ABB

ASEA BROWN BOVERI

release

December 10, 1993
ML-93-057

Docket No. 70-36
License No. SNM-33

R

Dr. Michael Tokar, Section Leader
Licensing Section II, Licensing Branch
Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Materials Safety and Safeguards
U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Subject: **Hematite License Renewal Update - Chapter 13, Environmental Information**

References: (A) Letter, J. F. Conant (C-E), to M. Tokar (NRC), dated November 24, 1993, ML-93-055

Dear Dr. Tokar:

In the recent Hematite license renewal application update of Reference (A), Chapter 13 contains environmental monitoring data up to 1991. The NRC staff has informally requested more recent data in support of the environmental assessment. Accordingly, this letter provides data through the third quarter of 1993.

Enclosure I provides an explanation of substantive changes from the previous renewal submittals. No listing of affected pages is deemed necessary, since this replaces the entire Chapter 13 of the renewal application. Enclosure II provides the replacement pages of the renewal application. Six (6) copies of this document are provided for your use.

M-87

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If there are any questions or comments concerning this matter, please do not hesitate to call me or Mr. Mark A. Michelsen of my staff at (203) 285-5261.

Very truly yours,

COMBUSTION ENGINEERING, INC.

John F. Conant
Manager
Nuclear Materials Licensing

Enclosures: As Stated

cc: G. France (NRC - Region III)
S. Soong (NRC)
E. Keegan

Enclosure 1 to
ML-93-057

COMBUSTION ENGINEERING, INC.

HEMATITE NUCLEAR FUEL MANUFACTURING FACILITY

LICENSE RENEWAL APPLICATION

ENVIRONMENTAL INFORMATION UPDATE

EXPLANATION OF CHANGES

December 1993

COMBUSTION ENGINEERING, INC.
HEMATITE NUCLEAR FUEL MANUFACTURING FACILITY
LICENSE RENEWAL APPLICATION
ENVIRONMENTAL INFORMATION UPDATE

EXPLANATION OF CHANGES

This submittal is part of an update to the Hematite License Renewal Application. This submittal consists of an update to Chapter 13 of the application, adding to the update submittal of October 29, 1993, and replacing the Chapter 13 submitted on November 24, 1993. The existing License Renewal Application is comprised of the original application of 11/22/89, as modified by letters dated 6/17/91, 10/11/91, 12/16/91, 10/2/92 and 11/4/92. The substantive changes to the existing Hematite License Renewal Application which are submitted herein are discussed below.

The enclosed Chapter 13 contains environmental monitoring data through the third quarter of 1993.

Please note that Table 13-1 also contains a correction. The stack release data in Table 13-1 had previously been incorrectly reported for the month of October 1989 (was 47.1 microcuries); the correct value is 39.8 microcuries. The total annual release for 1989 has also been corrected accordingly (from to 374.3 to 367.1 microcuries).

We would also like to take this opportunity to correct for the record a potential misunderstanding regarding the location of the nearest neighbor with respect to prevailing wind direction. In our letter of December 16, 1991 (J. F. Conant (C-E) letter to C. J. Haughney (NRC), ML-91-048, dated December 16, 1991, "Response to Environmental Questions Regarding Materials License No. SNM-33 Renewal Application"), the response to Item No. 2 of the NRC request for additional information (Letter, G. H. Bidinger (NRC) to J. A. Rode (C-E), dated September 5, 1991) gave an outdated location for the nearest neighbor and did not clearly define the prevailing wind direction. The nearest neighbor is located approximately 290 meters to the west-northwest of the plant site. The prevailing wind is taken from Table 1 of our December 16, 1991, letter; that table gives wind direction as "the direction from which the wind is blowing", as is the common practice in the discipline of meteorology.

Enclosure II to
ML-93-057

COMBUSTION ENGINEERING, INC.

HEMATITE NUCLEAR FUEL MANUFACTURING FACILITY

LICENSE RENEWAL APPLICATION

AFFECTED PAGES

December 1993

CHAPTER 13 ENVIRONMENTAL SAFETY - RADIOLOGICAL

13.1 Airborne Releases

During routine plant operations, gaseous effluents containing insoluble uranium radionuclides are the primary releases that could radiologically affect humans and the surrounding environment. Maximum individual dose commitments were calculated based on measured releases from all exhaust stacks. Dose commitments for 1987 and 1988 were:

	LUNG DOSE (mrem/yr)	
	North Onsite Monitoring Station (100 m)	Nearest Low Population Zone Resident (800 m)
1987	9.5	0.10
1988	11.6	0.13

The critical organ for routine insoluble releases is the lung. As shown above, the nearest low population zone resident received a maximum lung dose commitment of 0.13 mrem in 1988. This is less than 1% of the 40 CFR 90 limit of 25 mrem/year.

13.2 Liquid Releases

Liquids containing trace quantities of uranium are discharged from the plant storm sewer and the sewage treatment plant. Average concentrations of the site dam overflow were less than 0.25% of 10 CFR 20 limits for 1987 and 1988. Further diluted in Joachim Creek, these levels would result in an insignificant dose to an individual downstream of the plant.

