U-005-202.62

4351

REMOVAL SITE EVALUATION SEWAGE TREATMENT PLANT INCINERATOR APRIL 1993

DOE-FN/FERMCO

30
RESEARCH

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

SEWAGE TREATMENT PLANT INCINERATOR (STPI)

REMOVAL SITE EVALUATION

April 1993

UNITED STATES DEPARTMENT OF ENERGY

CONTENTS

Page

1.0 INTRODUCTION 1-1

2.0 SOURCE TERM 2-1
- **2.1 STPI COMPONENTS AND CONTENTS DATA** 2-1
- **2.2 SOIL SAMPLING DATA** 2-1
- **2.3 PATHWAY ASSESSMENT** 2-2

3.0 EVALUATION OF THE POTENTIAL THREAT 3-1

4.0 ASSESSMENT OF THE NEED FOR A REMOVAL ACTION 4-1

5.0 APPROPRIATENESS OF A RESPONSE 5-1

ATTACHMENT 1 RADIOLOGICAL SURVEY DATA

ATTACHMENT 2 SOIL SAMPLING DATA

FIGURES

		Page
1-1	Master grid site map	1-2
1-2	Grid no. 32	1-3

TABLES

3-1	Comparison of measured contaminant concentrations with regulatory criteria	3-2

ACRONYMS AND ABBREVIATIONS

C.F.R.	Code of Federal Regulations
DOE	U.S. Department of Energy
EDE	effective dose equivalent
EPA	U.S. Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FS	feasibility study
OU	Operable Unit
RI	remedial investigation
SS	stainless steel
STPI	Sewage Treatment Plant Incinerator
TCLP	Toxicity Characteristic Leaching Procedure
TLV	threshold limit value

1.0 INTRODUCTION

In accordance with the Amended Consent Agreement between the U.S. DOE and the U.S. EPA (September 20, 1991), the DOE conducts and submits to the EPA, an annual review of the need for additional removal actions at the FEMP. The Sewage Treatment Plant Incinerator (STPI) was identified as a candidate for evaluation as a potential removal action in the DOE letter DOE-0854-93, "Proposed Phase IV Removal Actions", submitted to the EPA on January 14, 1993. The purpose of this document is to evaluate the appropriateness of such a removal action based on potential hazards to FEMP employees, the public, and the environment from the STPI.

The STPI operated from 1954 to December 31, 1979. It is located in the northwest corner of the sewage treatment plant area near the eastern fence line of the FEMP site. It was originally installed to burn paper, cardboard, office waste, and any other nonhazardous solid waste. No operational records exist to confirm what materials were actually incinerated. However, limited background information indicates that personal protective equipment, oily rags, wood pallets, lubricating and hydraulic oils, solvents, and uranium contaminated materials were also burned.

Interviews with former operating personnel have indicated that the secondary combustion chamber was added specifically to burn liquid wastes. These wastes consisted of oils which were probably contaminated with solvents. These liquid wastes were sprayed into the secondary combustion chamber using a gear driven pump and spray nozzle. Feed rates were approximately two gallons per minute. Thick wastes and sludges were placed into rectangular pans and slid into the incinerator through a large door located at the entrance of the secondary combustion chamber. Ash was removed from the incinerator by operating personnel wearing respirators. Personnel shoveled the ash into drums which are presently stored on site.

