01	1.74E-02	2.75E-01	1.40E-02	1.05E-02	8.13E+00	1.63E-03	6.50E-03
6	106	106	3.05E-01	1.40E-02	2.20E-01	1.12E-02	8.41E-03	6.51E+00	1.30E-03	5.21E-03
7	323	323	9.13E-01	4.18E-02	6.59E-01	3.36E-02	2.52E-02	1.95E+01	3.90E-03	1.56E-02
			1.60E+00	7.32E-02	1.15E+00	5.88E-02	4.41E-02		6.8242	

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms	SNM kg	Source Material Kg
10	143	143	3.78E-01	1.73E-02	2.73E-01	1.39E-02	1.04E-02	8.08E+00	1.62E-03	6.46E-03
12	192	192	5.18E-01	2.37E-02	3.74E-01	1.90E-02	1.43E-02	1.11E+01	2.21E-03	8.84E-03
13	123	123	3.33E-01	1.52E-02	2.40E-01	1.22E-02	9.18E-03	7.11E+00	1.42E-03	5.68E-03
			1.23E+00	5.63E-02	8.87E-01	4.52E-02	3.39E-02		5.24729	

Box Number	Alpha Screening Counts/10 min	Total Uranium Concentration pCi/g	U-238 Activity mCi	U-235 Activity mCi	U-234 Activity mCi	Th-232 Activity mCi	Th-230 Activity mCi	U-235 Mass gms	SNM kg	Source Material Kg
14	119	119	3.07E-01	1.40E-02	2.21E-01	1.13E-02	8.45E-03	6.54E+00	1.31E-03	5.23E-03
15	172	172	3.87E-02	1.77E-03	2.79E-02	1.42E-03	1.07E-03	8.25E-01	1.65E-04	6.60E-04
16	233	233	3.89E-01	1.78E-02	2.81E-01	1.43E-02	1.07E-02	8.30E+00	1.66E-03	6.64E-03
17	154	154	3.56E-01	1.63E-02	2.57E-01	1.31E-02	9.82E-03	7.60E+00	1.52E-03	6.08E-03
			1.09E+00	4.99E-02	7.87E-01	4.01E-02	3.01E-02		4.65428	

Texas Instruments Soil Shipment Information Sorted By B-25 Box

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Concen	Total Activity mCi	Weight (tons)
1	2.21E+02	1.01E+01	1.59E+02	8.11E+00	6.20E+00	8.09E+01	2.03E+00	5.53
8	6.79E+01	3.11E+00	4.90E+01	2.50E+00	1.91E+00	2.49E+01	5.58E-01	4.94
9	1.47E+02	6.71E+00	1.06E+02	5.39E+00	4.12E+00	5.37E+01	1.21E+00	4.96
11	1.71E+02	7.82E+00	1.23E+02	6.28E+00	4.80E+00	6.26E+01	1.14E+00	4.00
						55.526	4.93E+00	19.43

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Concen	Total Activity mCi	Weight (tons)
2	9.17E+01	4.20E+00	6.61E+01	3.37E+00	2.58E+00	3.36E+01	8.50E-01	5.58
3	2.35E+02	1.08E+01	1.70E+02	8.65E+00	6.61E+00	8.63E+01	2.14E+00	5.48
4	1.25E+02	5.72E+00	9.02E+01	4.60E+00	3.51E+00	4.58E+01	1.24E+00	5.98
						55.23221	4.24E+00	17.03

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Concen	Total Activity mCi	Weight (tons)
5	7.70E+01	3.52E+00	5.55E+01	2.83E+00	2.16E+00	2.82E+01	6.98E-01	5.45
6	6.00E+01	2.75E+00	4.33E+01	2.20E+00	1.69E+00	2.20E+01	5.59E-01	5.60
7	1.83E+02	8.37E+00	1.32E+02	6.72E+00	5.14E+00	6.70E+01	1.67E+00	5.50
						39.06	2.93E+00	16.55

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Concen	Total Activity mCi	Weight (tons)
10	8.09E+01	3.70E+00	5.84E+01	2.97E+00	2.27E+00	2.97E+01	6.93E-01	5.15
12	1.09E+02	4.97E+00	7.84E+01	3.99E+00	3.05E+00	3.98E+01	9.49E-01	5.25
13	6.96E+01	3.19E+00	5.02E+01	2.56E+00	1.96E+00	2.55E+01	6.10E-01	5.27
						31.66	2.25E+00	15.67

Box Number	U-238 Concentration pCi/g	U-235 Concentration pCi/g	U-234 Concentration pCi/g	Th-232 Concentration pCi/g	Th-230 Concentration pCi/g	Average Concen	Total Activity mCi	Weight (tons)
14	6.74E+01	3.08E+00	4.86E+01	2.48E+00	1.89E+00	2.47E+01	5.61E-01	5.01
15	9.74E+01	4.45E+00	7.02E+01	3.58E+00	2.73E+00	3.57E+01	7.08E-02	0.44
16	1.32E+02	6.03E+00	9.51E+01	4.85E+00	3.70E+00	4.83E+01	7.13E-01	3.25
17	8.72E+01	3.99E+00	6.29E+01	3.20E+00	2.45E+00	3.19E+01	6.52E-01	4.50
						35.15091	2.00E+00	13.20

Attachment 6

Emergency Response and Instructions to Drivers for Exclusive Use Consignments.

Texas Instruments Incorporated

Emergency Response Procedures for Radioactive Material LSA

Scope:

This procedure is established to provide guidance in regards to emergency procedures in the transport radioactive material LSA.

Description:

This emergency response is appropriate for the following types of material:
RADIOACTIVE MATERIAL, LSA, N.O.S., UN 2912. DOT Response Guide 62.

Physical Nature of Material:

Soils and Debris

Emergency Phone Numbers:

Provided on Radioactive Shipment Record

Health Hazard:

The quantity of Radioactive Material present in this conveyance presents no significant hazard.

Fire or Explosion:

This material is not flammable or explosive

Immediate Actions:

Call the emergency response numbers.

Accident (No Fire)

If no spill or leak has occurred and packaging is intact, treat injured person(s) according to the injury. Take actions to prevent further accidents and secure the vehicle. Keep all unnecessary people at least 150 feet away.

Accident (Fire)

If fire is not associated with the load, extinguish as rapidly as possible.
If Fire is affecting the load, keep unnecessary people at least 150 ft upwind. Greater distances may be necessary for people upwind. Detain uninjured persons and equipment until arrival of qualified radiation authorities.

Spill or Leak

Isolate area and keep unnecessary people 150 feet upwind.

First Aid

Call emergency care. Advise medical personnel if persons were in contact with un-packaged material.

Texas Instruments Incorporated
Emergency Procedures for Limited Empty Packaging

Scope:

This procedure is established to provide guidance in regards to emergency procedures in the transport of Excepted Quantities of Radioactive Material as Empty Packaging.

Description:

This emergency response is appropriate for the following types of material: RADIOACTIVE MATERIAL, Empty Packaging, N.O.S., UN 2910. DOT Response Guide 61.

Physical Nature of Material:

Empty Packages.

Emergency Phone Numbers:

Attached

Health Hazard:

Minimal radiation hazard.

Fire or Explosion:

This material is not flammable or explosive

Immediate Actions:

Call the emergency response numbers.

Accident (No Fire)

If no spill or leak has occurred and packaging is intact, treat injured person(s) according to the injury. Take actions to prevent further accidents and secure the vehicle. Keep all unnecessary people at least 150 feet away and deny entry.

Accident (Fire)

If fire is not associated with the load, extinguish as rapidly as possible.

If Fire is affecting the load, keep unnecessary people at least 150 ft upwind. Detain uninjured persons and equipment until arrival of qualified radiation authorities.

Spill or Leak

Isolate area and keep unnecessary people 150 feet upwind.

First Aid

Call emergency care. Advise medical personnel if persons were in contact with unpackaged material.

Texas Instruments Incorporated
Emergency Response Information

Scope:

This procedure is established to provide guidance in regards to emergency procedures in the transport of LSA quantities of Radioactive Material.

Description:

This emergency response information is appropriate for the following types of material:

RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY, n.o.s., UN 2912

Physical Nature of Material:

The material is principaly contaminated soil with a debris content of approximately 1%. The contaminate is Uranium oxide and metals.

Emergency Phone Numbers:

a. **PRINTED ON RADIOACTIVE SHIPMENT RECORD**
b. Additional response assistance and guidance is available from CHEMTREC

Health Hazards:

a. No external Radiation Hazard.
b. If package is intact, no significant internal radiation hazards.
c. If package is broken, leaking or otherwise questionable; assume the package and immediate areas are contaminated and a potential exists for internal contamination.

Fire or Explosion Potential:

The material is not flammable or explosive

Immediate Actions:

Call the emergency response numbers.

Accident (No Fire)

If no spill or leak has occurred, the risk of contamination is remote, treat injured person(s) according to the injury immediately. If packaging is intact and braced take actions to prevent further accidents and secure the vehicle.

Accident (Fire)

If fire is not located in cargo area, extinguish as rapidly as possible.

If fire is located in cargo area or threatens cargo area, keep unnecessary personnel 150 feet upwind. Isolate area and deny entry. If in doubt, Level B or A protective clothing will provide adequate protection. Use dry chemical, CO_2, water spray or Foam. Detain uninjured persons and equipment which may be potentially contaminated until arrival of qualified radiation authorities.

Spill or Leak:

Do not touch or move damaged packages or spilled material. Isolate the area and keep unnecessary people 150 feet upwind.

First Aid:

Call emergency care. Persons in contact with unpackaged material or in contact with smoke may be contaminated. If so, advise medical personnel that the injured person(s) may be contaminated with radioactive material.

Shipment Identification Number: TI-1100

Shipper

Texas Instruments Incorporated
34 Forest Street
North Attleboro, Massachusetts 02703

Contact Person:	Mike Elliott
Telephone (Normal Hours):	(508) 699-1809
Emergency Telephone (24 hours):	(508) 699-3800

Consignee

Envirocare of Utah, Inc.
Clive Disposal Site
Interstate 80, Exit 49
West of Salt Lake City, Utah

Telephone:	(801)532-1330

Description

1.
- Number of Packages: 4 Weight: 38,850 pounds
- Radioactive Material, Low Specific Activity LSA, n.o.s. UN2912
- DOT Emergency Guide # 62
- Quantiies: Uranium = 4.93 mCi
- Class 7
- Form: Solid; Chemical form: UO_x and U metals
- Label: Radioactive LSA
- Exclusive Use Shipment.

2.
- Number of Packages: 3 Weight: 1980 pounds
- Radioactive Material, Excepted Package - Empty Packaging n.o.s, UN2910; No Label Required
- DOT Emergency Guide # 61
- Class 7
- Description: Empty Packages

Carrier:

Kindrick Trucking
Rte 8, Box 342
Harriman, Tennesee 37748

Telephone: (615) 882-0457

Certifications:

a. This is to certify that the above named material are properly classified, described, packaged, marked and labeled, and labeled and are in proper condition for transportation according to applicable regulations of the Department of Transportation.

b. Received the property as described above in apparent good order, except as noted, marked, consigned and destined as indicated above with said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its place of delivery at said location.

Shipper: ______________________________ Date: ________________

Carrier: ______________________________ Date: ________________

______________________________ Date: ________________

Instructions Regarding Controls for Shipments Consigned as Exclusive Use.

Definition of Exclusive Use

49 CFR 173.403(i)

"Exclusive Use" (as referred to in other regulations as "sole use" or "full load") means the sole use of a conveyance by a single consignor and for which all initial, intermediate, and final loading and unloading is carried out in accordance with the direction of the consignor or consignee. Any loading or unloading must be performed by personnel having radiological training and resources appropriate for safe handling of the consignment. Specific instructions for maintenance of exclusive use shipment controls must be issued in writing and included with the shipping paper information provided to the carrier by the consignor.

Responsibility

These written instructions are provided to the carrier named on the shipping papers for the referenced shipment and are to be maintained with said shipping papers. It is the carriers responsibility to that these instructions are conveyed to the driver(s) and administrative personnel, as appropriate, for the duration of the movement to the final destination.

Instructions/Requirements

1. Maintain exclusive use of this vehicle for the duration of the movement. No other freight is to be loaded with this shipment except as directed by the consignor.

2. All loading or unloading of freight in this shipment shall be done, or as directed by the consignor or consignee.

3. The shipper is to move this shipment without delay, but in accordance with the legal statues of jurisdiction.

4. The shipper is to take positive steps en-route and during necessary stops to segregate this shipment from other freight, buildings, and personnel.

5. The shipping documents contain information prescribed by DOT regulations for a shipment of radioactive material. These documents must accompany all carriers of this shipment.

6. Drivers shall inspect the loaded transport vehicle pursuant to:
   a. 49 CFR 392.7 Driver's Equipment Inspection,
   b. 49 CFR 392.8 Driver's Emergency Equipment Inspection,

c. 49 CFR 392.9 Driver's Inspection Load,
and verified compliance.

7. Proper, packaging,, marking, labeling, and shippers certification indicated on the shipping papers.

8. Vehicle is placarding is provided and affixed by the shipper. The carrier is responsible for replacing any placards that are lost or damaged.

9. Driver qualifications are to include hazardous material endorsement of the Commercial Drivers License (CDL) as required under Federal Motor Carrier Regulations (DOT).

10. Notification of delays.

When it is apparent that delays for any reason will delay delivery time significantly, advise Texas Instrument Incorporated of the new estimated time of arrival and the causes for the delay.

11. Inspection by Authorized Officials en Route.

This shipment is proceeding under the full compliance of all known regulations. If an inspection by authorized officials occurs, then this document and bill of lading should be presented for their inspection purposes and they are permitted access to the truck and its load for their inspection purposes. Under no conditions should anyone except the consignee be permitted to release any blocking or bracing, or open any container without written authorization from Texas Instruments Incorporated.

12. Emergencies

In the event of an emergency follow the emergency instructions provided.

October 12, 1992

Contingency Plan

Rail Transportation of Contaminated Soils with Debris

The following is a contingency plan for the rail transport of contaminated soils with debris from Texas Instruments Incorporated, Attleboro Massachusetts to EnviroCare of Utah, Clive, Utah.

I. Basic description and technical of hazardous materials involved in shipment:

The shipment includes soils and debris contaminated with radioactive material. The radioactive material involved is Uranium. Uranium, principally an alpha emitter, could pose a risk if inhaled. Uranium poses minimum risk from an external exposure standpoint.

Proper Shipping Name: Radioactive Material, Low Specific Activity, UN2912

II. Immediate Hazard to Health:

There is no immediate hazard to health.

III. Risk of Fire or Explosion:

None

IV. Immediate Precautions to be taken in the event of an accident or incident:

Control access to immediate area.

Avoid direct contact with material.

V. Immediate methods for handling fires:

Material is non-flammable. If involved in a fire, avoid direct contact with material or residue.

VI. Initial methods for handling spills or leaks in the absence of fire:

Control access to immediate area.

Avoid direct contact with material.

VII. Preliminary first aid measures:

Standard first aid practices should be employed. If there is direct contact with material, mild soap and water should be used to decontaminating (washing) the victim.

In the event of a life threatening situation, first aid takes precedence over decontamination of the victim.

In the event of transport of a victim to a hospital, the hospital should be notified that radioactive materials may be involved.

VII. Emergency contacts:

Texas Instruments	Mike Elliott	(508) 699-1809
	Frank Veale	(508) 699-3800
Texas Instruments Emergency Phone		(508) 699-1843
National Response Center		(800) 424-8802
Chem-Trec		(800) 424-9300

Appendix C

Radiological Field Screening for Uranium in Soil

RADIOLOGICAL FIELD SCREENING TECHNIQUES FOR URANIUM IN SOIL

1.0 INTRODUCTION

For the determination of uranium concentrations in soil two methods are commonly employed: gamma spectroscopy and alpha spectroscopy.

The use of alpha spectroscopy for the determination of total uranium in soil involves the chemical separation of the uranium from the soil and the direct measurement of the alpha particles associated with each radionuclide: U-235, U-234, and U-238.

The use of gamma spectroscopy for the determination of total uranium involves determination of U-235 concentration directly, although radium (186 keV) can cause some interference, and by inference and/or scaling factors, the concentrations of Uranium-238 and Uranium-234 respectively. The scaling factors for the estimation of the U-234 concentrations are often based upon a U-234 to U-235 ratio. Industry experiences have generally found a ratio of 22 to be representative. This scaling factor, however, may vary significantly depending upon previous site specific activities. It is therefore more reasonable to base the isotopic uranium distribution on alpha spectroscopy data obtained from representative samples on site.

The analytical results of the samples provided herein indicated a scaling factor disparate from industry norm in representing a value of approximately 11 - 13 for the ratio of U-234 to U-235. This discrepancy could be related to either the use of natural and depleted uranium in the early fabrication and experimentation prior to the production of products requiring enriched uranium or earlier naval fuel activities where reprocessed uranium may have been introduced thereby generated different isotopic ratios.

Regardless, routine use of gamma spectroscopy and alpha spectroscopy is time consuming, requires extensive experience, sample preparation, analysis and interpretation, and requires the use of independent laboratories or extensive capital outlay. It was therefore desirable to develop methodologies which could be used in the field to assess the extent of remediation activities and to provide a reasonable and accurate estimation of contaminants (uranium) for final determinations.

Two such methodologies are presented: GM screening and gross alpha screening. GM screening uses a pancake type GM probes placed in close proximity to the soil matrix of interest. It has been determined from experimentation and practice that this technique is limited to concentration values in excess of 100 pCi/g uranium in soil. Nonetheless this does not detract from its utility within field application during physical excavation. Gross Alpha Screening provides for estimation of total uranium activity at levels well below the action limits specified for remediation. This appendix presents the basis for the use of GM and gross alpha screening techniques.

2.0 GM SCREENING TECHNIQUE.

A technique for the use of a hand held GM survey meter is desirable for quick determinations of remediation attainment. With the emission of alpha, beta and gamma radiations from uranium and its' progeny, the use of a GM detector becomes a desirable option for gross screening of materials for contamination in levels which exceed natural abundances.

To quantify levels and extent of contamination in the TI soil which can be identified by a conventional hand held GM survey meter, a simple response determination was done. One composite sample analyzed by LAL and determined to contain 4700 pCi/gram of uranium, was prepared in an infinitely thick geometry for the detection of beta. The thickness of soil required to obtain "infinitely thick" was based on a Sargents Rule calculation for beta energies over 0.8 MeV.

SARGENTS RULE
E > 0.8 Mev

$$R = 0.526\ E\ (-0.094)$$

Where R is the range in grams/cm^2

$$R = 0.526\ (2.3)^{-0.094}$$

$$R = 0.486\ \text{grams/cm}^2$$

for a soil density of 2.0 grams/cm^3

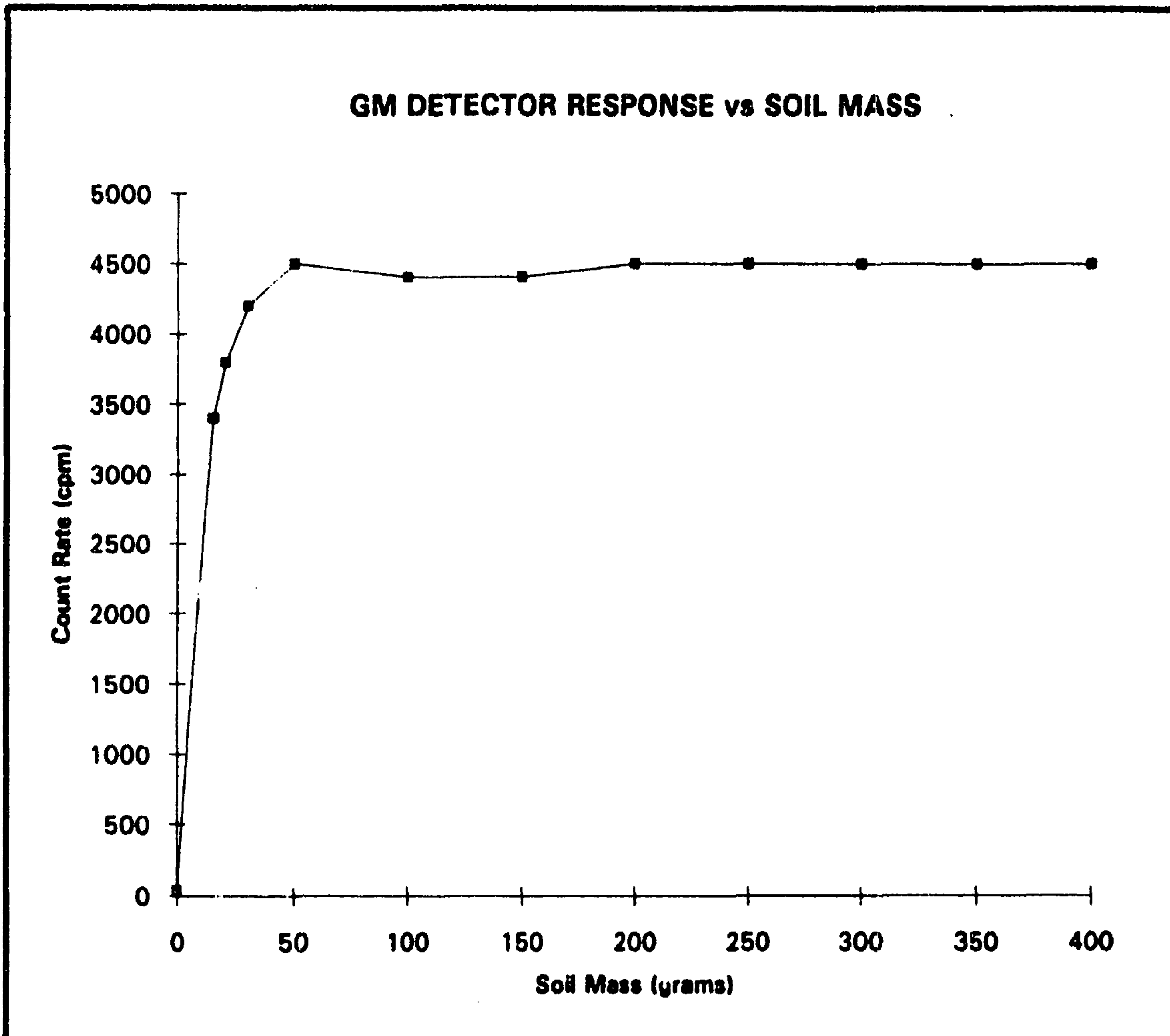
$$R = 0.243\ \text{cm or}\ 0.618\ \text{inches}$$

A GM detector was placed in direct contact with the soil of known uranium content, 4700 pCi/gm, and the detector response was recorded. A single sheet of mylar was used to prevent detector contamination. To establish the condition of equilibrium detector response the sample volume (thickness) was incrementally reduced while recording the detector response. The results of this exercise are plotted and provided in Figure C-1.

The uniformity in the GM detector response at sample down to thicknesses of only a few centimeters indicates the ability to achieve equilibrium conditions within a sample volume of 100 cm^3 (50 grams). Based on the detector surface area and the sample volume at which non equilibrium conditions were observed, the approximate range or thickness of soil in this sample, necessary to achieve equilibrium conditions, was experimentally determined to be less than 1.0 centimeters. This experimental conclusicn is consistent with the theoretical calculation shown above.

Analysis of GM Detector Response to Varying Soil Mass

Mass of Soil	0	15	20	30	50	100	150	200	250	300	350	400
Detector Response	40	3400	3800	4200	4500	4400	4400	4500	4500	4500	4500	4500



Using the known sample concentration of 4700 pCi/gm (LAL); an approximate effective sample volume (based on the detector window area); and the experimentally determined effective range; the resulting mass of soil is calculated at approximately 20 grams. The sample concentration, 4700 pCi/gram, multiplied by the sample mass of 20 grams provides the total effective sample activity of 9.4E4 pCi or 2.08E5 disintegrations per minute (dpm). With the detector response of 4500 counts per minute (cpm) the effective detector efficiency is calculated.

4500 cpm / 2.08E5 dpm = 2.15E-2 c/d
or
An effective GM detector efficiency of 2.15%

This demonstrates the sensitivity of the GM to small sample volumes and low concentrations. If a criteria of 2 times background is applied as a field screening action point an effective sample concentration can be calculated.

GM background = 50 cpm
2 x 50 cpm = 100 cpm or 50 cpm net

50 cpm(net) / 0.0215 cpm/dpm = 2.32E3 dpm

applying an effective sample mass of 20 grams

1.05E3 pCi / 20 grams = 52.4 pCi/gram

If the conservative assumption is made that the gross GM screening could effectively see contamination in excess of twice background then the application of "no detectable" would result in a contamination level of 52 pCi/gm. Therefore, results at or below twice background could be instituted as a technique for determining when to suspend remediation and apply the more sensitive technique like alpha screening to determine actual contamination levels. This screening technique will eliminate excessive delays in the determination of the extent to which each location should be mitigated. The cost savings in laboratory sample analysis alone justifies the use of such a technique not to mention the costs associated with delays in site excavation.

3.0 GROSS ALPHA SCREENING TECHNIQUE.

3.1 Introduction.

The gross alpha screening technique used during the excavation involved direct counting of alpha particles within a soil matrix. The use of direct counting of alpha particle for the detection of radiological constituents mixed within a sample matrix has been discounted as a viable technique mainly due to the concerns over self absorption of the alpha particle within the sample matrix itself. The common industry method of quantifying alpha activity, alpha spectroscopy, involves minimizing any self absorption by means of chemical preparation such as ion exchange or microwave dissolution of a sample aliquot and subsequent plating onto a surface in an infinitely thin layer. The sample is then evaluated in a similar manner as in gamma spectroscopy where the detection of the radiation within the detector results in proportional counts to appear on the channels of the analyzer. The resolution and peak fitting difficulties with this technique requires careful and precise analytical preparation as well as detailed calibration. Even when these factors are adequately addressed sample count times can be very long. The cost of alpha spectrographic analysis can be on the order of $200 to $500 per sample with turn around times ranging from 7 to 60 days.

The desire to quantify alpha emitting nuclide concentrations such as uranium and plutonium within various environmental media because of there extensive uses over the past forty plus years has brought on the need to further evaluate a direct, quick and inexpensive technique for the quantification of alpha emitters.

One such technique was developed from the work published by K.W. Skrable and K.A. Pheonix in Health Physics, Volume 60, Number 3, March 1991 "Theoretical Response of a ZnS(Ag) Scintillation Detector to Alpha emitting Sources and Suggested Applications". This approach derives an expected count rate from an infinitely thick source of alpha emitting material using Zeigler's theoretical ranges of alpha particle based on energy and the elemental make up of the sample matrix. Early trials of this technique indicated a correlation between the gross alpha counts and the isotopic alpha concentrations determined by alpha spectroscopy.

The expected results (pCi/gm), however, did not yield the values determined by alpha spectroscopy. With the strong correlation of the total alpha counts to the alpha (uranium) concentration determined by the certified lab a cross calibration using a range of samples was pursued. In addition, field portable counting systems and standard sample collection and preparation techniques had to be developed.

3.2 Sample Counting Equipment.

The theory of counting alphas with a phosphor such as ZnS(Ag) is to have intimate contact between the alpha emitting material and the phosphor. This was achieved by using 2 inch disks of ZnS(Ag) on the bottom (phosphor side up) of a 2 inch clear plastic culture dish. The soils could then be placed within the dish directly on top of the phosphor disk. The dish with the soil phosphor sandwich is then placed on a conventional photo multiplier tube (pmt). The PMT is housed inside a light tight container with a removable lid.

One tremendous advantage to this PMT arrangement is that the detector background count rate is very near zero for the intended count time of 10 minutes. Typical count rates have been 0.01 to 0.05 counts per minute over extended count times.

3.3 Sample Preparation.

With the sample in a fixed configuration within the dish the only other factors which need to be standardized were (1) the water content of the soil and (2) the particle size of the soil.

The easiest approach to standardizing the moisture content of the soil samples which may be experienced in the field for counting was to dry them in a small oven to eliminate the moisture inconsistencies. A simple set of experiments was undertaken to determine what combination of temperature and drying time was optimum. It was experimentally determined that a 15 to 20 gram samples of soil with varying moisture contents could be heated in the oven within a small tin dish for 15 minutes at 100 degrees centigrade and result in consistent moisture removal on soils typically found insitu.

The particle size of the soil was important to insure the most intimate contact between soil and phosphor was achieved. Experiments sieving dried soils were done to evaluate the effects of sieve size to the sample counts. It was obvious that all aggregate such as small rocks should be removed as they would preclude the soils from touching the ZnS(Ag). Various sieves were used to determine an acceptable sieve size to maximize counter response. It was determined that once below a sieve size of about 0.125 inches consistent response on the detector is achieved. Based on this determination the use of a common kitchen strainer (sieve size about 0.0625 inches) was employed.

3.4 Sample Counting and System Evaluation.

In addition to standard chi-square tests of the counter to determine the reliability and stability of the counting system daily source checks and background checks were performed. Routine samples were also split and run as well as independent splits using gamma spectroscopy and alpha spectroscopy. Information relating to individual sample counts on a single sample was desirable to insure reproducibility of the results for a single sample. A prepared dish, phosphor and soil configuration was repeatedly put onto the counter, counted and taken off. This procedure was followed for ten iterations and the results are tabulated in Table C-1. The results show that the system experienced a smaller sample deviation that theoretically expected.

With a background count rate at or near zero, the calculation of an MDA is simplified. Assuming a background of zero the MDA would be 2.7 pCi/g. However, "background" soil, free of any alpha emitters other than those provided by nature would present additional counts and therefore a different MDA. These background counts would not only arise from the three Uraniums of interest but any other natural occurring alpha emitting species and therefore confounds the interpretation of low count samples. The results of alpha screening on background soils yielded 10 counts per ten minutes. Alpha specectroscopy correlated this sample to approximately 2.5 pCi/g of total uranium. Therefore any sample with a count of less than this, could be interpreted as background soil at 2.5 pCi/g. Nonetheless, the ability to determine soil concentrations at less than 30 pCi/g is established.

REPETITIVE COUNTS ON SINGLE SAMPLE
Test #1 High Sample Activity
(COUNTS PER 10 MINUTES)
90
97
99
88
89
95
92
90
99
90
MEAN = 92.90
EXPERIMENTAL STANDARD DEVIATION = 4.23
THEORETICAL STANDARD DEVIATION = 9.64

REPETITIVE COUNTS ON SINGLE SAMPLE
Test #2 Low Sample Activity
(COUNTS PER 10 MINUTES)
23
24
16
23
17
20
16
22
22
21
MEAN = 20.40
EXPERIMENTAL STANDARD DEVIATION = 3.03
THEORETICAL STANDARD DEVIATION = 4.52

INDEPENDENT PROGENY COUNTS FROM PARENT SAMPLE
Test #1 High Sample Activity (RS 414)
(Each Individual Sample Counted 10 Minutes)
97
88
90
95
99
92
90
99
90
99
MEAN = 93.90
EXPERIMENTAL STANDARD DEVIATION = 4.38
THEORETICAL STANDARD DEVIATION = 9.69

INDEPENDENT PROGENY COUNTS FROM PARENT SAMPLE
Test #2 Low Sample Activity (MP 5)
(Each Individual Sample Counted 10 Minutes)
23
26
22
18
21
18
20
20
23
15
MEAN = 20.6
EXPERIMENTAL STANDARD DEVIATION = 3.12
THEORETICAL STANDARD DEVIATION = 4.54

INDIVIDUAL PROGENY SAMPLES FROM PROCESS PILE	
Ten Samples Cored At Random From Reed Screened Process Pile	
Reed Screened Process Pile Volume: 200 Cubic Feet	
Each Individual Sample (10 - 20 grams) Counted 10 Minutes	
RS 277 - 1	47
RS 277 - 2	62
RS 277 - 3	37
RS 277 - 4	49
RS 277 - 5	61
RS 277 - 6	40
RS 277 - 7	70
RS 277 - 8	55
RS 277 - 9	87
RS 277 - 10	52
MEAN = 56.00	
EXPERIMENTAL STANDARD DEVIATION = 14.84	
THEORETICAL STANDARD DEVIATION = 7.48	

3.5 Sample Variability.

Due to the small sample volume needed with this technique an evaluation of sample variability was prudent. In the field a one liter sample is extracted under standard protocols. From two such sample volumes of different activity concentrations multiple counting samples were prepared. The tabulation of these repetitive counts and the resulting statistics are provided in Table C-2. This data set also shows the statistics which complement this technique. The actual observed deviation about the mean is less than expected by theoretical calculation.

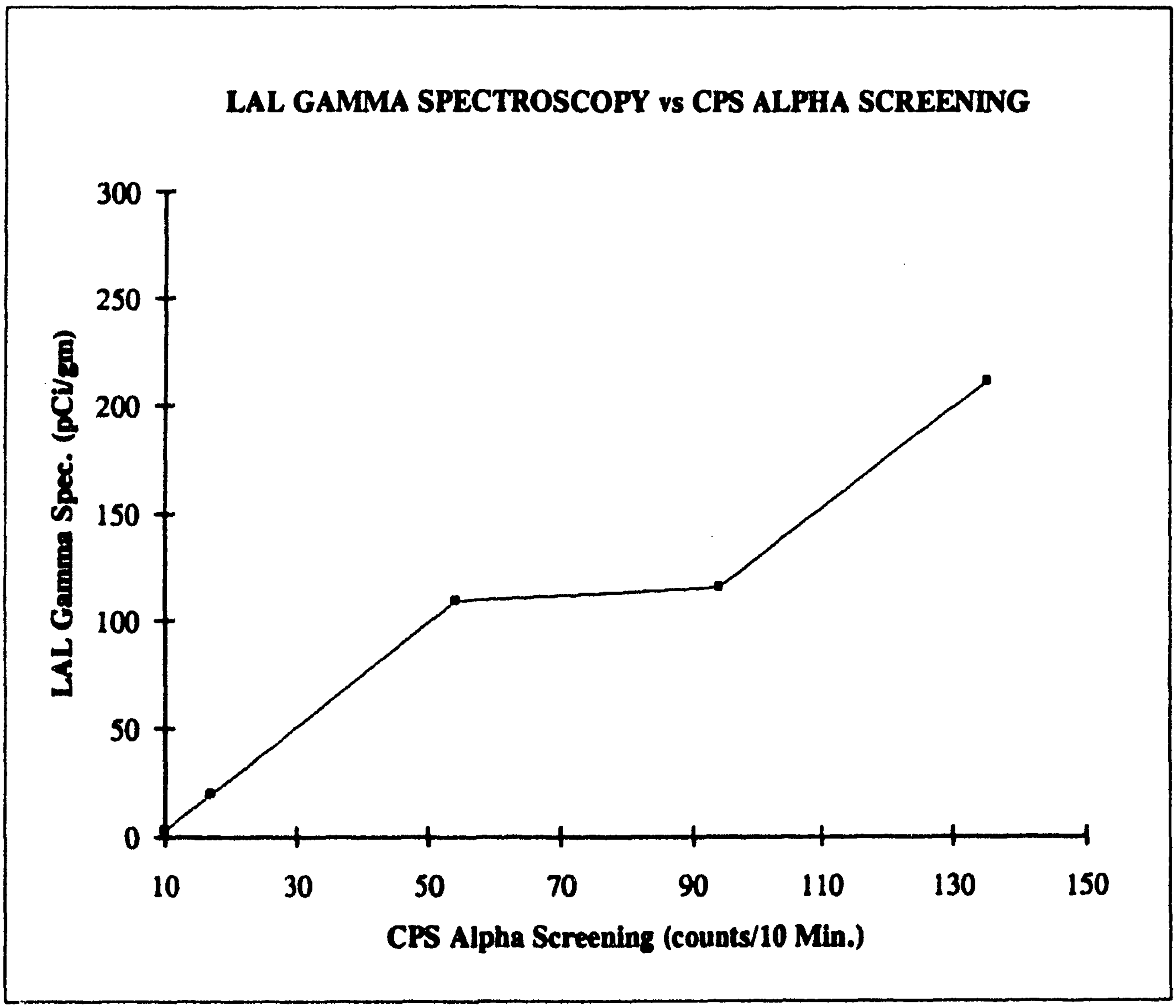
3.6 Sample Collection In The Field.

The process of soil excavation followed by reed screening for the removal of aggregate and contaminated debris resulted in the continuous generation of piles of screened soils. These piles were estimated at 200 cubic feet each and were staged separate for each reed screen load. These piles were analyzed by alpha screening to determine their disposition. To insure adequate sampling as many as ten coring were taken in each pile. The individual coring were composited and homogenized within a larger container. From this composite a one liter aliquot is drawn for analysis. In support of this sampling procedure each individual coring has been analyzed for selected piles and the individual counts with the resulting statistics are provided in Table C-3. In this case of random sampling from a large volume of soil the resulting deviation about the sample mean is larger that expected by theoretical calculation. In almost all cases where samples were taken a one liter composite sample was taken, mixed and an aliquot sample of 20 grams, from the larger initial sample, taken for alpha screening.

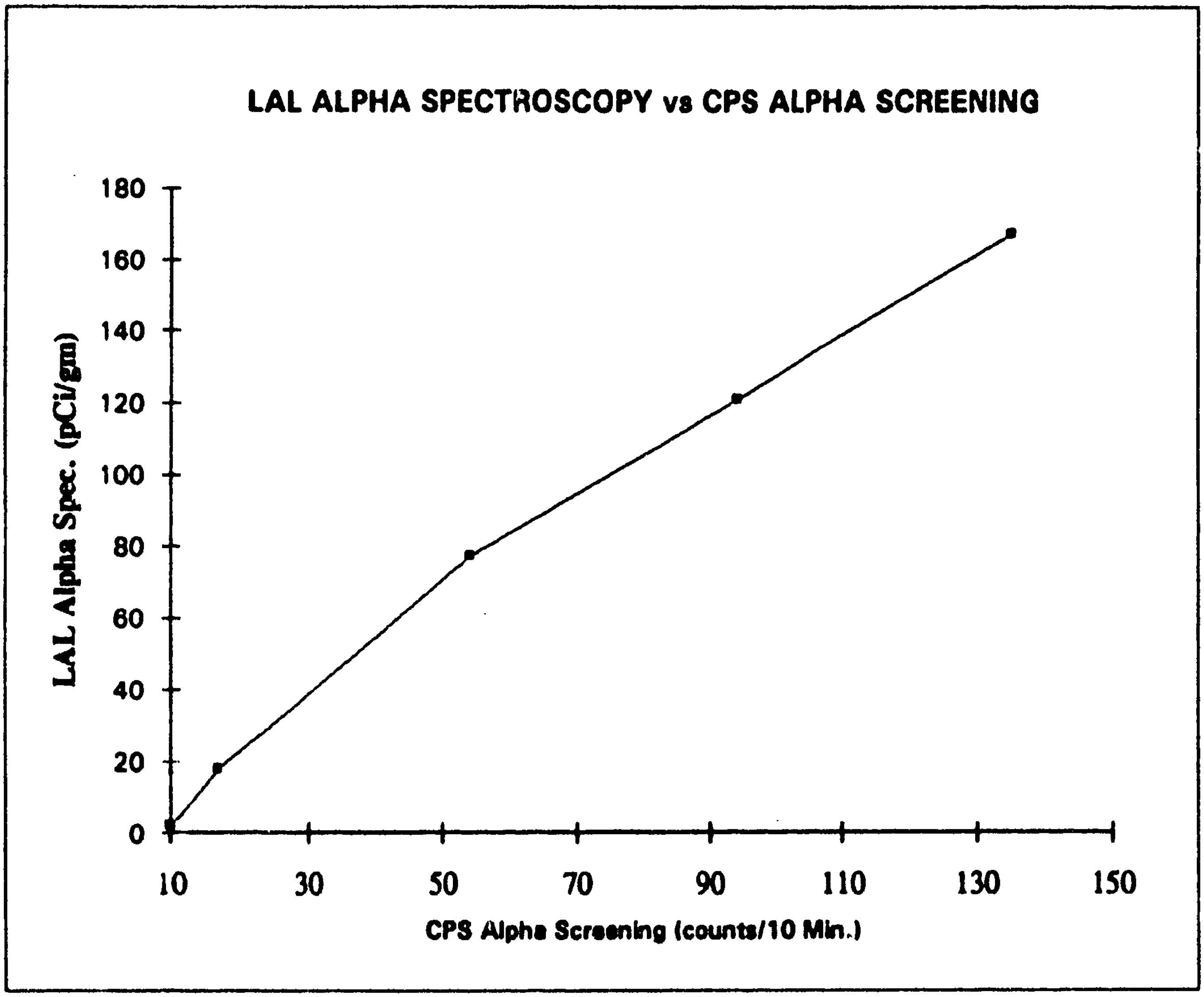
3.7 Initial Alpha Screening Correlation.