13.3 Non-Radiological Releases

The only release of non-radiological materials of environmental concern is hydrogen fluoride (HF), which is released as an offgas of the UF_6 to UO_2 conversion process. HF releases for 1987 were 18.1×10^3 pounds and for 1988 were 21.0×10^3 pounds.

These releases would indicate a ground level concentration of less than 5.2 $\mu g/m^3$ at 100 meters and less than 1.0 $\mu g/m^3$ at the nearest low population zone residence. Damage to vegetation is unlikely at these concentrations.

13.4 Environmental Monitoring Summary

Environmental monitoring for the 1982-1988 period is summarized in the tables on the following pages.

TABLE 13-1

STACK MONITORING - RADIOACTIVITY[1][2]

(MICROCURIES RELEASED)

MONTH\YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993
JAN	13.6	9.2	27.2	31.3	23.7	48.3	28.9	16.3	18.3
FEB	9.2	5.6	26.5	39.2	15.3	15.3	12.0	16.7	56.7
MAR	7.3	16.6	15.0	25.8	22.2	14.6	21.4	42.0	61.5
APR	8.6	19.0	20.7	35.2	23.9	12.0	22.4	28.6	11.1
MAY	8.2	6.9	16.8	42.1	40.8	18.0	19.4	23.3	34.4
JUN	12.7	8.8	20.8	28.5	17.5	18.9	13.8	15.1	22.3
JUL	5.9	10.4	15.9	30.8	16.3	20.0	19.8	19.7	73.4
AUG	8.7	10.2	20.9	18.3	41.6	24.6	27.4	76.5	47.5
SEP	9.5	5.7	21.9	16.0	22.7	27.2	24.5	35.5	10.7
OCT	12.3	33.9	46.3	16.5	47.1	29.8	27.4	25.3	
NOV	9.3	15.2	30.7	38.5	40.9	20.2	16.0	10.7	
DEC	21.6	17.3	14.5	25.3	62.3	21.0	17.7	13.3	
TOTALS	126.9	158.8	277.2	347.5	367.1	288.3	250.5	323.0	335.9

SITE BOUNDARY CONCENTRATION[3]

Value (10^{-15} µCi/m)	0.4	0.5	0.8	1.1	1.1	0.9	0.8	1.0	1.0
Percent of MPC	0.010	0.012	0.021	0.026	0.028	0.022	0.019	0.024	0.025

(1) Determined by gross alpha counting after allowing at least 8 hours for decay of radon daughters.
(2) For location, see Figure 13-1.

TABLE 13-2

ENVIRONMENTAL AIR MONITORING - RADIOACTIVITY[1][2]

(10^{-15} MICROCURIES PER MILLILITER)

OFFSITE EAST MONTH\YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993
JAN	10	17	5	2	3	1	3	1	2
FEB	2	27	4	3	4	3	2	1	1
MAR	23	6	2	4	3	3	2	1	2
APR	10	11	4	3	3	2	2	1	1
MAY	25	7	4	3	2	2	2	1	2
JUN	13	6	2	3	2	4	2	3	1
JUL	14	9	4	5	2	3	2	2	3
AUG	6	9	5	3	5	5	10	1	1
SEP	7	6	3	4	3	3	1	1	3
OCT	10	2	5	2	2	2	2	3	
NOV	8	3	4	3	1	3	1	2	
DEC	15	4	3	5	2	6	1	3	
AVERAGE CONC.	12	9	4	3	3	3	3	2	2

OFFSITE WEST MONTH\YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993
JAN	13	31	6	2	2	1	4	1	3
FEB	5	37	4	3	1	2	2	1	3
MAR	26	11	3	3	2	2	2	1	2
APR	5	13	3	5	3	2	1	2	2
MAY	21	10	5	3	3	1	1	2	1
JUN	6	18	2	3	3	4	2	3	1
JUL	5	26	2	7	1	3	2	2	3
AUG	31	28	3	12	2	2	11	3	2
SEP	20	17	2	5	2	1	2	1	2
OCT	9	4	4	3	1	2	2	1	
NOV	11	4	4	2	1	1	2	1	
DEC	49	5	4	3	2	4	1	2	
AVERAGE CONC.	17	17	4	4	2	2	3	2	2

(1) Determined by gross alpha counting after allowing a 72 hour period for decay of radon and thorium daughters.
(2) For location, see Figure 13-1.

TABLE 13-2 (continued)

ENVIRONMENTAL AIR MONITORING - RADIOACTIVITY[1][2]

(10^{-18} MICROCURIES PER MILLILITER)

OFFSITE SOUTHEAST MONTH\YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993
JAN	--	--	--	--	--	--	3	2	2
FEB	--	--	--	--	--	2	2	4	3
MAR	--	--	--	--	--	2	4	1	5
APR	--	--	--	--	--	2	2	3	2
MAY	--	--	--	--	--	2	8	3	1
JUN	--	--	--	--	--	2	1	2	2
JUL	--	--	--	--	--	2	2	2	5
AUG	--	--	--	--	--	2	3	2	2
SEP	--	--	--	--	--	2	2	2	3
OCT	--	--	--	--	--	3	2	1	
NOV	--	--	--	--	--	1	2	1	
DEC	--	--	--	--	--	6	5	2	
AVERAGE CONCENTRATION					2	3	2		

-- Not sampling yet

(1) Determined by gross alpha counting after allowing a 72 hour period for decay of radon and thorium daughters.
(2) For location, see Figure 13-1.