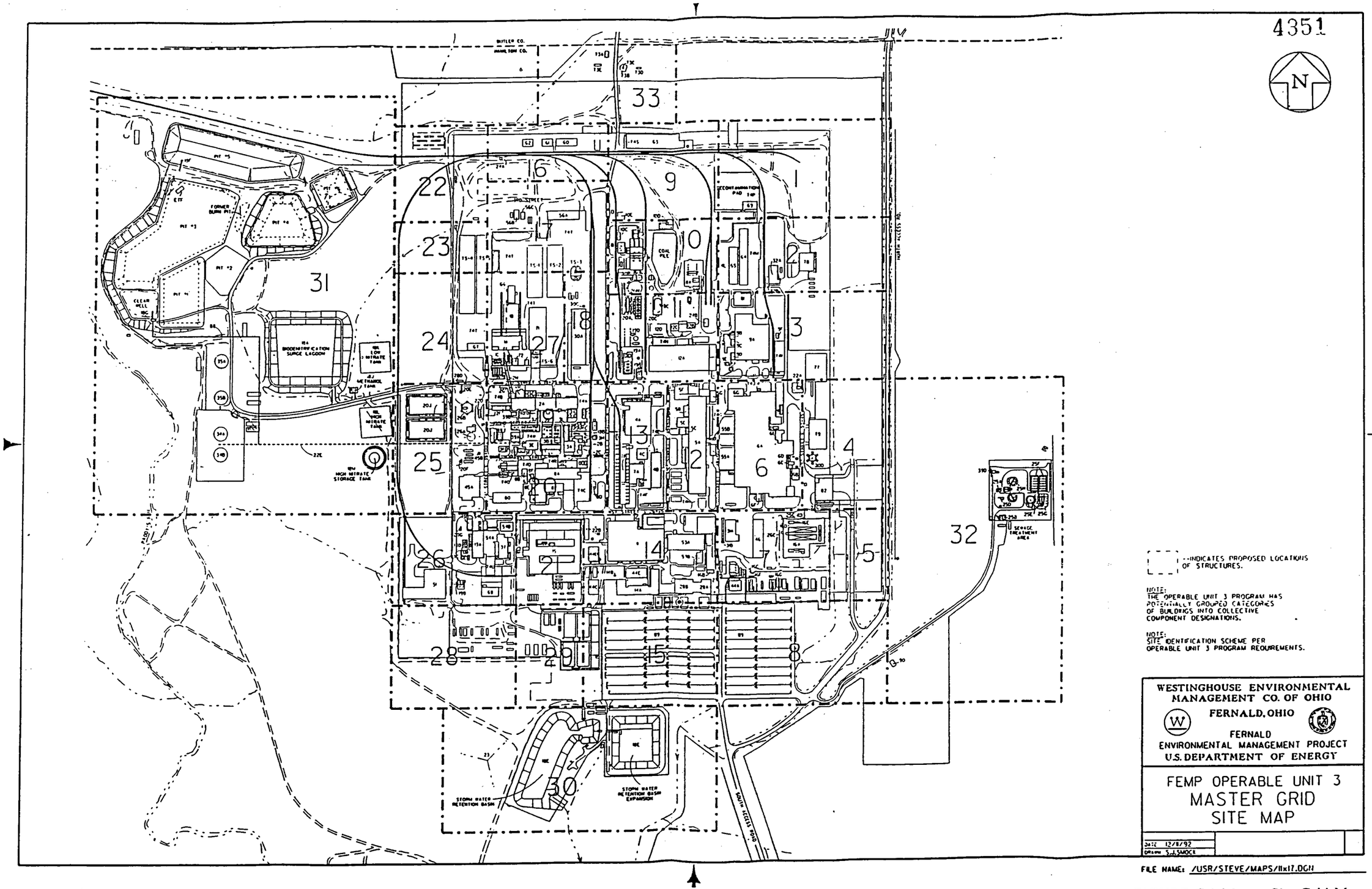


FIGURE C.1 Master Site Grid Map

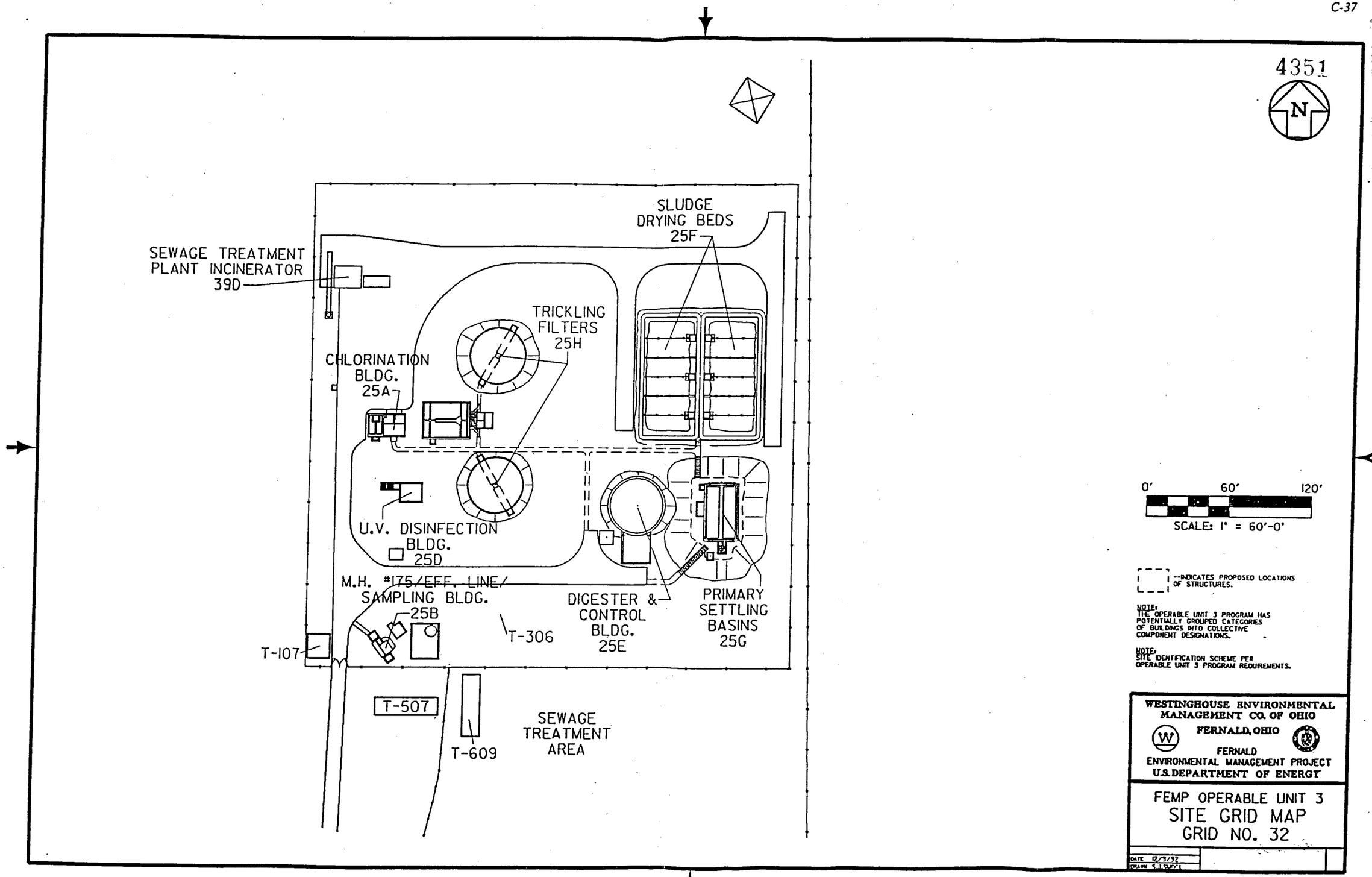


FIGURE C.33 Grid No. 32

2.0 SOURCE TERM

No representative sampling has been performed to characterize potential residual waste inventories within STPI components, however, comprehensive radiological surveys have been performed. Samples have been collected from the soil surrounding the STPI in connection with the ongoing activities of Removal Action No. 14, *Contaminated Soils Adjacent to the Sewage Treatment Plant Incinerator*. Existing characterization data are discussed in the sections that follow.

2.1 STPI COMPONENTS AND CONTENTS DATA

Radiological survey measurements indicate high levels of residual surface contamination within and around the STPI. Contact dose rates were observed to be on the order of 10 mrad/hr on the incinerator burn chamber floor. Surface contamination levels exhibited a wide range of values from less than detectable to on the order of 1 million dpm (probe area), with the highest levels found on the accessible interior surfaces of the incinerator. The levels of removable contamination were also observed to vary with location. On the accessible interior surfaces of the incinerator, and other areas where surfaces are relatively protected from the effects of wind and rain, levels of removable contamination were observed to be on the order of 1 to 0.1 percent of the total contamination levels. In the case of external surfaces exposed to wind and rain, the removable levels were generally less than detectable. Recent radiological survey results are contained in Attachment 1.

Characterization of drummed ash from the incinerator confirm the presence of uranium isotopes but do not include quantitative data on potential hazardous chemical contaminants.

2.2 SOIL SAMPLING DATA

Soil samples were collected in connection with Removal Action No. 14, *Contaminated Soils Adjacent to the Sewage Treatment Plant Incinerator*. The available analytical results are presented in Attachment 2 for the 18 sampling locations in the vicinity of the STPI. Samples number 7, 2, and 10 were taken on the north side of the STPI facing the exhaust stack. These samples showed the highest concentrations of total uranium at over 1,000 pCi/g,

including elevated levels of thorium, but did not indicate the presence of hazardous chemical contaminants. The remaining soil samples were taken around the area perimeter (off-property), those concentrations of total uranium averaged on the order of 100 pCi/g.

2.3 PATHWAY ASSESSMENT

The STPI can reasonably be assumed to be hazardous on the basis of 1) existing radiological survey data, 2) existing soil analysis data, and 3) knowledge of the STPI's operating history based on employee interviews. Because the STPI is not housed within a building, surface deposited contaminants that are exposed to the elements can be transported into the environment through the effects of wind and rain. The elevated concentrations of uranium and thorium found in samples of soil collected adjacent to the STPI likely include contributions from such transport, in addition to the direct deposition that occurred during STPI operations.

While there is a potential for ongoing transport to the soil and atmosphere, the STPI has been exposed to the elements for the past 14 years, and the majority of removable contamination has already been removed. The resulting radiological contamination in nearby soils resulting from this weathering is being remediated by Removal Action No. 14, *Contaminated Soils Adjacent to the Sewage Treatment Plant Incinerator*. The recent radiological surveys confirm that contamination on STPI external surfaces exposed to the action of wind and rain is, for the most part, fixed contamination. The area surrounding the STPI is posted and controlled as a radiological contamination area, with access limited further by the Sewage Treatment Plant Fence.

3.0 EVALUATION OF THE POTENTIAL THREAT

The STPI contains potentially hazardous levels of radiological contamination. For that reason, the area surrounding the STPI is posted as a radiological contamination zone and access is restricted without an approved radiological work permit. Access to the STPI is further restricted by the Sewage Treatment Plant fence and locked gate.

Potential hazards associated with the contaminated soils surrounding the STPI are being addressed and mitigated by Removal Action No. 14, *Contaminated Soils Adjacent to the Sewage Treatment Plant Incinerator*. In accordance with the Removal Action No. 14 work plan, soils containing greater than 100 pCi/g uranium, 50 pCi/g thorium, and 5 pCi/g radium, are being removed. In three phases, Removal Action No. 14 is 1) identifying the area of concern and excavating contaminated soils, 2) sampling the excavated and residual soils, and 3) revising the RSE and issuing a final report.

The STPI also represents a potential source of ongoing release to the environment through the effects of wind and rain on residual surface contamination. However, the action of wind and rain over the past 14 years since the STPI ceased operations has removed the majority of smearable contamination on exposed surfaces. The radiological contamination in nearby soils resulting from this weathering is being remediated by Removal Action No. 14, as described above.

Remaining removable surface contamination is predominantly associated with the internal surfaces of the STPI, where the removable levels are on the order of 1 to 0.1 percent of the total surface contamination. The north and south access doors to the incinerator burn chamber will be closed to further mitigate the potential for releases to the environment.

FERNALD – Sewage Treatment Plant
Correlation Data

TABLE 1

Soil Sample I.D.	ASI Sample I.D.	North Coord.	East Coord.	Depth (in.)	SPA-3 #2057[1] (cpm)	SPA-3 #1793[2] (cpm)	SPA-3 #1793[3] (cpm)	FIDLER (cpm)	Ru-106 (pCi/g)	Cs-137 (pCi/g)	Ac-227 (pCi/g)	Pa-231 (pCi/g)	Ra-224 (pCi/g)	Ra-226 (pCi/g)	Ra-228 (pCi/g)	Th-230 (pCi/g)	Th-234 (pCi/g)	U-235 (pCi/g)	U-Total (ug/g)	U-Total (pCi/g)
1	102415	479720	1382874	0-4	23000	9567	7900	22000	<0.9	0.55	1.2	<3.6	1.34	10.3	1.05	48.9	17.8	1.55	64.3	43.08
2	102410	480179	1383003	0-4	105000	49250	46200	154910	<3.1	0.71	<1.6	<9.0	5.36	4.45	5.13	<64	2289	145	7572	5073.24
3	102403	479927	1382866	0-4	35000	15433	13000	38716	<1.3	0.55	3.95	5.04	1.27	27.6	1.36	108	35.6	3.2	122	81.74
4	102401	479848	1383040	0-4	13000	3763	2840	9188	<0.3	0.63	<0.2	<1.2	1.03	0.96	1.22	<6.9	10.6	0.56	39.5	26.47
5	102402	479848	1383130	0-4	12500	3450	2540	8423	<0.3	0.65	<0.2	<1.3	1.01	1	1.12	<8.7	10.8	0.78	39.5	26.47
6	102413	479846	1383288	0-4	10000	2410	1670	5490	<0.1	0.05	0.76	<0.7	0.31	0.73	0.33	<3.8	2.05	<0.1	7.26	4.86
7	102411	480180	1383001	0-4	73000	24267	21700	69335	<1.5	0.39	<0.8	<4.5	2.99	1.92	3.11	<36	456	27.9	1515	1015.05
8	102409	480221	1382934	0-4	16000	4250	3140	10632	<0.7	0.29	<0.4	<2.4	1.21	0.94	1.26	<10	15.3	1.05	57.5	38.53
9	102420	480196	1383008	0-4	21000	5683	4430	16093	<1.0	0.71	<0.6	<3.4	2.1	1.11	1.98	<17	86.2	4.74	278	186.26
10	102412	480180	1383004	0-4	75000	29067	26400	93139	<2.2	0.56	<1.2	<6.6	3.87	2.91	3.82	<53	1234	67.9	3623	2427.41
11	102421	480347	1383323	0-4	15000	4680	3710	11988	<0.3	1.2	<0.2	<1.4	1.37	1.11	1.47	<9.6	36.9	2.27	138	92.46
12	102419	480337	1383148	0-4	17000	5052	3950	12993	<0.8	0.8	<0.5	<2.9	1.58	1.05	1.68	<13	33.4	2.65	134	89.78
13	102417	480429	1382803	0-4	18000	4608	3490	11536	<0.4	0.78	<0.2	<1.5	1.19	1	1.35	<10	20.9	1.08	70.9	47.50
14	102407	480128	1382926	0-4	33000	10083	8000	25452	<1.0	0.68	<0.6	<3.7	3.83	1.57	5.05	<19	109	5.73	344	230.48
15	102404	479934	1382863	0-4	33000	13717	11600	31751	<0.9	0.68	2.8	<3.9	1.22	18.5	1.37	67.6	29.4	3	117	78.39
16	102416	480218	1382657	0-4	17000	4227	3200	11276	<0.3	0.74	<0.2	<1.3	1.21	0.92	1.4	<9.3	21.3	1.44	81.4	54.54
17	102406	480123	1382925	0-4	32000	10333	8460	27105	<1.1	0.57	<0.6	<4.0	5.02	2	6.43	<20	111	7.41	420	281.40
18	102414	479726	1382875	0-4	21200	6933	5330	15395	<0.9	0.75	0.65	<2.8	1.01	5.61	1.15	28	13.6	1.07	51.5	34.51
19	102418	480214	1382969	0-4	21500	5767	4530	15295	<0.3	0.76	<0.2	<1.5	1.46	1.23	1.73	<12	73.5	4.04	247	165.49
20	102408	480184	1382932	0-4	20500	5633	4430	15204	<0.9	0.66	<0.5	<3.5	1.65	1.17	1.73	<16	62.5	3.6	208.00	139.36
21	102405	480079	1382925	0-4	28000	8517	7020	24540	<1.0	0.08	<0.5	<3.1	1.45	1.13	1.53	<15	83.5	4.35	267	178.89

1 = SPA-3, #2057, without shielding
2 = SPA-3, #1793, with shielding
3 = SPA-3, #1793, with shielding, with steel shot shielding gamma from soil

7/24/92 corrdat2.wk1

4.0 ASSESSMENT OF THE NEED FOR A REMOVAL ACTION

Consistent with Section 40 of the Code of Federal Regulations (C.F.R.), Part 300.410 of the National Contingency Plan, the DOE shall determine the appropriateness of a removal action. Of the eight factors to be considered in this determination, the following apply specifically to the Sewage Treatment Plant Incinerator.