The initial sampling done prior to the excavation of soils for disposal provided for the analysis of five unique samples by a certified laboratory. The samples were analyzed by gamma spectroscopy and plotted against alpha screening (Figure C-2) and analyzed by alpha spectroscopy and plotted against alpha screening (Figure C-3). The combined data is plotted in Figure C-4. From this data plot the relationship between alpha screening counts observed in a 10 minute count and the laboratory alpna spectrographic results was determined to be a stronger correlation. The gamma spectrographic results which, due to it's inherent difficulty in resolving low yield gamma peaks from progeny of the isotopes of primary interest, has less of an observable correlation. These plots also raise concerns over the use of gamma spectroscopy for the detection of low yield, low activity, progeny born photons in the determination of their parent activities. It is from these plots that the verification and justification of the alpha screening technique as a fast, cheap and reliable measurement method was based.

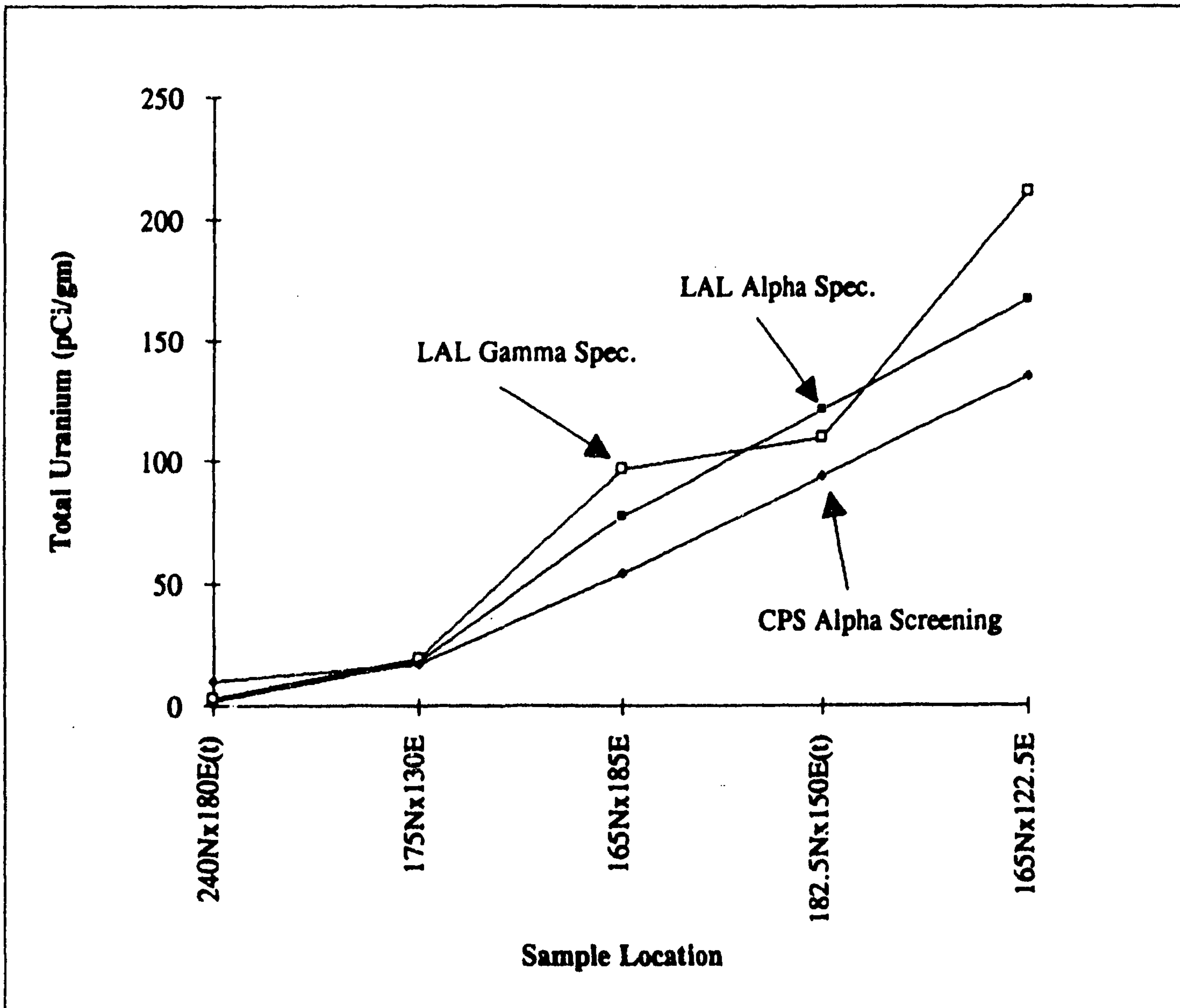
TOTAL URANIUM COMPARISON	
Alpha Screening (counts/10 Min.)	LAL Gamma Spec. (pCi/gm)
135	211.51
94	115.87
54	109.46
17	19.41
10	2.95



TOTAL URANIUM COMPARISON	
Alpha Screening (counts/10 Min.)	LAL Alpha Spec. (pCi/gm)
135	166.9
94	121.17
54	77.37
17	17.98
10	2.13



ALPHA SCREENING CORRELATION WITH URANIUM IN SOIL			
LOCATION	LAL ALPHA SPEC.	LAL GAMMA SPEC.	CPS ALPHA SCREENING
	Total U (pCi/gm)	Total U (pCi/gm)	Total U (pCi/gm)
240Nx180E(t)	2.13	2.95	10
175Nx130E	17.96	19.41	17
165Nx185E	77.37	96.91	54
182.5Nx150E(t)	121.17	109.46	94
165Nx122.5E	166.9	211.51	135



3.8 Additional Alpha Screening Correlations.

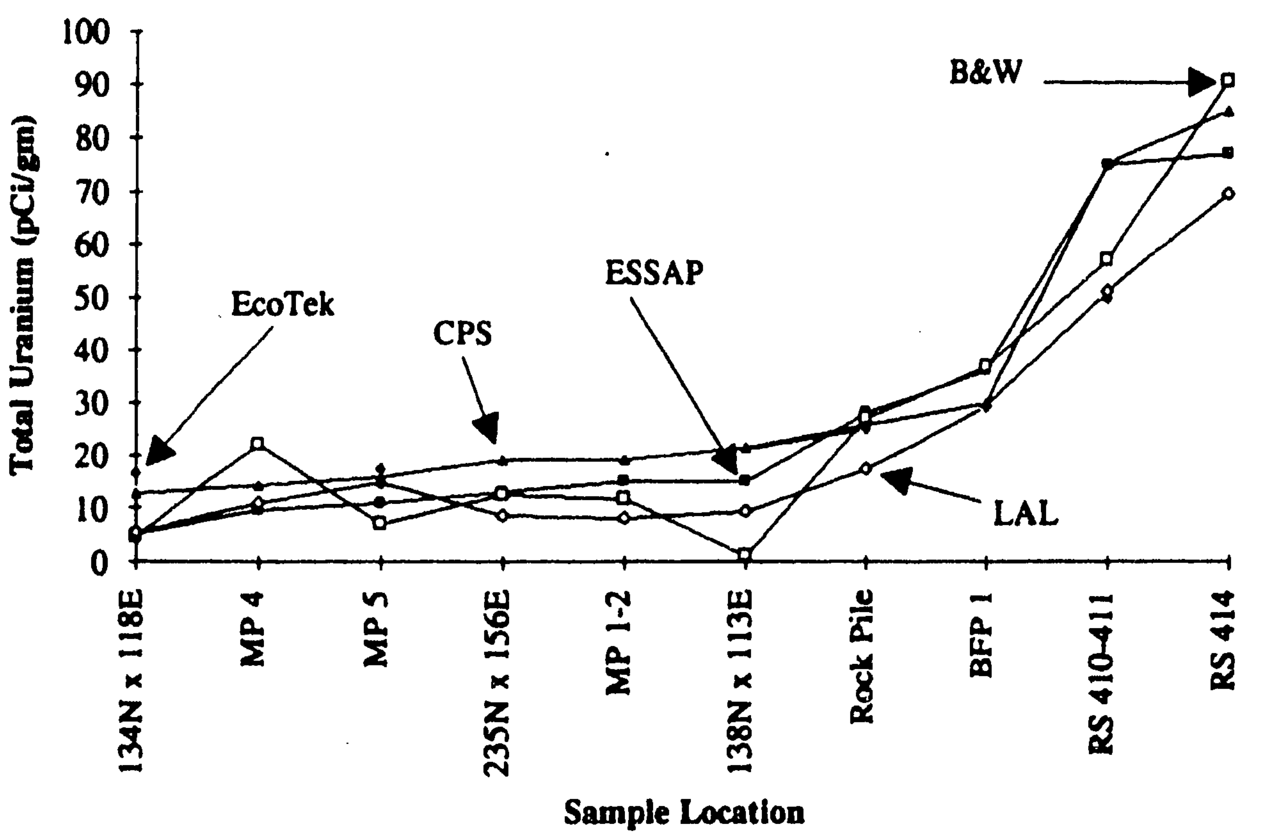
The quality control and quality assurance aspects of the sampling and analysis program provided for further split sample opportunities. The ten ORISE ESSAP samples taken during a survey exercise were split with: (1) B&W Nuclear Environmental Services, Inc.; (2) EcoTek; (3) Lockheed Analytical Laboratory and (4) CPS, Inc. All samples except CPS, Inc. were analyzed by gamma spectroscopy. The comparison of this data is presented in Figure C-5. It is apparent that there is variability between sample results, however, these variations do not appear to be of a magnitude that is of concern or deviates from expected variations in sample results normally encountered with gamma spectroscopy for uranium-238 and uranium-235 and uranium-234 by inference from uranium-235.

4.0 CONCLUSIONS.

The use of gross counting of alpha emissions from infinitely thick sources of soil has proven through correlation to both alpha spectroscopy and gamma spectroscopy to by a viable method for the rapid, inexpensive and economical determination of soil activities. It provided for precise and cost effective mitigation of uranium contaminated soils and resulted in no loss time in waiting for results of samples taken. The cost savings just in sample analysis alone justifies it's usefulness. With over 2000 samples analyzed by alpha screening a cost saving can be estimated to be in the order of $500,000.00 (based on $300.00 per sample by alpha spectroscopy). The ability to know sample results within tens of minutes resulted in the tight control in the disposition of soil volumes. This control provided unprecedented minimization of soils requiring ultimate disposal as radioactive waste, again saving hundreds of thousands of dollars.

COMPARISON OF TOTAL URANIUM ANALYSIS RESULTS					
Sample Locations	Total Uranium Concentration (pCi/gm)				
	Gamma Spectroscopy				Alpha Screening
	ESSAP	B&W	EcoTek	LAL	CPS
134N x 118E	5.3	4.66	16.5	5.44	12.8
MP 4	9.6	21.82		10.96	14.2
MP 5	11	7.1	17.34	14.8	15.9
235N x 156E	13	12.48		8.62	19
MP 1-2	15	11.65		7.96	19.2
138N x 113E	15	1.25	21.18	9.31	21.4
Rock Pile	28	26.96	25.12	17.24	25.8
BFP 1	36	36.76		29.4	29.9
RS 410-411	75	56.99	49.86	51.11	75.3
RS 414	77	90.77		69.74	85

COMPARISON OF URANIUM ANALYSIS RESULTS



Attachment 1

Gross Alpha Screening Data

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
7/2/92	Exp. B					21		67	
7/2/92	Exp. C					46		67	
9/2/92	T-1	170		130				1	
9/2/92	RS-1	170		130		81		61	RO#71
9/3/92	RS-2	172		130		36,39		61	RO#71
9/3/92	RS-2A	172		130		27,39		61	
9/3/92	RS-2B	172		130		53,51		61	
9/3/92	RS-2B	172		130		49,58,73,54		61	
9/3/92	RS-2B	172		130		51,40,47		61	
9/4/92	RS-3	175		125		85		61	RO#144S
9/4/92	RS-3	175		125		103,95		61	
9/4/92	RS-3	175		125		106,82		61	
9/4/92	RO-152-1#1					2715		61	
9/4/92	RO-152-1#1					2660		61	
9/4/92	RO-152-1#2					2928		61	
9/4/92	RO-152-1#2					3236		61	
9/4/92	RO-67-1					2365		61	
9/4/92	RO-67-1					2859		61	
9/8/92	RS-5	171		140		77		61	RO#144S
9/8/92	RS-4	171		140		1		61	Rockpile
9/8/92	COM					739		61	152,67,27
9/8/92	RS-6	171		140		192		61	RO#35
9/8/92	RS-7	171		140		70		61	RO#144S
9/9/92	RO#71	171		140		108		61	
9/9/92	RO#27-2	171		140		803		61	
9/9/92	RO#67-2	171		140		3092		61	
9/9/92	RO#152-2	171		140		2379		61	
9/9/92	RS#4	171		140		22		61	
9/9/92	RS#5	171		140		76		61	
9/9/92	RS#7	171		140		71		63	
9/9/92	RS#6	171		140		188		63	
9/9/92	RS#8	171		140		54		63	RO 30-55 PILE#1
9/9/92	RS#9	160		135		60		63	RO 30-55 PILE#1
9/9/92	RO#27-1					398		63	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
9/9/92	RO#27-2-1					497		63	
9/9/92	RO#27-2-2					1155		63	
9/9/92	RO#27-2-3					1238		63	
9/9/92	RO#27-2-4					503		63	
9/9/92	RO#27-2-5					809		63	
9/9/92	RO#27-2-6					254		63	
9/9/92	RO#67-2-1					1988		63	
9/9/92	RO#67-2-2					1606		63	
9/9/92	RO#67-2-1					1656		63	
9/9/92	RO#67-2-1					1616		63	Reread
9/9/92	RO#67-2-3					1212		63	
9/9/92	RO#67-2-4					3186		63	
9/9/92	RO#67-2-5					3888		63	
9/9/92	RO#67-2-6					3722		63	
9/9/92	RO#19-1					3807		63	
9/9/92	RO#19-2					2780		63	
9/9/92	RO#19-3					2755		63	
9/9/92	RO#19-4					1625		63	
9/9/92	RO#19-5					350		63	
9/9/92	RO#19-6					107		63	
9/9/92	RO#19-7					21		63	
9/9/92	RO#19-8					30		63	
9/9/92	RO#10	160		140		70		63	RO 30-55 Pile #1
9/9/92	RS#11					354		65	RO#35
9/10/92	RS#12	160		140		72		65	PILE#2
9/10/92	RS#13					41		65	PILE#2
9/10/92	RS#14					132		65	RO#35
9/10/92	RS#15					46		65	PILE#2
9/10/92	RS#16					28		65	PILE#2
9/11/92	TP#1	165%		127		17		65	PILE#2
9/11/92	TP 2meter	165%		127		7		65	PILE#2
9/11/92	RS#17	155		110	115	25		65	PILE#2
9/11/92	RS#18	155		110	115	50		65	PILE#2
9/11/92	RS#19	155		110	115	67		65	PILE#2

GROSS ALPHA SCREENING DATA

Date	Sample ID.	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
9/11/92	RS#20	155		110	115	101		65	PILE#2
9/11/92	RS#21	155		110	115	53		65	PILE#2
9/14/92	RS#22	155		115		79		65	PILE#3
9/14/92	PILE#1					43		65	RO#30,55
9/14/92	PILE#2					70		65	RO#53
9/14/92	PILE#1					42		65	
9/14/92	PILE#2					63		65	RO#14 Recounted
9/14/92	RS#23	155		115		55		65	PILE#3
9/14/92	RS#24	155		110		26		65	PILE#3
9/14/92	PILE 1 #2					57		65	Different sample's from liter b
9/14/92	PILE 2 #2					62		65	Different sample's from liter b
9/14/92	RS#25	155		110		37		65	PILE#3
9/14/92	RS#26	150		110		902		65	RO#115
9/14/92	RS#27	150		110		60		65	PILE#3
9/15/92	RS#28	155				72		65	PILE#3
9/15/92	RS#29	155				49		65	PILE#3
9/15/92	RS#30	155				22		65	PILE#3
9/15/92	RS#31	155				13		65	PILE#4
9/15/92	RS#32					24		65	PILE#4
9/15/92	RS#33					28		65	PILE#4
9/15/92	RS#34	147				31		65	PILE#4
9/15/92	RS#35	147				29		65	PILE#4
9/15/92	RO#178 Co.					1029		67	
9/15/92	RO#178-1					1111		67	O#178-1 thru RO#178-6 = 20:
9/15/92	RO#178-2					1447		67	O#178-1 thru RO#178-6 = 20:
9/15/92	RO#178-3					952		67	O#178-1 thru RO#178-6 = 20:
9/15/92	RO#178-4					2144		67	O#178-1 thru RO#178-6 = 20:
9/15/92	RO#178-5					3084		67	O#178-1 thru RO#178-6 = 20:
9/15/92	RO#178-6					3469		67	O#178-1 thru RO#178-6 = 20:
9/15/92	RO#176 Co					111		67	
9/16/92	RO#152-2-1					764		67	
9/16/92	RO#152-2-2					610		67	
9/16/92	RO#152-2-3					10369		67	
9/16/92	RO#152-2-4					2530		67	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
9/16/92	RO#152-2-5					2925		67	
9/16/92	RO#152-2-6					2412		67	
9/16/92	DRUM 7					294		67	
9/16/92	176-1					495		67	
9/16/92	176-2					39		67	
9/16/92	176-3					89		67	
9/16/92	176-4					72		67	
9/16/92	176-5					49		67	
9/16/92	176-6					532		67	
9/16/92	Co. PILE#3					50		67	
9/16/92	RO#138 Co.					1232		67	
9/16/92	#138-1					3471		67	
9/16/92	#138-2					1305		67	
9/16/92	#138-3					214		67	
9/16/92	#138-4					120		67	
9/16/92	#138-5					1863		67	
9/16/92	#138-6					1136		67	
9/16/92	RS#36	165		115		89		67	RO#35
9/16/92	RS#37	165		115		142		67	RO#35
9/16/92	RS#38	165		115		18		67	PILE#4
9/17/92	RS#39					59		69	PILE#5
9/17/92	RS#40					125		69	RO#35
9/17/92	RS#41					65		69	PILE#5
9/17/92	DRUM#8					108		69	
9/17/92	Co.#55					34		69	
9/17/92	RS#42					39		69	PILE#5
9/17/92	RS#43					59		69	PILE#5
9/17/92	RO#55-1					36		69	
9/17/92	RO#55-2					76		69	
9/17/92	RO#55-3					36		69	
9/17/92	RO#55-4					68		69	
9/17/92	RO#55-5					43		69	
9/17/92	RO#55-6					32		69	
9/18/92	RO#30					69		69	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
9/18/92	RO#30-1					41		69	
9/18/92	RO#30-2					63		69	
9/18/92	RO#30-3					58		69	
9/18/92	RO#30-4					55		69	
9/18/92	RO#30-5					52		69	
9/18/92	RO#30-6					30		69	
9/18/92	RS#44	155		140		33		69	PILE#4
9/18/92	RS#45	155		140		58		69	RO#54 PILE#5
9/18/92	RO#53 Co					37		69	
9/18/92	RO#53-1					35		69	
9/18/92	RO#53-2					36		69	
9/18/92	RO#53-3					58		69	
9/18/92	RO#53-4					197		69	
9/18/92	RO#53-5					175		69	
9/18/92	RO#53-6					72		69	
9/18/92	RS#46	155		140		76		69	RO#54 PILE#5
9/18/92	RS#47	155		140		75		69	RO#54 PILE#5
9/18/92	RO#109 Co.					49		69	
9/18/92	RO#109-1					318		69	
9/18/92	RO#109-2					33		69	
9/18/92	RO#109-3					38		69	
9/18/92	RO#109-4					84		69	
9/18/92	RO#109-5					39		71	
9/18/92	RO#109-6					50		71	
9/18/92	RS 48	165				15		71	
9/18/92	RS 49	165				14		71	PILE 5
9/18/92	RS 50	165				30		71	PILE 5
9/18/92	RS 51	165				21		71	PILE 6
9/18/92	RS 52	165				20		71	PILE 6
9/18/92	RS 53	165				15		71	PILE 6
9/18/92	RS 54	165				22		71	PILE 6
9/18/92	RS 55	165				19		71	PILE 6
9/20/92	TW 5	170	132	140		14		2	
9/20/92	TW 5	170	132	140		4		2	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
9/21/92	TW 3	148		114	118	118		2	
9/21/92	TW 2	151	148	112		24		2	
9/21/92	TW 1	165	160	112		31		2	
9/21/92	TW 4	150	147	116	120	8		2	
9/21/92	TW 6	160		140		56		2	
9/21/92	TW 7	150		135		72		2	
9/21/92	TW 7-2	150		135		57		2	
9/21/92	TW 8	150		135		26		2	
9/21/92	TW 9	149		135		70		2	
9/21/92	TW 10	148		134		134		2	
9/21/92	TW 11	148		135		20		2	
9/21/92	RS 56	170				136		71	RO #62
9/21/92	RS 57	170				22		71	PILE 6
9/21/92	RS 58	170				18		71	PILE 6
9/21/92	RS 59	170				25		71	PILE 6
9/21/92	RS 60	170				26		71	PILE 6
9/21/92	RS 61	170				29		71	PILE 6
9/21/92	RS 62	170				82		71	PILE 5
9/21/92	RS 63	155				51		71	PILE 5
9/21/92	RS 64					39		71	PILE 7
9/21/92	RS 65					27		71	PILE 7
9/21/92	RS 66					21		71	PILE 7
9/21/92	RS 67					33		71	PILE 7
9/21/92	RS 68					67		71	PILE 8
9/21/92	RS 69					77		71	PILE 8
9/21/92	Pile #3					44		71	
9/21/92	Pile #4					34		71	
9/21/92	Pile #5					53		71	RO #54
9/21/92	Pile #6					14		71	
9/21/92	RS#70	146				27		71	PILE 7
9/21/92	RS#71	146				28		71	PILE 7
9/21/92	RS#tailing					29		71	
9/21/92	RS#72	155				63		71	PILE 8

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
9/21/92	RS#73	155				68		71	PILE 8
9/21/92	RS#74	155				63		71	PILE 8
9/21/92	RS#75	155				40		71	PILE 8
9/21/92	RS 76	160		130		72		73	PIL E 8
9/21/92	RS 77	160		130		77		73	PIL E 8
9/21/92	RS 78	160		130		40		73	PIL E 8
9/22/92	TW 12	150		132		12		2	
9/22/92	RS 79	135		150		80		73	PILE 9
9/22/92	RS 80	135		150		104		73	PILE 9
9/22/92	RS 81	135		150		50		73	PILE 9
9/22/92	RS 82	135		150		47		73	PILE 9
9/22/92	RS 83	135		150		24		73	PILE 9
9/22/92	RS 84	135		150		53		73	PILE 9
9/22/92	RS 85	135		155		93		73	PILE 9
9/22/92	RS 86	135		155		28		73	PILE 10
9/22/92	RS 87	135		155		28		73	PILE 10
9/22/92	RS 88	135		155		32		73	PILE 10
9/22/92	RS 89	135		155		25		73	PILE 10
9/22/92	RS 90	135		155		14		73	PILE 10
9/22/92	RS 91	135		155		15		73	PILE 10
9/22/92	RS 92	160		130		20		73	PILE 10
9/22/92	RS 93	160		130		23		73	PILE 10
9/22/92	RS 94	160		130		24		73	PILE 10
9/22/92	RS 95	160		130		122		73	PILE 11
9/22/92	RS 96	160		130		106		73	PILE 11
9/23/92	RS 97	160		130		103		73	PILE 11
9/23/92	RO #14	160		130		86		73	
9/23/92	RO #14-1	160		130		106		73	
9/23/92	RO #14-2	160		130		68		73	
9/23/92	RO #14-3	160		130		54		73	
9/23/92	RO #14-4	160		130		82		73	
9/23/92	RO #14-5	160		130		39		73	
9/23/92	RO #14-6	160		130		56		73	
9/23/92	RS #98	160		130		164		73	PILE 14

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
9/23/92	RS #99	158		120		17		73	PILE 12
9/23/92	RS #100	158		120		12		73	PILE 12
9/23/92	RS #101	158		120		20		73	PILE 12
9/23/92	RS #102	158		120		19		73	PILE 12
9/23/92	RS #103	158		120		283		73	PILE 14
9/23/92	RS #104	158		120		99		73	PILE 11
9/23/92						21		75	Soil sample for water conte
9/23/92	RS #105					98		75	PILE 11
9/23/92	RS #106					102		75	PILE 11
9/23/92	RS #107					101		75	PILE 11
9/23/92	RS #108					134		75	PILE 11
9/23/92	RS #109					58		75	PILE 13
9/23/92	RS #110					97		75	PILE 13
9/23/92	RS #111					27		75	PILE 12
9/23/92	RS #112					111		75	
9/23/92	RS #113					59		75	PILE 13
9/23/92	RO #54 Co					19		75	PILE 13
9/23/92	RO #54-1					25		75	
9/23/92	RO #54-2					242		75	
9/23/92	RO #54-3					29		75	
9/23/92	RS #114					52		75	PILE 13
9/23/92	RS #115					113		75	PILE 13
9/23/92	RS #116					64		75	PILE 13
9/23/92	PILE #8					83		75	
9/23/92	PILE #9					37		75	
9/23/92	PILE #11					75		75	
9/24/92	TW 13	E. Wall		130		10		2	
9/24/92	TW 14	E. Wall		135		15		2	
9/24/92	RO #54-4					63		75	
9/24/92	RO #54-5					36		75	
9/24/92	RO #54-6					66		75	
9/24/92	RS #117					53		75	PILE 15
9/24/92	RS #118					47		75	PILE 15
9/24/92	RS #119					26		75	PILE 15

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
9/24/92	RS #120					39		75	PILE 15
9/24/92	RS #121					40		75	PILE 15
9/24/92	RS #122					63		75	PILE 15
9/24/92	RS #119-2					48		75	PILE 15
9/24/92	RS #123	160		122		39		77	PILE 15
9/24/92	ile #9 RS tailings					47		77	
9/24/92	Pile #9 RS-1					39		77	
9/24/92	Pile #9 RS-2					50		77	
9/24/92	Pile #9 RS-3					38		77	
9/24/92	RS #124	158		118		32		77	PILE 15
9/24/92	RS #125	158		118		29		77	PILE 15
9/24/92	RS #126	158		118		56		77	PILE 15
9/24/92	RS #127	158		118		46		77	PILE 15
9/24/92	RS #128	162		120		64		77	PILE 15
9/24/92	RS #128	162		120		58		77	PILE 15
9/24/92	RS #124-2	158		118		42		77	PILE 15 RECOUNTED RS #1
9/24/92	RS #125-2	158		118		94		77	PILE 15 RECOUNTED RS #1
9/24/92	RS #129	162		120		45		77	PILE 15
9/24/92	RS #130	162		120		46		77	PILE 15
9/24/92	RS #125-3	158		118		40		77	
9/24/92	RS #131	162		120		50		77	PILE 15
9/24/92	RS #132	162		120		41		77	PILE 15
9/24/92	RS #133	162		120		31		77	PILE 16
9/24/92	RS #134	162		120		21		77	PILE 16
9/24/92	RS #135	170		128		24		77	PILE 16
9/24/92	RS #136	170		128		24		77	PILE 16
9/24/92	RS #137	170		128		25		77	PILE 16
9/24/92	RS #138	170		128		67		77	PILE 16
9/24/92	RS #139	170		128		20		77	PILE 16
9/24/92	RS #140	170		128		32		77	PILE 16
9/24/92	RS #138	170		128		26		77	
9/25/92	TW 15	E. Wall		140		34		2	
9/25/92	TW 16	E. Wall		145		22		2	
9/25/92	TW 17	E. Wall		150		26		2	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
9/25/92	TW 18	170		125		14		2	
9/25/92	RS #125	158		118		33		77	
9/25/92	RS #141	170		125		28		79	PILE 17
9/25/92	RS #142	170		125		33		79	PILE 17
9/25/92	RS #143	170		125		27		79	PILE 17
9/25/92	RS #144	170		125		33		79	PILE 17
9/25/92	RS #145	170		125		21		79	PILE 17
9/25/92	RS #146	170		125		24		79	PILE 17
9/25/92	RS #127	170		130		24		79	PILE 17
9/25/92	RS #148	175		130		64		79	PILE 17
9/25/92	RS #148	175		130		28		79	PILE 17
9/25/92	RS #149	175		130		22		79	PILE 17
9/25/92	RS #150	175		130		20		79	PILE 17
9/25/92	RS #151	175		130		30		79	PILE 17
9/25/92	RS #152	175		130		16		79	PILE 17
9/25/92	RS #153	175		130		22		79	PILE 17
9/25/92	RS #154	175		130		28		79	Originally came from 150N-1
9/25/92	3--2					19		79	
9/25/92	3--3					80		79	
9/25/92	3--2					23		79	
9/25/92	3--3					84		79	
9/25/92	RS #155	175		130		55		79	PILE 18
9/25/92	RS #156	175		130		42		79	PILE 18
9/25/92	RS #157	175		130		61		79	PILE 18
9/25/92	RS #158	175		130		48		79	PILE 18
9/25/92	#2 sample#1 pile 15					36		79	Test run for M. Elliot
9/25/92	st #2 sample#2 BFP					21		79	Test run for M. Elliot
9/25/92	#2 sample#3 test pile					35		79	Test run for M. Elliot
9/25/92	RS #159	180		135		49		79	PILE 18
9/25/92	RS #160	180		135		51		79	PILE 18
9/25/92	RS #161	180		135		39		79	PILE 18
9/25/92	RS #162	180		135		45		79	PILE 18
9/25/92	RS #163	180		135		42		79	PILE 18
9/25/92	RS #164	180		135		71		79	PILE 18

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
9/25/92	RS #165	180		135		61		81	PILE 18
9/25/92	RS #166	180		135		52		81	PILE 18
9/25/92	RS #167	180		135		95		81	PILE 11
9/25/92	RS #168	180		135		59		81	PILE 19
9/25/92	RS #169	180		135		21		81	PILE 20
9/25/92	RS #170	180		135		47		81	PILE 19
9/25/92	RS #171	180		135		23		81	PILE 20
9/25/92	Special pile A					125		81	
9/25/92	RS #172	152		110		109		81	PILE 19
9/25/92	RS #173	180		135		41		81	PILE 19
9/26/92	RO #109 Co					70		81	
9/26/92	RO #109-1					65		81	
9/26/92	RO #109-2					70		81	
9/26/92	RO #109-3					67		81	
9/26/92	RO #109-4					57		81	
9/26/92	RO #109-5					64		81	
9/26/92	RO #109-6					70.1		81	
9/26/92	RS #174	180		120		83		81	PILE 19
9/26/92	RS #175	180		120		84		81	PILE 19
9/26/92	RS #176	180		120		60		81	PILE 19
9/26/92	RS #177	180		120		65		81	PILE 19
9/26/92	RS #178	180		120		59		81	PILE 19
9/26/92	RS #179	180		120		37		81	PILE 19
9/26/92	RS #180	180		120		46		81	PILE 19
9/26/92	RS #181	180		120		118		81	PILE 19
9/26/92	RS #182	180		120		107		81	PILE 19
9/26/92	RS #183	180		120		73		81	PILE 19
9/26/92	RS #184	180		120		89		81	PILE 19
9/26/92	RS #185	180		120		72		81	PILE 19
9/26/92	RS #186	180		120		108		81	PILE 11
9/26/92	RS #187	180		120		106		81	PILE 11
9/26/92	RS #188	180		120		145		81	PILE 11
9/26/92	RS#189	180		120		59		83	PILE 19
9/26/92	RS#190	180		120		82		83	PILE 19

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
9/26/92	RS#191	180		120		61		83	PILE 19
9/27/92	TW 19	190		130		204		2	
9/27/92	RO#132 Co.					104		83	
9/27/92	RO#132-1					98		83	
9/27/92	RO#132-2					81		83	
9/27/92	RO#132-3					69		83	
9/27/92	RO#132-4					45		83	
9/27/92	RO#132-5					78		83	
9/27/92	RO#132-6					63		83	
9/27/92	TP#2	110		260		8	72	83	6' DEPTH
9/27/92	TP#2	110		260		103	30	83	2.5' DEPTH
9/27/92	TP#2	110		260		113		83	TOP SOIL
9/27/92	RS#192	110		260		55		83	TP#2 PILE 19
9/27/92	RO#150 Co					381		83	
9/27/92	RO#150-1					182		83	
9/27/92	RO#150-2					1593		83	
9/27/92	RO#150-3					136		83	
9/27/92	RO#150-4					60		83	
9/27/92	RO#150-5					88		83	
9/27/92	RO#150-6					198		83	
9/27/92	RS#193					34		83	PILE 20
9/27/92	RS#194					28		83	PILE 20
9/27/92	RO#150-2					2703		83	SECOND SAMPLE FROM 1 LITER
9/28/92	RO#10 Co					52		85	
9/28/92	RO#10-1					33		85	
9/28/92	RO#10-2					46		85	
9/28/92	RO#10-3					30		85	
9/28/92	RO#10-4					22		85	
9/28/92	RO#10-5					70		85	
9/28/92	RO#10-6					26		85	
9/28/92	TW#29	145	150	105		25		85	
9/28/92	TW#30	125	130	190125		9		85	
9/28/92	TW#25	185	190	125		18		85	
9/28/92	TW#26	185		125		86		85	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
9/28/92	TW#27	177		135	140	64		85	
9/28/92	TW#28	190				17		85	
9/28/92	A (IN PIT)	145		105		12		85	TEMORARY PILES
9/28/92	B(Prk.Lot)	150		150		63		85	TEMORARY PILES
9/28/92	C (Excavtion)					68		85	TEMORARY PILES
9/28/92	TW#31	190		135		48		85	[redacted]
9/28/92	TW#32	190		135		36		85	[redacted]
9/28/92	TW#33	190		135		5		85	[redacted]
9/28/92	TW#34	190		135		6		85	[redacted]
9/29/92	PILE D					96		85	
9/29/92	PILE E					47		85	
9/29/92	PILE F					57		85	
9/29/92	PILE G					122		85	
9/29/92	PILE	170		170		18		85	
9/29/92	TF	170		170		38		85	
9/29/92	TW	170		170		61		85	
9/29/92	PILE H					14		85	
9/30/92	Bldg. #12floor					23		87	
9/30/92	Bldg. #12	160		wall		214		87	%% LOCATION
9/30/92	Bldg. #12	170		wall		38		87	%% LOCATION
9/30/92	Bldg. #12	wall		180		35		87	%% LOCATION
9/30/92	Bldg. #12	wall		190		119		87	%% LOCATION
9/30/92	Soil Sample#1					133		87	PIT UNDERWATER
9/30/92	Soil Sample#2					53		87	PIT UNDERWATER
9/30/92	RS#195	165		185		35	top soil	87	%% TOP SOIL PILE 21
9/30/92	RS#196	165		185		21		87	PILE 22
9/30/92	RS#197	165		185		51		87	PILE 21
9/30/92	RS#198	165		185		30		87	PILE 22
9/30/92	RS#199	165		185		26		87	PILE 22
9/30/92	RS#200	165		185		20		87	PILE 22
9/30/92	RS#201	165		185		24		87	PILE 22
9/30/92	RP#1					98		87	PILE 23 ROCK PILE
9/30/92	RP#2					32		87	PILE 23 ROCK PILE
9/30/92	RP#3					38		87	PILE 23 ROCK PILE

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
9/30/92	RP#5					42		87	PILE 23
9/30/92	RS#203	165		185		24		87	PILE 22
9/30/92	RS#204	165		185		29		87	PILE 22
9/30/92	RP#6					79		87	PILE 23 ROCK PILE
9/30/92	RP#7					24		87	PILE 23 ROCK PILE
9/30/92	RS# 205	165		185		54		87	(RECOUNTED) PILE 22
9/30/92	RS# 206	165		185		25		87	PILE 22
9/30/92	PILE#22					17		87	
9/30/92	RP#8					44		89	PILE 23
9/30/92	RS#207					32		89	PILE 23
9/30/92	RS#205					19		89	*RECOUNTED DUE TO HIGH C
9/30/92	RP#9					44		89	PILE 23
10/1/92	RP#1					44		89	COUNTED DUE TO HIGH COUNT
10/1/92	RS#208					46		89	PILE 23
10/1/92	RS#209					82		89	PILE 23
10/1/92	RP#9					49		89	
10/1/92	RP#10					32		89	PILE 23
10/1/92	RS#208					47		89	
10/1/92	RS#209					40		89	
10/1/92	RS 205					13		89	
10/1/92	RP#6					43		89	
10/1/92	RS#210					34		89	PILE 23
10/1/92	RS#211					45		89	PILE 23
10/1/92	RS#212					39		89	PILE 23
10/1/92	RS#213					30		89	PILE 23
10/1/92	RS#214					45		89	PILE 23
10/1/92	RS#215					30		89	PILE 23
10/1/92	RS#216					34		89	PILE 23
10/1/92	RP-11					52		89	PILE 23
10/1/92	RP-12					60		89	PILE 23
10/1/92	RS#217					48		89	PILE 24
10/1/92	PILE 23 Co					55		89	
10/1/92	RS#218					41		91	
10/1/92	RS#219					39		91	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/1/92	RS#220					42		91	
10/1/92	RS#221					49		91	
10/1/92	RS#222					45		91	
10/1/92	RS#223					52		91	
10/1/92	RS#224					45		91	
10/2/92	RS#225					37		91	
10/2/92	RS#226					54		91	
10/2/92	RS#227					51		91	
10/2/92	RS#228					39		91	
10/2/92	RS#229					37		91	
10/2/92	RS#230					56		91	
10/2/92	PILE#24					34		91	
10/2/92	RO#115 Co					550		91	
10/2/92	RO#115-1					902		91	
10/2/92	RO#115-2					870		91	
10/2/92	RO#115-3					432		91	
10/2/92	RO#115-4					269		91	
10/2/92	RO#115-5					278		91	
10/2/92	RO#115-6					235		91	
10/2/92	RS#231					47		91	C TRENCH
10/2/92	RS#232					53		91	C TRENCH
10/2/92	RS#233					41		91	C TRENCH
10/2/92	RS#234					57		91	C TRENCH
10/2/92	RS#235					42		91	C TRENCH
10/2/92	RS#236					51		91	C TRENCH
10/2/92	RS#237					43		91	C TRENCH
10/2/92	RS#238					48		91	C TRENCH
10/2/92	RS#239					46		91	C TRENCH
10/2/92	RS#240					27		93	IX BETWEEN ROCK PILE AND C
10/2/92	RS#241					58		93	IX BETWEEN ROCK PILE AND C
10/2/92	RS#242					39		93	IX BETWEEN ROCK PILE AND C
10/2/92	RS#243					67		93	IX BETWEEN ROCK PILE AND C
10/2/92	RS#244					40		93	IX BETWEEN ROCK PILE AND C
10/2/92	RS#245					54		93	IX BETWEEN ROCK PILE AND C