TABLE 13-3

SITE DAM OVERFLOW MONITORING - RADIOACTIVITY(1)

(PICOCURIES PER LITER)

YEAR	1985		1986		1987		1988		1989		1990		1991		1992		1993	
MONTH	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA
JAN	4	7	29	28	10	5	5	9	6	8	33	15	4	13	7	4	10	6
FEB	7	23	65	88	12	14	14	15	21	15	7	14	3	5	22	26	9	5
MAR	5	10	22	18	5	4	31	14	22	11	45	11	6	6	9	4	3	5
APR	4	47	22	16	13	11	115	14	35	21	12	10	8	6	7	5	12	11
MAY	23	21	37	40	172	108	34	28	27	16	10	12	13	9	13	6	17	20
JUN	7	16			83	52	122	81	42	24	9	8	44	11	25	8	10	8
JUL	29	32	115	160	18	38	94	55	24	31	21	12	55	18	50	19	11	11
AUG	29	28	40	166	36	20	134	53	75	93	53	51	40	16	32	8	11	12
SEP	15	10	80	163	69	46	132	31	35	41	25	15	28	11	42	23	23	34
OCT	81	28	8	7	285	150	65	33	24	19	37	19	56	15	228	39		
NOV	37	33	10	12	153	48	59	32	27	27	19	12	25	10	74	66		
DEC	6	5	10	7	21	34	11	11	57	46	7	10	14	7	10	9		
AVE. CONC.	21	22	37	64	73	44	60	31	33	29	23	16	25	11	43	18	12	1[illegible]
% MPC	1	1	1	2	2	1	1	1	1	1	1	0	1	0	1	0	0	0

(1) For location, see Figure 13-2.

TABLE 13-4

JOACHIM CREEK MONITORING - RADIOACTIVITY[1]

(PICOCURIES PER LITER) UPSTREAM

YEAR	1985		1986		1987		1988		1989		1990		1991		1992		1993	
MONTH	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA
JAN	<1	<3	<1	4	<3	4	<4	3	<3	8	1	4	3	4	2	2	<3	
FEB	<1	22	<2	4	<5	4	<3	3	<2	3	<3	3	<2	2	<2	4	<2	
MAR	<3	3	<2	3	<4	2	<4	3	<2	3	<1	3	<2	2	3	3	<2	3
APR	<1	7	<2	4	<5	6	<3	4	<3	5	<4	2	<3	2	<3	4	<2	3
MAY	<1	3	<2	3	<4	4	<3	3	<2	5	5	4	4	4	<3	<2	<2	3
JUN	<4	5	<3	3	<4	4	<3	6	<4	<3	<1	4	<3	3	<2	3	<4	3
JUL	<1	3	<2	2	<4	3	<2	5	<2	4	<2	3	<3	3	<2	3	<2	3
AUG	<1	3	<2	4	<3	4	<3	6	<4	9	<2	2	4	2	<1	3	<1	4
SEP	<1	<3	<3	3	<3	4	<3	5	<4	4	<2	3	<2	3	3	4	4	4
OCT	<2	<3	<4	6	<5	5	<4	6	<4	5	<1	<1	<2	<1	<3	4		
NOV	<1	2	<2	12	<4	4	<3	4	<4	4	2	2	<2	2	<2	3		
DEC	<1	2	<5	9	<2	5	<3	5	<4	<3	<2	3	<2	3	<3	3		

(1) For location, see Figure 13-2.

TABLE 13-5

JOACHIM CREEK MONITORING - RADIOACTIVITY[1]

(PICOCURIES PER LITER) DOWNSTREAM

YEAR	1985		1986		1987		1988		1989		1990		1991		1992		1993	
MONTH	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA
JAN	<2	<3	<1	3	<3	4	<4	2	<3	3	1	3	3	2	<2	3	<3	<4
FEB	<1	4	<2	4	<4	4	<4	4	<2	2	<3	3	<2	2	<2	2	<2	
MAR	<3	3	<2	5	<4	4	<4	4	<2	4	1	2	<3	<1	<2	3	<2	3
APR	<0.8	3	<2	4	<5	3	<3	3	<3	5	<4	3	<3	2	<3	3	<2	3
MAY	<1	3	<2	3	<4	3	5	33	<4	5	<3	<3	3	3	<3	<2	<3	6
JUN	<4	9	<3	<3	<4	4	<3	3	<2	3	2	2	<3	3	<2	6	<4	2
JUL	<1	3	<2	5	<4	4	<2	3	<3	3	3	3	<3	4	<2	8	<6	4
AUG	<1	4	<2	3	<3	5	5	3	<2	5	2	2	5	3	<1	4	3	5
SEP	<1	<3	<3	3	<3	4	<3	7	<4	5	3	4	<2	4	3	3	2	4
OCT	<2	4	<3	4	<5	6	<4	5	<3	3	<1	<1	<2	7	<3	3		
NOV	<1	2	8	18	<4	6	<3	5	<4	4	3	3	<2	5	<3	4		
DEC	<1	2	<4	5	<4	4	<3	5	<4	<3	<2	3	<2	4	<3	4		

(1) For location, see Figure 13-2.