40 C.F.R. 300.415

(b)(2)(i) - *Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants*;

(b)(2)(ii) - *Actual or potential contamination of drinking water supplies or sensitive ecosystems*;

(b)(2)(iv) - *High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate*;

(b)(2)(vi) - *Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released*

(b)(2)(vii) - *Other situations or factors that may pose threats to public health or welfare or the environment*;

The applicability of the five criteria is based on the assessment of construction and operating history of the STPI as well as the results of recent sampling and analysis efforts.

5.0 APPROPRIATENESS OF A RESPONSE

Based of the foregoing evaluation, it has been determined that a removal action will not be necessary, and the STPI should continue to be maintained in accordance with best management practices in support of the CERCLA remediation process. Potential hazards associated with residual radiological contamination at the STPI are adequately controlled by the ongoing FEMP ES&H programs, and radiological control procedures. Furthermore, these programs are adequate to mitigate any potential hazards that may result from deterioration of existing site conditions.

ATTACHMENT 1

RADIOLOGICAL SURVEY DATA

Inc. Furnace Bldg
BC250

4351

FMPC
INDUSTRIAL, RADIOLOGICAL SAFETY & TRAINING - RADIOLOGICAL SAFETY

RADIOLOGICAL SURVEY REPORT

Date: 91 LOCATION: RST: C Nelson Page 1 of 2

Time: 1630 LEVEL:

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

COMMENTS:
Semiannual survey of area around incinerator
[illegible] - contamination area

INSTRUMENTS

MODEL	SERIAL NUMBER	CALIBRATION DATE	BKRD.	EFF.
M-3	77182	Dec 91	50cpm	10%

ANALYZE FOR: ☑ ALPHA ☑ BETA-GAMMA ☐ OTHER

TYPE OF SURVEY: ☑ CONTAMINATION ☐ RADIATION ☐ OTHER

FOLLOW-UP SURVEY ATTACHED ☐YES ☑NO
SURVEY MAP ATTACHED ☑YES ☐NO

ITEM NUMBER	GRID COORDINATES	DESCRIPTION	CORRECTED DOSE RATE (mRem/hr) γ CONTACT	β/γ CONTACT	γ 3 FT.	β/γ 3 FT.	DPM ALPHA 100 CM²	DPM ALPHA PROBE	DPM BETA-GAMMA* 100 CM²	DPM BETA-GAMMA* PROBE
1		Pavement be edges of incinerator					NA	NA	NA	20-100
2		edge of incinerator concrete pavement								800k
3		inside incinerator (main one)								20m-1000k
4		corner of BLDG on pavement								150k
5		dirt, gravel & moss on pavement								100k
6		large area on concrete								100-800
7		corner of BLDG underneath								150k
—		on pavement	—	—	—	—	—	—	—	NA
8		trench (pavement)								10-70k
9		dirt on pad								16-40k
10		tar spot								70k
11		tar spot								65k
12		tar spot								70k
13		dirt + debris								50-60k
14		dirt along pad								125k
15		dirt along pad								30-50k

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

NOTIFICATION OF SURVEY RESULTS

SUPERVISOR NOTIFIED	TIME	DATE	NOTIFIED BY	REVIEWED BY	DATE

FMPC-IRS&T-1993-1 (REV. 3/14/90)

* "100 cm²" indicates removable contamination in dpm/100 cm²
"Probe" indicates fixed [illegible]

FMPC

INDUSTRIAL, RADIOLOGICAL SAFETY & TRAINING - RADIOLOGICAL SAFETY

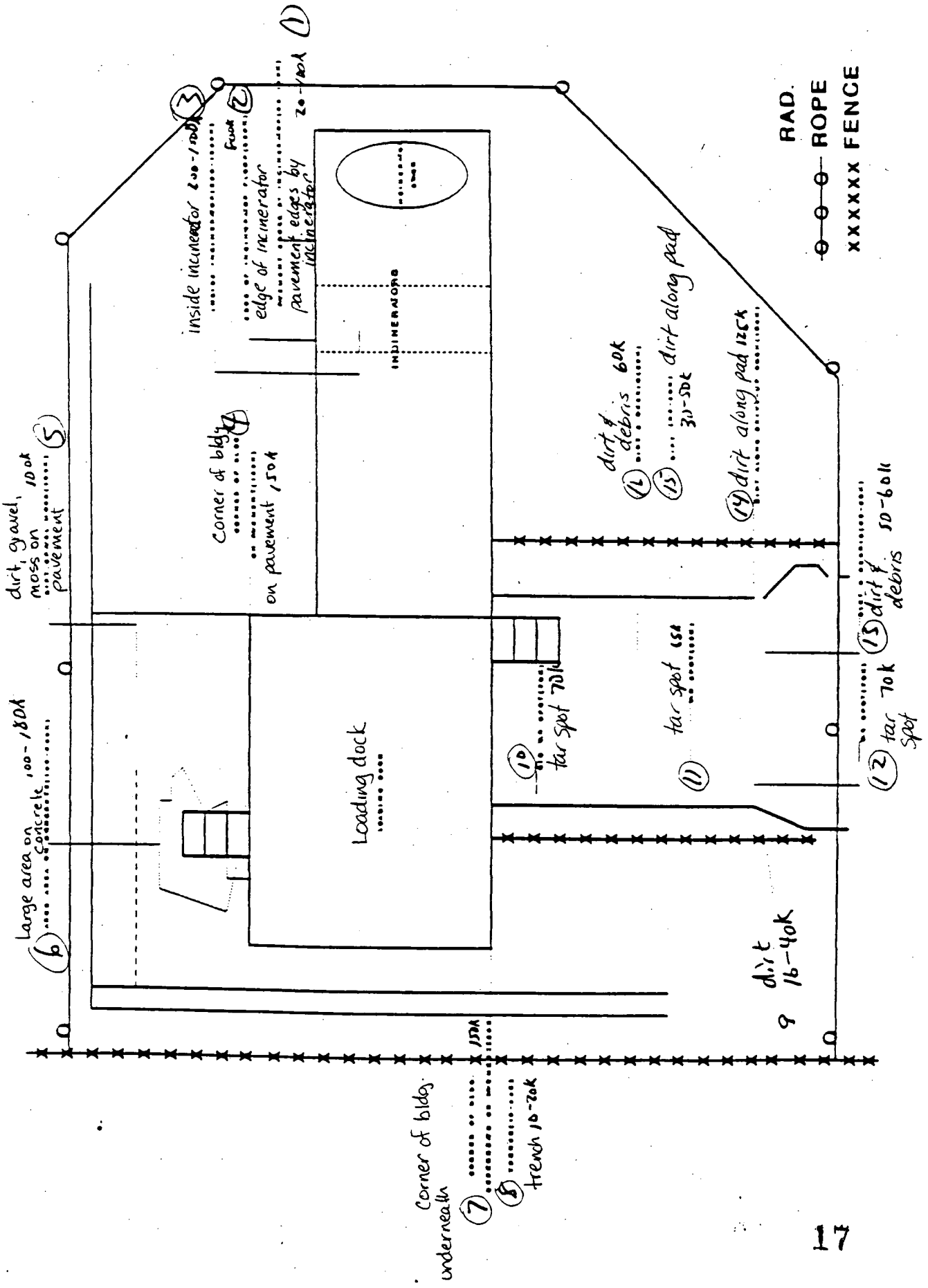
4351

RADIOLOGICAL SURVEY REPORT (CONTINUATION SHEET)