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/2/92	RS#246					162		93	IX BETWEEN ROCK PILE AND C
10/2/92	RS#247					55		93	IX BETWEEN ROCK PILE AND C
10/2/92	RS#248					47		93	IX BETWEEN ROCK PILE AND C
10/2/92	RS#249					42		93	IX BETWEEN ROCK PILE AND C
10/2/92	RO#54 Co					37		93	
10/2/92	RO#54-1					66		93	
10/2/92	RO#54-2					24		93	
10/2/92	RO#54-3					26		93	
10/2/92	RO#54-4					33		93	
10/2/92	RO#54-5					46		93	
10/2/92	RO#54-6					37		93	
10/2/92	*RS 246					41		93	
10/3/92	BOX#1					57		93	See 85 - Not Sent
10/3/92	BOX#2					58		93	
10/3/92	BOX#3					67		93	
10/3/92	BOX#4					40		93	
10/3/92	BOX#5					53		93	
10/3/92	BOX#6					81		93	
10/3/92	BOX#7					46		93	
10/3/92	BOX#8					37		93	
10/3/92	BOX#9					51		93	
10/3/92	BOX#10					53		93	
10/3/92	BOX#11					37		93	
10/3/92	BOX#12					46		93	
10/3/92	BOX#13					41		93	
10/3/92	BOX#14					111		93	
10/3/92	BOX#15					57		93	
10/3/92	BOX#16					48		95	
10/3/92	BOX#17					73		95	
10/3/92	BOX#18					57		95	
10/3/92	BOX#19					59		95	
10/3/92	BOX#20					42		95	
10/3/92	BOX#21					29		95	
10/3/92	BOX#22					62		95	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/3/92	BOX#23					40		95	
10/3/92	BOX#24					60		95	
10/3/92	BOX#25					35		95	
10/3/92	BOX#26					59		95	
10/3/92	BOX#27					44		95	
10/3/92	BOX#28					34		95	
10/3/92	TA-1	140		105		25	0¯36	95	
10/3/92	TA-2	150		105		16	0¯36	95	
10/3/92	TA-2	150		105		25	36¯72	95	
10/3/92	BOX#29					44		95	
10/3/92	BOX#30					35		95	
10/3/92	BOX#31					58		95	
10/3/92	BOX#32					39		95	
10/3/92	TA-3	160		105		13	0¯36	95	
10/3/92	OTA-3	160		105		34	36¯72	95	
10/3/92	BOX#33					91		95	
10/3/92	BOX#34					53		95	
10/3/92	BOX#35					46		95	
10/3/92	BOX#36					44		95	
10/3/92	BOX#37					52		95	
10/3/92	BOX#38					49		95	
10/3/92	TA-4	140		110		11	0¯36	95	
10/3/92	BOX#39					40		95	
10/3/92	BOX#40					35		97	
10/3/92	BOX#41					59		97	
10/3/92	BOX#42					62		97	
10/3/92	BOX#43					39		97	
10/3/92	BOX#44					99		97	
10/3/92	BOX#45					31		97	
10/3/92	BOX#46					41		97	
10/3/92	BOX#47					48		97	
10/3/92	BOX#48					43		97	
10/3/92	BOX#49					48		97	
10/3/92	BOX#50					43		97	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/3/92	BOX#51					55		97	
10/3/92	BOX#52					59		97	
10/3/92	BOX#53					40		97	
10/3/92	BOX#54					53		97	
10/3/92	BOX#55					43		97	
10/3/92	BOX#56					53		97	
10/3/92	BOX#57					55		97	
10/3/92	BOX#58					62		97	
10/3/92	BOX#59					85		97	
10/3/92	BOX#60					93		97	
10/3/92	TA-6A	145		145		9	36-72	97	
10/3/92	TA-6	145		145		12	0-36	97	
10/3/92	TA-5	140		115		7	0-36	97	
10/3/92	TA-5	140		115		18	36-60	97	
10/3/92	TA-4	140		115		20	36-48	97	Refusal
10/3/92	TA-6A	145		145		13	0-36	97	Corner
10/3/92	TA-7	170		150		15	0-36	97	
10/3/92	TA-7					11	36-60	97	
10/3/92	TA-8	175		115		39	0-36	99	
10/4/92	BOX#61					31		99	
10/4/92	BOX#62					68		99	
10/4/92	BOX#63					65		99	
10/4/92	BOX#64					70		99	
10/4/92	BOX#65					51		99	
10/4/92	BOX#66					62		99	
10/4/92	BOX#67					66		99	
10/4/92	BOX#68					64		99	
10/4/92	BOX#69					44		99	
10/4/92	BOX#70					84		99	
10/4/92	BOX#71					101		99	
10/4/92	BOX#72					69		99	
10/4/92	BOX#73					46		99	
10/4/92	BOX#74					92		99	
10/4/92	BOX#75					54		99	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	inches		
10/4/92	BOX#76					79		99	
10/4/92	BOX#77					80		99	
10/4/92	BOX#78					60		99	
10/4/92	BOX#79					73		99	
10/4/92	BOX#80					53		99	
10/4/92	BOX#81					51		99	
10/4/92	BOX#82					71		99	
10/4/92	BOX#83					58		99	
10/4/92	BOX#84					75		99	
10/4/92	RS#250					39		99	BFP-3
10/4/92	RS#251					48		99	BFP-3
10/4/92	RS#252					47		99	BFP-3
10/4/92	RS#253					71		99	BFP-3
10/4/92	RS#254					75		99	BFP-3
10/4/92	RS#255					36		99	BFP-3
10/4/92	RS#256					38		99	BFP-3
10/4/92	RS#257					57		99	BFP-3
10/4/92	RS#258					45		99	BFP-3
10/4/92	RS#259	185		130		52		101	BFP-3
10/4/92	RS#260					52		101	BFP-3
10/4/92	RS#261					29		101	BFP-3
10/4/92	RS#262					42		101	BFP-3
10/4/92	RS#263					65		101	BFP-3
10/4/92	RS#264					66		101	BFP-3
10/4/92	RS#265					48		101	BFP-3
10/4/92	RS#266					49		101	BFP-3
10/4/92	RS#267					60		101	BFP-3
10/4/92	RS#268					52		101	BFP-3
10/4/92	RS#269					63		101	BFP-3
10/4/92	RS#270					50		101	BFP-3
10/4/92	RS#271					48		101	BFP-3
10/4/92	RS#272					53		101	BFP-3
10/4/92	RS#273					46		101	BFP-3
10/5/92	TFS-1	160		130		107		101	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/5/92	TFS-2	160		140		14		101	
10/5/92	TFS-3	152		138		55		101	
10/5/92	RS#274					59		101	BFP-3
10/5/92	RS#275					95		101	BFP-3
10/5/92	TFS-4	152		130		21		101	
10/5/92	TFS-5	155		135		25		101	
10/5/92	RO#-143 Co					60		101	
10/5/92	RO#143-1					53		101	
10/5/92	RO#143-2					51		101	
10/5/92	RS#276					65		101	BFP-3
10/5/92	RS#277					75		101	BFP-3
10/5/92	RS#278					47		101	BFP-3
10/5/92	RS#279					56		101	BFP-3
10/5/92	RS#280					34		101	BFP-4
10/5/92	RS#281					38		101	BFP-4
10/5/92	RS#282					43		103	BFP-4
10/5/92	RS#283					52		103	BFP-3
10/5/92	RS#284					54		103	
10/5/92	RS#277-1					47		103	
10/5/92	RS#277-2					62		103	
10/5/92	RS#277-3					37		103	
10/5/92	RS#277-4					49		103	
10/5/92	RS#277-5					61		103	
10/5/92	RS#277-6					40		103	
10/5/92	RS#277-7					70		103	
10/5/92	RS#277-8					55		103	
10/5/92	RS#277-9					87		103	
10/5/92	RS#277-10					58		103	
10/5/92	RS#285					28		103	
10/5/92	RS#286					50		103	
10/5/92	RS#287					45		103	
10/5/92	RS#288					49		103	
10/5/92	RS#289					61		103	
10/5/92	RS#290					33		103	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/5/92	B Trench(Top)					34		103	
10/5/92	B Trench (Bot)					56		103	
10/5/92	RO#143-3					68		103	
10/5/92	RO#143-4					52		103	
10/5/92	RO#143-5					157		103	
10/5/92	RO#143-6					95		103	
10/6/92	RS#291					41		103	
10/6/92	RS#292					42		103	
10/6/92	RS#293					45		103	
10/6/92	RS#294					40		103	
10/6/92	RS#295					43		103	
10/6/92	TW			155	Wall	160		105	B Trench
10/6/92	B Trench Floor					21		105	
10/6/92	B Trench	wall		145		21		105	
10/6/92	B Trench	200		wall		21		105	
10/6/92	RS#277-8-1					64		105	
10/6/92	RS#277-8-2					59		105	
10/6/92	RS#277-8-3					45		105	
10/6/92	RS#277-8-4					41		105	
10/6/92	RS#277-8-5					48		105	
10/6/92	RS#296					27		105	
10/6/92	B Trench Floor					11		105	Under Rock
10/6/92	RS#297					24		105	BFP#1
10/6/92	RS#298					75		105	BFP#3
10/6/92	RS#299					33		105	BFP#2
10/6/92	RS#300					43		105	BFP#2
10/6/92	RS#301					35		105	
10/6/92	RS#298					47		105	
10/6/92	RS#302					27		105	BFP#1
10/6/92	RS#303					25		105	BFP#1
10/6/92	RS#304					35		105	BFP#2
10/6/92	RS#305					28		105	BFP#1
10/6/92	RS#306					38		105	BFP#2
10/6/92	RS#307					32		105	BFP#2

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	inches		
10/6/92	RS#308					27		105	BFP#1
10/6/92	BG - RH					12		105	Background Soil From ITI Raill
10/6/92	RS #309					23		107	BFP #1
10/6/92	RS #310					38		107	BFP #2
10/6/92	RS #311					40		107	BFP #2
10/6/92	BKgd split					10		107	To LAL 10/6/92
10/6/92	RS #262					42		107	To LAL 10/6/92
10/7/92	RS #312					20		107	BFP #1 Location: rockpile
10/7/92	RS #313					23		107	BFP #1
10/7/92	RS #314					24		107	BFP #1
10/7/92	RS #315					25		107	BFP #1
10/7/92	BFP front perim					40		107	
10/7/92	BFP back perim					35		107	
10/7/92	BFP #3 front					45		107	
10/7/92	BFP #3 back					35		107	
10/7/92	BFP #4 front					43		107	
10/7/92	BFP #4 back					50		107	
10/7/92	RS #316					34		107	BFP #4 Location: rockpile
10/7/92	RS #317					27		107	BFP #1
10/7/92	RS #318					29		107	BFP #1
10/7/92	RS #319					22		107	BFP #1 Location: rockpile
10/7/92	RS #320					39		107	BFP #4 Location: rockpile
10/7/92	RO #62 Co					68		107	BFP #4
10/7/92	RO #62-1					79		107	
10/7/92	RO #62-2					47		107	
10/7/92	RO #62-3					100		107	
10/7/92	RO #62-4					81		107	
10/7/92	RO #62-5					65		109	
10/7/92	RO #29 Co					1142		109	
10/7/92	RO #29-1					883		109	
10/7/92	RO #29-2					559		109	
10/7/92	RO #29-3					489		109	
10/7/92	RO #29-4					643		109	
10/7/92	RS #321					35		109	BFP #4 Location: rockpile

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/7/92	RS #322					46		109	BFP #4 Location: rockpil
10/7/92	RS #323	165		185		40		109	BFP #4
10/7/92	RS #324					65		109	BFP [illegible]
10/7/92	RS #325	165		185		33		109	BFP #4
10/7/92	RS #326					32		109	BFP #4
10/7/92	RS #327					50		109	BFP #4
10/7/92	RS #328	165		185		31		109	BFP #4
10/7/92	RS #329	165		185		47		109	BFP #4
10/7/92	RS #330					70		109	BFP #3 Location: rockpil
10/7/92	RS #331	165		185		43		109	BFP #3
10/7/92	RS #332	165		185		82		109	BFP #3
10/8/92	RS #333	165		185		79		109	BFP #3
10/8/92	RS #334					60		109	BFP #3 Location: rockpil
10/8/92	RS #335	165		185		59		109	BFP #3
10/8/92	RS #332	165		185		80		109	Recounted BFP #3
10/8/92	RS #336	165		185		59		109	BFP #3
10/8/92	RS #337	165		185		67		109	BFP #3
10/8/92	RS #338					52		109	BFP #3 Location: rockpil
10/8/92	RS #339					83		109	BFP #3 Location: C trenc
10/8/92	RS #340					87		109	BFP #3 Location: C trenc
10/8/92	RS #341					50		109	BFP #3 Location: rockpil
10/8/92	RS #342					54		109	BFP #3 Location: rockpil
10/8/92	RS #343					78		109	BFP #3 Location: C trenc
10/8/92	RS #344					46		109	BFP #3 Location: C trenc
10/8/92	RS #345					90		111	BFP #3 Location: C trenc
10/8/92	RS #346					33		111	BFP #4 Location: rockp
10/8/92	RS #347					127		111	BFP #3 Location: C tren
10/8/92	RS #348					86		111	BFP #3 Location: C tren
10/8/92	RS #349					84		111	BFP #3 Location: C tren
10/8/92	RS #350					117		111	BFP #3 Location: C tren
10/9/92	RS #351					33		111	BFP #4
10/9/92	RS #352					100		111	BFP #3
10/9/92	RS #353					147		111	BFP #3
10/9/92	RS #354					44		111	BFP #4

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/9/92	RS #385					127		111	LSA Box
10/9/92	RS #355					41		111	BFP #4 Location: C trenc
10/9/92	RS #356					74		111	BFP #3
10/9/92	RO #123-1					555		111	
10/9/92	RO #123-2					640		111	
10/9/92	RO #123-3					185		111	
10/9/92	RO #123-4					408		111	
10/9/92	RO #123-5					846		111	
10/9/92	RO #123-6					1067		111	
10/9/92	RS #357					71		111	BFP #3 Location: rockpil
10/9/92	RS #358					55		111	BFP #3 Location: rockpil
10/9/92	RS #359					29		111	BFP #1
10/9/92	RS #360					37		111	BFP #4
10/10/92	RS #361					57		111	BFP #3
10/10/92	Box 85					70		111	
10/10/92	Box 86					301		111	
10/10/92	Box 87					1256		111	
10/10/92	Box 88					60		111	
10/10/92	Box 89					963		113	RO 115
10/10/92	Box 90					264		113	RO 150
10/10/92	Box 91					467		113	RO 150
10/10/92	Box 92					413		113	RO 150
10/10/92	Box 93					543		113	RO 150
10/10/92	Box 94					968		113	RO 115
10/10/92	Box 95					1568		113	RO 115
10/10/92	Box 96					512		113	RO 29
10/10/92	Box 97					478		113	ROS 115/29
10/10/92	Box 98					1007		113	RO 115
10/10/92	Box 99					3103		113	RO 115/150/29
10/10/92	Box 100							113	RO 115
10/10/92	Box 101					584		113	RO 29
10/10/92	Box 102					306		113	RO 29
10/10/92	Box 103					1647		113	RO 178
10/10/92	Box 104					566		113	RO 29

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/10/92	Box 105					1605		113	RO 115/150/29
10/10/92	Box 106					1751		113	RO 27
10/10/92	Box 107					207		113	RO 123
10/10/92	Box 108					1036		113	RO 27
10/10/92	Box 109					318		113	RO 123
10/10/92	Box 110					350		113	RO 123
10/10/92	Box 111					281		113	RO 123
10/10/92	Box 112					13176		113	RO 27
10/10/92	Box 113					242		113	RO 123
10/10/92	Box 114					332		113	RO 123
10/10/92	Box 115					1161		113	RO 27
10/10/92	Box 116					539		113	RO 123/27
10/10/9?	Box 117					1648		113	RO 27
10/10/92	Box 118					3048		113	RO 67
10/10/92	Box 119					3504		113	RO 67
10/10/92	Box 120					3546		113	RO 67
10/10/92	Box 121					2389		113	RO 67
10/10/92	Box 122					2169		113	RO 67
10/10/92	Box 123					4717		113	RO 152
10/10/92	Box 124					1860		113	RO 67
10/11/92	Box 125					1007		115	RO 138
10/11/92	Box 126					504		115	RO 138
10/11/92	Box 127					1916		115	RO 19
10/11/92	Box 128					224		115	RO 138
10/11/92	Box 129					2338		115	RO 138
10/11/92	Box 130					927		115	RO 176
10/11/92	Box 131					1200		115	RO 138
10/11/92	Box 132					356		115	RO 138
10/11/92	Box 133					1534		115	RO 178
10/11/92	Box 134					1773		115	RO 176
10/11/92	Box 135					1453		115	RO 19
10/11/92	Box 136					2372		115	RO 19
10/11/92	Box 137					1588		115	RO 176
10/11/92	Box 138					2141		115	RO 178

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/11/92	Box 139					2389		115	RO 19
10/11/92	Box 140					730		115	RO 176
10/11/92	Box 141							115	
10/11/92	Box 142					1608		115	RO 178
10/11/92	Box 143					592		115	RO 176
10/11/92	Box 144					1538		115	RO 176
10/11/92	Box 145					1153		115	RO 176
10/11/92	Box 146							115	
10/11/92	Box 147							115	
10/11/92	Box 148							115	
10/11/92	Box 149							115	
10/11/92	Box 150							115	
10/11/92	Box 151							115	
10/11/92	Box 152							115	
10/11/92	Box 153							115	
10/11/92	Box 154					3610		115	RO 152
10/11/92	Box 155					3268		115	RO 152
10/11/92	Box 156					2984		115	RO 152
10/11/92	Box 157					2848		115	RO 152
10/11/92	Box 158					1167		115	RO 19
10/11/92	Box 159							115	
10/11/92	Box 160							115	
10/11/92	Box 161							117	
10/11/92	Box 162							117	
10/11/92	Box 163							117	
10/11/92	Box 164							117	
10/11/92	Box 165							117	
10/11/92	Box 166							117	
10/11/92	Box 167							117	
10/11/92	Box 168							117	
10/11/92	Box 169							117	
1C/11/92	Box 170					606		117	RO 19
10/11/92	Box 171					1030		117	RO 152/19
10/11/92	RO #20 Co					63		117	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/11/92	RO #20-1					64		117	
10/11/92	RO #20-2					69		117	
10/11/92	RO #20-3					69		117	
10/11/92	RO #20-4					86		117	
10/11/92	RO #20-5					68		117	
10/11/92	RO #20-6					133		117	
10/12/92	RO #35 Co					102		117	
10/12/92	RO #35-1					146		117	
10/12/92	RO #35-2					157		117	
10/12/92	RO #35-3					314		117	
10/12/92	RO #35-4					52		117	
10/12/92	RO #35-5					56		117	
10/12/92	RO #144 Co					59		117	
10/12/92	RO #144-1					58		117	
10/12/92	RO #144-2					54		117	
10/12/92	RO #144-3					44		117	
10/12/92	RO #144-4					48		117	
10/12/92	80-1					66		131	
10/12/92	80-2					92		131	
10/12/92	80-3					63		131	
10/12/92	80-4					79		131	
10/12/92	80-5					80		131	
10/12/92	80-6					90		131	
10/12/92	80 Composite					70		131	
10/12/92	138A-comp					100		131	
10/12/92	138A-1					67		131	
10/12/92	138A-2					61		131	
10/12/92	138A-3					106		131	
10/12/92	138A-4					130		131	
10/12/92	138A-5					80		131	
10/12/92	138A-6					73		131	
10/12/92	138A-7					89		131	
10/12/92	115-A-Comp					84		131	
10/12/92	115A-1					74		131	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/12/92	115A-2					56		131	
10/12/92	115A-3					98		131	
10/12/92	115A-4					92		131	
10/12/92	115A-5					61		131	
10/12/92	115A-6					83		131	
10/12/92	Box 141					1625		131	
10/13/92	27A Comp					80		131	
10/13/92	27A-1					138		131	
10/13/92	27A-2					84		131	
10/13/92	27A-3					79		131	
10/13/92	27A-4					80		131	
10/13/92	27A-5					59		131	
10/13/92	27A-6					56		131	
10/13/92	150A-Comp					76		133	
10/13/92	150A-1					73		133	
10/13/92	150A-2					60		133	
10/13/92	150A-3					53		133	
10/13/92	150A-4					57		133	
10/13/92	150A-5					48		133	
10/13/92	150A-6					81		133	
10/13/92	67A-Comp					67		133	
10/13/92	67A-1					58		133	
10/13/92	67A-2					61		133	
10/13/92	67A-3					57		133	
10/13/92	67A-4					94		133	
10/13/92	67A-5					153		133	
10/13/92	67A-6					64		133	
10/13/92	Bx#112					2887		133	2/3 from BFP #3
10/13/92	Bx#112					60		133	1/3 Hot
10/13/92	Bx#161					2198		133	1/3 from Box #112
10/13/92	Bx#161					118		133	2/3 from BFP #3
10/13/92	Bx #159					3017		133	From RO 35 B-25 Box 1/2
10/13/92	Bx #159					119		133	Bx # 159 from BFP #3
10/13/92	Bx#177					2640		133	1/3 from 112(hot)

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/13/92	Bx#177					101		133	2/3 from BFP #3
10/13/92	Bx#173					60		133	1/2 debris 1/2 BFP #3
10/13/92	Bx#178					46		133	1/2 debris 1/2 from BFP
10/13/92	Bx#149					77		133	
10/13/92	Bx#172					97		133	
10/13/92	Box #160					86		135	Debris from yellow barre
10/13/92	Box #169					50		135	Debris from yellow barre
10/13/92	Box #174					46		135	
10/13/92	Box #146					70		135	
10/13/92	Box #147					55		135	
10/13/92	Box #148					73		135	
10/13/92	Box #168					51		135	
10/14/92	Box #150					46		135	
10/14/92	Box #175					65		135	
10/14/92	176 A-Co					52		135	
10/14/92	176A-1					59		135	
10/14/92	176A-2					54		135	
10/14/92	176A-3					71		135	
10/14/92	176A-4					77		135	
10/14/92	176A-5					61		135	
10/14/92	176A-6					75		135	
10/14/92	Top soil					17		135	Cooling tower area
10/14/92	RS# 362					53		135	BFP #3
10/14/92	RS# 363					156		135	BFP #3
10/14/92	RS# 364					350		135	BFP #3
10/14/92	Cooling tower					18		135	Cooling tower area
10/14/92	RS# 363					20		135	BFP #1 Recounted due to higl
10/14/92	RS# 364					16		135	BFP #1 Recounted due to higl
10/14/92	29A-Co					46		137	
10/14/92	29A-1					61		137	
10/14/92	29A-2					103		137	
10/14/92	29A-3					50		137	
10/14/92	29A-4					59		137	
10/14/92	29A-5					51		137	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/14/92	29A-6					31		137	
10/14/92	RS #365					14		137	BFP
10/14/92	RS #366					277		137	BFP
10/14/92	Cooling tower					58	48¯84	137	
10/14/92	RS #367					19		137	
10/14/92	RS#366					18		137	
10/14/92	29A-2					52		137	
10/14/92	Box #100					1185		137	
10/14/92	RS #368					25		137	
10/14/92	RS #369					30		137	
10/14/92	RS #370					72		137	
10/14/92	RS #371					51		137	
10/14/92	Pile H #2					36		137	
10/14/92	RS #372					49		137	
10/14/92	RS #373					53		137	
10/15/92	152A-Co					57		139	
10/15/92	152A-1					67		139	
10/15/92	152A-2					54		139	
10/15/92	152A-3					49		139	
10/15/92	152A-4					68		139	
10/15/92	152A-5					48		139	
10/15/92	152A-6					88		139	
10/15/92	RS #374	170		120		40		139	
10/15/92	RS #375	170		120		56		139	
10/15/92	178A-Co					79		139	
10/15/92	178A-1					68		139	
10/15/92	178A-2					47		139	
10/15/92	178A-3					58		139	
10/15/92	178A-4					69		139	
10/15/92	178A-5					74		139	
10/15/92	178A-6					40		139	
10/15/92	RS #376	170		120		57		139	
10/15/92	RS #377	170		120		60		139	
10/15/92	RS #378	170		120		[illegible]		139	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/15/92	RS #379	170		120		21		139	
10/15/92	RS #379	170		120		30		139	
10/16/92	RS #380	170		120		60		139	
10/16/92	RS #381	170		120		49		139	
10/16/92	RS #382	170		120		51		139	
10/16/92	RS #383	170		120		50		139	
10/16/92	RS #384	170		120		44		139	
10/16/92	RS #385	170		120		18		139	
10/16/92	RS #386	180		160		44		139	
10/16/92	RS #387	180		160		36		139	
10/16/92	RS #388	180		160		60		141	
10/16/92	RS #389	180		160		57		141	
10/17/92	RS #390	165		110		37		141	
10/17/92	RS #391	165		110		38		141	
10/17/92	RS #392					32		141	
10/17/92	RS #393					45		141	Location: rockpile
10/17/92	RS #392A					23		141	
10/17/92	RS#394					52		141	
10/17/92	RS#395					55		141	
10/17/92	RS#396					54		141	
10/17/92	RS#397					56		141	
10/17/92	RS#398					72		141	
10/21/92	RS#399					58		141	
10/21/92		160		130		27		141	
10/21/92		160		140		24		141	
10/21/92		165		135		258		141	Resampled
10/21/92		170		130		64		141	After scraping
10/21/92		170		140		16		141	
10/21/92		170		120		57		141	
10/21/92		160		120		17		141	
10/21/92		165		125		11		141	
10/21/92		170		110		60		141	
10/21/92		165		115		18		141	
10/21/92		160		110		22		141	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/21/92		140		110		42	0-6	141	
10/21/92		150		120		27	0-6	141	
10/21/92		142		110		24	0-6	141	
10/21/92		140		120		9	0-6	141	
10/21/92		135		115		18	0-8	143	
10/21/92		142		120		14	0-8	143	
10/21/92		150		110		26	0-1	143	
10/22/92		155		105		72	0-6	143	underwater
10/22/92		145		105		9		143	underwater
10/22/92	RS #400					59		143	
10/22/92	RS #27B-Co					55		143	
10/22/92	RS #27B-1					43		143	
10/22/92	RS #27B-2					69		143	
10/22/92	RS #27B-3					38		143	
10/22/92	RS #27B-4					60		143	
10/22/92	RS #27B-5					98		143	
10/22/92	RS #27B-6					50		143	
10/22/92	RO #14C-1					54		143	
10/22/92	RO #14C-2					63		143	
10/22/92	RO #14C-3					60		143	
10/22/92	RO #14C-4					74		143	
10/22/92	RO #14C-5					50		143	
10/22/92	143S B-1					58		143	
10/22/92	143S B-2					55		143	
10/22/92	143S B-3					57		143	
10/22/92	143S B-4					32		143	
10/22/92	143S B-5					40		143	
10/22/92	RO #14D-1					49		143	
10/22/92	RO #14D-2					72		143	
10/22/92	RO #14D-3					101		143	
10/22/92	RO #14D-4					62		143	
10/22/92	RO #14D-5					55		143	
10/23/92	RO #27C-1					68		145	
10/23/92	RO #27C-2					73		145	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/23/92	RO #27C-3					59		145	
10/23/92	RO #27C-4					50		145	
10/23/92	RO #27D-1					59		145	
10/23/92	RO #27D-2					52		145	
10/23/92	RO #27D-3					59		145	
10/23/92	RO #27D-4					69		145	
10/23/92	RO #14DD-1					55		145	
10/23/92	RO #14DD-2					54		145	
10/23/92	RO #14DD-3					49		145	
10/23/92	RO #14DD-4					48		145	
10/23/92	RO #14DD-5					53		145	
10/23/92	RO #27E-1					61		145	
10/23/92	RO #27E-2					44		145	
10/23/92	RO #27E-3					155		145	
10/23/92	RO #27E-4					68		145	
10/23/92	RO #14E-1					52		145	
10/24/92	RO #14E-2					62		145	
10/24/92	RO #14E-3					4353		145	
10/24/92	RO #14E-4					49		145	
10/24/92	RO #14E-5					34		145	
10/24/92	RO #14E-6					45		145	
10/24/92	RO #14E-7					157		145	
10/24/92	RO #14F-1					92		145	
10/24/92	RO #14F-2					79		145	
10/24/92	RO #14F-3					62		145	
10/24/92	RO #14F-4					77		147	
10/24/92	RO #14F-5					65		147	
10/24/92	RO #27G-1					67		147	
10/24/92	RO #27G-2					123		147	
10/24/92	RO #27G-3					58		147	
10/24/92	RO #27G-4					54		147	
10/24/92	RO #27G-5					70		147	
10/24/92	RO #27H-1					59		147	
10/24/92	RO #27H-2					62		147	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/24/92	RO #27H-3					55		147	
10/24/92	RO #27H-4					64		147	
10/24/92	RO #27H-5					66		147	
10/24/92	RO #27I-1					64		147	
10/24/92	RO #27I-2					37		147	
10/24/92	RO #27I-3					56		147	
10/24/92	RO #27I-4					62		147	
10/24/92	RO #27I-5					56		147	
10/24/92	RO #27I-6					110		147	
10/26/92	Top soil B-trench	198		160		16	0-30	147	
10/26/92	B-trench					40	0-60	147	
10/26/92	Trench floor	195		165		10		147	
10/26/92	Trench wall	210		115		12		147	
10/26/92	Trench floor	201		165		19		147	
10/26/92	Trench floor	198		155		7		147	
10/26/92	Trench wall	195		155		18		147	
10/26/92	Trench wall	195		160		25		147	
10/26/92	Trench wall	201		160		26		147	
10/26/92	Trench floor	198		160		16		147	
10/26/92	Trench wall	195		165		38		149	
10/26/92	Trench wall	201		160		10		149	
10/26/92	Trench wall	195		160		10		149	
10/27/92	RS 401					47		149	B-trench top BFP #3
10/27/92	RS 402					49		149	B-trench top BFP #3
10/27/92	RS 403					22		149	B-trench top BFP #1
10/27/92	Pile AA					38		149	parking lot
10/27/92	RS 404					10		149	B-trench top
10/27/92	RS 405					30		149	B-trench
10/27/92	Rail car debris					7		149	Rail car debris
10/27/92	RS #406					24		149	B-trench
10/27/92	RS #407					26		149	B-trench
10/27/92	RS #408					17		149	B-trench
10/28/92	RO #27J-1					53		149	
10/28/92	RO #27J-2					83		149	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/28/92	RO #27J-3					65		149	
10/28/92	RO #27J-4					48		149	
10/28/92	RO #14G-1					78		149	
10/28/92	RO #14G-2					22		149	
10/28/92	RO #14G-3					25		149	
10/28/92	RO #14H-1					20		149	
10/28/92	RO #14H-2					26		149	
10/28/92	RO #28-1					87		149	
10/28/92	RO #28-2					149		149	
10/28/92	RO #28-3					51		149	
10/28/92	RO #28-4					78		149	
10/28/92	RO #28-5					80		149	
10/28/92	RO #28-6					72		149	
10/28/92	RO #14I-1					44		151	
10/28/92	RO #14I-2					37		151	
10/28/92	RO #28A-1					41		151	
10/28/92	RO #28A-2					36		151	
10/28/92	RO #28A-3					40		151	
10/28/92	RO #28A-4					114		151	
10/28/92	RO #14J-1					17		151	
10/28/92	RO #14J-2					36		151	
10/28/92	RO #14J-3					62		151	
10/28/92	RO #28B-1					27		151	
10/28/92	RO #28B-2					37		151	
10/28/92	RO #28B-3					43		151	
10/28/92	RO #28B-4					42		151	
10/28/92	Rock pile #1					56		151	
10/28/92	Rock pile #2					65		151	
10/28/92	Rock pile #3					46		151	
10/28/92	Rock pile #4					36		151	
10/28/92	Rock pile #5					48		151	
10/29/92	RO #14K-1					57		151	
10/29/92	RO #14K-2					38		151	
10/29/92	RO #14K-3					49		151	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
10/29/92	RO #14K-4					44		151	
10/29/92	RO #28C-1					31		151	
10/29/92	RO #28C-2					49		151	
10/29/92	RO #28C-3					61		151	
10/29/92	RO #14L-1					62		153	
10/29/92	RO #14L-2					38		153	
10/29/92	RO #14L-3					61		153	
10/29/92	RO #14L-4					58		153	
10/29/92	RO #14L-5					59		153	
10/29/92	RO #27JJ-1					60		153	
10/29/92	RO #27JJ-2					43		153	
10/29/92	RO #27JJ-3					35		153	
10/29/92	RO #27JJ-4					46		153	
10/29/92	RO #27JJ-5					34		153	
10/29/92	RO #14M-1					58		153	
10/29/92	RO #14M-2					65		153	
10/29/92	RO #27K-1					26		153	
10/29/92	RO #27K-2					43		153	
10/29/92	RO #27K-3					40		153	
10/29/92	RO #27K-4					51		153	
10/29/92	RO #27K-5					32		153	
10/29/92	RO #14N-1					67		153	
10/29/92	RO #14N-2					31		153	
10/29/92	RO #14N-3					48		153	
10/29/92	RO #14N-4					59		153	
10/29/92	RO #14N-5					61		153	
10/29/92	RO #14N-6					74		153	
10/29/92		165		135		75	0-6	153	retest
10/29/92	RO #27L-1					42		153	
10/29/92	RO #27L-2					83		153	
10/30/92	RO #144S A-1					73		153	
10/30/92	RO #144S A-2					74		153	
10/30/92	RO #144S A-3					45		153	
11/1/92	RO #27M-1					39		155	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
11/1/92	RO #27M-2					47		155	
11/1/92	RO #27M-3					62		155	
11/1/92	RO #27M-4					37		155	
11/1/92	RO #27M-5					61		155	
11/1/92	RO #14O-1					70		155	
11/1/92	RO #14O-2					55		155	
11/1/92	RO #14O-3					40		155	
11/1/92	RO #14O-4					52		155	
11/1/92	RS #409					38		155	rockpile
11/1/92	RO #27N-1					65		155	
11/1/92	RO #27N-2					61		155	
11/1/92	RO #27N-3					38		155	
11/1/92	RO #14P-1					50		155	
11/1/92	RO #14P-2					51		155	
11/1/92	RO #14P-3					61		155	
11/1/92	RO #14P-4					86		155	
11/1/92	RO #27O-1					62		155	
11/1/92	RO #27O-2					56		155	
11/1/92	RO #27O-3					33		155	
11/1/92	RO #27O-4					66		155	
11/1/92	RO #14G-1					31		155	
11/1/92	RO #14G-2					32		155	
11/1/92	RO #14G-3					41		155	
11/1/92	RO #14G-4					60		155	
11/2/92	RO #14R-1					67		155	
11/2/92	RO #14R-2					46		155	
11/2/92	RO #14R-3					47		155	
11/2/92	RO #27P-1					38		157	
11/2/92	RO #27P-2					38		157	
11/2/92	RO #27P-3					43		157	
11/2/92	RO #27P-4					39		157	
11/2/92	RO #27P-5					62		157	
11/2/92	RO #14S-1					67		157	
11/2/92	RO #14S-2					63		157	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
11/2/92	RO #14S-3					24		157	
11/2/92	RO #14S-4					49		157	
11/2/92	RO #14S-5					61		157	
11/2/92	RO #14T-1					61		157	
11/2/92	RO #14T-2					58		157	
11/2/92	RO #14T-3					49		157	
11/2/92	RO #14T-4					39		157	
11/2/92	RO #27G-1					53		157	
11/2/92	RO #27G-2					46		157	
11/2/92	RO #27G-3					53		157	
11/2/92	RO #27G-4					44		157	
11/2/92	RO #27G-5					41		157	
11/2/92	RO #R-1					37		157	
11/2/92	RO #R-2					61		157	
11/2/92	RO #R-3					40		157	
11/2/92	RO #27S-1					49		157	resampled the following d
11/2/92	RO #27S-2					59		157	resampled the following d
11/2/92	RO #27S-3					30		157	resampled the following d
11/2/92	RO #27S-4					37		157	resampled the following d
11/3/92	RO #14V-1					46		159	
11/3/92	RO #14V-2					69		159	
11/3/92	RO #14V-3					45		159	
11/3/92	RO #14V-4					64		159	
11/3/92	RO #27MM-1					55		159	
11/3/92	RO #27MM-2					43		159	
11/3/92	RO #27MM-3					47		159	
11/3/92	RO #27MM-4					37		159	
11/3/92	RO #27MM-5					75		159	
11/3/92	RO #27MM-6					44		159	
11/3/92	RO #14U-1					58		159	
11/3/92	RO #14U-2					54		159	
11/3/92	RO #14U-3					39		159	
11/3/92	RO #14U-4					45		159	
11/3/92	RO #14U-5					43		159	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
11/3/92	RO #14W-1					44		159	
11/3/92	RO #14W-2					50		159	
11/3/92	RO #14W-3					41		159	
11/3/92	RO #14W-4					47		159	
11/3/92	RO #14X-1					51		159	
11/3/92	RO #14X-2					54		159	
11/3/92	RO #14X-3					47		159	
11/3/92	RO #14X-4					76		159	
11/3/92	RO #14X-5					56		159	
11/3/92	RO #14Y-1					70		159	
11/3/92	RO #14Y-2					37		159	
11/3/92	RO #14Y-3					74		159	
11/3/92	RO #14Y-4					66		159	
11/3/92	RO #14Y-5					76		159	
11/4/92	RO 14Z-1					85		7	
11/4/92	RO 14Z-2					120		7	
11/4/92	RO 14Z-3					28		7	
11/4/92	RO 14Z-4					54		7	
11/4/92	RO 14Z-5					55		7	
11/4/92	RO 14Z-6					51		7	
11/4/92	RO 14AA-1					51		7	
11/4/92	RO 14Aa-2					68		7	
11/4/92	RO 14AA-3					56		7	
11/4/92	RO 14AA-4					44		7	
11/4/92	RO 14AA-5					61		7	
11/4/92	RO 14AA-6					49		7	
11/4/92	RO 14BB-1					80		7	
11/4/92	RO 14BB-2					45		7	
11/4/92	RO 14BB-3					56		7	
11/5/92	Rock pile back	230		180		65		9	
11/5/92	Rock pile back	230		180		70		9	
11/6/92		190		140		12		9	
11/6/92		185		145		8		9	
11/6/92		180		130		14		9	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
11/6/92		180		150		4		9	
11/6/92		180		125		58		9	
11/6/92	RO 14HH-1					45		9	
11/6/92	RO 14HH-2					34		9	
11/6/92	RO 14HH-3					44		9	
11/6/92	RO 14HH-4					38		9	
11/6/92		175		135		14		11	
11/6/92		175		125		206		11	
11/6/92		185		135		50		11	
11/6/92		190		130		17		11	
11/6/92		185		125		45		11	
11/6/92	RO 14II-1					42		11	
11/6/92	RO 14II-2					42		11	
11/6/92	RO 14II-3					54		11	
11/6/92	RO 14II-4					40		11	
11/6/92	RO 14II-5					63		11	
11/6/92	RO 14JJ-1					23		11	
11/6/92	RO 14JJ-2					61		11	
11/6/92	Cooling tower1					24		11	
11/6/92	Cooling tower2					48		11	
11/6/92	#1	175		115		44		11	
11/6/92	#2	175		115		14		11	
11/6/92	#1	170		110		51		11	
11/6/92	#2	170		110		64		11	
11/6/92	RO 14KK-1					39		11	
11/6/92	RO 14KK-2					39		11	
11/6/92	RO 14KK-3					31		11	
11/6/92	RO 14KK-4					42		11	
11/6/92	RO 14KK-5					48		11	
11/6/92	RO 14LL-1					52		11	
11/6/92	RO 14LL-2					41		11	
11/6/92	RO 14LL-3					55		11	
11/6/92	RO 14LL-4					23		11	
11/6/92	RO 14LL-5					49		11	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
11/6/92	Due bank					46		13	
11/6/92	RO 14MM-1					44		13	
11/6/92	RO 14MM-2					39		13	
11/6/92	RO 14MM-3					23		13	
11/6/92	#3	170		110		33		13	
11/6/92	#4	170		110		53		13	
11/6/92		190		150		32		13	Roll off 14
11/6/92		190		140		34		13	Roll off 14
11/6/92		180		120		54		13	Roll off 143-5
11/6/92		190		160		44		13	Roll off 143-5
11/6/92		200		160		48		13	Roll off 144-5
11/6/92		170		150		7		13	Roll off 144-5
11/7/92		200		150		29		13	
11/7/92		200		150		23		13	
11/7/92		175		115		32	0-12	13	
11/7/92		175		115		28	12-24	13	Drill
11/7/92		175		115		246	24-36	13	Drill
11/7/92		175		115		44	36-48	13	Drill
11/7/92		175		115		29	48-72	13	Drill
11/7/92		165		125		41		13	Floor
11/7/92		173		123		78		13	Floor
11/7/92		170		120		118		13	Floor
11/7/92	Rock pile					37		13	
11/7/92		185		155		21		13	Floor
11/7/92		190		150		28		13	Floor
11/7/92		185		152		50		13	Floor
11/7/92		170		130		7		15	Floor
11/7/92		182		150		49		15	Floor
11/7/92		190		120		14	0-12	15	
11/7/92		190		120		16	24-48	15	
11/7/92		190		120		26	12-24	15	
11/7/92		195		140		30	12-24	15	
11/7/92		195		130		32	0-24	15	
11/7/92		195		140		18	0-12	15	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
11/7/92		190		120		13	48-72	15	
11/7/92		205		150		187	24-36	15	refusal
11/7/92		205		151		71	0-24	15	
11/7/92		185		135		63		15	Floor
11/7/92		165		135		22		15	Floor
11/7/92		205		150		46	0-12	15	
11/7/92		195		140		8	24-48	15	
11/7/92		125		151		16	48-72	15	
11/7/92		195		140		8	48-72	15	
11/7/92		180		167		60	0-12	15	
11/7/92		180		167		40	12-24	15	
11/7/92		180		167		11	24-48	15	
11/7/92		180		167		44	48-72	15	
11/7/92		170		120		34		15	Floor
11/7/92		175		125		12		15	Floor
11/7/92		180		125		15		15	Floor
11/7/92		165		125		16		15	Floor
11/7/92		204		162		51	1-12	17	
11/7/92		204		162		13	12-24	17	
11/7/92		204		162		41	24-36	17	
11/7/92		155		115		68		17	Floor
11/8/92		145		95		7	0-12	17	
11/8/92		145		95		34	12-24	17	
11/8/92		145		95		13	24-36	17	
11/8/92		145		95		19	48-72	17	
11/8/92		170		150		9	0-12	17	
11/8/92		170		150		12	12-24	17	
11/8/92		170		150		6	24-36	17	
11/8/92		170		150		5	36-48	17	
11/8/92		170		150		7	48-72	17	
11/8/92		195		130		114	1-24	17	
11/8/92		195		130		22	24-48	17	
11/8/92		195		130		14	48-72	17	
11/8/92		205		151		31	1-24	17	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
11/8/92		205		151		37	24-48	17	
11/8/92		205		151		17	48-72	17	
11/8/92		205		150		40	1-12	17	
11/8/92		205		150		77	12-24	17	
11/8/92		205		150		311	24-36	17	
11/8/92		190		170		62	1-12	17	
11/8/92		190		170		16	12-24	17	
11/8/92		190		170		9	24-48	17	
11/8/92		190		170		27	48-72	17	
11/8/92		202		170		11	1-12	19	
11/8/92		202		170		16	12-24	19	
11/8/92		202		170		12	48-72	19	
11/8/92		165		95		92	1-12	19	
11/8/92		165		95		64	12-24	19	
11/8/92		165		95		76	12-24	19	
11/8/92		165		95		64	24-36	19	
11/8/92		165		95		19	24-36	19	
11/8/92		165		95		12	36-48	19	
11/8/92		165		95		19	48-72	19	
11/8/92	#1	170		120		13		19	Mud Pile
11/8/92	#2	170		120		26		19	Mud Pile
11/8/92		145		140		27	1-12	19	
11/8/92		145		140		34	12-24	19	
11/8/92		145		140		10	24-36	19	
11/8/92		145		140		10	36-48	19	
11/8/92		145		140		9	48-72	19	
11/8/92	RO 27V-1					64		19	
11/8/92	RO 27V-1					52		19	
11/8/92	RO 27V-2					53		19	
11/8/92	RO 27V-3					38		19	
11/8/92	RO 27V-4					42		19	
11/8/92	RO 27W-1					54		19	
11/8/92	RO 27W-2					38		19	
11/8/92	RO 27W-3					37		19	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
11/8/92		175		125		834		19	
11/8/92		175		125		895		19	
11/8/92	RO 27X-1					44		19	
11/8/92	RO 27X-2					35		19	
11/8/92	Rock Pile					61		19	
11/8/92		180		167		38	1-12	21	
11/8/92		180		167		32	12-24	21	
11/8/92		180		167		17	24-48	21	
11/8/92		180		167		9	48-72	21	
11/8/92		145		95		10	1-12	21	
11/8/92		145		95		30	12-24	21	
11/8/92		145		95		17	24-36	21	
11/8/92		145		95		22	48-72	21	
11/8/92		195		140		23	1-12	21	
11/8/92		195		140		19	12-24	21	
11/8/92		195		140		13	24-36	21	
11/8/92		195		140		46	48-72	21	
11/8/92		145		95		10	1-12	21	
11/8/92		145		95		30	12-24	21	
11/8/92		145		95		17	24-36	21	
11/8/92		145		95		22	48-72	21	
11/8/92		195		140		23	1-12	21	
11/8/92		195		140		19	12-24	21	
11/8/92		195		140		13	24-48	21	
11/8/92		195		140		46	48-72	21	
11/8/92		175		115		26	1-12	21	
11/8/92		175		115		31	12-24	21	
11/8/92		175		115		128	24-36	21	
11/8/92		175		115		28	36-48	21	
11/8/92		175		115		29	48-72	21	
11/8/92		190		120		18	1-12	21	
11/8/92		190		120		21	12-24	21	
11/8/92		190		120		15	24-48	21	
11/8/92		190		120		15	48-72	21	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
11/8/92		204		162		19	1¯12	21	
11/8/92		204		162		21	12¯24	21	
11/8/92		204		162		47	24¯36	21	
11/10/92	Catch base					94		21	
11/10/92	RO 27					49		21	Composites
11/10/92	RO 54					69		21	Composites
11/10/92	RO 35					53		21	Composites
11/10/92	RO 14					44		21	Composites
11/10/92	144 S Co					42		23	
11/10/92	143 SCo					26		23	
11/11/92	Parking lot					47		23	
11/11/92	Center	165		185		53		23	
11/11/92	ornerby parking l	160		180		17		23	
11/11/92	Right corner	190		190		46		23	
11/11/92	Corner #3	170		180		35		23	
11/11/92	Corner by Bldg	160		190		82		23	
11/11/92	Sand pile #1					9		23	
11/11/92	Sand pile #2					8		23	
11/11/92	M#1					19		23	
11/11/92	RO # Mud					31		23	
11/11/92	M#2					13		23	
11/11/92	Mud pile park lot					22		23	
11/11/92	SP#3					8		23	
11/11/92	M#3					16		23	
11/11/92	M#4					23		23	
11/11/92	M#5					31		23	
11/11/92	M#6					18		23	
11/11/92	M#7					21		23	
11/11/92	M2#1					17		23	
11/11/92	M2#2					35		23	
11/11/92	M2#3					20		23	
11/11/92	M2#4					27		23	
11/11/92	M2#5					27		25	
11/11/92	M3#1					17		25	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
11/11/92	M3#2					24		25	
11/11/92	M3#3					13		25	
11/11/92	M3#4					14		25	
11/11/92	M3#5					31		25	
11/11/92		170		120		76		25	
11/11/92		180		155		68		25	Wall
11/11/92		180		155		11		25	Floor
11/11/92		170		132		10		25	
11/11/92	M3#1A					20		25	
11/11/92	M3#2A					22		25	
11/11/92	M3#3A					21		25	
11/11/92	M3#4A					27		25	
11/11/92	M3#5A					20		25	
11/11/92	M1-2#1A					13		25	
11/11/92	M1-2#2A					17		25	
11/11/92	M1-2#3A					12		25	
11/11/92	M1-2#4A					31		25	
11/11/92	M1-2#5A					22		25	
11/11/92	M4#1					30		25	
11/11/92	M4#2					18		25	
11/11/92	M4#3					38		25	
11/11/92	M4#4					30		25	
11/11/92	M4#5					28		25	
11/11/92	M1-2#1B					12		25	
11/11/92	M1-2#2B					26		25	
11/11/92	M1-2#3B					20		25	
11/11/92	M1-2#4B					19		25	
11/11/92	M1-2#5B					29		25	
11/12/92	Rock pile Co					29		27	
11/12/92	MP1-2 CO					16		27	
11/12/92	BFP #1					28		27	
11/12/92	Top Soil	165		115		173		27	
11/12/92	M4A#1					22		27	
11/12/92	M4A#2					7		27	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
11/12/92	M4A#3					15		27	
11/12/92	M4A#4					8		27	
11/12/92	M4A#5					11		27	
11/12/92		165		115		65		27	Wall
11/12/92		165		115		121		27	Floor
11/12/92	MPS #1					13		27	Special rock pile
11/12/92	MPS #2					20		27	Special rock pile
11/12/92	MPS #3					23		27	Special rock pile
11/12/92	MPS #4					35		27	Special rock pile
11/12/92	MPS #5					25		27	Special rock pile
11/12/92	MPS #6					32		27	Special rock pile
11/12/92	MPS #7					29		27	Special rock pile
11/12/92	MPS #8					33		27	Special rock pile
11/12/92	MPS #9					19		27	Special rock pile
11/12/92	MPS #10					29		27	Special rock pile
11/12/92	MPS #1					14		27	
11/12/92	MPS #2					15		27	
11/12/92	MPS #3					16		27	
11/12/92	MPS #4					11		27	
11/12/92	MPS #5					19		27	
11/12/92	MP-4-S #1					11		29	
11/12/92	MP-4-S #2					15		29	
11/12/92	MP-4-S #3					17		29	
11/12/92	MP-4-S #4					9		29	
11/12/92	MP-4-S #5					19		29	
11/12/92	MP-4-S #6					13		29	
11/12/92	MP-4-S #7					24		29	
11/12/92	MP-4-S #8					3		29	
11/12/92	MP-4-S #9					12		29	
11/12/92	MP-4-S #10					19		29	
11/13/92	BFP S-1					34		29	
11/13/92	BFP S-2					23		29	
11/13/92	BFP S-3					30		29	
11/13/92	BFP S-4					31		29	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
11/13/92	BFP S-5					26		29	
11/13/92	BFP S-6					28		29	
11/13/92	BFP S-7					36		29	
11/13/92	BFP S-8					26		29	
11/13/92	BFP S-9					36		29	
11/13/92	BFP S-10					29		29	
11/13/92	MP-5-S #1					16		29	
11/13/92	MP-5-S #2					9		29	
11/13/92	MP-5-S #3					10		29	
11/13/92	MP-5-S #4					15		29	
11/13/92	MP-5-S #5					22		29	
11/13/92	MP-5-S #6					16		29	
11/13/92	MP-5-S #7					18		29	
11/13/92	MP-5-S #8					14		29	
11/13/92	MP-5-S #9					26		29	
11/13/92	MP-5-S #10					13		29	
11/13/92	MP-6-1					15		31	
11/13/92	MP-6-2					24		31	
11/13/92	MP-6-3					25		31	
11/13/92	MP-6-4					6		31	
11/13/92	MP-6-5					21		31	
11/13/92	Inside 1					33		31	
11/13/92	1st Top Soil					27		31	
11/13/92	1 2nd					26		31	
11/13/92	1st Top Soil					15		31	
11/13/92	1 2nd					32		31	
11/13/92	Inside 1					33		31	
11/13/92	1st 2					19		31	
11/13/92	1st 2					25		31	
11/13/92	2nd 3					28		31	
11/13/92	2nd 3					36		31	
11/13/92	1st 3					37		31	
11/13/92	1st 3					38		31	
11/13/92	2nd 2 16/15					36		31	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
11/13/92	2nd 2 16/15					40		31	
11/13/92	3-5 2 Inside					33		31	Inside
11/13/92	3-5 2 Inside					25		31	Inside
11/13/92	13/15 58					65		31	
11/13/92	13/15 58					49		31	
11/13/92	MP-7-1					25		31	
11/13/92	MP-7-2					24		31	
11/13/92	MP-7-3					17		31	
11/13/92	MP-7-4					25		31	
11/13/92	MP-7-5					27		33	
11/13/92	MP-8-1					18		33	
11/13/92	MP-8-2					14		33	
11/13/92	MP-8-3					32		33	
11/13/92	MP-8-4					26		33	
11/13/92	MP-8-5					20		33	
11/13/92	MP-8-A-1					15		33	
11/13/92	MP-8-A-2					16		33	
11/13/92	MP-8-A-3					22		33	
11/13/92	MP-8-A-4					8		33	
11/13/92	MP-8-A-5					23		33	
11/14/92	MP-9-1					23		33	
11/14/92	MP-9-2					11		33	
11/14/92	MP-9-3					10		33	
11/14/92	MP-9-4					11		33	
11/14/92	MP-9-5					5		33	
11/14/92	SP					7		33	Parking Lot
11/14/92	MP-1-2-1					18		33	Composite
11/14/92	MP-1-2-2					25		33	Composite
11/14/92	MP-1-2-3					11		33	Composite
11/14/92	MP-1-2-4					17		33	Composite
11/14/92	MP-1-2-5					9		33	Composite
11/14/92	MP-1-2-6					33		33	Composite
11/14/92	MP-1-2-7					62		33	Composite
11/14/92	MP-1-2-8					19		33	Composite