TABLE 13-6

QUARTERLY LIQUID ENVIRONMENTAL MONITORING - RADIOACTIVITY[1]

(PICOCURIES PER LITER)

JOACHIM CREEK/SITE CREEK CONFLUENCE

YEAR	1985		1986		1987		1988		1989		1990		1991		1992		1993	
Qtr	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA
1ST QTR	<2	6	<2	5	<2	<3	<2	11	<2	6	3	3	4	4	<3	4	<2	4
2ND QTR	<4	9	<2	4	<2	<3	<2	<3	<2	<3	11	11	*	*	3	13	4	6
3RD QTR	<2	<3	<2	<3	<2	<3	<3	3	<4	3	3	6	<2	4	3	3	<3	4
4TH QTR	2	5	<2	5	<2	8	<2	<3	<2	<3	<3	3	<2	5	2	4		

HEMATITE WELL

YEAR	1985		1986		1987		1988		1989		1990		1991		1992		1993	
Qtr	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA
1ST QTR	<2	<3	<2	3	<2	<3	<2	14	<4	10	7	4	<3	4	<2	3	<6	6
2ND QTR	<2	6	<2	<2	<2	<3	<2	<3	<4	9	2	2	<4	3	<5	15	2	5
3RD QTR	<1	<3	<2	<3	5	<3	<3	10	<5	5	9	5	2	5	12	4	6	<6
4TH QTR	<2	5	<2	<3	<2	<3	--	--	8	7	5	4	3	3	<7	4		

* Data not available for this period.

(1) For location, see Figure 13-2.

TABLE 13-7

RETENTION POND WELL MONITORING - RADIOACTIVITY[1]
SAMPLE WELL NORTH

(PICOCURIES PER LITER)

YEAR	1985		1986		1987		1988		1989		1990		1991		1992		1993	
MONTH	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA
JAN	4	137	<2	229	10	150	26	331	<2	321	4	336	4	396	3	335	<2	321
FEB	4	157	4	207	61	246	10	22	4	368	5	212	<3	309	<4	346	<3	36
MAR	6	72	5	187	60	241	15	44	3	347	<2	315	<3	255	<4	239	3	4
APR	7	66	<2	178	40	243	12	393	18	250	<2	261	<2	424	<3	471	8	213
MAY	4	327	7	280	<2	329	<2	423	3	368	2	210	4	266	<3	465	<3	297
JUN	5	325	<2	277	76	370	<2	520	<2	363	5	152	<4	297	<4	509	<4	269
JUL	<2	238	6	413	6	539	<2	547	3	354	4	273	<11	275	<6	391	<3	254
AUG	4	166	8	131	263	617	<4	238	4	342	<2	460	5	524	<4	159	5	349
SEP	5	142	19	338	<2	642	10	190	5	456	<3	496	3	602	5	292	<3	313
OCT	3	127	5	85	<2	729	38	596	3	38	<2	382	<5	253	<5	290		
NOV	6	223	4	114	62	334	<2	248	3	226	<1	407	3	463	<7	361		
DEC	3	173	12	290	55	376	4	266	3	227	<2	328	<3	482	<4	595		

(1) For location, see Figure 13-2.

TABLE 13-8

RETENTION POND WELL MONITORING - RADIOACTIVITY(1)
SAMPLE WELL SOUTHEAST

(PICOCURIES PER LITER)

YEAR	1985		1986		1987		1988		1989		1990		1991		1992		1993	
MONTH	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA
JAN	<2	<3	95	55	28	18	<2	<3	<2	<3	*	*	<3	<1	2	5	<2	6
FEB	<2	4	<20	4	19	17	8	25	<2	5	5	9	4	3	<2	3	4	8
MAR	<2	<3	4	5	7	5	11	<3	5	10	<2	5	3	2	<2	4	<1	4
APR	<2	<3	4	5	<2	<3	<2	<3	<2	<3	3	6	<3	3	<3	2	4	3
MAY	<2	<3	<2	4	<2	<3	252	132	<2	4	4	2	5	8	<2	<1	2	4
JUN	3	<3	5	6	65	55	*	*	14	103	<2	3	<4	3	<2	5	<2	3
JUL	<2	<3	<2	11	34	22	*	*	10	14	*	*	<11	162	<2	3	3	4
AUG	4	6	4	4	14	21	*	*	*	*	12	12	4	6	<3	2	17	16
SEP	<2	<3	7	8	*	*	*	*	5	10	18	24	<2	7	6	8	3	6
OCT	<2	7	45	17	*	*	*	*	*	*	<2	4	2	5	5	8		
NOV	92	16	16	10	*	*	*	*	*	*	3	5	3	7	<4	8		
DEC	33	10	10	7	19	19	15	12	*	*	5	5	2	5	<3	7		

* Well dry at this time

(1) For location, see Figure 13-2.