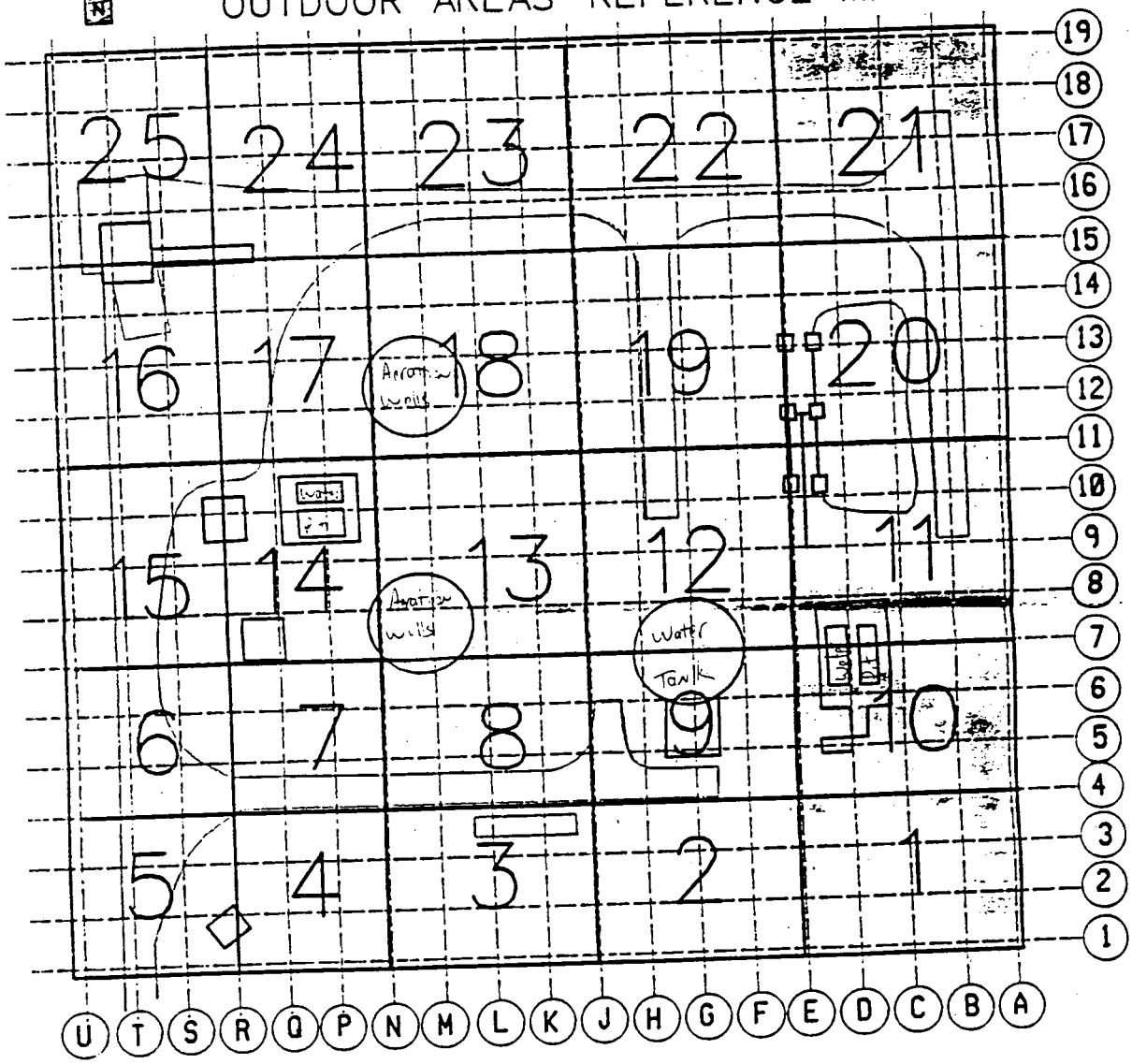
ITEM NUMBER	GRID COORDINATES	DESCRIPTION	CORRECTED DOSE RATE (mRem/hr) γ CONTACT	β/γ CONTACT	γ 3 FT.	β/γ 3 FT.	DPM ALPHA 100 CM²	DPM ALPHA PROBE	DPM BETA-GAMMA 100 CM²	DPM BETA-GAMMA PROBE
16	E	debris & dirt on pad					NA	NA	NA	60K

* "100 cm²" indicates removable contamination in dpm/100 cm²
"Probe" indicates fixed plus removable contamination in dpm/100

FMPC-RS&T-1993-2 (REV 7-13/90)


RAD.
ROPE
XXXXXX FENCE
Loading dock
INDINERATORS
inside incinerator 200-1500k
edge of incinerator
pavement edges by incinerator
20-100k
corner of bldg on pavement 150k
dirt, gravel, moss on pavement 100k
Large area on concrete 100-180k
dirt & debris 60k
dirt along pad
dirt along pad 125k
tar spot 70k
tar spot 65k
tar spot 70k
dirt & debris 50-60k
dirt 16-40k
corner of bldg underneath
trench 10-20k

GRID 4, SEWAGE TREATMENT FACILITY OUTDOOR AREAS REFERENCE MAP



Grid Tracking Completed:
12-9-91
G. Stevens

FMPC

INDUSTRIAL, RADIOLOGICAL SAFETY & TRAINING - RADIOLOGICAL SAFETY

RADIOLOGICAL SURVEY REPORT

4351

Date: 9.17.91	LOCATION: Grid #4 Outdoors	RST: G. Stevens #6148	Page 1 of 3
Time: 09:30	LEVEL: 580'	Chris Havens #6263	

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

COMMENTS:
Characterization of Map #25
NAD = Not Able to Determine
Note... Dose rate too low to determine except where noted.
See pg. #3 for additional instrumentation info.

FOLLOW-UP SURVEY ATTACHED ☐YES ☑NO

SURVEY MAP ATTACHED ☑YES ☐NO

INSTRUMENTS

MODEL	SERIAL NUMBER	CALIBRATION DATE	BKRD.	EFF.
α Ludlum #3	44209	9.91	0	0.1
β Ludlum #3	77178	10.91	70/120	0.1
Teletector	69745	11.22.91	~~70~~ 0	

ANALYZE FOR: ☑ ALPHA ☑ BETA-GAMMA ☐ OTHER

TYPE OF SURVEY: ☑ CONTAMINATION ☐ RADIATION ☐ OTHER

ITEM NUMBER	GRID COORDINATES	DESCRIPTION	CORRECTED DOSE RATE (mRem/hr) γ CONTACT	β/γ CONTACT	γ 3 FT.	β/γ 3 FT.	DPM ALPHA 100 CM²	DPM ALPHA PROBE	DPM BETA-GAMMA 100 CM²	DPM BETA-GAMMA PROBE
1		fence post						ND		<1k
2		fence wire						ND		ND
3		fence post						<.2k		<1k
4		fence wire						ND		ND
5		fence post						ND		<1k
6		fence wire						ND		ND
7		fence post						ND		ND
8		fence wire						ND		ND
9		fence post						ND		<1k
10		fence base						ND		<1k
11		fence post						ND		<1k
12		concrete post base						ND		ND
13		support bar						<.2k		<1
14		fence post						ND		ND
15		fence wire						ND		<1
16		fence post						ND		<1k

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

NOTIFICATION OF SURVEY RESULTS

SUPERVISOR NOTIFIED	TIME	DATE	NOTIFIED BY	REVIEWED BY	DATE
					19

FMPC-IRS&T-1993-1 (REV. 3/14/90)

• "100 cm²" indicates removable contamination in dpm/100 cm²
"Probe" indicates fixed plus removable contamination in dpm/100 cm²

Grid # 4 Outdoors

4351

Map #25 9.17.91

FMPC

INDUSTRIAL, RADIOLOGICAL SAFETY & TRAINING - RADIOLOGICAL SAFETY

RADIOLOGICAL SURVEY REPORT (CONTINUATION SHEET)

ITEM NUMBER	GRID COORDINATES	DESCRIPTION	CORRECTED DOSE RATE (mRem/hr) γ CONTACT	β/γ CONTACT	γ 3 FT.	β/γ 3 FT.	DPM ALPHA 100 CM²	PROBE	DPM BETA-GAMM. 100 CM²	PROBE
17		fence wire						NAD		<1
18		Grass at post base						NAD		<1
19								NAD		1.3
20								NAD		<1
21								NAD		<1
22								NAD		<1
23								NAD		<1
24		Grassy Area						NAD		2.3
25								NAD		1.3
26								NAD		<1
27								NAD		1.3
28								NAD		1.31
29								NAD		2.3
30								NAD		3.3
31								NAD		2.3
32								NAD		2.8
33								NAD		2.3
34								NAD		2.3
35								NAD		1.8
36								NAD		2.8
37		base of post						NAD		4.3
38		" "						NAD		4.3
39								NAD		21.3
40								NAD		8.3
41								NAD		7.3
42								NAD		12.3
43								NAD		19.3

* "100 cm²" indicates removable contamination in dpm/100 cm²
"Probe" indicates fixed plus removable contamination in dpm/100 cm²

FMPC-IRS&T-1993-2 (R

Grid #4 Outdoor
Map #25 9.17.91

FMPC 4351

INDUSTRIAL, RADIOLOGICAL SAFETY & TRAINING - RADIOLOGICAL SAFETY

RADIOLOGICAL SURVEY REPORT (CONTINUATION SHEET)

ITEM NUMBER	GRID COORDINATES	DESCRIPTION	CORRECTED DOSE RATE (mRem/hr) γ CONTACT	β/γ CONTACT	γ 1 m FT.	β/γ 1 m FT.	DPM ALPHA 100 CM²	DPM ALPHA PROBE	DPM BETA-GAM 100 CM²	DPM BETA-GAM PR
44		Grassy Area						NAD		9.
45		floor N.E. corner of bay					87	3K	36	15
46		Wooden chair → seat					<MDA	.8K	<MDA	2
47		S.W. corner, Metal ledge at floor					<MDA	1K	<MDA	3:
48		floor, 9m S.E. of small control rm						1.5K		6
49		floor, bay center					<MDA	2K	<MDA	5
50		Concrete under ~~deck~~ bay, N.W. corner						10K		3:
51		Under bay stairs, N.W. corner					87	8K	183	1:
52		~~E. incinerator wall~~ N.E. Bay wall, outside .9 m. up					177	7K	332	5
53		Black top N.E. of incinerator						<.2K		1.
54		Black top, N. of incinerator						.4K		3.
55		Inside incinerator from W. door (Dose only)	0.1	0.4	0.1	0.3				
56		W. door of incinerator At door					<MDA	16K	171	20
		Tennelec #5	cal	due	10·1·91					
		0.5 min MDA = 60.1 α, 59.1 β								
		α BKg = 0.68		α ref = 0.222						
		β BKg = 4.1		β ref = 0.337						