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
11/14/92	MP-1-2-9					16		33	Composite
11/14/92	MP-1-2-10					24		33	Composite
11/14/92		165		112		34		33	
11/14/92		175		115		140		35	
11/14/92		170		115		22		35	
11/14/92	RS 410					78		35	
11/14/92	RS 411					69		35	
11/14/92	RS 412					68		35	
11/14/92	RS 413					102		35	
11/14/92	RS 414					97		35	
11/14/92	RS 415					76		35	
11/14/92	RS 416					225		35	
11/14/92	RS 417					119		35	
11/14/92	RS 418					148		35	
11/14/92	RS 419					165		35	
11/14/92	RS 420					123		35	
11/14/92	RS 421					126		35	
11/14/92	RS 422					108		35	
11/14/92		160		190		49		35	
11/14/92		165		185		30		35	
11/14/92		170		180		22		35	
11/14/92		160		180		33		35	
11/14/92		175		110		104		35	Wall Composite
11/14/92		160		190		23		35	
11/16/92	RS 410-411 1					75		35	
11/16/92	RS 410-411 2					76		35	
11/16/92	RS 410-411 3					83		35	
11/16/92	RS 410-411 4					85		35	
11/16/92	RS 410-411 5					82		35	
11/16/92	RS 410-411 6					60		35	
11/16/92	RS 410-411 7					65		35	
11/16/92	RS 410-411 8					62		35	
11/16/92	RS 410-411 9					83		35	
11/16/92	RS 410-411 10					82		35	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
11/16/92	165N-182E-1	165		182		42		37	
11/16/92	165N-182E-2	165		182		33		37	
11/16/92	165N-182E-3	165		182		40		37	
11/16/92	165N-182E-4	165		182		34		37	
11/16/92	165N-182E-5	165		182		35		37	
11/16/92	165N-182E-6	165		182		22		37	
11/16/92	165N-182E-7	165		182		37		37	
11/16/92	165N-182E-8	165		182		40		37	
11/16/92	165N-182E-9	165		182		44		37	
11/16/92	165N-182E-10	165		182		35		37	
11/16/92	D-Special 2					3694		37	
11/16/92	D-Special 3					442		37	
11/16/92	RO #152-2-3					12687		37	
11/16/92	MP-1-2-1					18		39	
11/16/92	MP-1-2-2					22		39	
11/16/92	MP-1-2-3					14		39	
11/16/92	MP-1-2-4					18		39	
11/16/92	MP-1-2-5					19		39	
11/16/92	MP-1-2-6					24		39	
11/16/92	RS-414-1					89		39	
11/16/92	RS-414-2					81		39	
11/16/92	RS-414-3					90		39	
11/16/92	RS-414-4					80		39	
11/16/92	RS-414-5					80		39	
11/16/92	RS-414-6					87		39	
11/16/92	134N-118E-5	134		118		83		39	
11/16/92	138N-113E-1	134		118		10		39	
11/16/92	138N-113E-2	134		118		14		39	
11/16/92	138N-113E-3	134		118		12		39	
11/16/92	138N-113E-4	134		118		13		39	
11/16/92	138N-113E-5	138		118		15		39	
11/16/92	138N-113E-1	138		113		24		39	
11/16/92	138N-113E-2	138		113		20		39	
11/16/92	138N-113E-3	138		113		23		39	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
11/16/92	138N-113E-4	138		113		21		39	
11/16/92	138N-113E-5	138		113		19		39	
11/16/92	235-156E-1	138		113		22		39	
11/16/92	235-156E-2	138		113		17		39	
11/16/92	235-156E-3	138		113		20		39	
11/16/92	235-156E-4	138		113		17		39	
11/16/92	235-156E-5	235		156		19		39	
11/17/92	RS-423					77		41	
11/17/92	RS-424					93		41	
11/17/92	RS-425					177		41	
11/18/92	RS-426					61		41	
11/18/92	RS-427					52		41	
11/18/92	RS-428					53		41	
11/18/92	RS-429					85		41	
11/18/92	RS-430					51		41	
11/19/92	Pile 1	210		140		32		41	
11/19/92	Pile 2	190		180		26		41	
11/19/92	Pile 1 AA	210		140		11		41	
11/19/92	Pile 2 AA	190		180		17		41	
11/30/92	RO-27					29		41	
12/1/92	Lot Sample					30		41	Sample from parking lot
12/1/92	NE					31		41	Corner of parking lot
12/1/92	SE					42		41	Corner of parking lot
12/1/92	NW					12		41	Corner of parking lot
12/1/92	SW					279		41	Corner of parking lot
12/1/92	Vacume Truck					76		41	12/1/92
12/1/92	Vacume Filter					47		41	Poor Geometry
12/14/92	RO-915					11		41	
12/14/92	CC915					14		41	Day 4
12/15/92		175		115		605		43	Wall
12/15/92		175		115		859		43	Wall
12/15/92		150		139		140		43	Corner Pocket
12/15/92		167		141		23		43	
12/15/92		171		140		26		43	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
12/15/92	BFP #1 SW					53		43	Tiasss005A-0-15 split
12/15/92	BFP #1 NE					18		43	Tiasss006A-0-15 split
12/15/92		220		155		10		43	Tiasss003A-0-15 split
12/15/92		210		145		9		43	Tiasss002A-0-15 split
12/15/92		230		155		43		43	Tiasss004A-0-15 split
12/15/92		220		140		38		43	Tiasss001A-0-15 split
12/15/92		188		146		97		43	
12/15/92		191		132		51		43	
12/15/92		192		132		180		43	
12/15/92		150		139		29		43	Composite
12/15/92		150		139		10		43	Stratified layer corner poc
12/15/92	BFP A					57		43	
12/15/92	BFP B					53		43	
12/15/92	BFP C					30		43	
12/15/92	BFP D					26		43	
12/15/92	BFP E					29		43	
12/15/92	BFP F					25		43	
12/15/92	BFP G					49		43	
12/15/92	BFP H					32		43	
12/16/92		179		145		12		47	42k Hot Spot - Piece of M
12/16/92		142		120		7		47	
12/16/92		147		120		17		47	
12/16/92		189		146		65		47	
12/16/92		195		132		72		47	After Scrapping
12/16/92		185		160		60		47	
12/16/92		160		130		29		47	
12/16/92		160		135		74		47	
12/16/92		180		130		14		47	
12/16/92		185		125		132		47	
12/16/92		195		127		20		47	
12/17/92	BFP-1					231		47	
12/17/92	BFP-2					104		47	
12/17/92	BFP-3					50		47	
12/17/92	BFP-4					61		47	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
12/17/92	BFP-5					34		47	
12/17/92	BFP-6					66		47	
12/17/92	BFP-7					33		47	
12/19/92		200		125		12	0¯24	49	
12/19/92		206		130		14	0¯24	49	
12/19/92		206		130		24	24¯48	49	
12/19/92		200		125		10	24¯48	49	
12/19/92		200		125		11	48¯72	49	Refusal
12/19/92		206		130		10	48¯72	49	
12/19/92		200		140		14	24¯48	49	
12/19/92		200		135		15	0¯24	49	
12/19/92		200		135		14	48¯72	49	
12/19/92		200		135		9		49	
12/19/92		180		115		12		49	Floor
12/19/92		182		119		49		49	Wall
12/19/92		180		115		23		49	Wall
12/19/92		180		115		56		49	Pile
12/19/92		140		200		29	0¯24	49	
12/19/92		140		200		8	48¯72	49	
12/19/92		145		200		12	0¯24	49	
12/19/92		184		128		68		49	Floor
12/19/92		200		145		15	24¯48	49	
12/19/92		200		145		5	48¯72	49	
12/19/92		184		128		14		49	Floor Re-Sample
12/19/92		205		145		16	24¯48	49	
12/19/92		205		145		9	48¯72	49	
12/19/92		215		150		47	0¯24	49	
12/19/92		215		150		60	24¯48	49	
12/19/92		188		125		25		49	Floor
12/19/92		215		150		31	48¯72	49	
12/19/92		210		165		11	0¯24	49	
12/19/92		210		165		21	24¯48	49	
12/19/92		210		165		13	48¯72	49	
12/19/92		205		153		8	0¯24	49	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
12/19/92		205		153		12	24-48	49	
12/19/92		205		153		23	48-72	49	
12/19/92		205		145		21	0-24	49	
12/19/92		170		115		30		51	
12/19/92		175		148		26		51	
12/19/92		195		135		25	0-24	51	PIT
12/19/92		195		135		11	0-36	51	PIT
12/19/92		195		145		17		51	
12/19/92		175		185		18	0-24	51	
12/19/92		175		185		21	24-48	51	
12/19/92		175		185		10	48-72	51	
12/19/92						5		51	BLACK LAYER
12/19/92		190		174		32	0-24	51	
12/19/92		190		174		5	24-48	51	
12/19/92		190		174		8	48-72	51	
12/19/92		BFP		99		30		51	
12/19/92		175		163		9	0-24	51	
12/19/92		175		163		5	24-48	51	
12/19/92		175		163		8	48-72	51	
12/19/92		175		165		17	0-24	51	
12/19/92		175		165		4	24-48	51	
12/19/92		175		165		16	48-72	51	
12/19/92		180		175		13	0-24	51	
12/19/92		180		175		10	24-48	51	
12/19/92		180		175		5	48-72	51	
12/20/92		175		168		13	0-24	51	
12/20/92		175		168		15	24-48	51	
12/20/92		175		168		37	48-72	51	
12/20/92		165		98		33	36	53	TEST PIT
12/20/92		165		98		28	48	53	TEST PIT
12/20/92		145		135		18	48-72	53	
12/20/92		145		135		33	1-24	53	
12/20/92		145		135		23	24-48	53	
12/20/92		205		150		48	1-24	53	

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
12/20/92		205		150		37	24-48	53	
12/20/92		205		150		12	48-72	53	
12/20/92		155		145		9	1-24	53	
12/20/92		155		145		18	24-48	53	
12/20/92		155		145		13	48-62	53	
12/20/92		165		105		321	WELL	53	WELL
12/20/92		175		175		7	1-24	53	
12/20/92		175		175		5	24-48	53	
12/20/92		175		175		9	48-72	53	
12/20/92		185		162.5		7	1-24	53	
12/20/92		185		162.5		5	24-48	53	
12/20/92		185		162.5		11	48-72	53	
12/20/92		160	170	105		709	48	53	
12/20/92		140		125		29	1-24	53	
12/20/92		140		125		20	24-48	53	
12/20/92		140		125		18	48-72	53	
12/20/92		140		103		17	1-24	53	
12/20/92		140		103		13	24-48	53	
12/20/92		140		103		16	48-72	53	
12/20/92		160		105		222		55	PARKING LOT WALL
12/20/92		175		105		17		55	SIDE WALK WALL
12/20/92		150		103		42	1-24	55	
12/20/92		150		103		12	24-48	55	
12/20/92		150		103		8	48-72	55	
12/20/92		155		95		93	1-24	55	
12/20/92		155		95		20	24-48	55	
12/20/92		155		95		10	48-72	55	
12/20/92		160		95		25	1-24	55	
12/20/92		160		95		17	24-48	55	
12/20/92		160		95		19	48-52	55	REFUSAL
12/20/92		178		98		19	1-24	55	REFUSAL OK'ED (SOME INIT
12/20/92		178		98		7	24-48	55	
12/20/92		135		115		17	1-24	55	
12/21/92		130		110		13	1-24	55	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
12/21/92		130		110		18	24-48	55	
12/21/92		130		110		10	48-72	55	
12/21/92		135		115		18	24-48	55	REFUSAL
12/21/92		135		115		15	48-72	55	
12/21/92		170		110		97		55	
12/21/92		170		105		182		55	
12/21/92		170		105		36	1-36	57	
12/21/92		170		105		30	72	57	
12/21/92	RO 14 MIX					22		57	
12/21/92	RO 62 SHIP					54		57	
12/21/92	RO 179 MIX					39		57	
12/21/92	RO 145 SHIP					198		57	
12/21/92	RO 117 MIX					14		57	
12/21/92	RO 14 Co					26		57	
12/21/92	RO 62 Co					76		57	
12/21/92	RO 179 Co					24		57	
12/21/92	RO 145 Co					87		57	
12/21/92	RO 117 Co					48		57	
12/21/92	Parking lot Co					176		57	
12/21/92	Wall	165	170	105		27		57	Wall
12/22/92		160				35		57	Above water line
12/22/92		170		100		892		57	
12/22/92		170		100		52		57	Floor
12/22/92		170		100		17	48	57	Close to pit 4ft.
12/22/92		170		100		199		57	3ft. Wall toward pit
12/22/92		175		100		27		57	Floor east side of water li
12/22/92		175		100		18		57	Wall 1' 6"
12/22/92		175		100		42		57	Floor
12/22/92		160		100		22		57	Composite
12/22/92		155		100		38		57	Middle of trench 3-4 ft
12/22/92						17		57	21' 6" away from pit wa
12/22/92						15		57	Close to pit wall
12/22/92						32	12	57	Break in asphalt 1ft. (PILI
12/22/92		160		97		163	12	57	Break in asphalt 1ft.

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comm
		meters				counts/10min	Inches		
12/22/92		145		97		36	12	57	Break in as
12/22/92		165		97		16		57	Break in as
12/22/92		190		95		22		58	Composite(put in
12/22/92		150		95		34		58	Pile (put in pile a
12/22/92						31		58	Reedscreen (pile
12/22/92		160		108		27	~waterleve	58	0- Wat
12/22/92		165		95		32	24	58	2
12/22/92		155		105		19		58	Readsc
12/22/92		165		93		17		58	Break in end
12/22/92		165		93		10		58	4f
12/22/92						36		58	Readsc
12/22/92		165		95		26		58	4f
12/23/92						8		58	Sand pile (F
12/23/92						38		58	
12/23/92		165		100		74		58	Close t
12/23/92		165		95		38		58	Away fr
12/23/92		175		90		48		58	Floc
12/23/92		165		100		49		58	Wa
12/23/92		165		102		24		58	2-4ft
12/23/92						14		58	
12/23/92		170		100		62		58	East
12/23/92						19		58	
12/23/92		155		100		42		58	Wall 0
12/23/92		155		100		24		58	Wall 2
12/23/92		155		100		67		58	Gray hot
12/23/92						10		58	Composite
12/23/92		170		100		64		58	Wall 0
12/23/92		170		100		16		58	Floo
12/23/92		165		95		34		58	Wal
12/23/92		160		98		36		58	0-2ft V
12/23/92		160		98		28		58	2-4ft V
12/23/92		160		105		24		58	Wal
12/24/92						17		58	
12/24/92						9		58	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
12/28/92	RO#145 Comp					78		59	
12/28/92	RO#145 A					75		59	
12/28/92	RO#145 B					87		59	
12/28/92	RO#145 C					38		59	
12/28/92	RO#145 D					60		59	
12/28/92	RO#145 E					226		59	
12/28/92	RO#145 F					105		59	
12/28/92	RO#145 G					67		59	
12/28/92	MP#6					19		59	Parking lot
12/28/92	MP#7					20		59	
12/28/92	RO#145 Comp					206		59	
12/29/92		160		95		23	0-24	59	
12/29/92		160		95		65	24-48	59	
12/29/92		160		95		29	48-72	59	
12/29/92		170		90		50	0-24	59	
12/29/92		170		90		23	24-48	59	
12/29/92		170		90		18	48-72	59	
12/29/92		160		90		30	0-24	59	
12/29/92		160		90		18	24-48	59	
12/29/92		160		90		9	48-72	59	
12/29/92		172.5		85		12	0-24	59	
12/29/92		172.5		85		13	24-48	59	
12/29/92		172.5		85		15	48-72	59	
12/29/92		175		90		16	0-24	59	
12/29/92		175		90		13	24-48	59	*CONTINUED ON PAGE 1
12/29/92		180		100		20	1-24	127	
12/29/92		180		100		22	24-48	127	
12/29/92		180		100		21	48-72	127	
12/29/92		145		97		67	1-24	127	
12/29/92		145		97		49	24-48	127	
12/29/92		145		97		34	48-72	127	
12/29/92		151		95		69	1-24	127	
12/29/92		151		95		22	24-48	127	
12/29/92		151		95		21	48-72	127	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
12/29/92	MSP #8					25		127	
12/29/92		165		85		15	1-24	127	
12/29/92		165		85		18	24-48	127	
12/29/92		165		85		25	48-72	127	
12/30/92		150		90		8	1-24	127	
12/30/92		150		90		8	24-48	127	
12/30/92	Refusal	150		90				127	Refusal
12/30/92		210		150		34	1-24	127	
12/30/92		210		150		25	24-48	127	
12/30/92		210		150		24	48-72	127	
12/30/92	MSP #9					71		127	
12/30/92		200		150		50	1-24	127	
12/30/92		200		150		67	24-48	127	
12/30/92		200		150		8	48-72	127	
12/30/92	MSP #10					30		127	
12/30/92	MSP #11					24		127	
12/30/92	MSP #12					20		127	
12/30/92	MSP #13					25		127	
12/31/92	MSP					15		129	
12/31/92	FLOOR	170		95		21		129	
12/31/92	FLOOR	165		95		31		129	
12/31/92	FLOOR	155		95		37		129	
12/31/92	BURM	165	155	105		24		129	
12/31/92	FLOOR	145		100		78		129	
12/31/92	FLOOR	150		95		85		129	
1/3/93	Behind Bld 12	210		160		10		129	
1/3/93	Blg 10 west side					37		129	
1/3/93	Bld 12 east side					13		129	
1/4/93	SA					8		128	
1/4/93	SA					7		128	
1/4/93	SA					8		128	
1/4/93	layer 1					10		129	BFP 99
1/4/93	layer 2					53		129	
1/4/93	WP					71		129	BFP 99

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
1/4/93	layer					35		129	BFP
1/4/93	layer					766		129	BFP 99
1/4/93						67		129	Close to pit
1/4/93	layer					56		129	BFP 99
1/4/93	SP#15					18		129	Mixed
1/4/93						28		129	Airline
1/4/93	MSP					22		129	
1/4/93						124		129	Pile in parking lot. black l
1/4/93						69		129	Pile in parking lot
1/4/93	MS#16					25		129	
1/4/93	SP					81		129	
1/5/93	MSP#17					22		129	
1/6/93	MSP #23					41		124	
1/6/93	MSP #24					30		124	
1/6/93	MSP #25					12		124	
1/6/93	MSP #26					8		124	
1/6/93	MSP #27					5		124	
1/6/93	MSP #28					18		124	
1/6/93	MSP #29					23		124	
1/6/93	SA					7		128	
1/6/93	MSP#18					23		129	
1/6/93	MSP#19					34		129	
1/6/93	MSP#20					32		129	
1/6/93	MSP#21					37		129	
1/7/93	MSP					10		124	
1/7/93	MSP					162		124	
1/7/93	RO #14 Co					160		124	
1/7/93	RO #14-1					174		124	
1/7/93	RO #14-2					148		124	
1/7/93	RO #14-3					16		124	
1/7/93	MSP					17		124	
1/7/93	MSP					196		124	
1/7/93	RO #179 Co					156		124	
1/7/93	RO #179-1					173		124	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
1/7/93	RO #179-2					131		124	
1/7/93	RO #179-3					180		124	
1/7/93	RO #117 Co					179		124	
1/7/93	RO #117-1					209		124	
1/7/93	RO #117-2					189		124	
1/7/93	RO #117-3					40		124	
1/7/93	MSP					29		124	
1/7/93	MSP					20		124	
1/7/93	MSP					12		124	
1/7/93	MSP					21		124	
1/7/93	MSP					20		124	
1/7/93	SA					7		128	
1/7/93	SA					8		128	
1/8/93	MS					19		3	Page 3 continued from page
1/8/93	MS					24		3	
1/8/93	MS					23		3	
1/8/93	MS					12		3	
1/8/93	MS					13		3	
1/8/93	MS					33		3	
1/8/93	MS					8		3	
1/8/93	MS					30		3	
1/8/93	MS					25		3	
1/8/93	MS					19		3	
1/8/93	MS					13		3	
1/8/93	MS					11		3	
1/8/93	MS					12		3	
1/8/93	MS					9		3	
1/8/93	SA					8		3	
1/8/93	SA					7		3	
1/9/93	MS					24		3	
1/9/93	MS					18		3	
1/9/93	MS					8		3	
1/9/93	MS					21		3	
1/9/93	MS					19		3	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
1/9/93	MS					12		3	
1/9/93	MS					26		3	
1/9/93	MS					21		3	
1/9/93	MS					41		3	
1/9/93	MS					26		3	
1/9/93	MS					16		3	
1/9/93	MS					25		3	
1/10/93	MS					22		3	
1/10/93	MS					19		3	
1/10/93	MS					17		3	
1/10/93	MS					15		3	
1/10/93	MS					24		3	
1/10/93	MS					10		3	
1/10/93	MS					15		4	
1/10/93	MS					16		4	
1/10/93	MS					35		4	
1/10/93	MS					23		4	
1/10/93	MS					24		4	
1/10/93	MS					13		4	
1/10/93	MS					23		4	
1/10/93	MS					11		4	
1/10/93	MS					17		4	
1/10/93	MS					18		4	
1/10/93	MS					20		4	
1/10/93	MS					8		4	
1/10/93	MS					10		4	
1/10/93	MS					13		4	
1/10/93	MS					14		4	
1/10/93	MS					8		4	
1/10/93	MS					22		4	
1/10/93	MS					16		4	
1/10/93	MS					32		4	
1/10/93	MS					11		4	
1/10/93	MS					16		4	

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
1/10/93	MS					7		4	
1/11/93	RO117Co					64		5	Location CR587472
1/11/93	RO117A1					50		5	Location CR587472
1/11/93	RO117A2					68		5	Location CR587472
1/11/93	RO117A3					45		5	Location CR587472
1/11/93	RO179Co					58		5	Location CR587315
1/11/93	RO179A1					60		5	Location CR587315
1/11/93	RO179A2					71		5	Location CR587315
1/11/93	RO179A3					60		5	Location CR587315
1/11/93	RO145Co					60		5	Location CR587472
1/11/93	RO145A1					50		5	Location CR587472
1/11/93	RO145A2					74		5	Location CR587472
1/11/93	RO145A3					41		5	Location CR587472
1/11/93	RO 14Co					42		5	Location CR587315
1/11/93	RO 14A1					56		5	Location CR587315
1/11/93	RO 14A2					69		5	Location CR587315
1/11/93	RO 14A3					54		5	Location CR587315
1/11/93	RO 62Co					833		5	
1/11/93	Pile Grou					56		5	
1/13/93	RO 62-1					329		5	
1/13/93	RO 62-2					510		5	
1/13/93	RO 62-3					722		5	
1/15/93	SA					9		5	
1/15/93	RO 14CC-1					57		7	
1/15/93	RO 14 CC-2					66		7	
1/15/93	RO 14CC-3					57		7	
1/15/93	RO 14CC-4					50		7	
1/15/93	RO 14CC-5					39		7	
1/15/93	RO 27T-1					26		7	
1/15/93	RO 27T-2					36		7	
1/15/93	RO 27T-3					33		7	
1/15/93	RO 27T-4					32		7	
1/15/93	RO 27T-5					23		7	
1/15/93	RO 14EE-1					35		7	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
1/15/93	RO 14EE-2					142		7	
1/15/93	RO 14FF-1					40		9	
1/15/93	RO 14FF-2					17		9	
1/15/93	RO 14FF-3					47		9	
1/15/93	RO 14FF-4					34		9	
1/15/93	RO 14FF-5					31		9	
1/15/93	Pile scrap1					66		9	
1/15/93	Pile scrap2					58		9	
1/15/93	Pile scrap3					18		9	
1/15/93	Pile scrap4					43		9	
1/15/93	Pile scrap5					43		9	
1/15/93	RO 27U-1					35		9	
1/15/93	RO 27U-2					17		9	
1/15/93	RO 27U-3					41		9	
1/15/93	RO 27U-4					20		9	
1/15/93	RO 27U-5					26		9	
1/15/93	RO 27U-6					16		9	
1/15/93	RO 14GG-1					17		9	
1/15/93	RO 14GG-2					25		9	
1/15/93	RO 14GG-3					15		9	
1/15/93	Rock pile front	210		170		66		9	
1/16/93	MSP#22					22		129	see page 124
1/18/93	Parklot Co					70		5	
2/6/93		170		190		6		45	
2/6/93		155		115		21		45	
2/6/93		160		135		77		45	
2/6/93		165		125		14		45	
2/6/93		185		125		49		45	
2/6/93		160		130		89		45	
2/6/93		180		130		51		45	
2/6/93		200		165		39		45	
2/6/93		180		115		97		45	e-Sample of Wall Post Diag of
2/6/93		172		111		46		45	e-Sample of Wall Post Diag of
2/6/93		165		110		97		45	e-Sample of Wall Post Diag of