TABLE 13-9

RETENTION POND WELL MONITORING - RADIOACTIVITY[1]
SAMPLE WELL SOUTHWEST

(PICOCURIES PER LITER)

YEAR	1985		1986		1987		1988		1989		1990		1991		1992		1993	
MONTH	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA
JAN	4	4	19	21	27	31	<2	<3	<2	<3	3	4	<3	3	2	6	<1	
FEB	4	4	5	<3	16	24	27	423	<2	<3	<2	3	<3	2	5	6	2	7
MAR	<2	3	10	13	17	21	<2	<3	5	5	<2	2	3	4	<1	4	4	9
APR	<2	5	5	10	<2	<3	<2	29	5	<3	<2	1	<3	6	4	7	4	5
MAY	5	8	16	10	17	20	<2	<3	<2	5	1	2	11	20	2	3	<2	4
JUN	12	28	10	15	49	62	*	*	89	55	<2	3	10	20	13	19	6	5
JUL	10	6	11	14	12	8	*	*	11	20	3	5	7	15	<2	5	3	5
AUG	13	15	12	11	<2	<3	9	13	6	11	<2	<3	14	18	3	7	5	6
SEP	11	8	<2	7	13	21	30	17	3	6	3	4	<2	3	2	7	<2	5
OCT	4	5	<2	<3	<2	14	20	97	<2	293	<2	1	2	4	4	4		
NOV	<2	4	<2	4	32	23	<2	5	4	8	<2	4	4	7	3	3		
DEC	6	7	11	13	3	5	8	9	3	7	<2	3	45	9	3	3		

* Well dry at this time

(1) For location, see Figure 13-2.

TABLE 13-10

SITE WATER SUPPLY WELL MONITORING - RADIOACTIVITY(1)

(PICOCURIES PER LITER)

YEAR	1985		1986		1987		1988		1989		1990		1991		1992		1993	
MONTH	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA
JAN	<2	<3	2.7	3	<2	<3	<4	<2	<3	7	4	2	4	5	<2	3	<2	2
FEB	<2	5	<2	3	<4	<2	<4	<2	<2	<2	<3	2	3	3	<2	2	<2	<3
MAR	<3	<2	<2	2	<4	<2	<4	4	<2	<2	<1	<2	<2	2	<2	3	7	2
APR	<2	3	<2	2	<4	<3	<3	3	<3	3	<4	<2	<3	1	<3	2	<4	<1
MAY	1.2	2	<2	2	<4	<2	<2	2	<2	3	12	2	2	2	<2	1	<3	1
JUN	<4	11	<2	<2	<3	3	<2	3	<3	<2	1	2	<3	2	<2	2	<1	<1
JUL	<1	<2	<2	<2	<4	2	<2	<2	<2	<3	14	14	<3	3	2	<2	3	2
AUG	5.3	<2	<2	2	<3	<2	<3	<3	2	<2	2	2	3	3	<1	2	4	4
SEP	<2	5	<3	2	<3	4	<3	<2	<3	<2	<2	3	<2	4	4	2	<2	3
OCT	<2	<3	<3	3	<4	3	<3	<3	<3	<2	2	6	<2	2	<3	3		
NOV	<1	<1	<2	<3	<3	<2	<3	<2	<3	<2	<2	1	<2	2	<3	4		
DEC	<1	<1	<2	<3	<2	3	<3	4	<3	<3	2	<1	<2	3	<3	4		

(1) For location, see Figure 13-2.

TABLE 13-11

SOUTH VAULT SAMPLE WELL MONITORING - RADIOACTIVITY[1]

(PICOCURIES PER LITER)

YEAR	1991*		1992		1993		1994		1995		1996	
MONTH	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA
JAN	5	15	<6	17	<3	735						
FEB	4	15	<3	17	5	32						
MAR	<3	3	4	19	4	27						
APR	3	631	3	18	5	28						
MAY	<3	731	<4	27	<5	29						
JUN	<3	21	5	30	<5	29						
JUL	4	20	<5	51	7	45						
AUG	<3	92	6	39	6	87						
SEP	4	39	4	52	3	63						
OCT	6	14	<4	69								
NOV	<3	31	<4	100								
DEC	20	17	<4	49								

* New sampling site

(1) For location, see Figure 13-2.

TABLE 13-12

BURIAL GROUND WELL MONITORING - RADIOACTIVITY(1)

(PICOCURIES PER LITER)

BURIAL GROUND WELL #1

YEAR	1990		1991		1992		1993		1994		1995	
MONTH	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA
JAN	<2	2	<3	3	1	3	5	14				
FEB	4	12	<3	3	2	5	<2	6				
MAR	2	5	<3	2	<1	3	<1	6				
APR	<2	2	<3	5	2	3	2	6				
MAY	3	4	10	14	<2	3	<2	10				
JUN	4	11	<2	<1	2	5	<2	6				
JUL	3	4	20	29	<2	8	2	5				
AUG	2	3	30	46	2	5	2	5				
SEP	5	9	5	9	<2	13	2	5				
OCT	3	6	5	10	2	11						
NOV	<2	6	2	6	66	13						
DEC	2	5	24	10	3	7						

BURIAL GROUND WELL #2

YEAR	1990		1991		1992		1993		1994		1995	
MONTH	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA
JAN	<3	73	3	19	7	17	<4	9				
FEB	<3	72	8	18	5	13	5	16				
MAR	<1	374	<3	11	<4	9	9	5				
APR	5	34	9	14	<2	10	26	3				
MAY	5	17	<3	15	<4	7	<4	7				
JUN	<2	12	5	12	<4	9	<3	16				
JUL	<3	15	21	30	<3	11	<4	6				
AUG	5	12	5	20	<4	9	13	6				
SEP	<3	17	12	27	55	11	5	12				
OCT	<2	15	7	14	3	5						
NOV	<3	<1	<1	21	<5	10						
DEC	5	18	4	13	<4	11						

* New sampling site

(1) For location, see Figure 13-2.