21

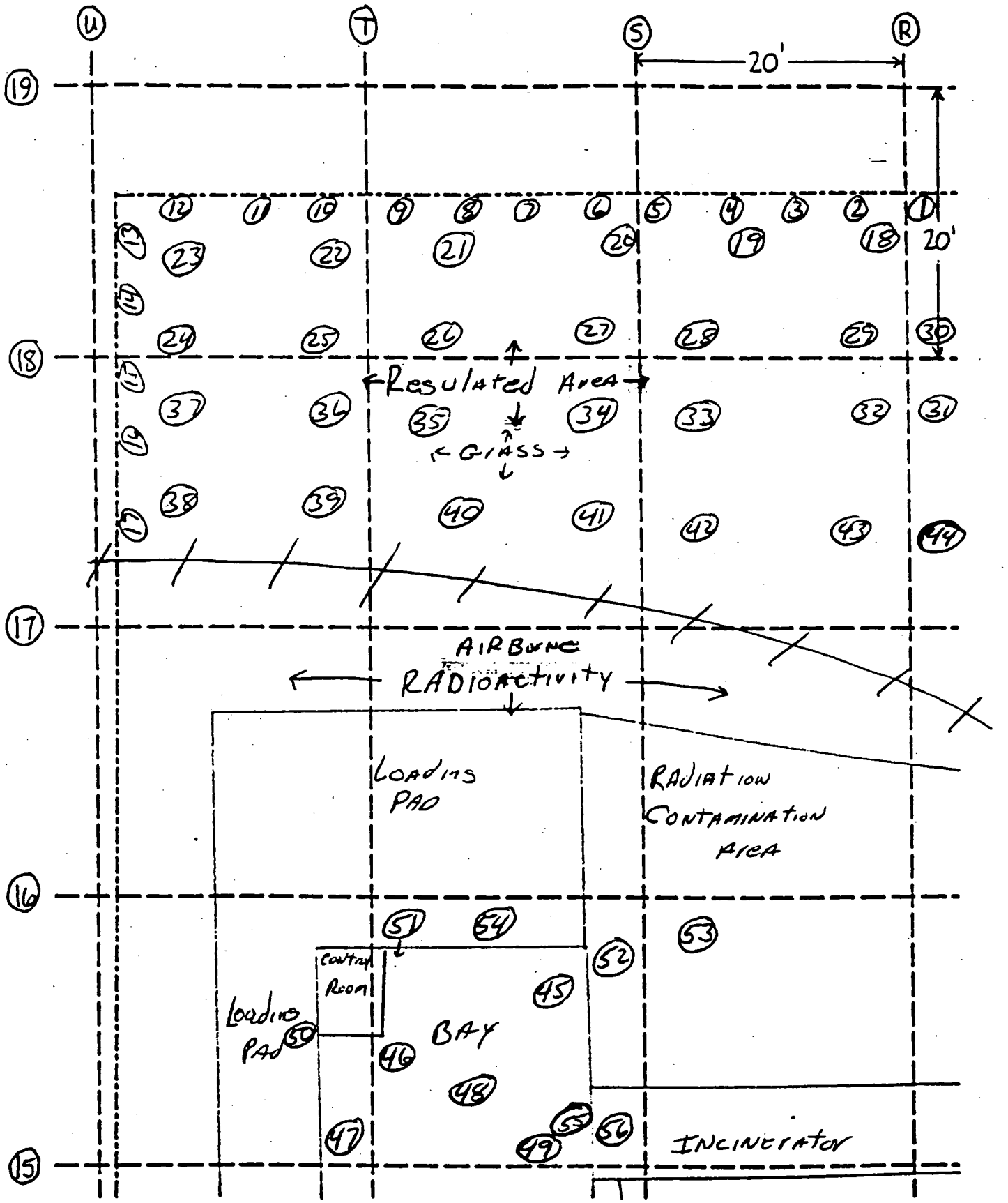
FMPC-IRS&T-1993-2 (REV 7/13/90)

* "100 cm²" indicates removable contamination in dpm/100 cm²
"Probe" indicates fixed plus removable contamination in dpm/100 cm²

GRID 4, MAP # 25 9-17-91

SEWAGE TREATMENT FACILITY

4351



FMPC
INDUSTRIAL, RADIOLOGICAL SAFETY & TRAINING - RADIOLOGICAL SAFETY

4351

RADIOLOGICAL SURVEY REPORT

Date: 9.17.91	LOCATION: Grid #4 Outdoors	RST: G. Stevens #6148	Page 1 of 4
Time: 09:00	LEVEL: 580'	Chris Havens #6263	

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

COMMENTS:
Characterization of Map# 24
NAD - Not Able to Determine
Note -- Dose rate ~~Not mR/hr or~~ too low to detect
except where noted

INSTRUMENTS

MODEL	SERIAL NUMBER	CALIBRATION DATE	BKRD.	EFF.
Ludlum #3	44209	9.91	0	0.1
Ludlum #3	77178	10.91	70/20	0.1
Teletector	69745	11.22.91	0	

ANALYZE FOR: ☑ ALPHA ☑ BETA-GAMMA ☐ OTHER

TYPE OF SURVEY: ☑ CONTAMINATION ☐ RADIATION ☐ OTHER

FOLLOW-UP SURVEY ATTACHED ☐YES ☑NO
SURVEY MAP ATTACHED ☑YES ☐NO
See #4 for additional instrumentation info.

ITEM NUMBER	GRID COORDINATES	DESCRIPTION	CORRECTED DOSE RATE (mRem/hr) γ CONTACT	β/γ CONTACT	γ 3 FT.	β/γ 3 FT.	DPM ALPHA 100 CM²	DPM ALPHA PROBE	DPM BETA-GAMMA 100 CM²	DPM BETA-GAMMA PROBE
1		fence wire						ND		<1K
2		fence post						ND		<1K
3		fence wire						ND		<1K
4		fence post					<MDA	<.2K	<MDA	1.3K
5		fence wire						ND		<1K
6		fence post						<.2K		<1K
7		fence wire						ND		ND
8		fence post						ND		<1K
9		fence wire						ND		<1K
10		fence post						ND		ND
11		fence wire						ND		ND
12		fence post						ND		<1K
13		Road (N side)						ND		1.3K
14		↓						ND		<1K
15		(Gravel)						ND		<1K
16		(Gravel)						ND		<1K

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

NOTIFICATION OF SURVEY RESULTS

SUPERVISOR NOTIFIED	TIME	DATE	NOTIFIED BY	REVIEWED BY	DATE
					23

FMPC-IRS&T-1993-1 (REV. 3/14/90)

* "100 cm²" indicates removable contamination in dpm/100 cm²
"Probe" indicates fixed plus removable contamination in dpm/100 cm²

Grid # 4 outdoors

4351 map # 24

9.17.91

FMPC

INDUSTRIAL RADIOLOGICAL SAFETY & TRAINING - RADIOLOGICAL SAFETY

RADIOLOGICAL SURVEY REPORT (CONTINUATION SHEET)

pg. 2 of 4

ITEM NUMBER	GRID COORDINATES	DESCRIPTION	CORRECTED DOSE RATE (mRem/hr) γ CONTACT	β/γ CONTACT	γ 3 FT.	β/γ 3 FT.	DPM ALPHA 100 CM²	DPM ALPHA PROBE	DPM BETA-GAMM 100 CM²	DPM BETA-GAMM PROBE
17		Road						ND		<1k
18		↓						ND		ND
19								ND		<1k
20		↓						ND		<1k
21		Road						ND		<1k
22		↓						ND		<1k
23								ND		<1k
24								ND		<1k
25								ND		1k
26								ND		<1k
27								ND		ND
28								ND		ND
29		↓						ND		ND
30		Grassy Area						NAD		1.3k
31		↓						NAD		2.3k
32								NAD		1.8k
33		(Post base)						NAD		1.8k
34		(Post Base)						NAD		1.3k
35		(Post Base)						NAD		1.3k
36		(Post Base)						NAD		1.8k
37		↓						NAD		1.3k
38								NAD		1.3k
39								NAD		1.3k
40								NAD		ND
41								NAD		ND
42								NAD		ND
43		↓						NAD	24	1.8k

FMPC-IRS&T-1993-2 (REV 7/13/90)

* "100 cm²" indicates removable contamination in dpm/100 cm²
"Probe" indicates fixed plus removable contamination in dpm/100 cm²

Grid #4 Outdoors
Map #24 9.17.91

FMPC

INDUSTRIAL, RADIOLOGICAL SAFETY & TRAINING - RADIOLOGICAL SAFETY

RADIOLOGICAL SURVEY REPORT (CONTINUATION SHEET) 4351

ITEM NUMBER	GRID COORDINATES	DESCRIPTION	CORRECTED DOSE RATE (mRem/hr) γ CONTACT	β/γ CONTACT	γ 1 3 FT.	β/γ 1 3 FT.	DPM ALPHA 100 CM²	DPM ALPHA PROBE	DPM BETA-GAMMA 100 CM²	DPM BETA-GAMMA PROB
44		Grassy Area						NAD		1.8
45								NAD		1.81
46							—	NAD		1.8
47								NAD		NAD
48								NAD		1.3
49								NAD		3.3
50								NAD		1.3
51								NAD		1.3
52								NAD		<1
53								NAD		1.3
54								NAD		1.3k
55								NAD		2.3
56								NAD		2.3
57								NAD		1.3
58								NAD		<1k
59								NAD		<1k
60								NAD		<1k
61								NAD		<1k
62								NAD		1.3k
63								NAD		1.8k
64								NAD		2.3
65								NAD		2.3
66								NAD		1.8k
67		Y						NAD		1.8k
68		Ledge, N. side of open door					<MDA	3K	<MDA	59K
69		N.W. open door inside (Dose only)	.1	.2	.05	.1				
70		N. incin. door inside (Dose only)	.1	.4	.1	.3			25	

FMPC-IRS&T-1993-2 (REV 7/13/90)

* "100 cm²" indicates removable contamination in dpm/100 cm²
"Probe" indicates fixed plus removable contamination in dpm/100 cm²

GIID #4 OUTDoor
MAP #24

FMPC

INDUSTRIAL, RADIOLOGICAL SAFETY & TRAINING - RADIOLOGICAL SAFETY

4351 9-17-91

RADIOLOGICAL SURVEY REPORT (CONTINUATION SHEET)