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	inches		
2/6/93		191		123		14		45	resample 20k spot after c
2/6/93		185		150		7(12)		45	
2/6/93		185		150		28(16)		45	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	⌞C 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
1/21/93	PILE #1					41		11	Parking Lot Sweep, BKG = 4 c/10mi
1/21/93	SAMPLE #1								Composite
1/21/93	SAMPLE #2					21		11	Composite
1/21/93	SAMPLE #3					21		11	Composite
									BKG = 4 c/10min
1/21/93	BFP#1					40		13	
1/21/93	BFP#2					29		13	
1/21/93	BFP#3					21		13	
1/21/93	BFP#4					36		13	
1/21/93	BFP#5					35		13	
1/21/93	BFP#6					54		13	
1/21/93	BFP#7					26		13	
1/21/93	BFP#8					45		13	
1/21/93	BFP#9					58		13	
1/21/93	BFP#10					29		13	
1/21/93	BFP#11					65		13	
1/21/93	BFP#12					46		13	
1/21/93	BFP#13					37		13	
1/21/93	BFP#14					38		13	
1/21/93	BFP#15					40		13	
						Gross			BKG = 2 c/10min
1/21/93	RP#1					32		13	
1/21/93	RP#2					20		13	
1/21/93	RP#3					29		13	
1/21/93	RP#4					34		13	
1/21/93	RP#5					52		13	
1/21/93	RP#6					28		13	
1/21/93	RP#7					54		13	
1/21/93	RP#8					43		13	
1/21/93	RP#9					24		13	
1/21/93	RP#10					45		13	
1/21/93	RP#11					23		13	
1/21/93	RP#12					28		13	
						Gross			BKG = 4 c/10min

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
1/21/93	RP#13					11		13	
1/21/93	RP#14					18		13	
1/21/93	RP#15					35		13	
1/21/93	RP#16					31		13	
1/21/93	RP#17					26		13	
1/21/93	RP#18					26		13	
1/21/93	RP#19					17		13	
1/21/93	RP#20					13		13	
1/30/93		175		130		59		14	
1/30/93		175		135		37		14	
1/30/93		170		110		128		14	
1/30/93		170		115		72		14	
						Gross			Count @ Office BKG = 4 c/10min
1/31/93		175		135		20		14	
1/31/93		178		115		78		14	
1/31/93		170		110		122		14	
1/31/93		175		130		80		14	
1/31/93		180		130		36		14	
1/31/93		170		125		84		14	
1/31/93		170		130		103		14	
1/31/93		180		125		30		14	
1/31/93		150		115		22		14	
1/31/93		195		132		108		14	
1/31/93		175		1[illegible]0		112		14	
						Gross			BKG = 4 c/10min
1/31/93		170		120		66		14	
1/31/93		180		120		26		14	
1/31/93		165		135		53		14	
1/31/93		175		115		46		14	
1/31/93		185		115		61		14	
1/31/93		165		115		94		14	
1/31/93		175		125		66		14	
1/31/93		175		120		105		14	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Commen
		meters				counts/10min	Inches		
1/31/93		155		140		35		14	
1/31/93		160		110		51		14	
1/31/93		155		135		41		14	
1/31/93		155		130		62		14	
1/31/93		160		135		110		14	
1/31/93		160		130		76		14	
1/31/93		160		115		71		14	
1/31/93		185		140		15		14	
						Gross			BKG = 4 c/
1/31/93		160		140		9		15	
1/31/93		180		150		37		15	
1/31/93		180		155		48		15	
1/31/93		190		150		29		15	
1/31/93		185		150		22		15	
1/31/93		190		155		80		15	
1/31/93		185		145		37		15	
1/31/93		185		155		46		15	
1/31/93		155		115		14		15	
1/31/93		180		145		27		15	
1/31/93		195		160		26		15	
1/31/93		195		150		34		15	
1/31/93		155		120		35		15	
1/31/93		155		120		26		15	Composite of 1
1/31/93		150		130		32		15	
						Gross			BKG = 4 c/1
1/31/93		195		155		68		15	
1/31/93		150		120		15		15	
1/31/93		150		140		58		15	
1/31/93		155		125		23		15	
1/31/93		150		125		34		15	
						Gross			BKG = 2 c/
1/31/93		160		120		22		15	
1/31/93		185		135		32		15	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	inches		
1/31/93		170		135		34		15	
1/31/93		145		115		111		15	
1/31/93		185		130		284		15	
1/31/93		180		135		63		15	
1/31/93		150		135		42		15	
1/31/93		170		140		37		15	
1/31/93		160		125		17		15	
1/31/93		165		130		104		15	
1/31/93		165		130		42		15	
1/31/93		165		125		26		15	%% Check Page 16 Wh
						Gross			BKG = 5 c/10mi
1/31/93		185		125		33		16	
1/31/93		185		125		33		16	
1/31/93		185		125		26		16	
1/31/93		185		125		13		16	
1/31/93		185		125		16		16	
1/31/93		180		130		90		16	
1/31/93		180		130		55		16	
1/31/93		180		130		41		16	
1/31/93		180		130		18		16	
1/31/93		180		130		20		16	
						Gross			BKG = 5 c/10 mi
1/31/93		180		125		510	0-12	17	Sediment
1/31/93		180		125		2525	12-24	17	
1/31/93		180		125		48	24-36	17	
1/31/93		180		125		24	36-48	17	
1/31/93		180		125		20	48-60	17	
1/31/93		175		120		132	0-12	17	Sediment
1/31/93		175		120		38	12-18	[illegible]	Top 1/3
1/31/93		175		120		29	18-24	[illegible]	Mid 1/3
1/31/93		175		120		26	24-3	17	Bottom 1/3
						Gross			BKG = 5 c/10min
1/31/93		165		110		146		17	Sediment
1/31/93		165		110		34	Top 2"	17	

GROSS ALPHA SCREENING DATA

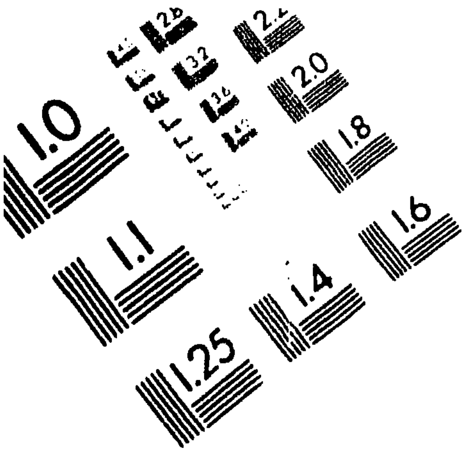
Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
1/31/93		165		110		31	Mid 2"	17	
1/31/93		165		110		16	Bot 2"	17	
1/31/93		160		110		94		17	Sediment
1/31/93		160		130		68	Top 3"	17	
1/31/93		160		130		25	Bot 3"	17	
						Gross			BKG = 5 c/10r
3/21/92		106		257		83	0"24	18	Building 12
3/21/92		106		257		154	24"48	18	Building 12
3/21/92		106		257		12	48"72	18	Building 12
3/21/92		106		256		46	0"24	18	Building 12
3/21/92		100		250		21		18	Building 12
3/21/92		100		260		41		18	Building 12
3/21/92		110		250		21		18	Building 12
3/21/92		110		260		34		18	Building 12
3/21/92		105		255		33		18	Building 12
						Gross			BKG = 5 c/10r
3/21/92		2.5		83		18	0"24	18	Building 10
3/21/92		2.5		83		24	24"48	18	Building 10
3/21/92		2.5		83		21	12" Wall	18	Building 10
3/21/92		-2		83		22	0"24	18	Building 10
						Gross			BKG = 5 c/10r
5/25/93		172		132		106		19	After Scrapin
5/25/93		173		133		28		19	
5/26/93		185		128		31		19	
5/26/93		185		128		72		19	Surface
5/26/93		160		133		119		19	Bottom - very v
5/26/93		160		133		52		19	Middle
5/26/93		160		133		86		19	. Top
5/26/93		185		130		73		19	Surface
5/26/93		158		133		27		19	Sediment
5/26/93		158		133		76		19	Surface - very we
5/26/93		181		133		66		19	Surface
5/26/93		181		133		70	1	19	
5/26/93		181		127		127		19	Surface

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
5/26/93		181		127		31	2	19	
5/26/93		185		130		18	1	19	Mismatched Lal
5/26/93		160		130		71		19	Surface
5/26/93		160		130		13	6	19	
5/26/93		164		134		101		19	Surface
5/26/93		164		134		72	6	19	
5/26/93		178		117		127		19	Hole
5/26/93		179		118		128		19	Hole
5/26/93		176		133		95		19	Surface
5/26/93		176		133		21	6	19	
5/26/93		180		125		167		19	Surface
5/26/93		180		125		29	3	19	
						Gross			BKG = 5 c/10n
5/26/93		165		127		102		19	Surface
5/26/93		165		127		74	3	19	
5/26/93		165		127		126	6+	19	
5/26/93		153		137		56		19	Surface
5/26/93		153		137		60	3	19	
5/26/93		157		133		63		19	Surface
5/26/93		157		133		36	6	19	
5/26/93		169		130		62		19	Surface
5/26/93		169		130		28	3	19	
5/26/93		169		130		21	6	19	
5/26/93		169		130		24	12	19	
5/26/93		174		120		128		19	Sludge
5/26/93		174		120		85		19	der Sludge - May be surface
						Gross			BKG = 6 c/10n
5/27/93		189		157		97		19	
5/27/93		185		157		80		19	
5/27/93		169		130		15		19	Bottom - Test Hole at end
5/27/93		169		130		52		19	Middle - Test Hole at end
5/27/93		169		130		858		19	Top - Test Hole at end o
5/27/93		169		130		26		19	Bottom - Test Hole at end
5/27/93		166		127		104		19	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
5/27/93		162		127		157	6	19	
5/27/93		169		130		86	Top 3	19	
5/27/93		169		130		45	3-6	19	
5/27/93		169		130		29	12	19	
						Gross			BKG = 5 c/10min Am-241 QC = 40805
5/27/93		160		125		68		20	Top
5/27/93		160		124		29		20	Under Sludge
5/27/93		156		130		92		20	Under Sludge
5/27/93		170		115		140		20	Staged Sludge
5/29/93		167		135		53		20	Surface
5/29/93		167		135		29	6	20	
5/29/93		167		135		13	12	20	
5/29/93		160		132		442	8 Down	20	
5/29/93		160		132		38	18	20	
5/29/93		153		140		37	Top 3	20	
5/29/93		153		140		32		20	Bottom
5/29/93		155		135		92	4 Down	20	
5/29/93		165		135		63	18 Down	20	
						Gross			BKG = 5 c/10min
5/29/93		153		135		32	4 Down	20	
5/29/93		154		133		133	4 Down	20	
5/29/93		185		130		104	3	20	
5/29/93		185		130		32	9	20	
5/29/93		183		132		76		20	Surface
5/29/93		183		132		83	2	20	
						Gross			BKG = 8 c/10min Am-241 QC 41526 c/
6/1/93		185		125		33	3	21	
6/1/93		185		125		25		21	Split
6/1/93		185		130		35		21	
6/1/93		180		130		23		21	
6/1/93		180		135		28		21	
6/1/93		155		135		45		21	
6/1/93		160		135		24		21	
6/1/93		155		135		174		21	#2



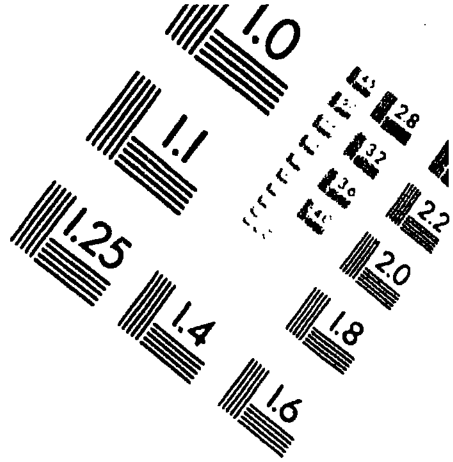
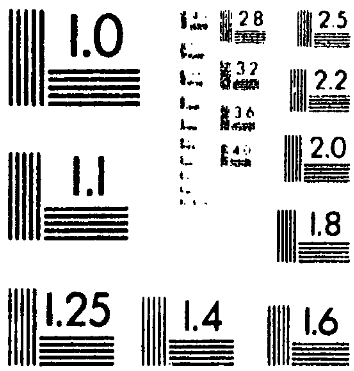
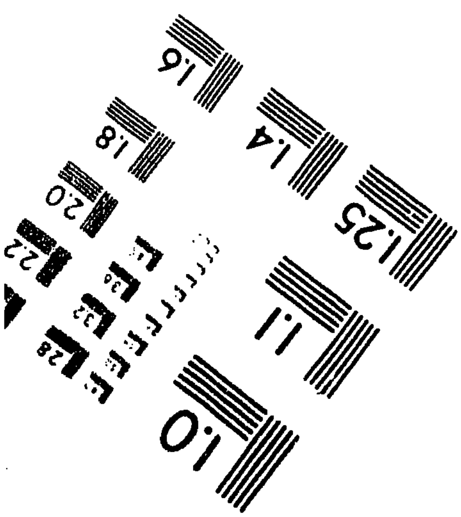


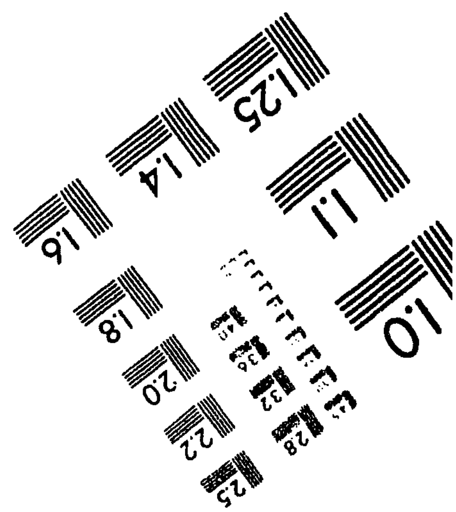
IMAGE EVALUATION TEST TARGET (MT-3)



150mm

6"





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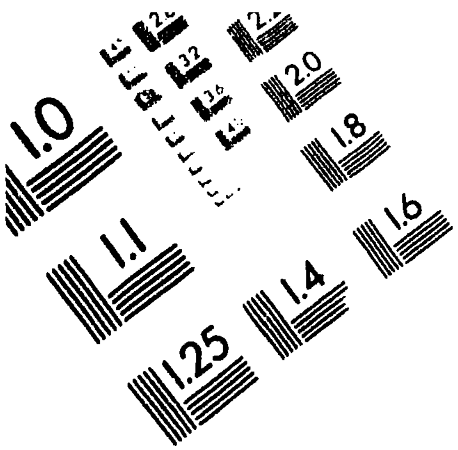


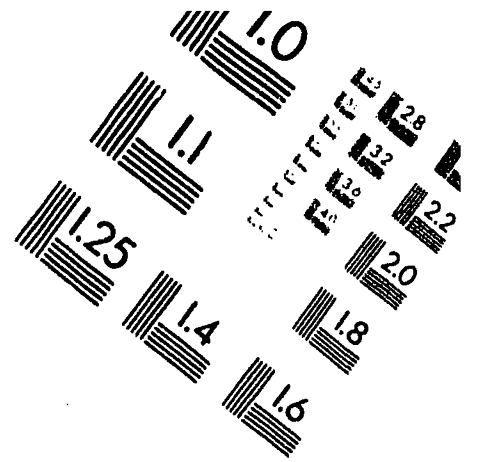
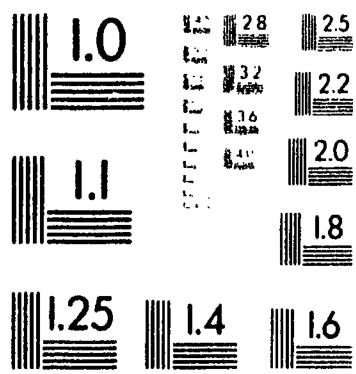
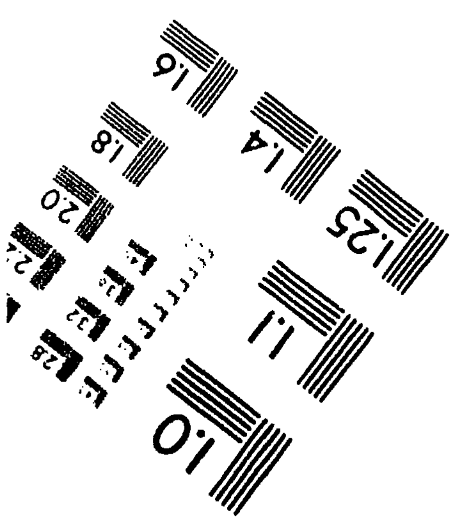


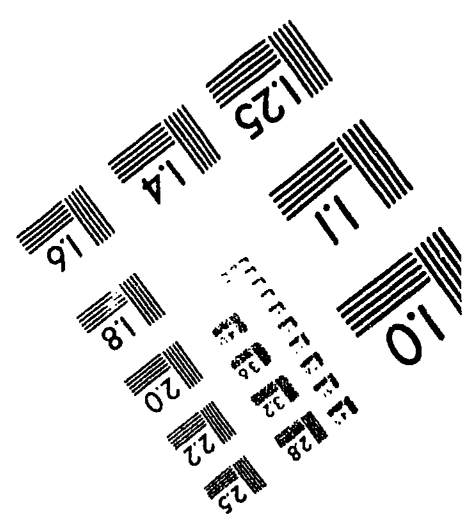
IMAGE EVALUATION TEST TARGET (MT-3)



150mm

6"





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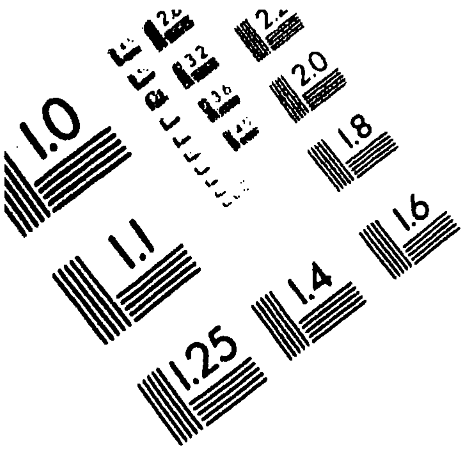


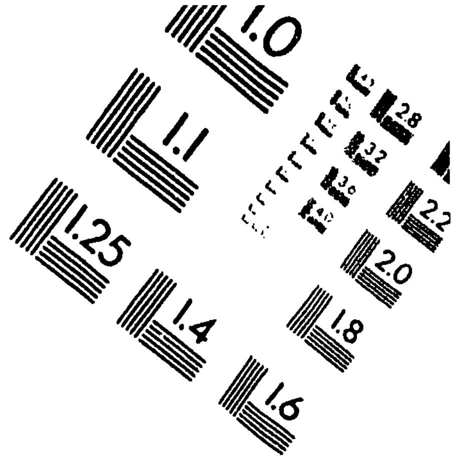
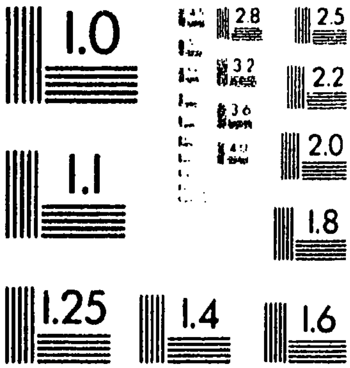
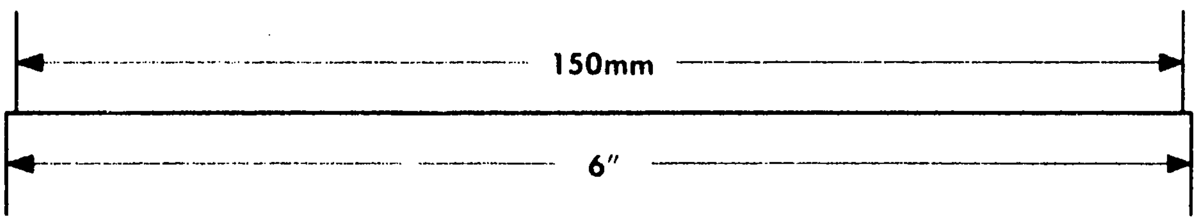
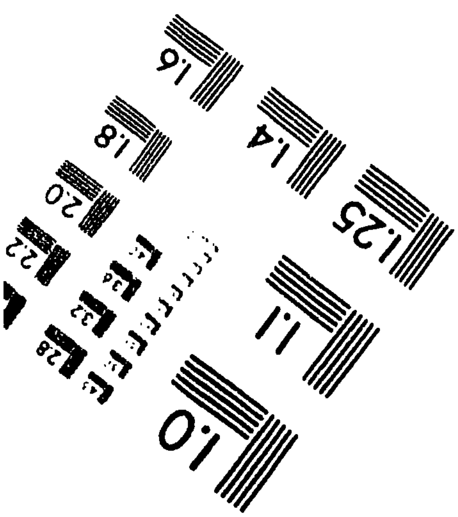


IMAGE EVALUATION TEST TARGET (MT-3)







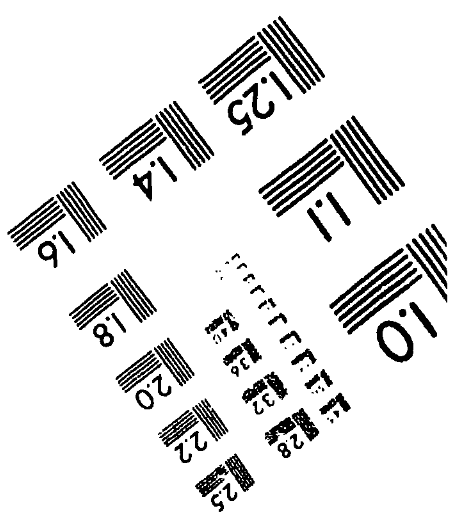


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IMAGE EVALUATION TEST TARGET (MT-3)

150mm

6″

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IMAGE EVALUATION TEST TARGET (MT-3)

1.0 1.1 1.25 1.4 1.6 1.8 2.0 2.2 2.5 2.8 3.2 3.6 4.0

150mm

6"

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GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
6/1/93		155		135		189		21	#2 Re-count
6/1/93		162		132		26		21	
6/1/93		170		132		32		21	
6/1/93		162		132		35		21	
6/1/93		164		132		39		21	
6/1/93		165		133		33		21	
6/1/93		167		133		23		21	
6/1/93		155		135		22		21	After Re-scrape
6/1/93		171		130		15		21	
						Gross			Dirt Pile
6/1/93	Front					112		21	
6/1/93	Right Side					106		21	
6/1/93	Back Side					87		21	
						Gross			BKG = 6 c/10 min Am-241 QC = 41875 c/
6/2/93		185		157		22		22	
6/2/93		177	175	122		58		22	
6/2/93		162		130		16		22	
6/2/93		182		132				22	No Measurement
						Gross			BKG = 9 c/10min QC is OK
6/9/93	Water Filter Residue					89		23	Outside pieces if filter ground up if possible
6/9/93	Sludge From Filter Scale					55		23	Good sample
6/9/93	Filter that Looks Clean					54		23	Poor sample
6/10/93	Sludge From Water Tank					132		23	BKG = 7 c/10min
						Gross			Samples from shrubs and dirt pile. BKG = 7 c/
6/11/93	1					24		23	
6/11/93	2					62		23	
6/11/93	3					28		23	
6/11/93	4					40		23	
6/11/93	5					44		23	
6/11/93	6					47		23	
									Attleboro Dirt - BKG = 5 c/10min Am-241 QC =
6/14/93		164		118		32		23	
6/14/93		177		138		34		23	
6/14/93		153		120		34		23	

GROSS ALPHA SCREENING DATA

Date	Sample ID	NC 1	NC 2	EC 1	EC 2	Measurement	Depth	Page	Comments
		meters				counts/10min	Inches		
6/14/93		183		144		43		23	
6/14/93		170		120		27		23	
6/14/93		195		158		33		23	
6/14/93		155		144		30		23	
6/14/93		185	195	180		74		23	Line
6/14/93		187		145		51		23	
6/14/93		165		147		29		23	
6/14/93		185		121		31		23	
6/14/93		192		148		32		23	
6/14/93		177.5		122		60		23	Wall
6/14/93		170		168		47		23	Composite
6/14/93		170		123		29		23	
6/14/93		158		115		26		23	
6/14/93		135		151		26		23	
6/14/93		185		157		30		23	
						Gross			BKG = 7 c/10min
6/15/93		175		185		24		24	
6/15/93		180		180		18		24	
6/15/93		175		175		29		24	
6/15/93		170		170		41		24	
6/15/93		170		180		32		24	
6/15/93		170		190		32		24	
6/15/93		180		170		66		24	
6/15/93		180		190		37		24	
6/15/93		185		185		38		24	
6/15/93		185		175		39		24	
6/15/93		190		170		56		24	
6/15/93		190		180		31		24	
6/15/93		190		190		21		24	
6/15/93		195		175		37		24	
6/15/93		200		170		36		24	
6/15/93		200		180		27		24	
6/15/93		190		170		23	6-8	24	
6/15/93		180		170		60	6-8	24	

Appendix D

Bore Hole Locations and Data Sheets

Bore Hole Locations and Data Sheets

Bore hole drilling was performed on a number of occassions to obtain split spoon soil samples. The purpose for the sampling program was predicated on the particular phase of the remediation program. Earlier drilling operations were conducted to better define the area neccessary for remediation. Later operations were designed to verify the extent of excavation and as verification of the overall sampling scheme. The data is used in part (outside the excavated area) for the final survey data presented within this report.

The drilling operations were conducted by Guild Drilling Co., Inc. under contract to Texas Instruments Incorporated. Physical locations (sampling design and protocol) and field direction were under the supervision of CPS Inc. Field decisions related to location, depth, sample handling, preparation, and analysis. In some cases, the originally desired locations were not attainable, due to drilling operations reaching refusal, physical obtrusions, or the concern for underground utilities.

Attachment 1 presents a listing of locations along with detailed diagrams depicting the physical layout of the site and locations identified by number as related to the listing. Attachment 2 to this appendix provides the drilling log provided by Guild Drilling Co., Inc. This log indicates locations, depths, samples and prevailing conditions encountered. Results of sample analysis are presented within Appendix C.

Attachment 1

Drilling Location Listing and Diagrams

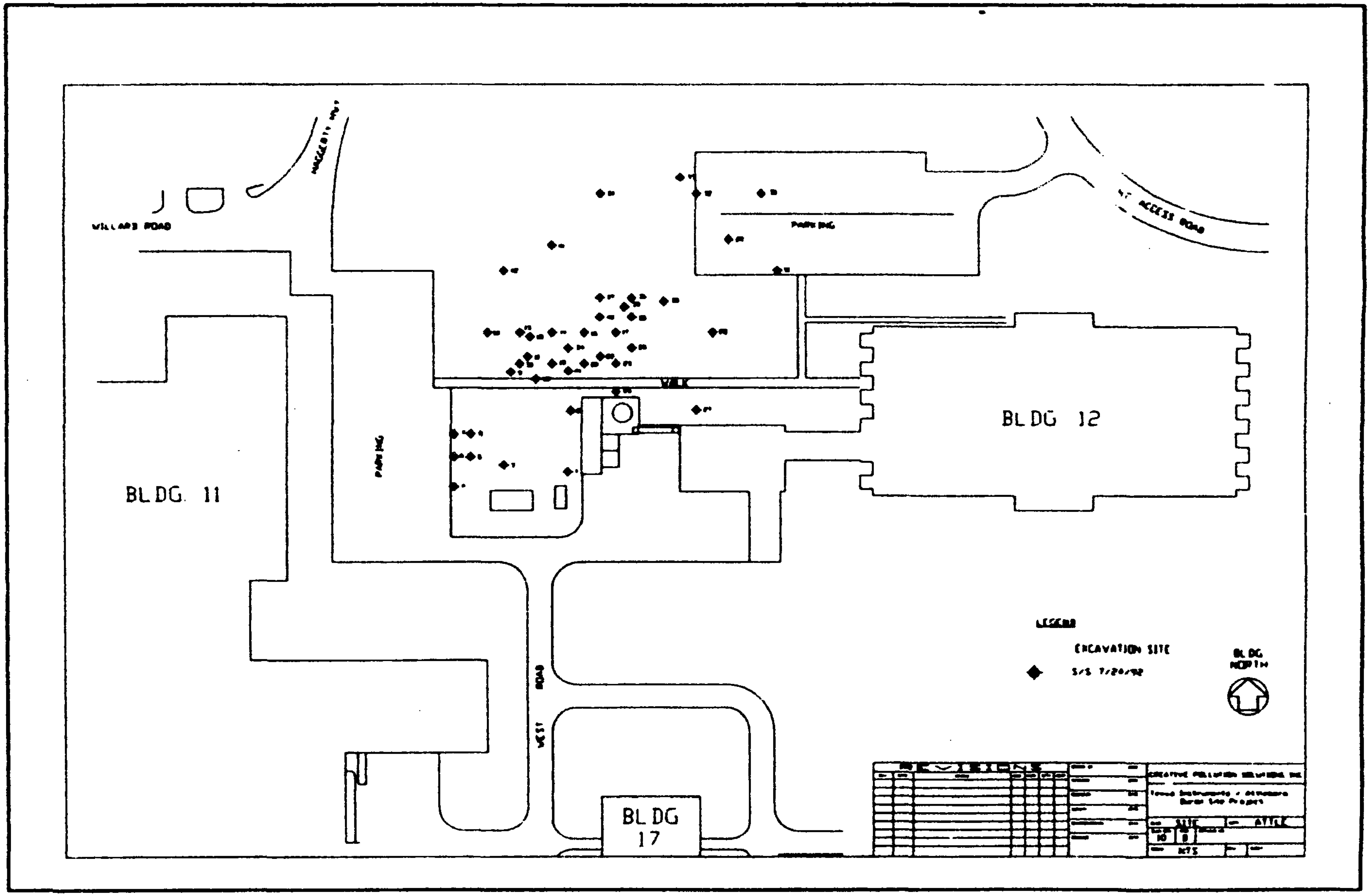
Bore Hole Locations, Number, and Date

Split Spoon/Drilling Number	Location	Date
1	145N-145E	24-Jul-92
2	165N-146E	24-Jul-92
3	147.5N-125E	24-Jul-92
4	140N-110E	24-Jul-92
5	150N-115E	24-Jul-92
6	150N-110E	24-Jul-92
7	157.5N-110E	24-Jul-92
8	157.5N-115E	24-Jul-92
9	177.5N-122.5E	24-Jul-92
10	180N-125E	24-Jul-92
11	182.5N-127.5E	24-Jul-92
12	190N-115E	24-Jul-92
13	190N-125E	24-Jul-92
14	190N-135E	24-Jul-92
15	189N-128E	24-Jul-92
16	190N-145E	24-Jul-92
17	190N-155E	24-Jul-92
18	175N-130E	24-Jul-92
19	180N-135E	24-Jul-92
20	180N-145E	24-Jul-92
21	177.5N-140E	24-Jul-92
22	182.5N-150E	24-Jul-92
23	180N-155E	24-Jul-92
24	185N-140E	24-Jul-92
25	185N-165E	24-Jul-92
26	171N-160E	24-Jul-92
27	165N-185E	24-Jul-92
28	190N-190E	24-Jul-92
29	220N-195E	24-Jul-92
30	235N-205E	24-Jul-92
31	210N-210E	24-Jul-92
32	235N-185E	24-Jul-92
33	240N-180E	24-Jul-92
34	235N-155E	24-Jul-92
35	200N-170E	24-Jul-92
36	201N-160E	24-Jul-92
37	201N-150E	24-Jul-92
38	195N-160E	24-Jul-92
39	198N-157.5E	24-Jul-92
40	195N-150E	24-Jul-92
41	218N-135E	24-Jul-92
42	210N-120E	24-Jul-92
43	145N-95E	7-Nov-92
44	145N-140E	7-Nov-92
45	160N-95E	7-Nov-92
46	165N-95E	7-Nov-92
47	170N-150E	7-Nov-92

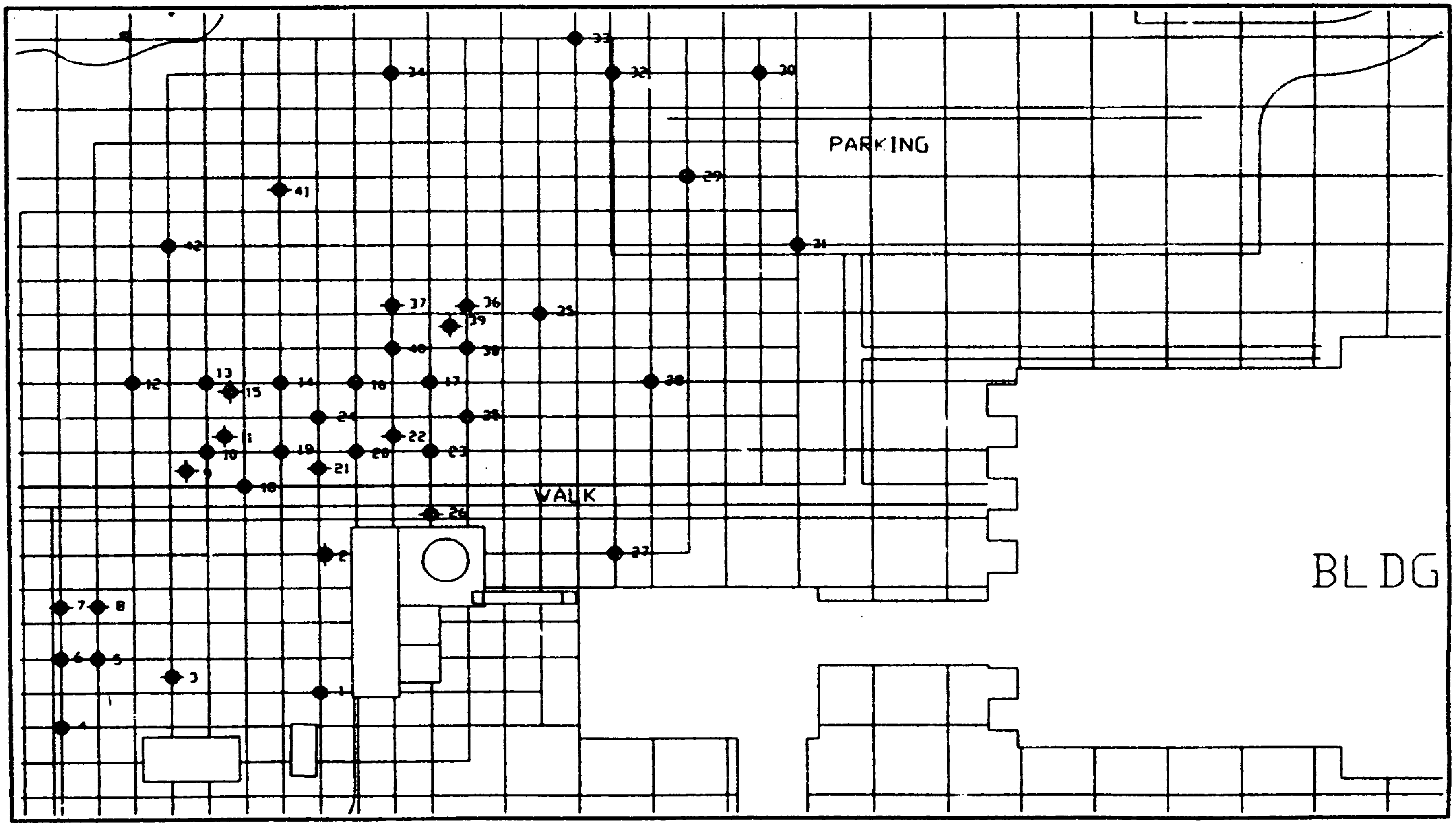
Bore Hole Locations, Number, and Date

Split Spoon/Drilling Number	Location	Date
48	175N-115E	7-Nov-92
49	180N-167E	7-Nov-92
50	190N-120E	7-Nov-92
51	190N-170E	7-Nov-92
52	195N-130E	7-Nov-92
53	195N-140E	7-Nov-92
54	202N-170E	7-Nov-92
55	204N-162E	7-Nov-92
56	205N-150E	7-Nov-92
57	205N-151E	7-Nov-92
58	160N-95E	29-Dec-93
59	170N-90E	29-Dec-93
60	160N-90E	29-Dec-93
62	172.5N-85E	29-Dec-93
63	180N-100E	29-Dec-93
64	145N-97E	29-Dec-93
65	151N-95E	29-Dec-93
66	165N-85E	29-Dec-93
67	150N-90E	29-Dec-93
68	210N-150E	29-Dec-93
69	200N-100E	29-Dec-93

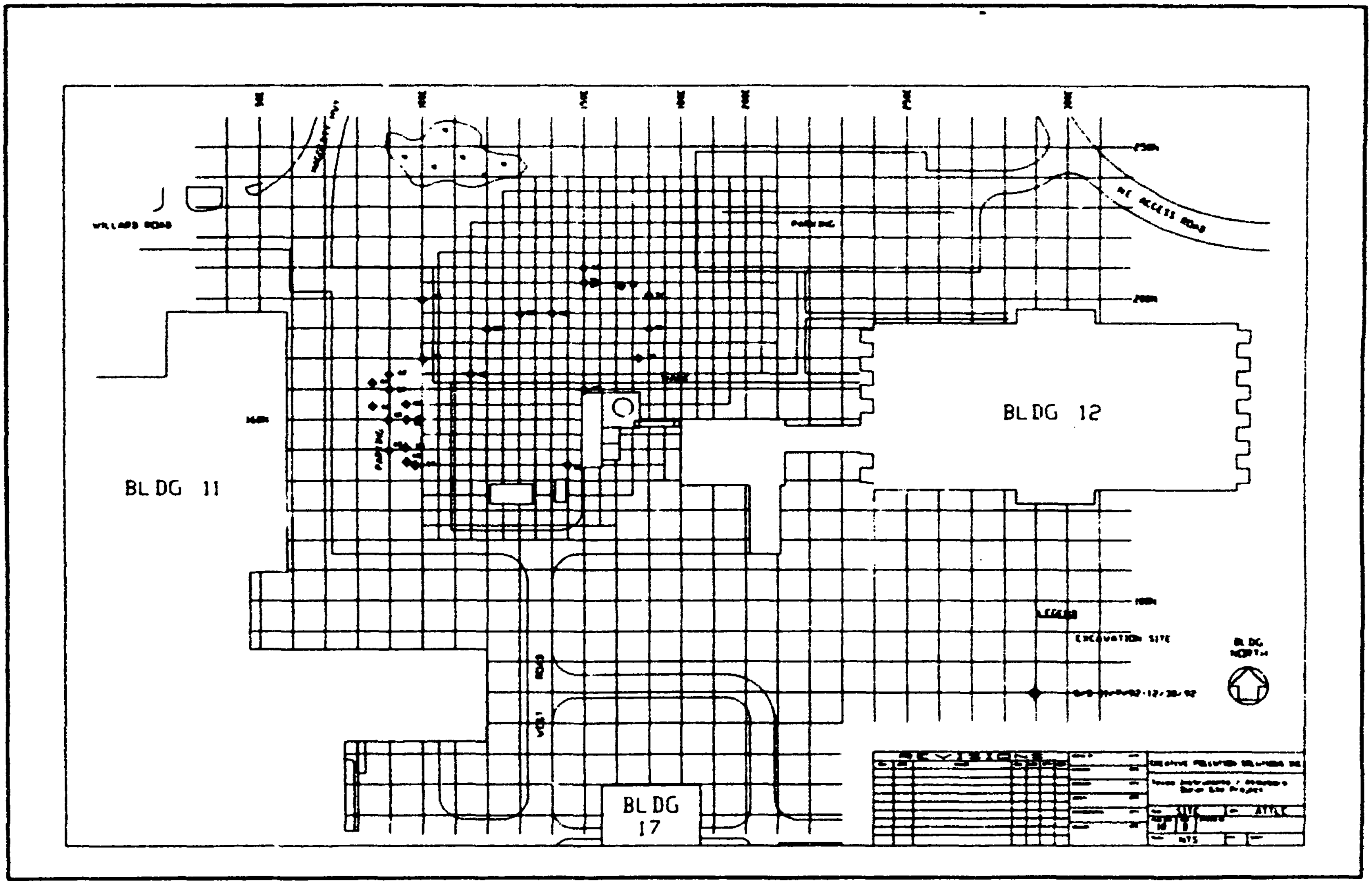
Bore Hole Locations Obtained on July 24, 1992