TABLE 13-13

BURIAL GROUND WELL MONITORING - RADIOACTIVITY(1)

(PICOCURIES PER LITER)

BURIAL GROUND WELL #3

YEAR	1990		1991		1992		1993		1994		1995	
MONTH	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA
JAN	4	20	<3	5	2	5	8	15				
FEB	<3	5	<3	7	2	6	2	5				
MAR	2	5	<3	5	<1	5	<1	4				
APR	<2	5	<2	8	<2	5	3	6				
MAY	2	73	5	15	<1	5	<2	5				
JUN	2	8	6	<1	4	14	<1	9				
JUL	<3	8	33	50	<5	15	<1	6				
AUG	1	7	22	41	5	33	2	2				
SEP	3	9	9	20	7	4	4	7				
OCT	<2	6	1	6	2	9						
NOV	<3	6	7	18	<13	28						
DEC	2	6	7	8	<2	7						

BURIAL GROUND WELL #4

YEAR	1990		1991		1992		1993		1994		1995	
MONTH	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA
JAN			<3	519	5	1705	6	843				
FEB			<3	681	1	2033	7	1023				
MAR			<3	695	<2	1811	6	1084				
APR			2	1102	<2	2173	<2	571				
MAY			3	1180	9	1369	<2	492				
JUN			<3	1817	2	1871	<2	658				
JUL			<11	1650	<2	1749	<2	346				
AUG			<3	1551	4	896	5	543				
SEP			<2	733	44	2068	7	735				
OCT			<2	805	6	1229						
NOV	9	1123	5	2054	10	1093						
DEC	<2	1427	4	1714	<2	2360						

* New sampling site

(1) For location, see Figure 13-2.

TABLE 13-14

SEWAGE OUTFALL MONITORING - RADIOACTIVITY[1]

(PICOCURIES PER LITER)

YEAR	1985		1986		1987		1988		1989		1990		1991		1992		1993	
MONTH	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA
JAN	244	148	155	183	24	21	133	94	84	40	216	85	73	48	66	30	22	58
FEB	39	84	134	131	127	163	69	118	133	100	111	86	192	81	54	35	19	28
MAR	54	143	32	28	207	80	43	35	68	67	49	22	156	39	58	41	10	4[illegible]
APR	82	80	129	59	28	39	91	95	110	69	24	30	63	22	56	76	18	42
MAY	77	67	135	168	43	56	39	47	61	37	47	44	82	40	34	46	10	39
JUN	213	266	*	*	79	75	56	61	30	24	52	56	121	131	42	38	17	39
JUL	97	103	17	36	17	75	55	40	13	30	52	32	76	24	106	32	17	44
AUG	97	112	46	182	109	93	33	31	6	18	53	46	141	52	96	41	19	28
SEP	189	90	50	401	43	36	71	25	29	41	105	43	40	30	55	39	83	51
OCT	219	96	16	117	87	62	171	106	23	29	31	28	49	146	25	42		
NOV	174	184	19	52	36	27	26	70	21	28	200	77	39	37	57	63		
DEC	405	177	46	42	76	150	31	87	281	209	38	35	84	33	32	56		

* These samples lost in shipping

(1) For location, see Figure 13-2.

TABLE 13-15

SOIL MONITORING - RADIOACTIVITY[1]

(PICOCURIES PER GRAM)

YEAR	1985		1986		1987		1988		1989		1990		1991		1992		1993	
	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA
Station 12																		
1st Qtr	8.6	27	<5	17	11	40	12	28	8.3	35	14	33	13	36	17	32	11	32
2nd Qtr	9.7	25	<7	28	19	29	12	36	11	36	11	36	13	35	7.3	32	14	38
3rd Qtr	<4	21	14	38	11	28	6.7	17	10	25	16	38	28	68	14	38	12	36
4th Qtr	<6	29	18	34	25	51	16	41	9.8	36	11	38	8.4	42	13	40		
Station 13																		
1st Qtr	5.6	55	<5	30	5	36	18	36	11	37	7.9	32	13	24	25	38	6.8	35
2nd Qtr	8.1	22	10	27	25	32	6.6	33	6.4	35	11	34	16	38	7.8	27	11	37
3rd Qtr	<4	33	<7	31	15	30	7.4	19	7	23	13	5.7	12	93	8.8	42	15	35
4th Qtr	<6	32	13	35	12	30	8.2	39	14	40	48	4	14	40	10	40		
Station 14																		
1st Qtr	15	35	11	27	16	20	16	40	15	46	14	43	15	40	15	36	14	41
2nd Qtr	62	47	20	53	20	30	17	43	19	48	10	43	18	91	14	40	10	41
3rd Qtr	13	31	8.2	35	12	43	8.2	25	6	27	19	46	7.7	47	18	45	13	39
4th Qtr	<6	30	19	48	22	44	16	44	15	45	8.4	5	21	47	14	46		
Station 15																		
1st Qtr	9.2	38	9.4	35	17	38	46	50	12	52	13	33	13	37	16	46	14	36
2nd Qtr	19	35	14	31	15	41	11	40	16	46	18	47	14	39	8.9	45	12	48
3rd Qtr	7.6	31	19	33	12	43	24.4	34	11	29	34	150	8.4	48	13	41	15	45
4th Qtr	11	36	33	55	18	44	10	47	19	45	13	6	13	49	17	43		

(1) For location, see Figure 13-3.