PG 4 of 4

ITEM NUMBER	GRID COORDINATES	DESCRIPTION	CORRECTED DOSE RATE (mRem/hr) γ CONTACT	β/γ CONTACT	γ 3 FT.	β/γ 3 FT.	DPM ALPHA 100 CM²	DPM ALPHA PROBE	DPM BETA-GAMM 100 CM²	DPM BETA-GAMM PRO
71		N. incinerator open door ledge						NAD		23
72		Black top						<.2K		<1
73		Black top						.5K		10
74		Black top						<.2K		9K
75		Wall (w.) of incinerator						<.2K		<1
		Tennelec #5		cal	due	10	1.91			
		0.5 min MDA = 60.1		591	Bo					
		α Bkg = 0.68		α eff =	0.222					
		βγ Bkg = 4.1		βγ eff =	0.337					

26

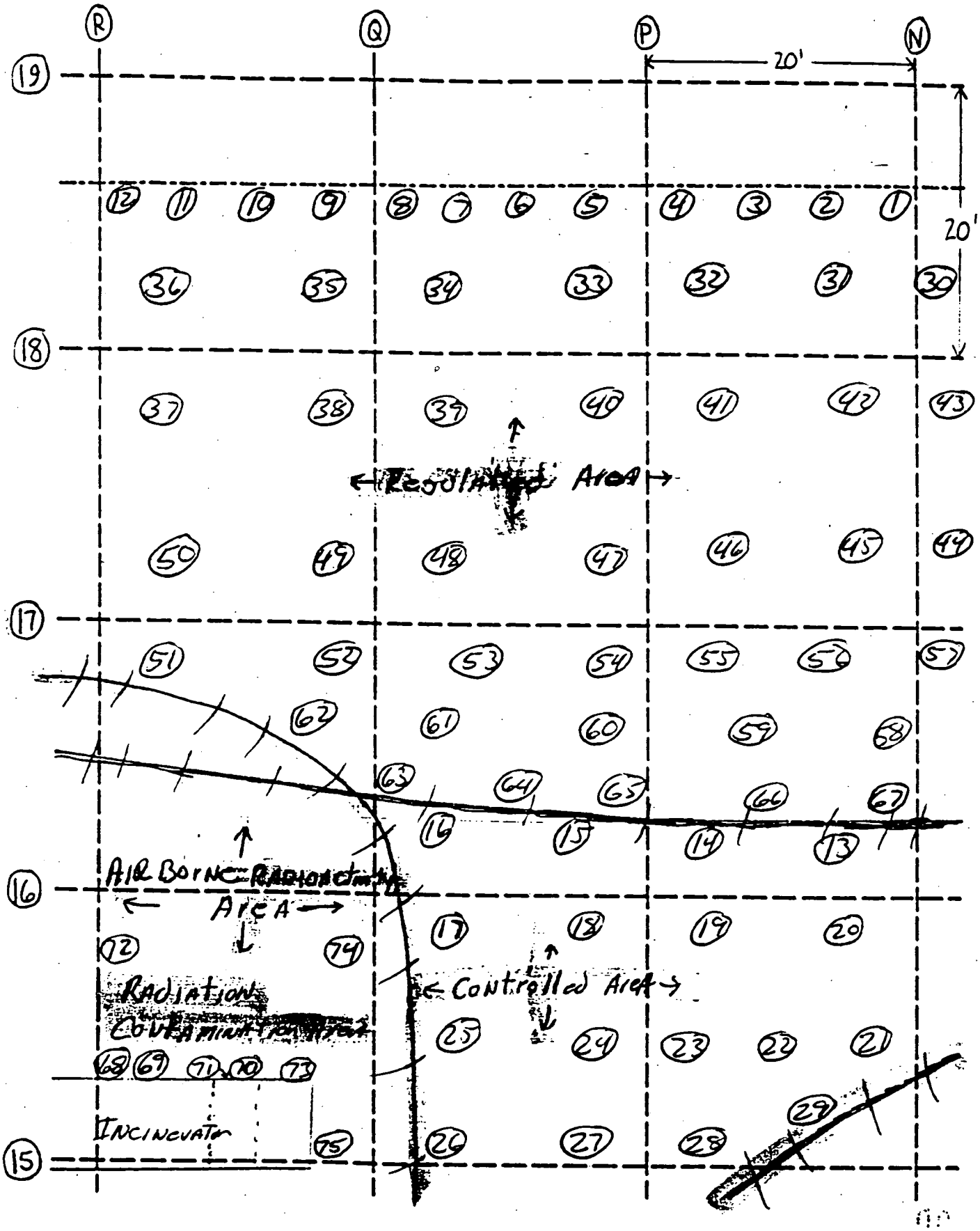
FMPC-IRS&T-1993-2 (REV 7/13/90)

* "100 cm²" indicates removable contamination in dpm/100 cm²
"Probe" indicates fixed plus removable contamination in dpm/100 cm²

GRID 4, MAP • 24 9-17-91

SEWAGE TREATMENT FACILITY

4351



FMPC

INDUSTRIAL, RADIOLOGICAL SAFETY & TRAINING - RADIOLOGICAL SAFETY

RADIOLOGICAL SURVEY REPORT

4351

Date: 9.17.91	LOCATION: Grid #4 Outdoors	RST: G Stevens #6148	
Time: 08:15	LEVEL: 580'	Chris Harris #6263	Page 1 of 4

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

COMMENTS: (Sewage Treatment Facility) Characterization of Grid # 16 ND = Not Able to Determine Note... Dose rate too low to detect except where noted.

INSTRUMENTS

MODEL	SERIAL NUMBER	CALIBRATION DATE	BKRD.	EFF.
Ludlum #3	44209	9.91	0	0.1
Ludlum #3	77178	10.91	70/100	0.1
Teletector	69745	11.22.91	0	

ANALYZE FOR: ☑ ALPHA ☑ BETA-GAMMA ☐ OTHER

TYPE OF SURVEY: ☑ CONTAMINATION ☐ RADIATION ☐ OTHER

FOLLOW-UP SURVEY ATTACHED ☐ YES ☑ NO

SURVEY MAP ATTACHED ☑ YES ☐ NO

See pg #4 for additional instrumentation info.

ITEM NUMBER	GRID COORDINATES	DESCRIPTION	CORRECTED DOSE RATE (mRem/hr) γ CONTACT	β/γ CONTACT	γ 3 FT.	β/γ 3 FT.	DPM ALPHA 100 CM²	DPM ALPHA PROBE	DPM BETA-GAMMA 100 CM²	DPM BETA-GAMMA PROBE
1		fence post						ND		<1
2		fence wire						ND		<1
3		fence post					<MDA	3.0	<MDA	<1
4		fence wire						ND		<1
5		fence post						ND		<1
6		fence wire						100		<1
7		fence post					<MDA	200	<MDA	<1
8		fence wire					<MDA	300	<MDA	1.3k
9		fence post					<MDA	300	<MDA	<1k
10		fence wire						ND		<1k
11		fence post					<MDA	300	<MDA	1.3
12		fence wire						100		<1k
13		Road						ND		ND
14		↓						ND		<1
15								ND		<1k
16								ND		<1k

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

NOTIFICATION OF SURVEY RESULTS

SUPERVISOR NOTIFIED	TIME	DATE	NOTIFIED BY	REVIEWED BY	DATE
					28

FMPC-IRS&T-1993-1 (REV. 3/14/90)

* "100 cm²" indicates removable contamination in dpm/100 cm²

"Probe" indicates fixed plus removable contamination in dpm/100 cm²

Grid # 4 Outdoors

4351 Map # 16

9.17.91

Pg 2 of 4

FMPC

INDUSTRIAL, RADIOLOGICAL SAFETY & TRAINING - RADIOLOGICAL SAFETY

RADIOLOGICAL SURVEY REPORT (CONTINUATION SHEET)

ITEM NUMBER	GRID COORDINATES	DESCRIPTION	CORRECTED DOSE RATE (mRem/hr) γ CONTACT	β/γ CONTACT	γ 3 FT.	β/γ 3 FT.	DPM ALPHA 100 CM²	DPM ALPHA PROBE	DPM BETA-GAMMA 100 CM²	DPM BETA-GAMMA PROBE
17		Road						ND		<1k
18								ND		ND
19								ND		<1K
20								ND		ND
21								ND		ND
22								ND		ND
23								ND		ND
24								ND		<1K
25								<.2K		<1k
26								ND		1.3K
27								<.2K		1.8K
28								ND		<1k
29								ND		<1k
30								ND		<1k
31								ND		ND
32								ND		<1k
33								<.2k		ND
34								ND		ND
35								ND		ND
36								ND		ND
37								ND		ND
38								<.2K		<1K
39								ND		<1K
40								ND		<1k
41								ND		<1k
42								ND	29	<1K
43								ND		<1k

• "100 cm²" indicates removable contamination in dpm/100 cm²
"Probe" indicates fixed plus removable contamination in dpm/100 cm²

FMPC-IRS&T-1993-2 (F

Grid # 4 outdo

FMPC 4351 Map #16.