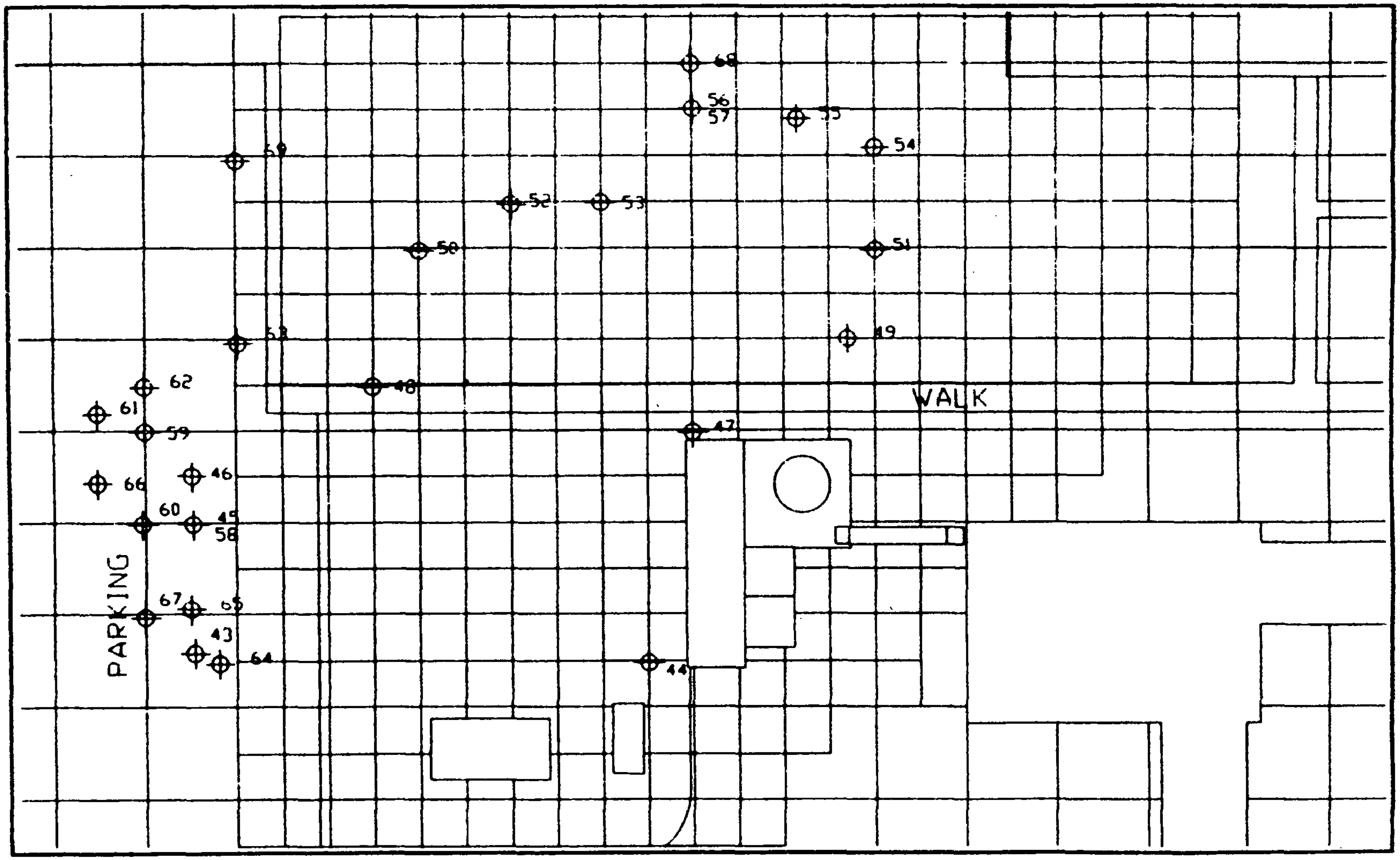
Bore Hole Locations Obtained on July 24, 1992



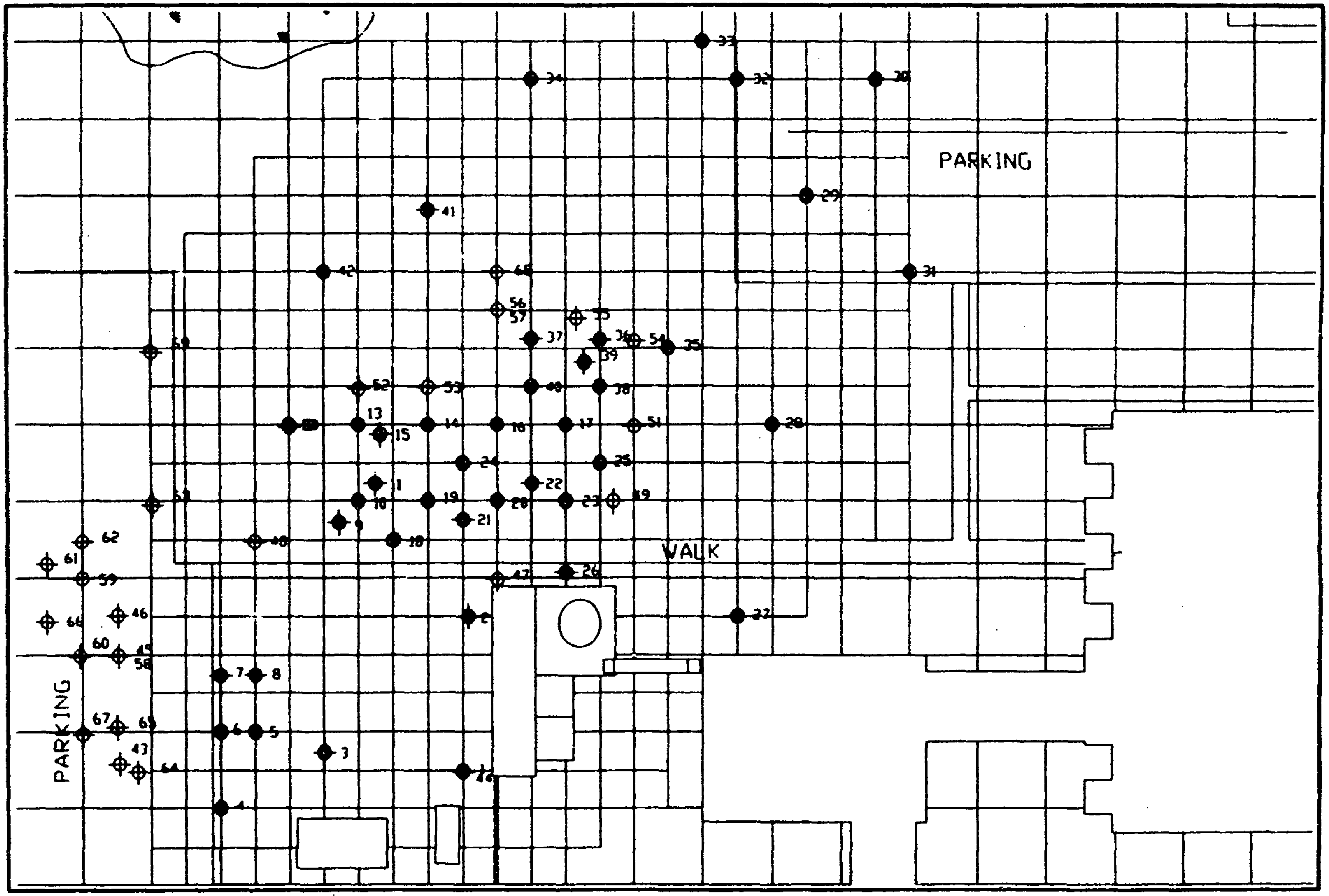
Bore Hole Locations Obtained on November 7 and December 30, 1992



Bore Hole Locations Obtained on November 7 and December 30, 1992



Combined Bore Hole Locations: July 24, 1992, November 7, and December 30, 1992



Attachment 2

Drilling Log Sheets

TO Texas Instruments | ADDRESS Attleboro, Mass. | HOLE NO.
PROJECT NAME Radiological Survey | LOCATION Attleboro, Mass. | LINE & STA.
REPORT SENT TO above | PROJ NO | OFFSET
SAMPLES SENT TO Taken at Site | OUR JOB NO 93-50 | SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

No Water

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		3"-2½"-2"	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	7/24/92	
COMPLETE	7/24/92	
TOTAL HRS.		

BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	R
	B#	(145 N - 145 E)							Bulk Samples taken (3")	1	20	
									for Testing (2½")	2	20	
								40"	on all Holes			
									Bottom of Boring 40"			
	B#	(165 N - 146 E)							(3")	1	20	
									(2½")	2	16	
								36"	(Possible Utility)			
									Bottom of Boring 36"			
	B#	(147.5 N - 125 E)							(3")	1	20	
									(2½") (2 Attemp	2	20	
								40"				
									Bottom of Boring 40"			
	B#	(140 N - 110 E)							(3")	1	20	
									(2½")	2	20	
								40"				
									Bottom of Boring 40"			
	B#	(150 N - 115 E)							(3")	1	20	
									(2½")	2	20	
								40"				
									Bottom of Boring 40"			
	B#	(150 N - 110 E)							(3")	1	20	
									(2½")	2	20	
								40"				
									Bottom of Boring 40"			
	B#	(157.5 N - 110 E)							(3")	1	20	
									(2½")	2	20	
								40"				
									Bottom of Boring 40"			
	B#	(157.5 N - 115 E)							(3")	1	20	
									(2½")	2	20	
								40"				
									Bottom of Boring 40"			

GROUND SURFACE TO ______ USED ______ "CASING THEN

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring
Rock Coring
Samples

HOLE NO

TO	Texas Instruments	ADDRESS	Attleboro, Mass.
PROJECT NAME	Radiological Survey	LOCATION	Attleboro, Mass.
REPORT SENT TO	above	PROJ NO	
SAMPLES SENT TO	Taken at Site	OUR JOB NO	93-50

HOLE NO.
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

No Water

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		3"-2½"-2"	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	7/24/92	
COMPLETE	7/24/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillip	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMP No	Pen
	B#	(177.5 N - 122.5 E)							Bulk Samples taken for Testing on all Holes (3")	1	17"
								17"	Refusal at 17"		
	B#	(180 N - 125 E)							(3")	1	20"
									(2½")	2	20"
								58"	(2")	3	18"
									Refusal at 58"		
	B#	(182.5 N - 127.5 E)							(3")	1	20"
									(2½")	2	10"
								30"	Refusal at 30"		
	B#	(190 N - 115 E)							(3")	1	20"
									(2½")	2	20"
								40"	Bottom of Boring 40"		
	B#	(190 N - 125 E)							(3")	1	20"
									(2½")	2	20"
								40"	Bottom of Boring 40"		
	B#	(190 N - 135 E)							(3")	1	20"
									(2½")	2	20"
								40"	Bottom of Boring 40"		
	B#	(189 N - 128 E)							(3")	1	20"
									(2½")	2	20"
								40"	Bottom of Boring 40"		

GROUND SURFACE TO ______ USED ______ " CASING. THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring
Rock Coring
Samples

HOLE NO

TO	Texas Instruments	ADDRESS	Attleboro, Mass.
PROJECT NAME	Radiological Survey	LOCATION	Attleboro, Mass.
REPORT SENT TO	above	PROJ NO	
SAMPLES SENT TO	Taken at Site	OUR JOB NO	93-50

HOLE NO.
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

No Water

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		3"-2½"-2"	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	7/25/92	
COMPLETE	7/25/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen
	B#	(190 N - 145 E)							Bulk Samples taken for Testing on all Holes (3")	1	20'
									(2½")	2	20'
								40"			
									Bottom of Boring 40"		
	B#	(190 N - 155 E)							(3")	1	20'
									(2½")	2	20'
								40"			
									Bottom of Boring 40"		
	B#	(175 N - 130 E)							(3")	1	20'
									(2½")	2	20'
									(2")	3	20'
								80"	(2")	4	
									Bottom of Boring 80"		
	B#	(180 N - 135 E)							(3")	1	20'
									(2½")	2	20'
									(2")	3	20'
								80"	(1-3/8")	4	20'
									Bottom of Boring 80"		
	B#	(180 N - 145 E)							(3")	1	20'
									(2½")	2	20'
								40"			
									Bottom of Boring 40"		
	B#	(177.5 N - 140 E)							(3")	1	20'
									(2½")	2	20'
									(2")	3	20'
								80"	(1-3/8")	4	20'
									Bottom of Boring 80"		
	B#	(182.5 N - 150 E)							(3")	1	20'
									(2½")	2	20'
								40"			
									Bottom of Boring 40"		
	B#	(180 N - 155 E)							(3")	1	20'
									(2½")	2	20'
								40"			
									Bottom of Boring 40"		

GROUND SURFACE TO ______ USED ______ "CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring ______
Rock Coring ______
Samples ______

HOLE NO

TO Texas Instruments | ADDRESS Attleboro, Mass. | HOLE NO.
PROJECT NAME Radiological Survey | LOCATION Attleboro, Mass. | LINE & STA.
REPORT SENT TO above | PROJ NO. | OFFSET
SAMPLES SENT TO Taken at Site | OUR JOB NO. 93-50 | SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

No Water

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		3"-2½"-2"	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	7/25/92	
COMPLETE	7/25/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen
	B#	(185 N - 140 E)							Bulk Samples taken (3")	1	20"
									for Testing (2½")	2	12"
								32"	on all Holes		
									Bottom of Boring 32"		
	B#	(185 N - 165 E)							(3")	1	20"
									(2½")	2	20"
								40"			
									Bottom of Boring 40"		
	B#	(171 N - 160 E)							(3")	1	20"
									(2½")	2	20"
								40"			
									Bottom of Boring 40"		
	B#	(165 N - 185 E)							(3")	1	20"
									(2½")	2	20"
								40"			
									Bottom of Boring 40"		
	B#	(190 N - 190 E)							(3")	1	20"
									(2½")	2	20"
								40"			
									Bottom of Boring 40"		
	B#	(220 N - 195 E)							(3")	1	20"
									(2½")	2	20"
								40"			
									Bottom of Boring 40"		
	B#	(235 N - 205 E)							(3")	1	20"
									(2½")	2	20"
								40"			
									Bottom of Boring 40"		
	B#	(210 N - 210 E)							(3")	1	20"
									(2½")	2	20"
								40"			
									Bottom of Boring 40"		

GROUND SURFACE TO ______ USED ______ " CASING THEN

Sample Type
D = Dry C = Cored W = Washed
UP = Undisturbed Piston
TP = Test Pit A = Auger V = Vane Test
UT = Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency			
0-10	Loose	0-4	Soft	30 +	Hard
10-30	Med. Dense	4-8	M/Stiff		
30-50	Dense	8-15	Stiff		
50 +	Very Dense	15-30	V-Stiff		

SUMMARY
Earth Boring ______
Rock Coring ______
Samples ______

HOLE NO

TO Texas Instruments | ADDRESS Attleboro, Mass. | HOLE NO. ____
PROJECT NAME Radiological Survey | LOCATION Attleboro, Mass. | LINE & STA. ____
REPORT SENT TO above | PROJ. NO. ____ | OFFSET ____
SAMPLES SENT TO Taken at Site | OUR JOB NO 93-50 | SURF. ELEV. ____

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At ____ after ____ Hours	Type		S/S	
No Water	Size I D		3"-2½"-2"	
At ____ after ____ Hours	Hammer Wt		300#	BIT
	Hammer Fall		24"	

	Date	Time
START	7/25/92	
COMPLETE	7/25/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING ____

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen
	B#	(235 N - 185 E)							Bulk Samples taken for Testing on all Holes (3")	1	20"
									(2½")	2	20"
								40"	Bottom of Boring 40"		
	B#	(240 N - 180 E)							(3")	1	20"
									(2½")	2	20"
								40"	Bottom of Boring 40"		
	B#	(235 N - 155 E)							(3")	1	20"
									(2½")	2	20"
								40"	Bottom of Boring 40"		
	B#	(200 N - 170 E)							(3")	1	20"
									(2½")	2	20"
								40"	Bottom of Boring 40"		
	B#	(201 N - 160 E)							(3")	1	20"
									(2½")	2	20"
								40"	Bottom of Boring 40"		
	B#	(201 N - 150 E)							(3")	1	20"
									(2½")	2	20"
								40"	Bottom of Boring 40"		
	B#	(195 N - 160 E)							(3")	1	20"
									(2½")	2	20"
								40"	Bottom of Boring 40"		
	B#	(198 N - 157.5 E)							(3")	1	20"
									(2½")	2	20"
								40"	Bottom of Boring 40"		

GROUND SURFACE TO ____ USED ____ " CASING THEN ____

Sample Type	Proportions Used		140 lb Wt x 30" fall on 2" O D Sampler Cohesionless Density		Cohesive Consistency			SUMMARY	
D: Dry C: Cored W: Washed	trace	0 to 10%	0-10	Loose	0-4	Soft	30 + Hard	Earth Boring	
UP: Undisturbed Piston	little	10 to 20%	10-30	Med Dense	4-8	M/Stiff		Rock Coring	
TP: Test Pit A: Auger V: Vane Test	some	20 to 35%	30-50	Dense	8-15	Stiff		Samples	
UT: Undisturbed Thinwall	and	35 to 50%	50 +	Very Dense	15-30	V-Stiff		HOLE NO	

TO Texas Instruments
PROJECT NAME Radiological Survey
REPORT SENT TO above
SAMPLES SENT TO Taken at Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ. NO.
OUR JOB NO. 93-50

HOLE NO.
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS
At ______ after ______ Hours
No Water
At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		3"-2½"-2"	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	7/25/92	
COMPLETE	7/25/92	
TOTAL HRS.		

BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc		SAMPLE No	Pen
	B#	(195 N - 150 E)							Bulk Samples taken	(3")	1	20"
									for Testing	(2½")	2	20"
								40"	on all Holes			
									Bottom of Boring 40"			
	B#	(218 N - 135 E)								(3")	1	20"
										(2½")	2	20"
								40"				
									Bottom of Boring 40"			
	B#	(210 N - 120 E)								(3")	1	20"
										(2½")	2	20"
								40"				
									Bottom of Boring 40"			

GROUND SURFACE TO ______ USED ______ "CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring ______
Rock Coring ______
Samples ______

HOLE NO

GUILD DRILLING CO., INC.

100 WATER STREET, EAST PROVIDENCE, R.I. 02914
(401) 434-0750

Subject: Boring Data - Radiological Survey - Haggerty drive

Location: Attleboro, Mass.

Our Job No: 93-155 **Your Project or Contract No.**

Date: November 12, 1992 **Via:** fcm

To: Texas Instruments
34 Forest Street
Attleboro, Mass. 03703

Attention of: Mr. Mike Elliot
or Paul Jost

Copies / or Sets	DESCRIPTION
(3)	Boring Reports: 145N-95E, 145N-140E, 160N-95E, 165N-95E, 170N-150E, 175N-115E 180N-167E, 190N-120E, 190N-170E, 195N-130E, 195N-140E, 202N-170E, 204N-162E, 205N-150E, 205N-151E

SAMPLES: Taken @ Site.

Remarks: Project Completed.

By: Sheila I. Erice
SHEILA I. ERICE

cc:

TO Texas Instruments | ADDRESS Attleboro, Mass. | HOLE NO 145N-95E
PROJECT NAME Radiological Survery @ | LOCATION Attleboro, Mass. | LINE & STA.
REPORT SENT TO above / Haggerty Drive | PROJ NO | OFFSET
SAMPLES SENT TO Taken @ Site | OUR JOB NO 93-155 | SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR		Date	Time
At ______ after ______ Hours	Type		S/S		START	11/7/92	
	Size ID		Various		COMPLETE	11/7/92	
At ______ after ______ Hours	Hammer Wt		300#	BIT	TOTAL HRS.		
	Hammer Fall		24"		BORING FOREMAN	J. Phillips	
					INSPECTOR		
					SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen	R
		0'-2'	D	2	7	6	Medium		Brown fine to coarse SAND,	1	24"	1
				10	(3"	S/S)	Dense		Silt (Fill)			
		2'-4'	D	6	7	4	"			2	24"	1
				6	(2½"	S/S)						
		4'-6'	D	4	5	6	"			3	24"	1
				7	(1-3/	8")		6.0'				
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ " CASING THEN ______

Sample Type	Proportions Used		140 lb Wt. x 30" fall on 2" O.D. Sampler		SUMMARY	
D: Dry C: Cored W: Washed	trace	0 to 10%	Cohesionless Density	Cohesive Consistency	Earth Boring	6
UP: Undisturbed Piston	little	10 to 20%	0-10 Loose	0-4 Soft 30 + Hard	Rock Coring	
TP: Test Pit A: Auger V: Vane Test	some	20 to 35%	10-30 Med Dense	4-8 M/Stiff	Samples	3
UT: Undisturbed Thinwall	and	35 to 50%	30-50 Dense	8-15 Stiff	HOLE NO	
			50 + Very Dense	15-30 V-Stiff		

100 WATER STREET EAST PROVIDENCE R.I.

TO Texas Instruments
ADDRESS Attleboro, Mass.
PROJECT NAME Radiological Survery @
LOCATION Attleboro, Mass.
REPORT SENT TO above / Haggerty Drive
PROJ NO
SAMPLES SENT TO Taken @ Site
OUR JOB NO 93-155

HOLE NO 145N-95E
LINE & STA
OFFSET
SURF ELEV

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I.D.		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen
		0'-2'	D	2	7	6	Medium		Brown fine to coarse SAND,	1	24'
				10	(3" S/S)		Dense		Silt (Fill)		
		2'-4'	D	6	7	4	"			2	24'
				6	(2" S/S)						
		4'-6'	D	4	5	6	"			3	24'
				7	(1-3/8")			6.0'			
									Bottom of Boring 6.0'		

GROUND SURFACE TO ______ USED ______ CASING THEN ______

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency			
0-10	Loose	0-4	Soft	30 +	Hard
10-30	Med Dense	4-8	M/Stiff		
30-50	Dense	8-15	Stiff		
50 +	Very Dense	15-30	V-Stiff		

SUMMARY
Earth Boring ______
Rock Coring ______
Samples ______
HOLE NO. ______

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-155

HOLE NO 145N-95E
LINE & STA
OFFSET
SURF ELEV

GROUND WATER OBSERVATIONS
At ______ after ______ Hours
At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6 on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	R
		0'-2'	D	2	7	6	Medium		Brown fine to coarse SAND,	1	24'	1
				10	(3" S/S)		Dense		Silt (Fill)			
		2'-4'	D	6	7	4	"			2	24'	1
				6	(2½" S/S)							
		4'-6'	D	4	5	6	"			3	24'	1
				7	(1-3/8")			6.0'				
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 6
Rock Coring
Samples

HOLE NO

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-155

DATE
HOLE NO. 145N-140E
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At ____ after ____ Hours	Type		S/S	
	Size I D		Various	
At ____ after ____ Hours	Hammer Wt		300#	BIT
	Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		

BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen	R
		0'-2'	D	1	4	7	Medium		Brown Topsoil & fine-med.	1	24"	
				11	(3"	S/S)	Dense		SAND, lit. f-m Gravel, tr. Cobbles			
		2'-4'	D	4	5	8	"		Gray-Brn. fine SAND, Cinders	2	24"	
				8	(2"	S/S)			tr. of Silt (Fill)			
		4'-6'	D	4	5	4	Loose		Brn. f-m SAND, lit. f-c	3	24"	
				4	(1-3/8")			6.0'	Gravel, little Silt			
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ "CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff

30 + Hard

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO.

TO Texas Instruments | ADDRESS Attleboro, Mass. | HOLE NO 145N-140E

PROJECT NAME Radiological Survery @ | LOCATION Attleboro, Mass. | LINE & STA

REPORT SENT TO above / Haggerty Drive | PROJ NO | OFFSET

SAMPLES SENT TO Taken @ Site | OUR JOB NO 93-155 | SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I.D.		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen	Re
		0'-2'	D	1	4	7	Medium		Brown Topsoil & fine-med.	1	24"	1
				11	(3"	S/S)	Dense		SAND, lit. f-m Gravel, tr. Cobbles			
		2'-4'	D	4	5	8	"		Gray-Brn. fine SAND, Cinders	2	24"	
				8	(2"	S/S)			tr. of Silt (Fill)			
		4'-6'	D	4	5	4	Loose		Brn. f-m SAND, lit. f-c	3	24"	
				4	(1-3/8")			6.0'	Gravel, little Silt			
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ " CASING THEN ______

Sample Type	Proportions Used		140 lb Wt x 30" fall on 2" O.D. Sampler Cohesionless Density		Cohesive Consistency			SUMMARY	
D=Dry C=Cored W=Washed	trace	0 to 10%	0-10	Loose	0-4	Soft	30 + Hard	Earth Boring	6'
UP=Undisturbed Piston	little	10 to 20%	10-30	Med Dense	4-8	M/Stiff		Rock Coring	
TP=Test Pit A=Auger V=Vane Test	some	20 to 35%	30-50	Dense	8-15	Stiff		Samples	3
UT=Undisturbed Thinwall	and	35 to 50%	50 +	Very Dense	15-30	V-Stiff		HOLE NO	

TO Texas Instruments | ADDRESS Attleboro, Mass. | HOLE NO 145N-140E
PROJECT NAME Radiological Survery @ | LOCATION Attleboro, Mass. | LINE & STA.
REPORT SENT TO above / Haggerty Drive | PROJ NO | OFFSET
SAMPLES SENT TO Taken @ Site | OUR JOB NO 93-155 | SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At ____ after ____ Hours	Type		S/S	
At ____ after ____ Hours	Size I.D.		Various	
	Hammer Wt.		300#	BIT
	Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen
		0'-2'	D	1	4	7	Medium		Brown Topsoil & fine-med.	1	24'
				11	(3"	S/S)	Dense		SAND, lit. f-m Gravel, tr. Cobbles		
		2'-4'	D	4	5	8	"		Gray-Brn. fine SAND, Cinders	2	24'
				8	(2"	S/S)			tr. of Silt (Fill)		
		4'-6'	D	4	5	4	Loose		Brn. f-m SAND, lit. f-c	3	24'
				4	(1-3/8")			6.0'	Gravel, little Silt		
									Bottom of Boring 6.0'		

GROUND SURFACE TO ____ USED ____ " CASING THEN ____

Sample Type	Proportions Used		140 lb Wt. x 30" fall on 2" O.D. Sampler			SUMMARY
D: Dry C: Cored W: Washed	trace	0 to 10%	Cohesionless Density	Cohesive Consistency		Earth Boring 6
UP: Undisturbed Piston	little	10 to 20%	0-10 Loose	0-4 Soft	30 + Hard	Rock Coring
TP: Test Pit A: Auger V: Vane Test	some	20 to 35%	10-30 Med. Dense	4-8 M/Stiff		Samples 3
UT: Undisturbed Thinwall	and	35 to 50%	30-50 Dense	8-15 Stiff		HOLE NO
			50 + Very Dense	15-30 V-Stiff		

100 WATER STREET EAST PROVIDENCE, R. I.

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO.
OUR JOB NO 93-155

HOLE NO. 160N-95E
LINE & STA
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I.D.		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	

TOTAL HRS.
BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen	R
		0'-2'	D	2	6	16	Medium		4" BLACKTOP-Brown fine to	1	24"	1
				23	(3"	S/S)	Dense		coarse SAND, little Gravel			
		2'-4'	D	12	22	32	Very		(Fill)	2	24"	0
				66			Dense	4.0'	(No recovery S-2)			
									Bottom of Boring 4.0'			

GROUND SURFACE TO ______ USED ______ "CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 4'
Rock Coring
Samples 1

HOLE NO.

TO Texas Instruments | ADDRESS Attleboro, Mass. | HOLE NO 160N-95E

PROJECT NAME Radiological Survery @ | LOCATION Attleboro, Mass. | LINE & STA

REPORT SENT TO above / Haggerty Drive | PROJ NO | OFFSET

SAMPLES SENT TO Taken @ Site | OUR JOB NO 93-155 | SURF. ELEV.

GROUND WATER OBSERVATIONS			CASING	SAMPLER	CORE BAR
At ____ after ____ Hours		Type		S/S	
		Size I.D.		Various	
At ____ after ____ Hours		Hammer Wt.		300#	BIT
		Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen	R
		0'-2'	D	2	6	16	Medium		4" BLACKTOP-Brown fine to	1	24"	1
				23	(3"	S/S)	Dense		coarse SAND, little Gravel			
		2'-4'	D	12	22	32	Very		(Fill)	2	24"	0
				66			Dense	4.0'	(No recovery S-2)			
									Bottom of Boring 4.0'			

GROUND SURFACE TO ____ USED ____ "CASING THEN ____

Sample Type	Proportions Used		140 lb Wt x 30" fall on 2" O.D. Sampler Cohesionless Density		Cohesive Consistency			SUMMARY	
O: Dry C: Cored W: Washed	trace	0 to 10%	0-10	Loose	0-4	Soft	30 + Hard	Earth Boring	4
UP: Undisturbed Piston	little	10 to 20%	10-30	Med Dense	4-8	M/Stiff		Rock Coring	
TP: Test Pit A: Auger V: Vane Test	some	20 to 35%	30-50	Dense	8-15	Stiff		Samples	I
UT: Undisturbed Thinwall	and	35 to 50%	50 +	Very Dense	15-30	V-Stiff		HOLE NO. 160N-95	

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-155

DATE
HOLE NO 160N-95E
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I.D.		Various	
Hammer Wt.		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	

TOTAL HRS.
BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen
		0'-2'	D	2	6	16	Medium		4" BLACKTOP-Brown fine to	1	24'
				23	(3"	S/S)	Dense		coarse SAND, little Gravel		
		2'-4'	D	12	22	32	Very		(Fill)	2	24'
				66			Dense	4.0'	(No recovery S-2)		
									Bottom of Boring 4.0'		

GROUND SURFACE TO ______ USED ______ CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%

140 lb Wt x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff

30 + Hard

SUMMARY
Earth Boring 4
Rock Coring
Samples 1

HOLE NO

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-155

DATE
HOLE NO 165N-95E
LINE & STA
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS		

BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen
		0'-2'	D	6	8	11	Medium		Brown fine to coarse SAND,	1	24"
				9	(3" S/S)		Dense		Gravel		
		2'-4'	D	10	15	20	Dense		Gray Brown TILL	2	24"
				23	(2-1/2")						
		4'-6'	D	8	13	10	Medium			3	24"
				11	(1-3/8")		Dense	6.0'			
									Bottom of Boring 6.0'		

GROUND SURFACE TO ______ USED ______ " CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%

140 lb Wt x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	

SUMMARY
Earth Boring
Rock Coring
Samples

HOLE NO

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments	ADDRESS Attleboro, Mass.	DATE	
PROJECT NAME Radiological Survery @	LOCATION Attleboro, Mass.	HOLE NO 165N-95E	
REPORT SENT TO above / Haggerty Drive	PROJ NO	LINE & STA	
SAMPLES SENT TO Taken @ Site	OUR JOB NO 93-155	OFFSET	
		SURF ELEV	

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At after hours	Type		S/S	
	Size ID		Various	
At after hours	Hammer Wt		300#	BIT
	Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen
		0'-2'	D	6	8	11	Medium		Brown fine to coarse SAND,	1	24"
				9	(3" S/S)		Dense		Gravel		
		2'-4'	D	10	15	20	Dense		Gray Brown TILL	2	24"
				23	(2-1/2")						
		4'-6'	D	8	13	10	Medium			3	24"
				11	(1-3/8")		Dense	6.0'			
									Bottom of Boring 6.0'		

GROUND SURFACE TO ______ USED ______ CASING THEN

Sample Type	Proportions Used	140 lb Wt x 30" fall on 2" O.D. Sampler		SUMMARY
D: Dry C: Cored W: Washed	trace 0 to 10%	Cohesionless Density	Cohesive Consistency	Earth Boring 6
UP: Undisturbed Piston	little 10 to 20%	0-10 Loose	0-4 Soft 30 + Hard	Rock Coring
TP: Test Pit A: Auger V: Vane Test	some 20 to 35%	10-30 Med Dense	4-8 M/Stiff	Samples 3
		30-50 Dense	8-15 Stiff	

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ. NO
OUR JOB NO 93-155

DATE
HOLE NO 165N-95E
LINE & STA
OFFSET
SURF ELEV

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		Various	
Hammer Wt		300#	B T
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS		

BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6 on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	R
		0'-2'	D	6	8	11	Medium		Brown fine to coarse SAND,	1	24'	2[illegible]
				9	(3" S/S)		Dense		Gravel			
		2'-4'	D	10	15	20	Dense		Gray Brown TILL	2	24'	2[illegible]
				23	(2-1/2")							
		4'-6'	D	8	13	10	Medium			3	24'	1[illegible]
				11	(1-3/8")		Dense	6.0'				
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%

140 lb Wt x 30 fall on 2 O D Sampler

Cohesionless Density
0-10 Loose
10-30 Med Dense
30-50 Dense

Cohesive Consistency
0-4 Soft
4-8 M/Stiff
8-15 Stiff
30 + Hard

SUMMARY
Earth Boring 6
Rock Coring
Samples 3

HOLE NO

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-155

DATE
HOLE NO 170N - 15
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At ________ after ____ Hours

At ________ after ____ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I.D.		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen	R
		0'-2'	D	2	5	6	Medium		Brn. Topsoil, lit. f-c Sand	1	24"	1
				5	(3" S/S)		Dense		& Gravel			
		2'-4'	D	2	3	2	Loose		Gray-Brn. f-c SAND, little	2	24"	2
				2	(2½" S/S)				fine to coarse Gravel			
		4'-6'	D	7	9	12	Medium		" ", some fine to coarse	3	24"	1
				7	(1-3/8")		Dense	6.0'	Gravel, Cobbles			
									Bottom of Boring 6.0'			

GROUND SURFACE TO ________ USED ________ CASING: THEN ________

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency			
0-10	Loose	0-4	Soft	30 +	Hard
10-30	Med. Dense	4-8	M/Stiff		
30-50	Dense	8-15	Stiff		

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

100 WATER STREET EAST PROVIDENCE, R. I.

TO Texas Instruments | ADDRESS Attleboro, Mass. | DATE

PROJECT NAME Radiological Survery @ | LOCATION Attleboro, Mass. | HOLE NO. 170N - 150E

REPORT SENT TO above / Haggerty Drive | PROJ NO | LINE & STA.

SAMPLES SENT TO Taken @ Site | OUR JOB NO 93-155 | OFFSET

SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At ____ after ____ Hours	Type		S/S	
	Size I D		Various	
At ____ after ____ Hours	Hammer Wt		300#	BIT
	Hammer Fall		24"	

	Date	Time
START	11/7/92	a.m. p.m.
COMPLETE	11/7/92	a.m. p.m.
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		0'-2'	D	2	5	6	Medium		Brn. Topsoil, lit. f-c Sand	1	24"	18"
				5	(3" S/S)		Dense		& Gravel			
		2'-4'	D	2	3	2	Loose		Gray-Brn. f-c SAND, little	2	24"	20"
				2	(2½" S/S)				fine to coarse Gravel			
		4'-6'	D	7	9	12	Medium		" ", some fine to coarse	3	24"	18"
				7	(1-3/8")		Dense	6.0'	Gravel, Cobbles			
									Bottom of Boring 6.0'			

GROUND SURFACE TO ________ USED ________ " CASING: THEN ________

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO.

100 WATER STREET EAST PROVIDENCE, R. I.

TO Texas Instruments | ADDRESS Attleboro, Mass.
PROJECT NAME Radiological Survery @ | LOCATION Attleboro, Mass.
REPORT SENT TO above / Haggerty Drive | PROJ NO.
SAMPLES SENT TO Taken @ Site | OUR JOB NO 93-155

DATE
HOLE NO. 170N - 150E
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS
At ______ after ______ Hours
At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	a.m. p.m.
COMPLETE	11/7/92	a.m. p.m.

TOTAL HRS.
BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		0'-2'	D	2	5	6	Medium		Brn. Topsoil, lit. f-c Sand	1	24'	18"
				5	(3" S/S)		Dense		& Gravel			
		2'-4'	D	2	3	2	Loose		Gray-Brn. f-c SAND, little	2	24'	20"
				2	(2½" S/S)				fine to coarse Gravel			
		4'-6'	D	7	9	12	Medium		" ", some fine to coarse	3	24'	18"
				7	(1-3/8")		Dense	6.0'	Gravel, Cobbles			
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ "CASING: THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO.

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments | ADDRESS Attleboro, Mass. | DATE | HOLE NO 175N-115E
PROJECT NAME Radiological Survery @ | LOCATION Attleboro, Mass. | LINE & STA.
REPORT SENT TO above / Haggerty Drive | PROJ NO | OFFSET
SAMPLES SENT TO Taken @ Site | OUR JOB NO 93-155 | SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR		Date	Time
At ______ after ______ Hours	Type		S/S		START	11/7/92	
	Size I D		Various		COMPLETE	11/7/92	
At ______ after ______ Hours	Hammer Wt		300#	BIT	TOTAL HRS.		
	Hammer Fall		24"		BORING FOREMAN	J. Phillips	
					INSPECTOR		
					SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	R
		0'-2'	D	9	21	13	Dense		Topsoil, Sand & Gravel	1	24"	2
				18	(3" S/S)							
		2'-4'	D	13	12	23	"			2	24"	2
				36	(2½" S/S)							
		4'-6'	D	44	45	38	Very		Gray fine to coarse SAND	3	24"	2
				38	(1-3/8")		Dense	6.0'				
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ "CASING THEN ______

Sample Type	Proportions Used		140 lb Wt. x 30" fall on 2" O D Sampler			SUMMARY	
D: Dry C: Cored W: Washed	trace	0 to 10%	Cohesionless Density	Cohesive Consistency		Earth Boring	6'
UP: Undisturbed Piston	little	10 to 20%	0-10 Loose	0-4 Soft	30 + Hard	Rock Coring	
TP: Test Pit A: Auger V: Vane Test	some	20 to 35%	10-30 Med Dense	4-8 M/Stiff		Samples	3
UT: Undisturbed Thin-wall	and	35 to 50%	30-50 Dense	8-15 Stiff		HOLE NO	
			50 + Very Dense	15-30 V. Stiff			

WATER STREET EAST PROVIDENCE, R. I.

TO	Texas Instruments	ADDRESS	Attleboro, Mass.
PROJECT NAME	Radiological Survery @	LOCATION	Attleboro, Mass.
REPORT SENT TO	above / Haggerty Drive	PROJ NO	
SAMPLES SENT TO	Taken @ Site	OUR JOB NO	93-155

DATE
HOLE NO 175N-115E
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I.D.		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		

BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		0'-2'	D	9	21	13	Dense		Topsoil, Sand & Gravel	1	24"	21
				18	(3" S/S)							
		2'-4'	D	13	12	23	"			2	24"	21
				36	(2½" S/S)							
		4'-6'	D	44	45	38	Very		Gray fine to coarse SAND	3	24"	21
				38	(1-3/8")		Dense	6.0'				
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ " CASING: THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-155

HOLE NO 175N-115E
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At ____ after ____ Hours	Type		S/S	
	Size I D		Various	
At ____ after ____ Hours	Hammer Wt		300#	BIT
	Hammer Fall		24"	

	Date	Time
START	11/7/92	a.m. p.m.
COMPLETE	11/7/92	a.m. p.m.
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		0'-2'	D	9	21	13	Dense		Topsoil, Sand & Gravel	1	24"	21
				18	(3" S/S)							
		2'-4'	D	13	12	23	"			2	24"	21
				36	(2½" S/S)							
		4'-6'	D	44	45	38	Very		Gray fine to coarse SAND	3	24"	21
				38	(1-3/8")		Dense	6.0'				
									Bottom of Boring 6.0'			

GROUND SURFACE TO ____ USED ____ " CASING THEN ____

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO

EAST PROVIDENCE, R. I.