TABLE 13-16

VEGETATION MONITORING - RADIOACTIVITY[1]

(PICOCURIES PER GRAM)

YEAR	1985		1986		1987		1988		1989		1990		1991		1992		1993	
	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA
Station 12																		
1st Qtr	0.4	17	1	18	1.1	16	0.8	13	<0.2	4	1.2	13	0.3	13	0.3	8	0.3	0.3
2nd Qtr	<0.2	3	<0.6	16	<0.2	11	<0.3	13	<0.2	12	1.1	15	0.4	9	<0.3	19	0.3	13
3rd Qtr	0.6	7	0.5	11	<0.2	6	1	13	0.5	30	0.9	10	10	98	0.4	8	0.2	11
4th Qtr	1.6	2	0.6	8	<0.6	17	0.8	12	0.2	16	<4	19	3.9	128	0.2	8		
Station 13																		
1st Qtr	0.5	17	<0.2	12	1.1	14	2.4	13	0.4	16	1.2	13	0.4	11	0.5	8	1.7	1
2nd Qtr	<0.2	17	0.4	13	<0.4	12	<0.2	12	0.5	15	0.5	18	0.2	10	0.2	17	<0.01	10
3rd Qtr	0.4	5	<0.6	14	<0.4	17	<0.4	15	1.4	35	0.4	11	21	390	0.2	9	0.2	15
4th Qtr	0.7	12	0.4	7	<0.5	10	0.4	9	0.4	11	7.3	16	3.3	99	0.3	12		
Station 14																		
1st Qtr	0.4	12	0.4	13	0.9	11	6.7	22	0.6	11	1.3	10	<0.03	14	0.4	7	0.3	0.3
2nd Qtr	0.8	10	1.5	55	<0.3	11	<0.1	12	<0.2	13	0.4	15	0.6	25	<0.1	13	<0.01	12
3rd Qtr	0.9	16	0.5	10	<0.2	11	<0.3	10	0.3	31	0.2	79	14	170	0.9	15	0.6	12
4th Qtr	11	18	0.8	12	<0.6	18	0.6	13	<0.4	14	<4	13	18.3	118	0.4	11		
Station 15																		
1st Qtr	0.2	11	<0.2	9	0.6	14	9	23	<0.2	16	2.7	15	0.9	15	0.6	12	0.5	0.4
2nd Qtr	0.4	10	<0.4	24	<0.2	11	<0.2	12	<0.2	14	0.8	15	1.1	33	<0.2	18	0.2	12
3rd Qtr	0.5	9	0.8	13	0.7	13	0.6	11	1.6	31	0.3	15	14	130	0.2	10	<0.1	10
4th Qtr	3.1	13	2	16	0.5	11	0.3	14	0.7	0.4	5.2	15	9.8	245	0.5	12		

(1) For location, see Figure 13-3.

TABLE 13-17

STACK MONITORING - FLUORIDE[1]
OXIDE PLANT DRY SCRUBBERS

(THOUSAND POUNDS RELEASED)

YEAR / MONTH	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
JAN	1.9	1.3	0.9	0.5	1.0	0.1	2.6	2.6	1.6	0.4	2.5	2.0
FEB	2.1	1.2	0.4	0.7	1.8	0.6	1.4	1.4	.8	1.2	1.0	4.2
MAR	1.6	0.7	0.1	1.0	1.4	1.4	2.1	2.1	6.4	0.0	3.2	2.9
APR	1.1	0.7	0.5	1.6	2.6	2.1	2.1	2.1	2.8	0.0	2.1	2.8
MAY	1.2	0.5	0.6	1.1	1.3	1.2	2.7	2.7	4.3	0.3	2.4	5.4
JUN	0.7	0.8	1.1	1.5	***	1.8	3.0	3.0	0.3	1.0	1.4	5.1
JUL	1.2	0.1	0.1	0.1	1.5	***	2.4	2.4	0.8	0.6	4.4	0.3
AUG	1.4	0.7	0.8	1.8	1.1	***	4.9	4.9	1.8	1.0	5.2	6.6
SEP	0.8	1.0	0.2	1.0	1.8	1.2	3.4	3.4	0.3	3.6	3.0	3.7
OCT	1.4	1.0	1.5	1.2	1.3	3.3	3.2	3.2	2.0	2.8	7.6	
NOV	1.0	1.0	1.9	0.9	0.3	2.5	2.5	2.5	0.4	1.6	3.7	
DEC	1.3	0.8	0.4	0.0	0.5	4.6	0.7	0.7	0.5	1.7	4.8	
TOTAL	15.7	9.8	8.5	11.4	14.6	10.0	31.0	22.0	31.0	14.2	41.3	33.0

*** Not in use this month

(1) For location, see Figure 13-3.