INDUSTRIAL, RADIOLOGICAL SAFETY & TRAINING - RADIOLOGICAL SAFETY

9.17.91

RADIOLOGICAL SURVEY REPORT (CONTINUATION SHEET)

pg 3 of

ITEM NUMBER	GRID COORDINATES	DESCRIPTION	CORRECTED DOSE RATE (mRem/hr) γ CONTACT	β/γ CONTACT	γ 3 FT.	β/γ 3 FT.	DPM ALPHA 100 CM²	DPM ALPHA PROBE	DPM BETA-GAMMA 100 CM²	DPM BETA-GAMMA PROB
44		Road						ND		<1
45								ND		<1k
46								ND		<1k
47								<.2K		<1k
48								ND		<1
49								ND		ND
50								ND		ND
51								ND		2.3
52								ND		<1k
53		Loose Wood (Boards) on skid					<MDA	<.2K	165	1.8k
54		Pallet					204	7K	415	59.3
55		Bricks						ND		<1K
56		"						<.2K		<1K
57		Skid with meter						ND		ND
58		Meter on skid						ND		ND
59		Grass						NAD		19.3k
60								NAD		7.3k
61								NAD		89.3
62								NAD		3.3k
63								NAD		17.3
64								NAD		4.3k
65								NAD		2.3k
66								NAD		19.3K
67								NAD		11.3k
68								NAD		17.3K
69								NAD	30	2.3k
70								NAD		<1k

* "100 cm²" indicates removable contamination in dpm/100 cm²
"Probe" indicates fixed plus removable contamination in dpm/100 cm²

FMPC-IRS&T-100

Grid #4 Outdoors
4351 Map # 16
9.17.91

FMPC

INDUSTRIAL, RADIOLOGICAL SAFETY & TRAINING - RADIOLOGICAL SAFETY

RADIOLOGICAL SURVEY REPORT (CONTINUATION SHEET)

ITEM NUMBER	GRID COORDINATES	DESCRIPTION	CORRECTED DOSE RATE (mRem/hr) γ CONTACT	β/γ CONTACT	γ 3 FT.	β/γ 3 FT.	DPM ALPHA 100 CM²	DPM ALPHA PROBE	DPM BETA-GAMMA 100 CM²	DPM BETA-GAMMA PROBE
71		Grass						ND		<1K
72		↓						ND		<1K
73							—	ND		14.3K
74								ND		11.3K
75		↓						ND		6.3K
76		Steel plate, S. edge of bay					<MDA	1K	<MDA	18.8K
77		Black top						<.2K		1.1K
78		W. side of wall. Black top						ND		.8K
79		Window Beam, W. side of bay 1m up					177	8K	171	150K
80		Black top.						ND		1.5K
81		Black top						ND		<1K
82		Brick, 2m up on S. side of window					<MDA	.5K	<MDA	5.3K
83		Black top						ND		<1K
		Tennelec #5	cal due		10.1.91					
		C.5 min MDA =	60.1 α							
			59.1 βγ							
		α Bkg = 0.68								
		βγ Bkg = 4.1								
		α ef = 0.222								
		βγ ef = 0.337								

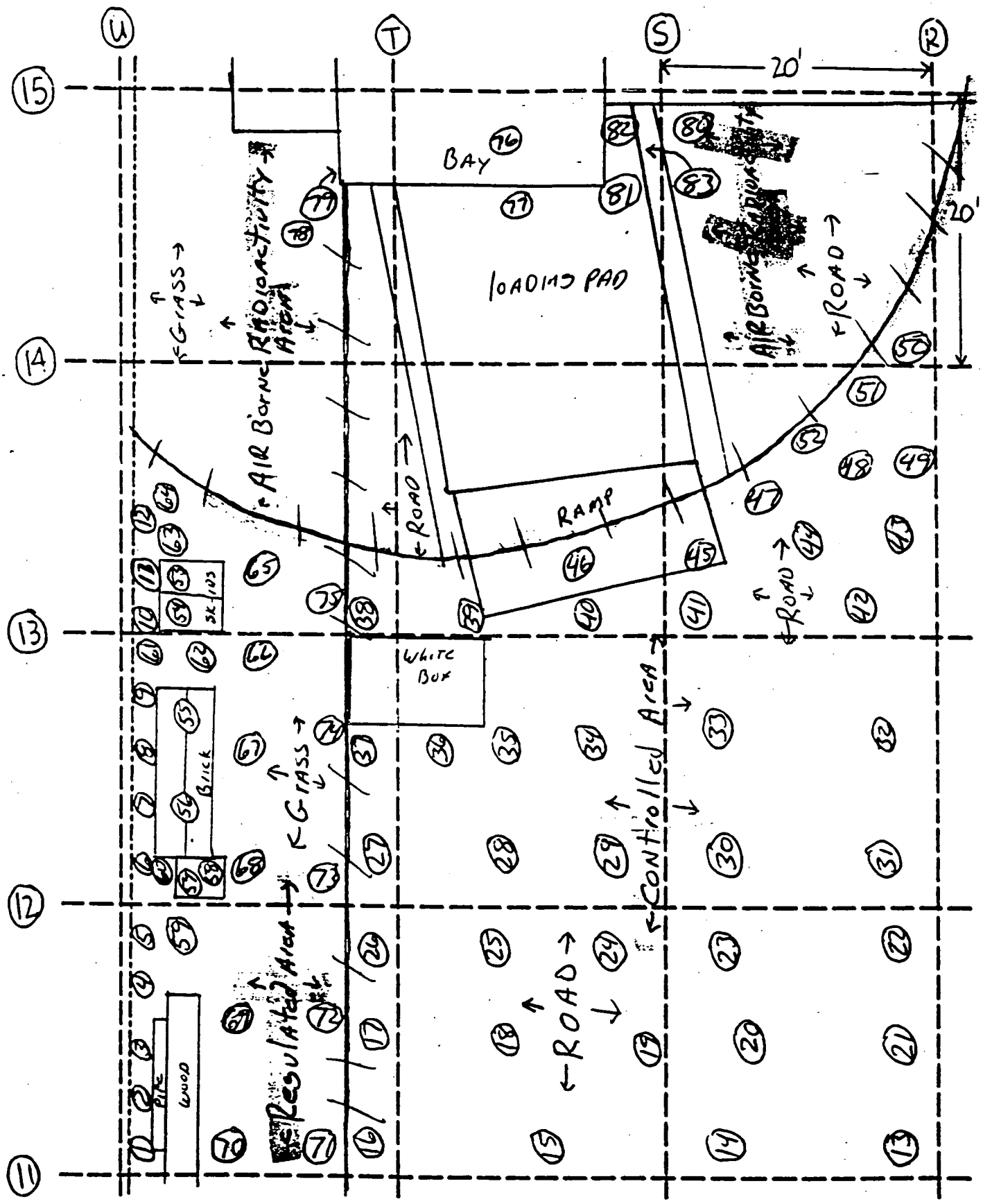
31

• "100 cm²" indicates removable contamination in dpm/100 cm²
"Probe" indicates fixed plus removable contamination in dpm/100 cm²

GRID 4, MAP # 16 9-17-91

SEWAGE TREATMENT FACILITY

4351



Note ... Collected Dose Rate reported in milli Roentgens/h not milli Rem.

FMPC

INDUSTRIAL, RADIOLOGICAL SAFETY & TRAINING - RADIOLOGICAL SAFETY

RADIOLOGICAL SURVEY REPORT

4351 G.S.

Date: 9.17.91	LOCATION: Grid #4 Outdoors	RST: G. Stevens #6148	
Time: 09:45	LEVEL: 580'	Chris Havens #6263	Page 1 of 3

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

COMMENTS: (Sewage Treatment Facility)
Characterization of Map #17
N.D. = Not Able to Determine
Note... Dose rate (mR/hr) too low to detect except where noted.
see pg #3 for additional instrumentation info.

FOLLOW-UP SURVEY ATTACHED ☐YES ☑NO
SURVEY MAP ATTACHED ☐YES ☐NO

INSTRUMENTS

MODEL	SERIAL NUMBER	CALIBRATION DATE	BKRD.	EFF.
Ludlum #3	44209	9.91	0	0.1
Ludlum #3	77178	10.91	70/120	0.1
Teletector	69745	11.22.91	0	

ANALYZE FOR: ☑ ALPHA ☑ BETA-GAMMA ☐ OTHER

TYPE OF SURVEY: ☑ CONTAMINATION ☐ RADIATION ☐ OTHER

ITEM NUMBER	GRID COORDINATES	DESCRIPTION	CORRECTED DOSE RATE (mRem/hr) γ CONTACT	β/γ CONTACT	γ 3 FT.	β/γ 3 FT.	DPM ALPHA 100 CM²	DPM ALPHA PROBE	DPM BETA-GAMMA 100 CM²	DPM BETA-GAMMA PROBE
1		Road						ND		<1K
2								ND		<1K
3								ND		<1K
4		(Grass/Dirt)						ND		<1K
5								ND		<1K
6								ND		<1K
7								ND		ND
8								ND		ND
9								ND		<1K
10								<.2K		<1K
11								<.2K		<1K
12								ND		<1K
13								ND		ND
14								ND		ND
15								ND		ND
16								ND		ND

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

NOTIFICATION OF SURVEY RESULTS

SUPERVISOR NOTIFIED	TIME	DATE	NOTIFIED BY	REVIEWED BY	DATE

33

* "100 cm²" indicates removable contamination in dpm/100 cm²
"Probe" indicates fixed plus removable contamination in dpm/100 cm²

FMPC-IRS&T-1993-1 (REV. 3/14)

Grid #4 Outdoors
Map #17
4351 9.17.91
pg. 2 of 3

FMPC

INDUSTRIAL, RADIOLOGICAL SAFETY & TRAINING - RADIOLOGICAL SAFETY

RADIOLOGICAL SURVEY REPORT (CONTINUATION SHEET)

ITEM NUMBER	GRID COORDINATES	DESCRIPTION	CORRECTED DOSE RATE (mRem/hr) γ CONTACT	β/γ CONTACT	γ 3 FT.	β/γ 3 FT.	DPM ALPHA 100 CM²	DPM ALPHA PROBE	DPM BETA-GAMM 100 CM²	DPM BETA-GAMM PROBE
17		Road						ND		ND
18								ND		<1
19								ND		ND
20								ND		ND
21		(Gravel)						ND		<1
22								ND		<1
23								ND		<1
24								ND		ND
25								ND		<1
26								ND		<1
27								<.2K		<1
28								ND		<1
29								ND		ND
30								ND		<1
31								ND		<1
32								<.2K		<1
33								ND		ND
34								<.2K		4.3
35		Grassy Area						ND		19K
36								ND		4.3
37								ND		<1
38								ND		1.3
39								ND		1.3
40								ND		1.3
41								ND		1.3
42								ND		1.3
43								ND		1.3

FMPC-IRS&T-1993-2 (REV 7/13/9

* "100 cm²" indicates removable contamination in dpm/100 cm²
"Probe" indicates fixed plus removable contamination in dpm/100 cm²