TO Texas Instruments

PROJECT NAME Radiological Survery @

REPORT SENT TO above / Haggerty Drive

SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.

LOCATION Attleboro, Mass.

PROJ NO

OUR JOB NO 93-155

HOLE NO 180N-167E

LINE & STA.

OFFSET

SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I.D.		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	

TOTAL HRS.

BORING FOREMAN J. Phillips

INSPECTOR

SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen	R
		0'-2'	D	5	8	10	Medium		Brown fine to coarse SAND,	1	24'	
				16	(3"	S/S)	Dense		Gravel, Silt (Fill)			
		2'-4'	D	11	6	6	"			2	24'	
				1	(2"	S/S)						
		4'-6'	D	2	5	16	"		Gray GRAVEL, Cobbles, lit. f-c SAND, (Possible Fill)	3	24'	
				7				6.0'				
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ " CASING: THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO ......

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO.
OUR JOB NO 93-155

HOLE NO 180N-167E
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		

BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	R
		0'-2'	D	5	8	10	Medium		Brown fine to coarse SAND,	1	24"	1
				16	(3"	S/S)	Dense		Gravel, Silt (Fill)			
		2'-4'	D	11	6	6	"			2	24"	5
				1	(2"	S/S)						
		4'-6'	D	2	5	16	"		Gray GRAVEL, Cobbles, lit. f-c SAND, (Possible Fill)	3	24"	8
				7				6.0'				
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ "CASING: THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO 180N-16

... WATER STREET EAST PROVIDENCE, R. I.

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-155

DATE
HOLE NO. 180N-167E
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	

TOTAL HRS.
BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	R...
		0'-2'	D	5	8	10	Medium		Brown fine to coarse SAND,	1	24'	1
				16	(3"	S/S)	Dense		Gravel, Silt (Fill)			
		2'-4'	D	11	6	6	"			2	24'	5
				1	(2½"	S/S)						
		4'-6'	D	2	5	16	"		Gray GRAVEL, Cobbles, lit.	3	24'	8
				7				6.0'	f-c SAND, (Possible Fill)			
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ " CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO.

TO Texas Instruments | ADDRESS Attleboro, Mass. | HOLE NO 190N - 12[illegible]

PROJECT NAME Radiological Survery @ | LOCATION Attleboro, Mass. | LINE & STA.

REPORT SENT TO above / Haggerty Drive | PROJ NO | OFFSET

SAMPLES SENT TO Taken @ Site | OUR JOB NO 93-155 | SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I.D.		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen	Rec
		0'-2'	D	1	6	7	Medium		TOPSOIL, Sand & Gravel	1	24"	9"
				8	(3"	D)	Dense					
		2'-4'	D	18	21	23	Dense		Gray fine to coarse GRAVEL	2	24"	4"
				34								
		4'-6'	D	19	34	31	Very		Brown Gray gravelly TILL	3	24"	1[illegible]
				19			Dense	6.0'				
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ " CASING: THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO. 190N - 12[illegible]

EAST PROVIDENCE, R I

TO	Texas Instruments	ADDRESS	Attleboro, Mass.
PROJECT NAME	Radiological Survery @	LOCATION	Attleboro, Mass.
REPORT SENT TO	above / Haggerty Drive	PROJ NO	
SAMPLES SENT TO	Taken @ Site	OUR JOB NO	93-155

DATE
HOLE NO 190N - 12[illegible]
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		

BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Re[illegible]
		0'-2'	D	1	6	7	Medium		TOPSOIL, Sand & Gravel	1	24"	9"
				8	(3"	ID)	Dense					
		2'-4'	D	18	21	23	Dense		Gray fine to coarse GRAVEL	2	24"	4"
				34								
		4'-6'	D	19	34	31	Very		Brown Gray gravelly TILL	3	24"	18
				19			Dense	6.0'				
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ " CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V. Stiff
		30 +	Hard

SUMMARY
Earth Boring 6'
Rock Coring ______
Samples 3

HOLE NO

EAST PROVIDENCE R I

TO Texas Instruments
ADDRESS Attleboro, Mass.
HOLE NO. 190N - 120
PROJECT NAME Radiological Survery @
LOCATION Attleboro, Mass.
LINE & STA.
REPORT SENT TO above / Haggerty Drive
OFFSET
PROJ NO
SAMPLES SENT TO Taken @ Site
OUR JOB NO 93-155
SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	

TOTAL HRS.
BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		0'-2'	D	1	6	7	Medium		TOPSOIL, Sand & Gravel	1	24'	9"
				8	(3"	ID)	Dense					
		2'-4'	D	18	21	23	Dense		Gray fine to coarse GRAVEL	2	24'	4"
				34								
		4'-6'	D	19	34	31	Very		Brown Gray gravelly TILL	3	24'	18
				19			Dense	6.0'				
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ " CASING: THEN

Sample Type
O: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO.

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-155

HOLE NO 190N-170E
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS			
At	after	Hours	
At	after	Hours	

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I.D.		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		

BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		0'-2'	D	8	14	11	Medium		Brown SAND, Gravel, Silt	1	24'	[illegible]
				16	(3" S/S)		Dense		(Fill)			
		2'-4'	D	7	6	9	"			2	24'	[illegible]
				10	(2½" S/S)			4.0'				
		4'-6'	D	2	1	2	Loose	5.0'	Loamy TOPSOIL & fine Sand	3	24'	[illegible]
				6	(1-3/8")			6.0'	Gray-Brn. f-m SAND, tr. Silt			
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ " CASING THEN ______

Sample Type
D = Dry C = Cored W = Washed
UP = Undisturbed Piston
TP = Test Pit A = Auger V = Vane Test
UT = Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO

TO Texas Instruments | ADDRESS Attleboro, Mass. | HOLE NO. 190N-170E

PROJECT NAME Radiological Survery @ | LOCATION Attleboro, Mass. | LINE & STA.

REPORT SENT TO above / Haggerty Drive | PROJ NO | OFFSET

SAMPLES SENT TO Taken @ Site | OUR JOB NO 93-155 | SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At ______ after ____ Hours	Type		S/S	
	Size I D		Various	
At ______ after ____ Hours	Hammer Wt		300#	BIT
	Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	R
		0'-2'	D	8	14	11	Medium		Brown SAND, Gravel, Silt	1	24"	1
				16	(3"	S/S)	Dense		(Fill)			
		2'-4'	D	7	6	9	"			2	24"	1
				10	(2½"	S/S)		4.0'				
		4'-6'	D	2	1	2	Loose	5.0'	Loamy TOPSOIL & fine Sand	3	24"	5
				6	(1-3	/8")		6.0'	Gray-Brn. f-m SAND, tr. Silt			
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ____ "CASING: THEN ______

Sample Type	Proportions Used		140 lb Wt. x 30" fall on 2" O D Sampler				SUMMARY
D: Dry C: Cored W: Washed	trace	0 to 10%	Cohesionless Density		Cohesive Consistency		Earth Boring 6'
UP: Undisturbed Piston	little	10 to 20%	0-10	Loose	0-4 Soft	30 + Hard	Rock Coring
TP: Test Pit A: Auger V: Vane Test	some	20 to 35%	10-30	Med. Dense	4-8 M/Stiff		Samples 3
UT: Undisturbed Thinwall	and	35 to 50%	30-50	Dense	8-15 Stiff		HOLE NO
			50 +	Very Dense	15-30 V-Stiff		

100 WATER STREET EAST PROVIDENCE, R I

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO.
OUR JOB NO 93-155

DATE
HOLE NO. 190N-170E
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS
At ______ after ______ Hours
At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	

TOTAL HRS.
BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		0'-2'	D	8	14	11	Medium		Brown SAND, Gravel, Silt	1	24"	18
				16	(3" S/S)		Dense		(Fill)			
		2'-4'	D	7	6	9	"			2	24"	12
				10	(2½" S/S)			4.0'				
		4'-6'	D	2	1	2	Loose	5.0'	Loamy TOPSOIL & fine Sand	3	24"	5"
				6	(1-3/8")			6.0'	Gray-Brn. f-m SAND, tr. Silt			
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ " CASING THEN ______

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%

140 lb Wt. x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency			
0-10	Loose	0-4	Soft	30 +	Hard
10-30	Med. Dense	4-8	M/Stiff		
30-50	Dense	8-15	Stiff		

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments | ADDRESS Attleboro, Mass. | DATE | HOLE NO 195N-130E
PROJECT NAME Radiological Survery @ | LOCATION Attleboro, Mass. | LINE & STA.
REPORT SENT TO above / Haggerty Drive | PROJ NO. | OFFSET
SAMPLES SENT TO Taken @ Site | OUR JOB NO 93-155 | SURF. ELEV.

GROUND WATER OBSERVATIONS
At No after ____ Hours
At ____ after ____ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I.D.		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Re
		0'-2'	D	1	4	6	Loose		Toposil, Sand & Gravel	1	24"	12
				7	(3"	S/S)						
		2'-4'	D	16	14	12	Medium		Gray SAND, Gravel, Cobbles	2	24"	4"
				23			Dense					
		4'-6'	D	10	7	12	"		"TILL"	3	24"	18
				8	(1-3/8")			6.0'				
									Bottom of Boring 6.0'			

GROUND SURFACE TO ____ USED ____ " CASING THEN ____

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 6'
Rock Coring ____
Samples 3

HOLE NO.

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-155

HOLE NO. 195N-130E
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At No after Hours

At after Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		

BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Re
		0'-2'	D	1	4	6	Loose		Toposil, Sand & Gravel	1	24"	12
				7	(3"	S/S)						
		2'-4'	D	16	14	12	Medium		Gray SAND, Gravel, Cobbles	2	24"	4"
				23			Dense					
		4'-6'	D	10	7	12	"		"TILL"	3	24"	18
				8	(1-3/8")			6.0'				
									Bottom of Boring 6.0'			

GROUND SURFACE TO USED "CASING THEN

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO

TO Texas Instruments | ADDRESS Attleboro, Mass. | HOLE NO 195N-130E

PROJECT NAME Radiological Survery @ | LOCATION Attleboro, Mass. | LINE & STA.

REPORT SENT TO above / Haggerty Drive | OFFSET

PROJ NO

SAMPLES SENT TO Taken @ Site | OUR JOB NO 93-155 | SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At No after ___ Hours	Type		S/S	
	Size I D		Various	
At ___ after ___ Hours	Hammer Wt		300#	BIT
	Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen	Re
		0'-2'	D	1	4	6	Loose		Toposil, Sand & Gravel	1	24"	12
				7	(3"	S/S)						
		2'-4'	D	16	14	12	Medium		Gray SAND, Gravel, Cobbles	2	24"	4"
				23			Dense					
		4'-6'	D	10	7	12	"		"TILL"	3	24"	18
				8	(1-3/8")			6.0'				
									Bottom of Boring 6.0'			

GROUND SURFACE TO ___ USED ___ " CASING THEN ___

Sample Type
D = Dry C = Cored W = Washed
UP = Undisturbed Piston
TP = Test Pit A = Auger V = Vane Test
UT = Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO

EAST PROVIDENCE, R. I.

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-155

HOLE NO. 195N-140I
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS
At ________ after ________ Hours
At ________ after ________ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I.D.		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		

BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen
		0'-2'	D	2	5	7	Medium		Topsoil, Sand & Gravel,	1	24"
				11			Dense		Silt		
		2'-4'	D	14	13	9	"		Gray SAND, Gravel, Cobbles	2	24"
				13							
		4'-6'	D	11	13	17	Dense		Brown Gray TILL	3	24"
				9				6.0'			
									Bottom of Boring 6.0'		

GROUND SURFACE TO ________ USED ________ "CASING THEN ________

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V. Stiff	

SUMMARY
Earth Boring 6
Rock Coring
Samples 3
HOLE NO.

TO Texas Instruments | ADDRESS Attleboro, Mass. | HOLE NO. 195N-140E
PROJECT NAME Radiological Survery @ | LOCATION Attleboro, Mass. | LINE & STA.
REPORT SENT TO above / Haggerty Drive | PROJ NO | OFFSET
SAMPLES SENT TO Taken @ Site | OUR JOB NO 93-155 | SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At ______ after ______ Hours	Type		S/S	
	Size I.D.		Various	
At ______ after ______ Hours	Hammer Wt		300#	BIT
	Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen	Rec
		0'-2'	D	2	5	7	Medium		Topsoil, Sand & Gravel,	1	24"	2
				11			Dense		Silt			
		2'-4'	D	14	13	9	"		Gray SAND, Gravel, Cobbles	2	24"	1
				13								
		4'-6'	D	11	13	17	Dense		Brown Gray TILL	3	24"	1
				9				6.0'				
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ " CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO.

100 WATER STREET EAST PROVIDENCE, R. I.

TO Texas Instruments | ADDRESS Attleboro, Mass. | DATE
PROJECT NAME Radiological Survery @ | LOCATION Attleboro, Mass. | HOLE NO. 195N-140
REPORT SENT TO above / Haggerty Drive | PROJ NO | LINE & STA.
SAMPLES SENT TO Taken @ Site | OUR JOB NO. 93-155 | OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At ____ after ____ Hours	Type		S/S	
	Size I.D.		Various	
At ____ after ____ Hours	Hammer Wt		300#	BIT
	Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen
		0'-2'	D	2	5	7	Medium		Topsoil, Sand & Gravel,	1	24"
				11			Dense		Silt		
		2'-4'	D	14	13	9	"		Gray SAND, Gravel, Cobbles	2	24"
				13							
		4'-6'	D	11	13	17	Dense		Brown Gray TILL	3	24"
				9				6.0'			
									Bottom of Boring 6.0'		

GROUND SURFACE TO ____ USED ____ " CASING: THEN ____

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 6
Rock Coring ____
Samples 3

HOLE NO.

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments ADDRESS Attleboro, Mass.
PROJECT NAME Radiological Survery @ LOCATION Attleboro, Mass.
REPORT SENT TO above / Haggerty Drive PROJ NO
SAMPLES SENT TO Taken @ Site OUR JOB NO 93-155

DATE
HOLE NO 202N-170E
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS
At ______ after ____ Hours
At ______ after ____ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	

TOTAL HRS.
BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		0'-2'	D	8	9	2	Medium		Brown SAND, Gravel, Topsoil	1	24"	18
				1	(3"	S/S)	Dense		(Fill)			
		2'-4'	D	8	6	2	Loose		WOOD, Sand, Gravel (Fill)	2	24"	4"
				1	(2½"	S/S)						
		4'-6'	D	1	0	1	Loose	5.5'		3	24"	9"
				5				6.0'	Gray f. SAND, tr. of Silt			
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ " CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO

TO Texas Instruments | ADDRESS Attleboro, Mass. | HOLE NO 202N-170E

PROJECT NAME Radiological Survery @ | LOCATION Attleboro, Mass. | LINE & STA.

REPORT SENT TO above / Haggerty Drive | PROJ NO | OFFSET

SAMPLES SENT TO Taken @ Site | OUR JOB NO. 93-155 | SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At ____ after ____ Hours	Type		S/S	
	Size I D		Various	
At ____ after ____ Hours	Hammer Wt		300#	BIT
	Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pe..	
		0'-2'	D	8	9	2	Medium		Brown SAND, Gravel, Topsoil	1	24"	1
				1	(3"	S/S)	Dense		(Fill)			
		2'-4'	D	8	6	2	Loose		WOOD, Sand, Gravel (Fill)	2	24"	4
				1	(2½"	S/S)						
		4'-6'	D	1	0	1	Loose	5.5'		3	24"	9
				5				6.0'	Gray f. SAND, tr. of Silt			
									Bottom of Boring 6.0'			

GROUND SURFACE TO ____ USED ____ " CASING THEN ____

Sample Type	Proportions Used		140 lb Wt. x 30" fall on 2" O.D. Sampler			SUMMARY	
D: Dry C: Cored W: Washed	trace	0 to 10%	Cohesionless Density	Cohesive Consistency		Earth Boring	6'
UP: Undisturbed Piston	little	10 to 20%	0-10 Loose	0-4 Soft	30 + Hard	Rock Coring	
TP: Test Pit A: Auger V: Vane Test	some	20 to 35%	10-30 Med Dense	4-8 M/Stiff		Samples	3
UT: Undisturbed Thinwall	and	35 to 50%	30-50 Dense	8-15 Stiff		HOLE NO	
			50 + Very Dense	15-30 V-Stiff			

100 WATER STREET EAST PROVIDENCE, R. I.

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-155

HOLE NO 202N-170E
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At ____ after ____ Hours	Type		S/S	
At ____ after ____ Hours	Size I D		Various	
	Hammer Wt		300#	BIT
	Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	

TOTAL HRS.
BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		0'-2'	D	8	9	2	Medium		Brown SAND, Gravel, Topsoil	1	24"	18
				1	(3"	S/S)	Dense		(Fill)			
		2'-4'	D	8	6	2	Loose		WOOD, Sand, Gravel (Fill)	2	24"	4"
				1	(2½"	S/S)						
		4'-6'	D	1	0	1	Loose	5.5'		3	24"	9"
				5				6.0'	Gray f. SAND, tr. of Silt			
									Bottom of Boring 6.0'			

GROUND SURFACE TO ____ USED ____ " CASING THEN ____

Sample Type	Proportions Used		140 lb Wt. x 30" fall on 2" O.D. Sampler Cohesionless Density		Cohesive Consistency	
D: Dry C: Cored W: Washed	trace	0 to 10%	0-10	Loose	0-4 Soft	30 + Hard
UP: Undisturbed Piston	little	10 to 20%	10-30	Med. Dense	4-8 M/Stiff	
TP: Test Pit A: Auger V: Vane Test	some	20 to 35%	30-50	Dense	8-15 Stiff	
UT: Undisturbed Thinwall	and	35 to 50%	50 +	Very Dense	15-30 V-Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO

100 WATER STREET EAST PROVIDENCE R. I

TO	Texas Instruments
PROJECT NAME	Radiological Survery @
REPORT SENT TO	above / Haggerty Drive
SAMPLES SENT TO	Taken @ Site
ADDRESS	Attleboro, Mass.
LOCATION	Attleboro, Mass.
PROJ NO	
OUR JOB NO	93-155
DATE	
HOLE NO	204N-162E
LINE & STA	
OFFSET	
SURF. ELEV.	

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I.D.		Various	
Hammer Wt.		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen
		0'-2'	D	2	3	8	Medium		Brown SAND, Topsoil (Fill)	1	24'
				5			Dense				
		2'-3.5'	D	1	2	21	"		Brn. f-c SAND & Gravel,	2	-
								3.5'	Silt (Fill)		
									Bottom of Boring 3.5'		
									(Soft bouncing resistance)		

GROUND SURFACE TO ______ USED ______ " CASING THEN ______

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%

140 lb Wt x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	

SUMMARY
Earth Boring 3.5
Rock Coring
Samples 2

100 WATER STREET EAST PROVIDENCE, R. I.

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-155

DATE
HOLE NO 204N-162E
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I.D.		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS		

BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen
		0'-2'	D	2	3	8	Medium		Brown SAND, Topsoil (Fill)	1	24"
				5			Dense				
		2'-3.5'	D	1	2	21	"		Brn. f-c SAND & Gravel,	2	-
								3.5'	Silt (Fill)		
									Bottom of Boring 3.5'		
									(Soft bouncing resistance)		

GROUND SURFACE TO ______ USED ______ " CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%

140 lb Wt x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency			
0-10	Loose	0-4	Soft	30 +	Hard
10-30	Med Dense	4-8	M/Stiff		
30-50	Dense	8-15	Stiff		

SUMMARY
Earth Boring 3.
Rock Coring
Samples 2

HOLE NO.

100 WATER STREET EAST PROVIDENCE, R. I.

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-155

DATE
HOLE NO 204N-162E
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	

TOTAL HRS.
BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Re
		0'-2'	D	2	3	8	Medium		Brown SAND, Topsoil (Fill)	1	24"	20
				5			Dense					
		2'-3.5'	D	1	2	21	"		Brn. f-c SAND & Gravel,	2	-	-
								3.5'	Silt (Fill)			
									Bottom of Boring 3.5'			
									(Soft bouncing resistance)			

GROUND SURFACE TO ______ USED ______" CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	

SUMMARY
Earth Boring 3.5'
Rock Coring
Samples 2

HOLE NO

100 WATER STREET EAST PROVIDENCE R I

DATE
HOLE NO 205N-150E
LINE & STA.
OFFSET
SURF. ELEV.

TO Texas Instruments
ADDRESS Attleboro, Mass.
PROJECT NAME Radiological Survery @
LOCATION Attleboro, Mass.
REPORT SENT TO above / Haggerty Drive
PROJ NO
SAMPLES SENT TO Taken @ Site
OUR JOB NO 93-155

GROUND WATER OBSERVATIONS
At ______ after ______ Hours
At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size ID		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen
		0'-2'	D	2	5	6	Medium		Brown-Red SAND, Gravel,	1	24"
				11	(3"	S/S)	Dense		Cinder (Fill)		
		2'-3'	D	3	17		"		Brown SAND & Gravel, Cinder	2	12"
								3.0'	Fill (Refusal)		
									Bottom of Boring 3.0'		

GROUND SURFACE TO ______ USED ______ "CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%

140 lb Wt x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	

SUMMARY
Earth Boring 3
Rock Coring
Samples 2

HOLE NO

100 WATER STREET EAST PROVIDENCE, R. I.

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-155

DATE
HOLE NO 205N-150E
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS
At ______ after ______ Hours
At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		

BORING FOREMAN J. Phillips
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen
		0'-2'	D	2	5	6	Medium		Brown-Red SAND, Gravel,	1	24"
				11	(3"	S/S)	Dense		Cinder (Fill)		
		2'-3'	D	3	17				Brown SAND & Gravel, Cinder	2	12"
								3.0'	Fill (Refusal)		
									Bottom of Boring 3.0'		

GROUND SURFACE TO ______ USED ______ " CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 3
Rock Coring
Samples 2

HOLE NO

100 WATER STREET EAST PROVIDENCE, R. I.

TO Texas Instruments
PROJECT NAME Radiological Survery @
REPORT SENT TO above / Haggerty Drive
SAMPLES SENT TO Taken @ Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-155

HOLE NO 205N-150E
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At ____ after ____ Hours	Type		S/S	
	Size I.D.		Various	
At ____ after ____ Hours	Hammer Wt		300#	BIT
	Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen
		0'-2'	D	2	5	6	Medium		Brown-Red SAND, Gravel,	1	24"
				11	(3"	S/S)	Dense		Cinder (Fill)		
		2'-3'	D	3	17		v		Brown SAND & Gravel, Cinder	2	12"
								3.0'	Fill (Refusal)		
									Bottom of Boring 3.0'		

GROUND SURFACE TO ____ USED ____ " CASING THEN ____

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency			
0-10	Loose	0-4	Soft	30 +	Hard
10-30	Med. Dense	4-8	M/Stiff		
30-50	Dense	8-15	Stiff		
50 +	Very Dense	15-30	V-Stiff		

SUMMARY
Earth Boring ____
Rock Coring ____
Samples ____

HOLE NO. 205N-

100 WATER STREET EAST PROVIDENCE, R I

TO Texas Instruments

ADDRESS Attleboro, Mass.

PROJECT NAME Radiological Survery @

LOCATION Attleboro, Mass.

REPORT SENT TO above / Haggerty Drive

PROJ NO

SAMPLES SENT TO Taken @ Site

OUR JOB NO 93-155

DATE

HOLE NO 205N-151E

LINE & STA.

OFFSET

SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At ____ after ____ Hours	Type		S/S	
	Size I.D		Various	
At ____ after ____ Hours	Hammer Wt		300#	BIT
	Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen
		0'-2'	D	3	5	7	Medium		Brown SAND, Gravel, Cinder	1	24"
				9	(3"	S/S)	Dense		(Fill)		
		2'-4'	D	5	3	2	Loose			2	24"
				2	(2½"	S/S)					
		4'-6'	D	3	2	5	Loose	5.0'		3	24"
				8	(1-3/8")			6.0'	Gray f. SAND, little Silt		
									Bottom of Boring 6.0'		

GROUND SURFACE TO ______ USED ______ " CASING: THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	

SUMMARY
Earth Boring 6
Rock Coring
Samples 3

100 WATER STREET EAST PROVIDENCE R I

TO	Texas Instruments	ADDRESS	Attleboro, Mass.
PROJECT NAME	Radiological Survery @	LOCATION	Attleboro, Mass.
REPORT SENT TO	above / Haggerty Drive	PROJ NO	
SAMPLES SENT TO	Taken @ Site	OUR JOB NO	93-155

DATE
HOLE NO 205N-151E
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		Various	
Hammer Wt		300#	BIT
Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	R
		0'-2'	D	3	5	7	Medium		Brown SAND, Gravel, Cinder	1	24"	
				9	(3"	S/S)	Dense		(Fill)			
		2'-4'	D	5	3	2	Loose			2	24"	
				2	(2½"	S/S)						
		4'-6'	D	3	2	5	Loose	5.0'		3	24"	
				8	(1-3/8")			6.0'	Gray f. SAND, little Silt			
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ " CASING THEN ______

Sample Type	Proportions Used		140 lb Wt. x 30" fall on 2" O D Sampler Cohesionless Density		Cohesive Consistency			SUMMARY
D: Dry C: Cored W: Washed	trace	0 to 10%	0-10	Loose	0-4	Soft	30 + Hard	Earth Boring 6
UP: Undisturbed Piston	little	10 to 20%	10-30	Med Dense	4-8	M/Stiff		Rock Coring
TP: Test Pit A: Auger V: Vane Test	some	20 to 35%	30-50	Dense	8-15	Stiff		Samples 3
UT: Undisturbed Thinwall	and	35 to 50%	50 +	Very Dense	15-30	V-Stiff		HOLE NO

TO Texas Instruments	ADDRESS Attleboro, Mass.		HOLE NO. 205N-151E
PROJECT NAME Radiological Survery @	LOCATION Attleboro, Mass.		LINE & STA.
REPORT SENT TO above / Haggerty Drive		PROJ NO	OFFSET
SAMPLES SENT TO Taken @ Site		OUR JOB NO 93-155	SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At ______ after ____ Hours	Type		S/S	
	Size I D		Various	
At ______ after ____ Hours	Hammer Wt		300#	BIT
	Hammer Fall		24"	

	Date	Time
START	11/7/92	
COMPLETE	11/7/92	
TOTAL HRS.		
BORING FOREMAN	J. Phillips	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	R
		0'-2'	D	3	5	7	Medium		Brown SAND, Gravel, Cinder	1	24"	[illegible]
				9	(3"	S/S)	Dense		(Fill)			
		2'-4'	D	5	3	2	Loose			2	24"	[illegible]
				2	(2½"	S/S)						
		4'-6'	D	3	2	5	Loose	5.0'		3	24"	[illegible]
				8	(1-3/8")			6.0'	Gray f. SAND, little Silt			
									Bottom of Boring 6.0'			

GROUND SURFACE TO ______ USED ______ " CASING: THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO

GUILD DRILLING CO., INC.

100 WATER STREET, EAST PROVIDENCE, R.I. 02914
(401) 434-0750

Subject: Boring Data - Radiological Survey @ T.I.

Location: Attleboro, Mass. (Haggerty Drive)

Our Job No: 93-184

Your Project or Contract No.

Date: January 4, 1993

Via: fcm

To: Texas Instruments
34 Forest Street
Attleboro, Mass. 03703

Attention of: Linda Armstrong

Copies / or Sets	DESCRIPTION
3	Boring Reports: 1 through 12, OW-1, OW-2 and OW-3.

SAMPLES: Taken at Site.

Remarks: Project complete.

By: ____________________

L. L. MORRIS

cc:

100 WATER STREET EAST PROVIDENCE, R I

TO Texas Instruments

PROJECT NAME Radiological Survey @ T.I.

REPORT SENT TO above

SAMPLES SENT TO Taken at Site

ADDRESS Attleboro, Mass.

LOCATION Attleboro, Mass.

PROJ NO

OUR JOB NO 93-184

DATE

HOLE NO 1

LINE & STA

OFFSET

SURF. ELEV.

GROUND WATER OBSERVATIONS

At 3' after Hours

At after Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size ID		*	
Hammer Wt		300#	BIT
Hammer Fall		30"	

	Date	Time
START	12/29/92	
COMPLETE	12/29/92	
TOTAL HRS.		
BORING FOREMAN	K. Allen	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING 160 N - 95 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen
		0'-2'	D	11	13	9			Brown Gray fine to coarse SAND & Gravel, trace boulders & silt	1	24"
						8					
		2'-4'	D	3	4	8				2	24"
						11					
		4'-6'	D	10	27	37				3	24"
						33		6'			
									Bottom of Boring 6'		

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

GROUND SURFACE TO USED "CASING THEN

Sample Type

D: Dry C: Cored W: Washed

UP: Undisturbed Piston

TP: Test Pit A: Auger V: Vane Test

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%

140 lb Wt x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	

SUMMARY

Earth Boring 6'

Rock Coring

Samples 3

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments
ADDRESS Attleboro, Mass.
PROJECT NAME Radiological Survey @ T.I.
LOCATION Attleboro, Mass.
REPORT SENT TO above
PROJ NO
SAMPLES SENT TO Taken at Site
OUR JOB NO 93-184

HOLE NO. 1
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At 3' after ___ Hours

At ___ after ___ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I.D.		*	
Hammer Wt		300#	BIT
Hammer Fall		30"	

	Date	Time
START	12/29/92	
COMPLETE	12/29/92	
TOTAL HRS.		

BORING FOREMAN K. Allen
INSPECTOR
SOILS ENGR.

LOCATION OF BORING 160 N - 95 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	R
		0'-2'	D	11	13	9			Brown Gray fine to coarse SAND & Gravel, trace boulders & silt	1	24"	7
						8						
		2'-4'	D	3	4	8				2	24"	1
						11						
		4'-6'	D	10	27	37				3	24"	1
						33		6'				
									Bottom of Boring 6'			

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

GROUND SURFACE TO ___ USED ___ " CASING THEN ___

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY:
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO 1

100 WATER STREET EAST PROVIDENCE R I

TO	Texas Instruments	ADDRESS	Attleboro, Mass.
PROJECT NAME	Radiological Survey @ T.I.	LOCATION	Attleboro, Mass.
REPORT SENT TO	above	PROJ NO	
SAMPLES SENT TO	Taken at Site	OUR JOB NO	93-184

DATE
HOLE NO 1
LINE & STA
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At 3' after ___ Hours

At ___ after ___ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		*	
Hammer Wt		300#	BIT
Hammer Fall		30"	

	Date	Time
START	12/29/92	
COMPLETE	12/29/92	
TOTAL HRS.		

BORING FOREMAN K. Allen
INSPECTOR
SOILS ENGR.

LOCATION OF BORING 160 N - 95 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	R
		0'-2'	D	11	13	9			Brown Gray fine to coarse SAND & Gravel, trace boulders & silt	1	24"	
						8						
		2'-4'	D	3	4	8				2	24"	
						11						
		4'-6'	D	10	27	37				3	24"	
						33		6'				
									Bottom of Boring 6'			

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

GROUND SURFACE TO ___ USED ___ " CASING THEN ___

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless	Density	Cohesive	Consistency
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
		30 +	Hard

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO. 1

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments | ADDRESS Attleboro, Mass.
PROJECT NAME Radiological Survey @ T.I. | LOCATION Attleboro, Mass.
REPORT SENT TO above | PROJ NO
SAMPLES SENT TO Taken at Site | OUR JOB NO 93-184

HOLE NO 2
LINE & STA
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS
At 3' after ___ Hours
At ___ after ___ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I.D.		*	
Hammer Wt		300#	BIT
Hammer Fall		30"	

	Date	Time
START	12/29/92	
COMPLETE	12/29/92	
TOTAL HRS.		
BORING FOREMAN	K. Allen	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING 170 N - 90 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	12-18 To	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen
		0'-2'	D	36	40	26			Brown Gray fine to coarse SAND & Gravel, trace boulders & silt	1	24"
						24					
		2'-4'	D	24	26	24				2	24"
						50					
		4'-6'	D	26	24	30				3	24"
						45		6'			
									Bottom of Boring 6'		

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

GROUND SURFACE TO ___ USED ___ CASING THEN ___

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%

140 lb Wt x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency			
0-10	Loose	0-4	Soft	30 +	Hard
10-30	Med Dense	4-8	M/Stiff		
30-50	Dense	8-15	Stiff		

SUMMARY
Earth Boring
Rock Coring
Samples
HOLE NO.

100 WATER STREET EAST PROVIDENCE, R. I.

TO Texas Instruments
ADDRESS Attleboro, Mass.
PROJECT NAME Radiological Survey @ T.I.
LOCATION Attleboro, Mass.
REPORT SENT TO above
PROJ NO
SAMPLES SENT TO Taken at Site
OUR JOB NO 93-184

HOLE NO 2
LINE & STA
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At 3' after ___ Hours	Type		S/S	
	Size I.D.		*	
At ___ after ___ Hours	Hammer Wt		300#	BIT
	Hammer Fall		30"	

	Date	Time
START	12/29/92	
COMPLETE	12/29/92	
TOTAL HRS.		
BORING FOREMAN	K. Allen	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING 170 N - 90 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen
		0'-2'	D	36	40	26			Brown Gray fine to coarse	1	24"
						24			SAND & Gravel, trace		
		2'-4'	D	24	26	24			boulders & silt	2	24"
						50					
		4'-6'	D	26	24	30				3	24"
						45		6'			
									Bottom of Boring 6'		

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

GROUND SURFACE TO ___ USED ___ " CASING THEN ___

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 6
Rock Coring
Samples 3

HOLE NO 2

100 WATER STREET EAST PROVIDENCE, R. I.

TO Texas Instruments | ADDRESS Attleboro, Mass.

PROJECT NAME Radiological Survey @ T.I. | LOCATION Attleboro, Mass.

REPORT SENT TO above | PROJ NO

SAMPLES SENT TO Taken at Site | OUR JOB NO 93-184

DATE

HOLE NO 2

LINE & STA.

OFFSET

SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At 3' after ___ Hours	Type		S/S	
	Size I.D.		*	
At ___ after ___ Hours	Hammer Wt.		300#	BIT
	Hammer Fall		30"	

	Date	Time
START	12/29/92	
COMPLETE	12/29/92	
TOTAL HRS.		
BORING FOREMAN	K. Allen	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING 170 N - 90 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen
		0'-2'	D	36	40	26			Brown Gray fine to coarse SAND & Gravel, trace boulders & silt	1	24"
						24					
		2'-4'	D	24	26	24				2	24"
						50					
		4'-6'	D	26	24	30				3	24"
						45		6'			
									Bottom of Boring 6'		

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

GROUND SURFACE TO ___ USED ___ " CASING THEN ___

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%

140 lb Wt x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO 2

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments
ADDRESS Attleboro, Mass.
PROJECT NAME Radiological Survey @ T.I.
LOCATION Attleboro, Mass.
REPORT SENT TO above
PROJ NO
SAMPLES SENT TO Taken at Site
OUR JOB NO 93-184

DATE
HOLE NO 3
LINE & STA
OFFSET
SURF ELEV

GROUND WATER OBSERVATIONS
At 3' after Hours
At after Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size D		*	
Hammer Wt		300#	BIT
Hammer Fall		30"	

	Date	Time
START	12/29/92	
COMPLETE	12/29/92	
TOTAL HRS		
BORING FOREMAN	K. Allen	
INSPECTOR		
SOILS ENGR		

LOCATION OF BORING 160 N - 90 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen
		0'-2'	D	40	24	17			Gray Brown fine to coarse	1	24"
						12			SAND & Gravel, trace		
		2'-4'	D	32	40	37			boulders & silt	2	24"
						45					
		4'-6'	D	17	13	42				3	24"
						68		6'			
									Bottom of Boring 6'		

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

GROUND SURFACE TO USED "CASING THEN

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density	
0-10	Loose
10-30	Med Dense
30-50	Dense

Cohesive Consistency		
0-4	Soft	30 + Hard
4-8	M/Stiff	
8-15	Stiff	

SUMMARY
Earth Boring 6
Rock Coring
Samples 3

HOLE NO 3

100 WATER STREET EAST PROVIDENCE, R I

TO Texas Instruments	ADDRESS Attleboro, Mass.	HOLE NO 3
PROJECT NAME Radiological Survey @ T.I.	LOCATION Attleboro, Mass.	LINE & STA
REPORT SENT TO above	PROJ NO	OFFSET
SAMPLES SENT TO Taken at Site	OUR JOB NO 93-184	SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR		Date	Time
At 3' after hours	Type		S/S		START	12/29/92	
	Size D		*		COMPLETE	12/29/92	
At after hours	Hammer Wt		300#	BIT	TOTAL HRS.		
	Hammer Fall		30"		BORING FOREMAN	K. Allen	
					INSPECTOR		
					SOILS ENGR.		

LOCATION OF BORING 160 N - 90 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	12-18 To	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen
		0'-2'	D	40	24	17			Gray Brown fine to coarse	1	24"
						12			SAND & Gravel, trace		
		2'-4'	D	32	40	37			boulders & silt	2	24"
						45					
		4'-6'	D	17	13	42				3	24"
						68		6'			
									Bottom of Boring 6'		

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

GROUND SURFACE TO USED "CASING THEN

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 6
Rock Coring
Samples 3

HOLE NO

100 WATER STREET EAST PROVIDENCE, R. I.

TO: Texas Instruments | ADDRESS: Attleboro, Mass.
PROJECT NAME: Radiological Survey @ T.I. | LOCATION: Attleboro, Mass.
REPORT SENT TO: above | PROJ NO:
SAMPLES SENT TO: Taken at Site | OUR JOB NO: 93-184

HOLE NO: 3
LINE & STA:
OFFSET:
SURF. ELEV.:

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At 3' after ___ Hours	Type		S/S	
	Size I.D.		*	
At ___ after ___ Hours	Hammer Wt		300#	BIT
	Hammer Fall		30"	

	Date	Time
START	12/29/92	
COMPLETE	12/29/92	
TOTAL HRS.		
BORING FOREMAN	K. Allen	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING: 160 N - 90 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen	R
		0'-2'	D	40	24	17			Gray Brown fine to coarse	1	24"	
						12			SAND & Gravel, trace			
		2'-4'	D	32	40	37			boulders & silt	2	24"	
						45						
		4'-6'	D	17	13	42				3	24"	
						68		6'				
									Bottom of Boring 6'			

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

GROUND SURFACE TO ___ USED ___ " CASING THEN ___

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO 3

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments	ADDRESS Attleboro, Mass.	DATE
PROJECT NAME Radiological Survey @ T.I.	LOCATION Attleboro, Mass.	HOLE NO 4
REPORT SENT TO above	PROJ NO	LINE & STA
SAMPLES SENT TO Taken at Site	OUR JOB NO 93-184	OFFSET
		SURF ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR		Date	Time
At 3' after ___ Hours	Type		S/S		START	12/29/92	
	Size D		*		COMPLETE	12/29/92	
At ___ after ___ Hours	Hammer Wt		300#	BIT	TOTAL HRS		
	Hammer Fall		30"		BORING FOREMAN	K. Allen	
					INSPECTOR		
					SOILS ENGR.		