4351

Grid #4 Outdoors
Map # 17
9.17.91

FMPC

INDUSTRIAL, RADIOLOGICAL SAFETY & TRAINING - RADIOLOGICAL SAFETY

RADIOLOGICAL SURVEY REPORT (CONTINUATION SHEET)

pg. 3 of 3

ITEM NUMBER	GRID COORDINATES	DESCRIPTION	CORRECTED DOSE RATE (mRem/hr) γ CONTACT	β/γ CONTACT	γ ± 8 FT.	β/γ ± 6 FT.	C.S. DPM ALPHA 100 CM²	PROBE	DPM BETA-GAMMA 100 CM²	PROB
44		Grassy Area						NAD		<1
45								NAD		<1
46								NAD		<1
47								NAD		<1 K
48								NAD		<1 K
49								NAD		<1
50								NAD		1.8 K
51								NAD		1.8 K
52								NAD		19.3
53								NAD		9.3
54								NAD		24.3
55								NAD		5.3
56								NAD		1.8 K
57								NAD		1.3 K
58								NAD		1.8 K
59								NAD		1.3 K
60								NAD		<1 K
61								NAD		1.3 K
62								NAD		ND
63								NAD		ND
64								NAD		3.3 K
65								NAD		9.3 K
66								NAD		9.3 K
67		Blacktop						ND		<1 K
68		S. incinerator door ledge (Includes dose)	.5	1.5	.1 ~~.3~~	.3 ~~.1~~	< MDA	8 K	< MDA	700
	Tennelec #5	0.5 min MDA = 60.1 α, 59.1 βγ cal due 10.1.91								
	αβkg = 0.68, βγ Bkn = ~~59.1~~ 4.1 βγ		α ef = 0.222, βγ ef = 0.337							

35

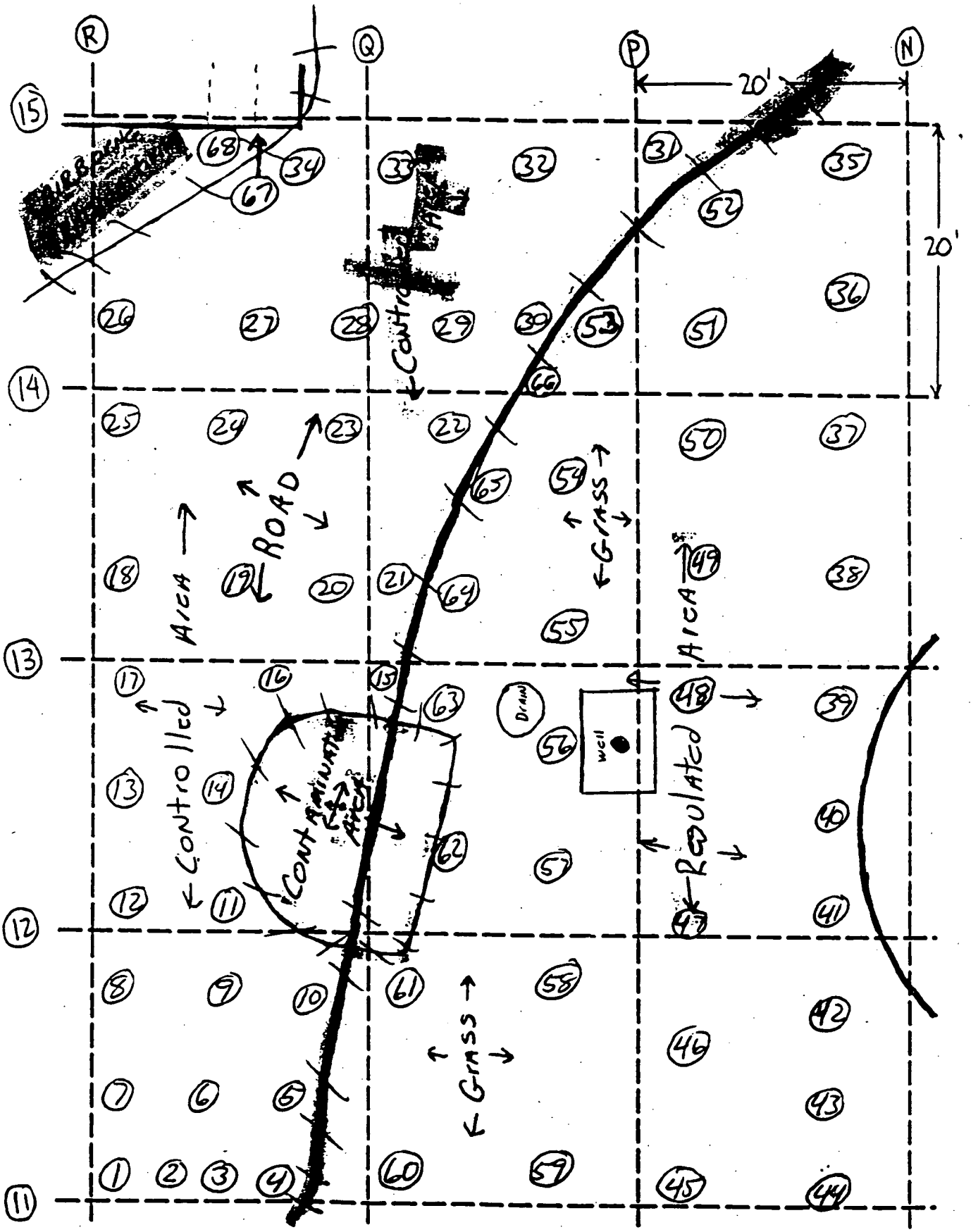
* "100 cm²" indicates removable contamination in dpm/100 cm²
"Probe" indicates fixed plus removable contamination in dpm/100 cm²

FMPC-IRS&T-1993-2 (REV 7/13/90)

GRID 4, MAP # 17 9-12-91

4351

SEWAGE TREATMENT FACILITY



ATTACHMENT 2

SOIL SAMPLING DATA

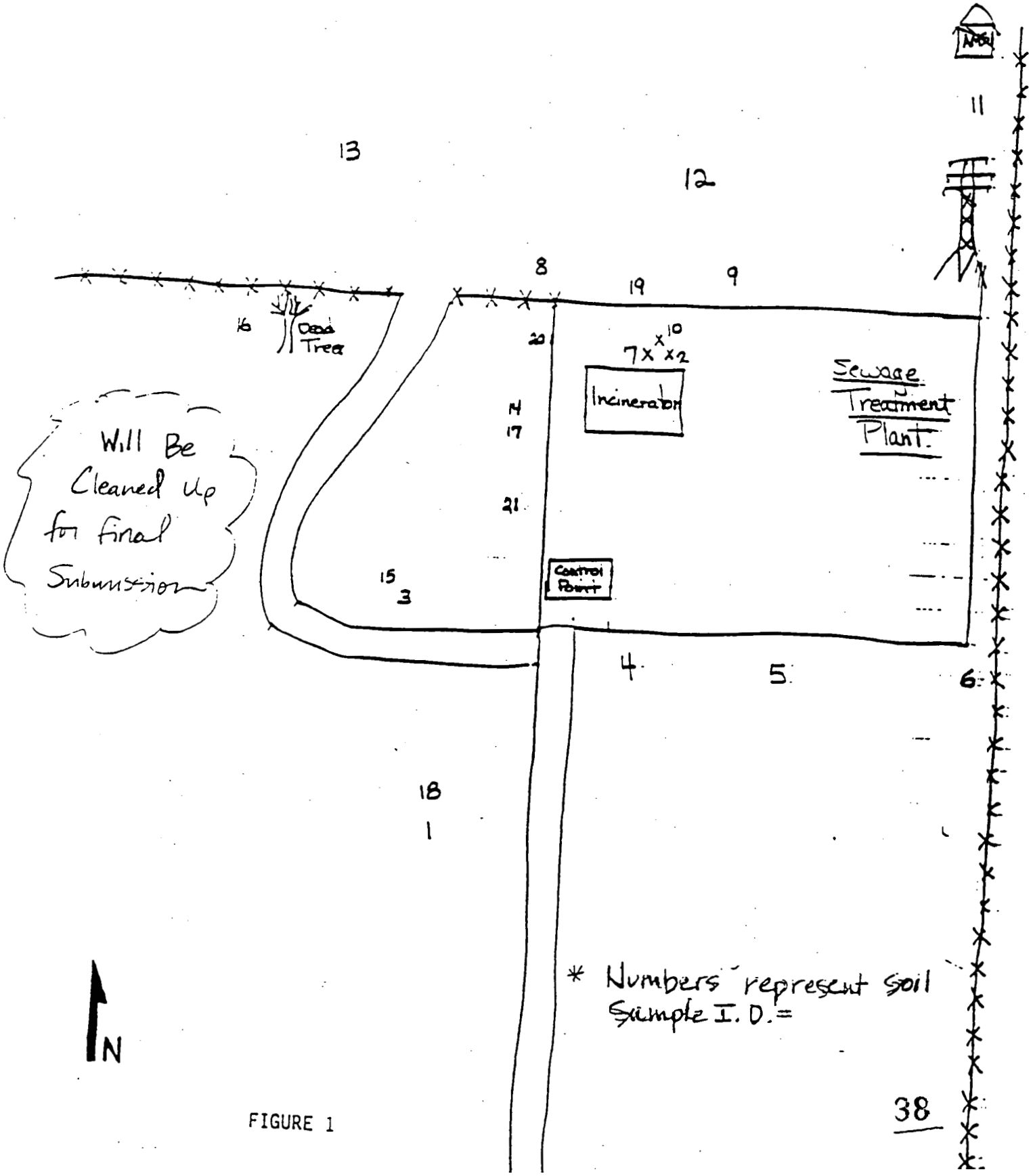

13
12
11
8
19
9
16
Dead Tree
20
7x x10 x2
Incinerator
Sewage Treatment Plant
14
17
21
Will Be Cleaned Up for final Submission
15
3
Control Point
4
5
6
18
1
* Numbers represent soil Sample I. D. =
N

FIGURE 1