LOCATION OF BORING 172.5 N - 85 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen
		0'-2'	D	26	63	36			Brown Gray fine to coarse SAND & Gravel, trace boulders & silt	1	24"
						45					
		2'-4'	D	17	20	27				2	24"
						48					
		4'-6'	D	26	46	48				3	24"
						35		6'			
									Bottom of Boring 6'		
								* Note:	Used 2-7/8" Spoon for Sample #1		
									Used 2-3/8" Spoon for Sample #2		
									Used 1-7/8" Spoon for Sample #3		

GROUND SURFACE TO ___ USED ___ " CASING THEN ___

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%

140 lb Wt x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
		30 +	Hard

SUMMARY
Earth Boring 6
Rock Coring
Samples 3

HOLE NO 4

100 WATER STREET EAST PROVIDENCE, R I

TO	Texas Instruments
PROJECT NAME	Radiological Survey @ T.I.
REPORT SENT TO	above
SAMPLES SENT TO	Taken at Site
ADDRESS	Attleboro, Mass.
LOCATION	Attleboro, Mass.
PROJ NO	
OUR JOB NO	93-184
HOLE NO	4
LINE & STA	
OFFSET	
SURF. ELEV.	

GROUND WATER OBSERVATIONS			CASING	SAMPLER	CORE BAR
At 3' after ___ Hours		Type		S/S	
At ___ after ___ Hours		Size D		*	
		Hammer Wt		300#	BIT
		Hammer Fall		30"	

	Date	Time
START	12/29/92	
COMPLETE	12/29/92	
TOTAL HRS.		
BORING FOREMAN	K. Allen	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING 172.5 N - 85 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	R
		0'-2'	D	26	63	36			Brown Gray fine to coarse SAND & Gravel, trace boulders & silt	1	24"	1
						45						
		2'-4'	D	17	20	27				2	24"	1
						48						
		4'-6'	D	26	46	48				3	24"	1
						35		6'				
									Bottom of Boring 6'			

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

GROUND SURFACE TO ______ USED ______ " CASING THEN ______

Sample Type	Proportions Used	140 lb Wt. x 30" fall on 2" O.D. Sampler		SUMMARY
D: Dry C: Cored W: Washed	trace 0 to 10%	Cohesionless Density	Cohesive Consistency	Earth Boring 6'
UP: Undisturbed Piston	little 10 to 20%	0-10 Loose	0-4 Soft 30 + Hard	Rock Coring
TP: Test Pit A: Auger V: Vane Test	some 20 to 35%	10-30 Med Dense	4-8 M/Stiff	Samples 3
UT: Undisturbed Thinwall	and 35 to 50%	30-50 Dense	8-15 Stiff	HOLE NO 4
		50 + Very Dense	15-30 V-Stiff	

100 WATER STREET EAST PROVIDENCE, R. I.

TO	Texas Instruments	ADDRESS	Attleboro, Mass.
PROJECT NAME	Radiological Survey @ T.I.	LOCATION	Attleboro, Mass.
REPORT SENT TO	above	PROJ NO	
SAMPLES SENT TO	Taken at Site	OUR JOB NO	93-184

DATE

HOLE NO 4

LINE & STA

OFFSET

SURF ELEV.

GROUND WATER OBSERVATIONS

At 3' after ___ Hours

At ___ after ___ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I.D.		*	
Hammer Wt		300#	BIT
Hammer Fall		30"	

	Date	Time
START	12/29/92	
COMPLETE	12/29/92	

TOTAL HRS.

BORING FOREMAN K. Allen

INSPECTOR

SOILS ENGR.

LOCATION OF BORING 172.5 N - 85 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	R
		0'-2'	D	26	63	36			Brown Gray fine to coarse SAND & Gravel, trace boulders & silt	1	24"	1
						45						
		2'-4'	D	17	20	27				2	24"	1
						48						
		4'-6'	D	26	46	48				3	24"	1
						35		6'				
									Bottom of Boring 6'			

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

GROUND SURFACE TO ___ USED ___ CASING THEN ___

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%

140 lb Wt x 30" fall on 2" O.D. Sampler

Cohesionless Density
0-10 Loose
10-30 Med Dense
30-50 Dense

Cohesive Consistency
0-4 Soft
4-8 M/Stiff
8-15 Stiff
30 + Hard

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO 4

100 WATER STREET EAST PROVIDENCE R I

TO	Texas Instruments	ADDRESS	Attleboro, Mass.
PROJECT NAME	Radiological Survey @ T.I	LOCATION	Attleboro, Mass.
REPORT SENT TO	above	PROJ NO	
SAMPLES SENT TO	Taken at Site	OUR JOB NO	93-184

HOLE NO. 5
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At 3' after ___ Hours	Type		S/S	
	Size D		*	
At ___ after ___ Hours	Hammer Wt		300#	BIT
	Hammer Fall		30"	

	Date	Time
START	12/29/92	
COMPLETE	12/29/92	
TOTAL HRS.		
BORING FOREMAN	K. Allen	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING 175 N - 90 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen
		0'-2'	D	18	22	22			Brown Gray fine to coarse	1	24"
						20			SAND & Gravel, trace silt		
		2'-4'	D	18	14	15			& boulders	2	24"
						18		4'			
									Bottom of Boring 4'		

* Note: Used 2-3/8" Spoon for Sample #1

Used 1-7/8" Spoon for Sample #2

GROUND SURFACE TO ______ USED ______ " CASING THEN ______

Sample Type	Proportions Used		140 lb Wt x 30" fall on 2" O.D. Sampler Cohesionless Density		Cohesive Consistency			SUMMARY
D: Dry C: Cored W: Washed	trace	0 to 10%	0-10	Loose	0-4	Soft	30 + Hard	Earth Boring 4
UP: Undisturbed Piston	little	10 to 20%	10-30	Med Dense	4-8	M/Stiff		Rock Coring
TP: Test Pit A: Auger V: Vane Test	some	20 to 35%	30-50	Dense	8-15	Stiff		Samples 2
UT: Undisturbed Thinwall	and	35 to 50%	50 +	Very Dense	15-30	V-Stiff		HOLE NO. 5

100 WATER STREET EAST PROVIDENCE, R. I.

TO Texas Instruments ADDRESS Attleboro, Mass. HOLE NO 5

PROJECT NAME Radiological Survey @ T.I LOCATION Attleboro, Mass. LINE & STA.

REPORT SENT TO above PROJ NO OFFSET

SAMPLES SENT TO Taken at Site OUR JOB NO 93-184 SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At 3' after Hours	Type		S/S	
	Size I D		*	
At after Hours	Hammer Wt		300#	BIT
	Hammer Fall		30"	

	Date	Time
START	12/29/92	
COMPLETE	12/29/92	
TOTAL HRS.		
BORING FOREMAN	K. Allen	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING 175 N - 90 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	R
		0'-2'	D	18	22	22			Brown Gray fine to coarse	1	24"	1
						20			SAND & Gravel, trace silt			
		2'-4'	D	18	14	15			& boulders	2	24"	1
						18		4'				
									Bottom of Boring 4'			

* Note: Used 2-3/8" Spoon for Sample #1

Used 1-7/8" Spoon for Sample #2

GROUND SURFACE TO USED "CASING THEN

Sample Type	Proportions Used		140lb Wt x 30" fall on 2" O D Sampler				SUMMARY	
			Cohesionless Density		Cohesive Consistency			
D: Dry C: Cored W: Washed	trace	0 to 10%	0-10	Loose	0-4 Soft	30 + Hard	Earth Boring	4'
UP: Undisturbed Piston	little	10 to 20%	10-30	Med Dense	4-8 M/Stiff		Rock Coring	
TP: Test Pit A: Auger V: Vane Test	some	20 to 35%	30-50	Dense	8-15 Stiff		Samples	2
UT: Undisturbed Thinwall	and	35 to 50%	50 +	Very Dense	15-30 V-Stiff		HOLE NO	5

100 WATER STREET EAST PROVIDENCE, R I

TO Texas Instruments

ADDRESS Attleboro, Mass.

PROJECT NAME Radiological Survey @ T.I.

LOCATION Attleboro, Mass.

REPORT SENT TO above

PROJ NO

SAMPLES SENT TO Taken at Site

OUR JOB NO 93-184

HOLE NO 5

LINE & STA

OFFSET

SURF. ELEV.

GROUND WATER OBSERVATIONS	
At 3' after ___ Hours	
At ___ after ___ Hours	

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size D		*	
Hammer Wt		300#	BIT
Hammer Fall		30"	

	Date	Time
START	12/29/92	
COMPLETE	12/29/92	
TOTAL HRS.		
BORING FOREMAN	K. Allen	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING 175 N - 90 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen
		0'-2'	D	18	22	22			Brown Gray fine to coarse	1	24"
						20			SAND & Gravel, trace silt		
		2'-4'	D	18	14	15			& boulders	2	24"
						18		4'			
									Bottom of Boring 4'		
							* Note:		Used 2-3/8" Spoon for Sample #1		
									Used 1-7/8" Spoon for Sample #2		

GROUND SURFACE TO ______ USED ______ "CASING THEN ______

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring
Rock Coring
Samples

HOLE NO

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments | ADDRESS Attleboro, Mass.

PROJECT NAME Radiological Survey @ T.I. | LOCATION Attleboro, Mass.

REPORT SENT TO above | PROJ NO

SAMPLES SENT TO Taken at Site | OUR JOB NO 93-184

DATE

HOLE NO 6

LINE & STA

OFFSET

SURF. ELEV.

GROUND WATER OBSERVATIONS

At 3' after Hours

At after Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		*	
Hammer Wt		300#	BIT
Hammer Fall		30"	

	Date	Time
START	12/29/92	
COMPLETE	12/29/92	
TOTAL HRS.		
BORING FOREMAN	K. Allen	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING 180 N - 100 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen
		0'-2'	D	42	36	40			Black Gray fine to coarse SAND & Gravel, trace boulders & silt	1	24"
						64					
		2'-4'	D	20	25	30				2	24"
						27					
		4'-6'	D	25	36	34				3	24"
						30		6'			
									Bottom of Boring 6'		

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

GROUND SURFACE TO USED CASING THEN

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%

140 lb Wt x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	

SUMMARY
Earth Boring 6
Rock Coring
Samples 3

HOLE NO. 6

100 WATER STREET EAST PROVIDENCE, R I

TO Texas Instruments
PROJECT NAME Radiological Survey @ T.I.
REPORT SENT TO above
SAMPLES SENT TO Taken at Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-184

DATE
HOLE NO 6
LINE & STA
OFFSET
SURF ELEV

GROUND WATER OBSERVATIONS

At 3' after ____ Hours

At ____ after ____ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size ID		*	
Hammer Wt		300#	BIT
Hammer Fall		30"	

	Date	Time
START	12/29/92	
COMPLETE	12/29/92	
TOTAL HRS		

BORING FOREMAN K. Allen
INSPECTOR
SOILS ENGR

LOCATION OF BORING 180 N - 100 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Re
		0'-2'	D	42	36	40			Black Gray fine to coarse SAND & Gravel, trace boulders & silt	1	24"	1
						64						
		2'-4'	D	20	25	30				2	24"	1
						27						
		4'-6'	D	25	36	34				3	24"	2
						30		6'				
									Bottom of Boring 6'			
								* Note:	Used 2-7/8" Spoon for Sample #1 Used 2-3/8" Spoon for Sample #2 Used 1-7/8" Spoon for Sample #3			

GROUND SURFACE TO ____ USED ____ " CASING THEN ____

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

100 WATER STREET EAST PROVIDENCE, R I

TO Texas Instruments
ADDRESS Attleboro, Mass.
PROJECT NAME Radiological Survey @ T.I.
LOCATION Attleboro, Mass.
REPORT SENT TO above
PROJ NO
SAMPLES SENT TO Taken at Site
OUR JOB NO 93-184

DATE
HOLE NO. 6
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At 3' after ____ Hours

At ____ after ____ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I.D.		*	
Hammer Wt		300#	BIT
Hammer Fall		30"	

	Date	Time
START	12/29/92	
COMPLETE	12/29/92	

TOTAL HRS.
BORING FOREMAN K. Allen
INSPECTOR
SOILS ENGR.

LOCATION OF BORING 180 N - 100 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Re
		0'-2'	D	42	36	40			Black Gray fine to coarse SAND & Gravel, trace boulders & silt	1	24"	1
						64						
		2'-4'	D	20	25	30				2	24"	1
						27						
		4'-6'	D	25	36	34				3	24"	2
						30		6'				
									Bottom of Boring 6'			

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

GROUND SURFACE TO ____ USED ____ "CASING THEN ____

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency			
0-10	Loose	0-4	Soft	30 +	Hard
10-30	Med. Dense	4-8	M/Stiff		
30-50	Dense	8-15	Stiff		

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO. 6

llen

SAMPLE		
o	Pen	Rec
	24"	-
	24"	-
	24"	-

At ______ after ______ Hours

Type

Size D ______ * ______

Hammer Wt ______ 300# ______ BIT

Hammer Fall ______ 30" ______

TOTAL HRS. ______

BORING FOREMAN K. Allen

INSPECTOR ______

SOILS ENGR. ______

LOCATION OF BORING 151 N - 95 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		0'-2'	D	12	12	18			Brown fine to coarse SAND, some fine to coarse gravel, trace silt & boulders	1	24"	-
						24						
		2'-4'	D	18	16	15				2	24"	-
						20						
		4'-6'	D	9	15	18				3	24"	-
						21		6'				
									Bottom of Boring 6'			

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

100 WATER STREET EAST PROVIDENCE, R. I.

TO Texas Instruments
PROJECT NAME Radiological Survey @ T.I.
REPORT SENT TO above
SAMPLES SENT TO Taken at Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-184

HOLE NO 11
LINE & STA
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS
At 4' after ___ Hours
At ___ after ___ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		*	
Hammer Wt		300#	BIT
Hammer Fall		30"	

	Date	Time
START	12/30/92	
COMPLETE	12/30/92	

TOTAL HRS.
BORING FOREMAN K. Allen
INSPECTOR
SOILS ENGR.

LOCATION OF BORING 210 N - 150 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	R
		0'-2'	D	1	3	25			Brown Gray fine to coarse SAND & Gravel, trace boulders & silt	1	24"	1
						29						
		2'-4'	D	37	11	11				2	24"	1
						4						
		4'-6'	D	2	4	5				3	24"	1
						8		6'				
									Bottom of Boring 6'			

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

GROUND SURFACE TO ______ USED ______ CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt x 30" fall on 2" O D Sampler

Cohesionless Density
0-10 Loose
10-30 Med Dense
30-50 Dense
50 + Very Dense

Cohesive Consistency
0-4 Soft
4-8 M/Stiff
8-15 Stiff
15-30 V-Stiff
30 + Hard

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO 11

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments | ADDRESS Attleboro, Mass.
PROJECT NAME Radiological Survey @ T.I. | LOCATION Attleboro, Mass.
REPORT SENT TO above | PROJ NO
SAMPLES SENT TO Taken at Site | OUR JOB NO 93-184

DATE
HOLE NO 12
LINE & STA
OFFSET
SURF ELEV.

GROUND WATER OBSERVATIONS

At 4' after ___ Hours

At ___ after ___ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		*	
Hammer Wt		300#	BIT
Hammer Fall		30"	

	Date	Time
START	12/30/92	
COMPLETE	12/30/92	
TOTAL HRS		
BORING FOREMAN	K. Allen	
INSPECTOR		
SOILS ENGR		

LOCATION OF BORING 200 N - 100 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen
		0'-2'	D	14	22	15			Brown Gray fine to coarse	1	24"
						16			SAND & Gravel, trace		
		2'-4'	D	7	3	3			boulders & silt	2	24"
						7					
		4'-6'	D	7	7	8			Gray fine to coarse SAND,	3	24"
						14		6'	trace of silt		
									Bottom of Boring 6'		

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

GROUND SURFACE TO ___ USED ___ CASING THEN ___

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%

140 lb Wt x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	

SUMMARY
Earth Boring 6
Rock Coring
Samples 3

HOLE NO 12

TO Texas Instruments
PROJECT NAME Radiological Survey @ T.I.
REPORT SENT TO above
SAMPLES SENT TO Taken at Site

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-184

HOLE NO 12
LINE & STA
OFFSET
SURF ELEV.

GROUND WATER OBSERVATIONS

At 4' after ___ Hours

At ___ after ___ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size I D		*	
Hammer Wt		300#	BIT
Hammer Fall		30"	

	Date	Time
START	12/30/92	
COMPLETE	12/30/92	
TOTAL HRS.		

BORING FOREMAN K. Allen
INSPECTOR
SOILS ENGR.

LOCATION OF BORING 200 N - 100 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen
		0'-2'	D	14	22	15			Brown Gray fine to coarse	1	24"
						16			SAND & Gravel, trace		
		2'-4'	D	7	3	3			boulders & silt	2	24"
						7					
		4'-6'	D	7	7	8			Gray fine to coarse SAND,	3	24"
						14		6'	trace of silt		
									Bottom of Boring 6'		

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

GROUND SURFACE TO ______ USED ______ " CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO 12

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments | ADDRESS Attleboro, Mass.
PROJECT NAME Radiological Survey @ T.I. | LOCATION Attleboro, Mass.
REPORT SENT TO above | PROJ NO
SAMPLES SENT TO Taken at Site | OUR JOB NO 93-184

DATE
HOLE NO 12
LINE & STA
OFFSET
SURF ELEV

GROUND WATER OBSERVATIONS
At 4' after ___ Hours
At ___ after ___ Hours

	CASING	SAMPLER	CORE BAR
Type		S/S	
Size ID		*	
Hammer Wt		300#	BIT
Hammer Fall		30"	

	Date	Time
START	12/30/92	
COMPLETE	12/30/92	

TOTAL HRS.
BORING FOREMAN K. Allen
INSPECTOR
SOILS ENGR.

LOCATION OF BORING 200 N - 100 E

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	R
		0'-2'	D	14	22	15			Brown Gray fine to coarse	1	24"	15
						16			SAND & Gravel, trace			
		2'-4'	D	7	3	3			boulders & silt	2	24"	18
						7						
		4'-6'	D	7	7	8			Gray fine to coarse SAND,	3	24"	2
						14		6'	trace of silt			
									Bottom of Boring 6'			

* Note: Used 2-7/8" Spoon for Sample #1

Used 2-3/8" Spoon for Sample #2

Used 1-7/8" Spoon for Sample #3

GROUND SURFACE TO ___ USED ___ CASING THEN ___

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%

140 lb Wt x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	

SUMMARY
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO 12

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments
PROJECT NAME Radiological Survey @ T.I
REPORT SENT TO above
SAMPLES SENT TO none

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ NO
OUR JOB NO 93-184

HOLE NO. OW-1
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At 3' ± after ___ Hours	Type	HW		
	Size D	4"		
At ___ after ___ Hours	Hammer Wt	300#		BIT
	Hammer Fall	24"		

	Date	Time
START	12/30/92	
COMPLETE	12/30/92	
TOTAL HRS.		
BORING FOREMAN	K. Allen	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING Approx. 5' South of Original Location

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	R
									(No Sampling Required)			
									Replaced Observation Well			
									Drove casing to 15' & cleaned out			
								15'				
									Bottom of Boring 15'			
									Installed Observation Well at 15'			
									10' Slotted - 5' Solid			
									2" PVC with Plug			
									2 Bags of Ottawa Sand			
									10 lbs. of Bentonite			
									One small Road Box			
									Note: Grouted old Well			

GROUND SURFACE TO ___ USED ___ CASING THEN ___

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%

140 lb Wt x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	

SUMMARY
Earth Boring 15'
Rock Coring
Samples 0

HOLE NO. OW-1

TO Texas Instruments | ADDRESS Attleboro, Mass. | HOLE NO OW-1
PROJECT NAME Radiological Survey @ T.I. | LOCATION Attleboro, Mass. | LINE & STA
REPORT SENT TO above | PROJ NO | OFFSET
SAMPLES SENT TO none | OUR JOB NO 93-184 | SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At 3' ± after ___ Hours	Type	HW		
	Size I D	4"		
At ___ after ___ Hours	Hammer Wt	300#		BIT
	Hammer Fall	24"		

	Date	Time
START	12/30/92	
COMPLETE	12/30/92	
TOTAL HRS.		

BORING FOREMAN K. Allen
INSPECTOR
SOILS ENGR.

LOCATION OF BORING Approx. 5' South of Original Location

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
									(No Sampling Required)			
									Replaced Observation Well			
									Drove casing to 15' & cleaned out			
								15'	Bottom of Boring 15'			
									Installed Observation Well at 15'			
									10' Slotted - 5' Solid			
									2" PVC with Plug			
									2 Bags of Ottawa Sand			
									10 lbs. of Bentonite			
									One small Road Box			
									Note: Grouted old Well			

GROUND SURFACE TO ___ USED ___ " CASING THEN ___

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 15'
Rock Coring —
Samples 0

HOLE NO OW-1

TO Texas Instruments | ADDRESS Attleboro, Mass. | HOLE NO [illegible]
PROJECT NAME Radiological Survey @ T.I | LOCATION Attleboro, Mass. | LINE & STA.
REPORT SENT TO above | PROJ NO | OFFSET
SAMPLES SENT TO none | OUR JOB NO 93-184 | SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At 3' ± after ___ Hours	Type	HW		
	Size I.D.	4"		
At ___ after ___ Hours	Hammer Wt	300#		BIT
	Hammer Fall	24"		

	Date	Time
START	12/30/92	
COMPLETE	12/30/92	
TOTAL HRS.		

BORING FOREMAN K. Allen
INSPECTOR
SOILS ENGR.

LOCATION OF BORING Approx. 5' South of Original Location

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
									(No Sampling Required)			
									Replaced Observation Well			
									Drove casing to 15' & cleaned out			
								15'				
									Bottom of Boring 15'			
									Installed Observation Well at 15'			
									10' Slotted - 5' Solid			
									2" PVC with Plug			
									2 Bags of Ottawa Sand			
									10 lbs. of Bentonite			
									One small Road Box			
									Note: Grouted old Well			

GROUND SURFACE TO ______ USED ______" CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY:
Earth Boring 15'
Rock Coring ___
Samples 0

HOLE NO OW-1

100 WATER STREET EAST PROVIDENCE R I

TO	Texas Instruments	ADDRESS	Attleboro, Mass.
PROJECT NAME	Radiological Survey @ T.I	LOCATION	Attleboro, Mass.
REPORT SENT TO	above	PROJ NO	
SAMPLES SENT TO	none	OUR JOB NO	93-184

HOLE NO. OW-2
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS

At 3' after ____ Hours

At ____ after ____ Hours

	CASING	SAMPLER	CORE BAR
Type	HW		
Size D	4"		
Hammer Wt	300#		BIT
Hammer Fall	24"		

	Date	Time
START	12/31/92	
COMPLETE	12/31/92	

TOTAL HRS.
BORING FOREMAN K. Allen
INSPECTOR
SOILS ENGR.

LOCATION OF BORING 4' South of Original Location

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
									(No Sampling Required)			
									Drove casing to 12.5' & cleaned out			
								12.5'				
									Bottom of Boring 12.5'			
									Installed Observation Well at 12.5'			
									10' Slotted - 2.5' Solid			
									2" PVC with Plug			
									2 Bags of Ottawa Sand			
									25 lbs. of Bentonite			
									One small Road Box			

GROUND SURFACE TO ____ USED ____ CASING THEN ____

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%

140 lb Wt. x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	

SUMMARY
Earth Boring 12.
Rock Coring
Samples 0

HOLE NO. OW-2

100 WATER STREET EAST PROVIDENCE, R. I.

TO Texas Instruments | ADDRESS Attleboro, Mass. | HOLE NO. OW-2

PROJECT NAME Radiological Survey @ T.I. | LOCATION Attleboro, Mass. | LINE & STA.

REPORT SENT TO above | PROJ NO | OFFSET

SAMPLES SENT TO none | OUR JOB NO 93-184 | SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At 3' after ___ Hours	Type	HW		
	Size I.D.	4"		
At ___ after ___ Hours	Hammer Wt.	300#		BIT
	Hammer Fall	24"		

	Date	Time
START	12/31/92	a.m. p.m.
COMPLETE	12/31/92	a.m. p.m.
TOTAL HRS.		
BORING FOREMAN	K. Allen	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING 4' South of Original Location

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen	Rec
									(No Sampling Required)			
									Drove casing to 12.5' & cleaned out			
								12.5'	Bottom of Boring 12.5'			
									Installed Observation Well at 12.5'			
									10' Slotted - 2.5' Solid			
									2" PVC with Plug			
									2 Bags of Ottawa Sand			
									25 lbs. of Bentonite			
									One small Road Box			

GROUND SURFACE TO ___ USED ___ " CASING THEN ___

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 12.5
Rock Coring ___
Samples 0

HOLE NO. OW-2

100 WATER STREET EAST PROVIDENCE, R I

TO Texas Instruments | ADDRESS Attleboro, Mass. | HOLE NO OW-2

PROJECT NAME Radiological Survey @ T.I. | LOCATION Attleboro, Mass. | LINE & STA.

REPORT SENT TO above | PROJ NO | OFFSET

SAMPLES SENT TO none | OUR JOB NO 93-184 | SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR
At 3' after ___ Hours	Type	HW		
	Size D	4"		
At ___ after ___ Hours	Hammer Wt	300#		BIT
	Hammer Fall	24"		

	Date	Time
START	12/31/92	a.m. p.m.
COMPLETE	12/31/92	a.m. p.m.
TOTAL HRS.		
BORING FOREMAN	K. Allen	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING 4' South of Original Location

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
									(No Sampling Required)			
									Drove casing to 12.5' & cleaned out			
								12.5'				
									Bottom of Boring 12.5'			
									Installed Observation Well at 12.5'			
									10' Slotted - 2.5' Solid			
									2" PVC with Plug			
									2 Bags of Ottawa Sand			
									25 lbs. of Bentonite			
									One small Road Box			

GROUND SURFACE TO ______ USED ______ " CASING THEN ______

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 12.5
Rock Coring
Samples 0

HOLE NO OW-2

100 WATER STREET EAST PROVIDENCE R I

TO Texas Instruments	ADDRESS Attleboro, Mass.	DATE
PROJECT NAME Radiological Survey @ T.I	LOCATION Attleboro, Mass.	HOLE NO. OW-3
REPORT SENT TO above	PROJ NO	LINE & STA.
SAMPLES SENT TO none	OUR JOB NO 93-184	OFFSET
		SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR		Date	Time
At 4' + after ___ Hours	Type	HW			START	12/31/92	
	Size D	4"			COMPLETE	12/31/92	
At ___ after ___ Hours	Hammer Wt	300#		BIT	TOTAL HRS.		
	Hammer Fall	24"			BORING FOREMAN	K. Allen	
					INSPECTOR		
					SOILS ENGR.		

LOCATION OF BORING 10' East of Existing 8" Deep Well

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
									(No Sampling Required)			
									Drove 4" casing to 14' & cleaned out			
								14'				
									Bottom of Boring 14'			
									Installed Observation Well at 13.5'			
									10' Slotted - 3.5' Solid			
									2" PVC with Plug			
									2 Bags Ottawa Sand			
									15 lbs of Bentonite			
									One sm Road Box			

GROUND SURFACE TO ___ USED ___ CASING THEN ___

Sample Type	Proportions Used	140lb Wt x 30" fall on 2" O D Sampler		SUMMARY
D: Dry C: Cored W: Washed	trace 0 to 10%	Cohesionless Density	Cohesive Consistency	Earth Boring 14'
UP: Undisturbed Piston	little 10 to 20%	0-10 Loose	0-4 Soft 30 + Hard	Rock Coring
TP: Test Pit A: Auger V: Vane Test	some 20 to 35%	10-30 Med Dense	4-8 M/Stiff	Samples 0
UT: Undisturbed Thinwall	and 35 to 50%	30-50 Dense	8-15 Stiff	HOLE NO. OW-3

100 WATER STREET   EAST PROVIDENCE, R. I.

TO: Texas Instruments	ADDRESS: Attleboro, Mass.		HOLE NO.: ~~OW-9~~
PROJECT NAME: Radiological Survey @ T.I.	LOCATION: Attleboro, Mass.		LINE & STA.:
REPORT SENT TO: above	PROJ. NO.:		OFFSET:
SAMPLES SENT TO: none	OUR JOB NO.: 93-184		SURF. ELEV.:

GROUND WATER OBSERVATIONS

At 4' ± after ___ Hours

At ___ after ___ Hours

	CASING	SAMPLER	CORE BAR
Type	HW		
Size I.D.	4"		
Hammer Wt.	300#		BIT
Hammer Fall	24"		

	Date	Time
START	12/31/92	
COMPLETE	12/31/92	
TOTAL HRS.		
BORING FOREMAN	K. Allen	
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING: 10' East of Existing 8" Deep Well

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen	Rec
									(No Sampling Required)			
									Drove 4" casing to 14' & cleaned out			
								14'	Bottom of Boring 14'			
									Installed Observation Well at 13.5' 10' Slotted - 3.5' Solid 2" PVC with Plug 2 Bags of Ottawa Sand 15 lbs. of Bentonite One small Road Box			

GROUND SURFACE TO ___ USED ___ " CASING THEN ___

Sample Type

D = Dry C = Cored W = Washed

UP = Undisturbed Piston

TP = Test Pit A = Auger V = Vane Test

UT = Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency			
0-10	Loose	0-4	Soft	30 +	Hard
10-30	Med Dense	4-8	M/Stiff		
30-50	Dense	8-15	Stiff		
50 +	Very Dense	15-30	V-Stiff		

SUMMARY

Earth Boring 14

Rock Coring ___

Samples 0

HOLE NO. OW-

100 WATER STREET EAST PROVIDENCE, R. I.

TO Texas Instruments
PROJECT NAME Radiological Survey @ T.I.
REPORT SENT TO above
SAMPLES SENT TO none

ADDRESS Attleboro, Mass.
LOCATION Attleboro, Mass.
PROJ. NO
OUR JOB NO 93-184

HOLE NO. ~~OW-3~~
LINE & STA.
OFFSET
SURF. ELEV.

GROUND WATER OBSERVATIONS
At 4' ± after ___ Hours
At ___ after ___ Hours

	CASING	SAMPLER	CORE BAR
Type	HW		
Size I.D.	4"		
Hammer Wt	300#		BIT
Hammer Fall	24"		

	Date	Time
START	12/31/92	
COMPLETE	12/31/92	

TOTAL HRS.
BORING FOREMAN K. Allen
INSPECTOR
SOILS ENGR.

LOCATION OF BORING 10' East of Existing 8" Deep Well

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen	Rec
									(No Sampling Required)			
									Drove 4" casing to 14' & cleaned out			
								14'				
									Bottom of Boring 14'			
									Installed Observation Well at 13.5'			
									10' Slotted - 3.5' Solid			
									2" PVC with Plug			
									2 Bags of Ottawa Sand			
									15 lbs. of Bentonite			
									One small Road Box			

118945

GROUND SURFACE TO ___ USED ___ "CASING THEN ___

Sample Type
D: Dry C: Cored W: Washed
UP: Undisturbed Piston
TP: Test Pit A: Auger V: Vane Test
UT: Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

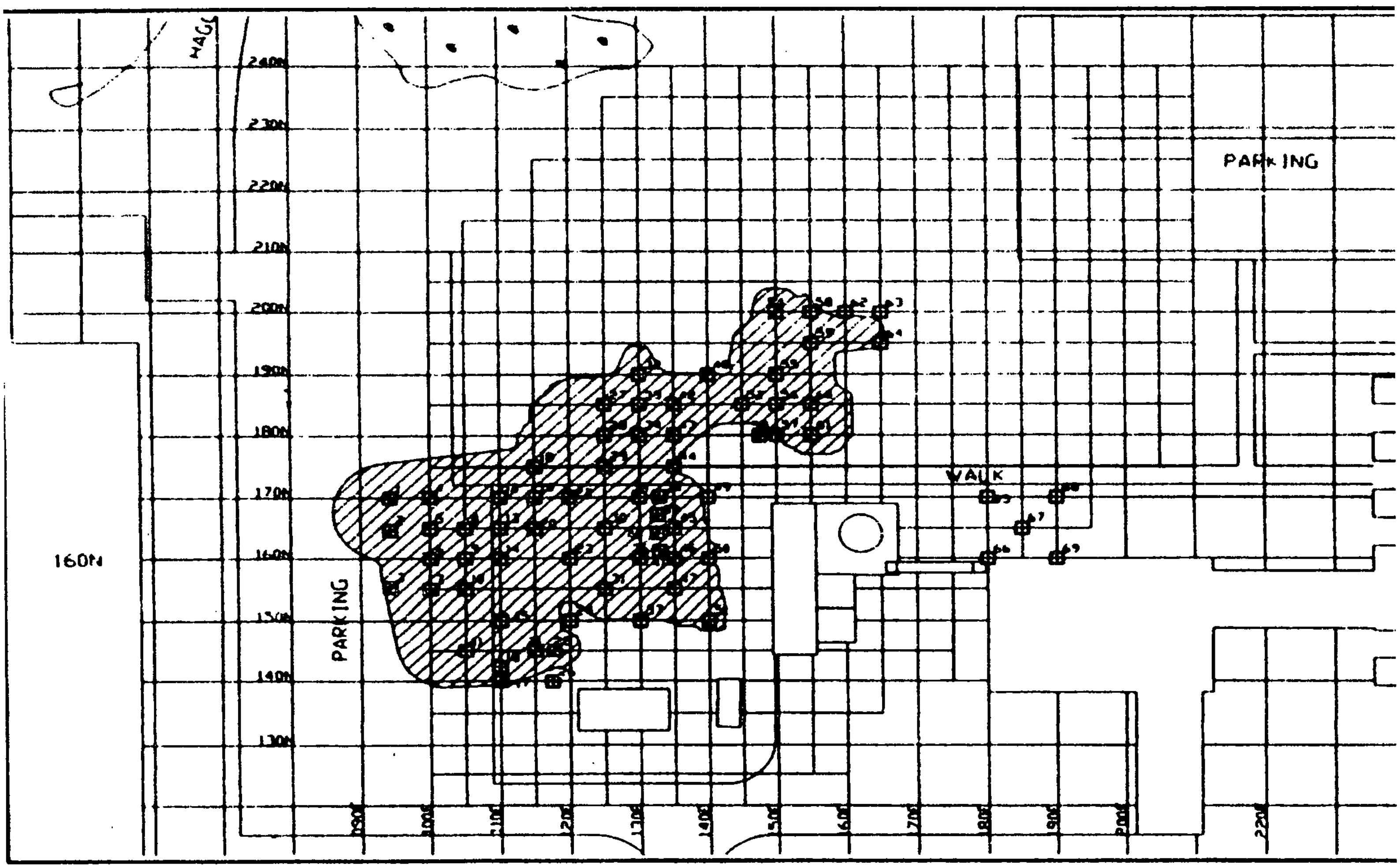
SUMMARY
Earth Boring 14
Rock Coring ___
Samples 0

HOLE NO OW-3

Appendix E

Final Survey Methods
and
Results

Figure 1
Surface Soil Sample Locations Within Excavated Area



NRC on 12/1/92. This report shows the areas where additional excavation took place on the site and the method for defining the extent of the excavation. This report does not include a walk-over survey of the entire affected area, however, this will be included in a later report to the NRC.

The conclusion of the survey conducted by ORISE for the NRC, on December 14-16 1992, was that the bottom of the excavation was at acceptable levels, however, there was some question on areas around the wall of the excavation. NRC requested that Texas Instruments continue to excavate in certain areas and that Texas Instruments demonstrate that the extent of the excavation is appropriate.

To address these issues Texas Instruments Incorporated (TI) performed additional excavation in areas where the walls of the excavation were above background radiation levels (using NaI measurements). In addition, to demonstrate that the excavation had been extended far enough TI performed split spoon sampling around the perimeter of the excavation (see Appendix A).

While a complete walk-over survey has not yet been completed all elevated areas identified during the ORISE survey or identified in the initial Post Excavation Survey report were addressed. In some cases the entire excavation area was extended while in other cases the surface of the area was scraped to removed the contaminated material. A complete walk-over survey will be included in a final report to the NRC.

PERIMETER SPLIT SPOON SAMPLING

As a means of demonstrating that the walls of the excavated area were at or below the approved guidance levels of 30 picocuries total uranium per gram of soil (pCi/g), a perimeter split spoon sampling plan was implemented. Initially, the walls of the excavation were surveyed to determine that the exposed wall (above the water) was at background levels (on the NaI meter). In areas where greater than background levels were found the excavation was extended. When all of the walls were found to be at background levels split spoon samples were taken to a depth of 6 feet. These samples were taken approximately 1-5 meters back from the wall of the excavation and were spaced approximately every 5-10 meters around the entire excavated area. Sampling results are included in Appendix A and locations are shown on the map in figure 1. In cases where past data was available the area was not resampled but, rather, the previous data was used as documentation.

. Site communications

It was determined that radio communication between personnel in the hot zone and support zone would be used.

. Site Authority

It was determined that field calls may be essential and with regards to sampling or exposure to radiation these judgements would be made by Creative Pollution Solutions but with regard to other health and safety considerations (including heavy equipment, heat, etc.) Franklin Environmental Services would make the decisions.

As a general rule it was decided that anyone could stop the job if they deemed it necessary.

Preliminary site layout and survey

Creative Pollution Solutions used reference site grid maps developed from the maps in the ORAU report to measure areas to perform the pilot excavation. The trench locations were determined based on the ORAU report. The plan was to excavate a total of four trenches (60' to 100' long x 3' wide x 2' deep) and 7 test pits (5' long x 3' wide x 2' deep). Diagram 1 (p.13) shows the locations of the trenches and test pits. During the layout of the trenches and the test pits survey measurements were taken at the surface of the soil to confirm areas of elevated radiation levels.

Workplan Development

Creative Pollution Solutions, with assistance from Franklin Environmental, developed the Sampling Workplan to be used during the pilot excavation. The procedure used is included in Attachment 1 (p. 9-10).

Health and Safety Plan Development

Creative Pollution Solutions developed the site specific radiation health and safety plan to be used in conjunction with Franklin Environmental Services site specific health and safety plan.

Zones Demarcated

One day prior to the excavation Franklin Environmental Services, with guidance from Creative Pollution Solutions erected a boundary fence along the exclusion zone. In addition to this security guards were positioned at access points to assure no unauthorized personnel would enter the restricted area. (see Diagram 2 p. 14)

Final Coordination and Training

One day prior to the pilot excavation field crews from Franklin Environmental, Texas Instruments Incorporated, and Creative Pollution Solutions were briefed with regard to the workplan and the health and safety plan. In this meeting the site hazards and associated health risks were discussed.

OPERATIONAL PHASE OF THE PILOT EXCAVATION

A chronological depiction of the activities on site during the one day pilot excavation follows:

6:00	Field teams arrive on site
6:30	Set up lab stations and command post
7:00	Set up decontamination zone
7:15	Area air samplers were positioned
7:30	Issue all field personnel appropriate dosimetry (Everyone in the exclusion area was issued TLD badges and pocket dosimeters, specified personnel entering the hot zone were issued Breathing zone air samplers)
8:30	Field personnel test communications and don proper protective gear to begin operations
9:00	Begin digging Test pits 1,2,3 (see summary workplan for details of excavation operation)
10:15	Continue with Trenches A and B
	Break

13:00	Continue with Trench C and Test pits 4 ,5,6, and 7
	Finish with Trench D and special D (in this area a decision was made, due to elevated survey readings, to dig further down then the previously specified depth of 2 feet)
16:00	Sampling aspect of the pilot excavation complete
17:00	Landscaping of trench areas by Franklin Environmental Services -- including separating aggregate rock and temporarily storing in drums.
18:00	Refencing of hot area (leaving the access walk way free for site employees)
19:00	Begin to survey /decon heavy equipment
19:30	Survey of access walkway
20:00	Final packaging of samples and drums for temporary storage
21:00	Field personnel leave site