TABLE 13-18

SITE DAM OVERFLOW MONITORING - FLUORIDE[1]

(MILLIGRAM PER LITER)

YEAR / MONTH	1985	1986	1987	1988	1989	1990	1991	1992	1993
JAN	<1	<1	0.1	<1	<1	<1	<1	2.5	2.0
FEB	<1	<1	0.6	<1	<1	<1	<1	1.0	4.2
MAR	<1	<1	1.4	<1	<1	<1	<1	3.2	2.9
APR	<1	<1	2.1	<1	<1	<1	<1	2.1	2.8
MAY	<1	<1	1.2	<1	<1	<1	<1	2.4	5.4
JUN	<1	<1	1.8	<1	<1	***	<1	1.4	5.1
JUL	<1	<1	***	1.2	<1	<1	<1	4.4	0.3
AUG	<1	**	***	1.0	<1	<1	1	5.2	6.6
SEP	<1	**	1.2	<1	<1	<1	3.6	3.0	3.7
OCT	1.9	<1	3.3	<1	<1	<1	2.8	7.6	
NOV	<1	<1	2.5	<1	<1	<1	1.6	3.7	
DEC	<1	<1	4.6	<1	<1	<1	1.7	4.8	

*** Results lost

(1) For location, see Figure 13-3.

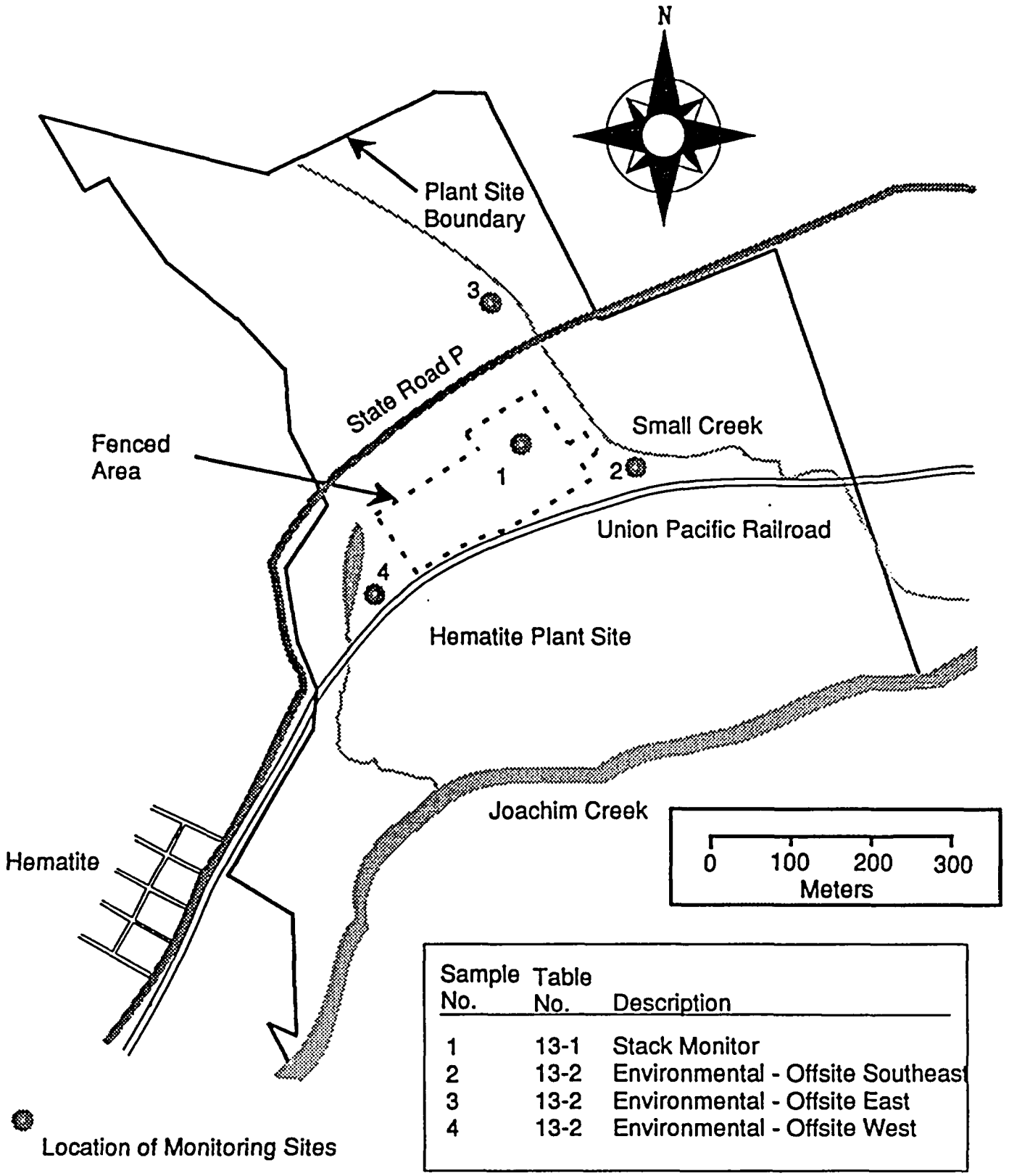
TABLE 13-19

VEGETATION MONITORING - FLUORIDE[1]

(PARTS PER MILLION)

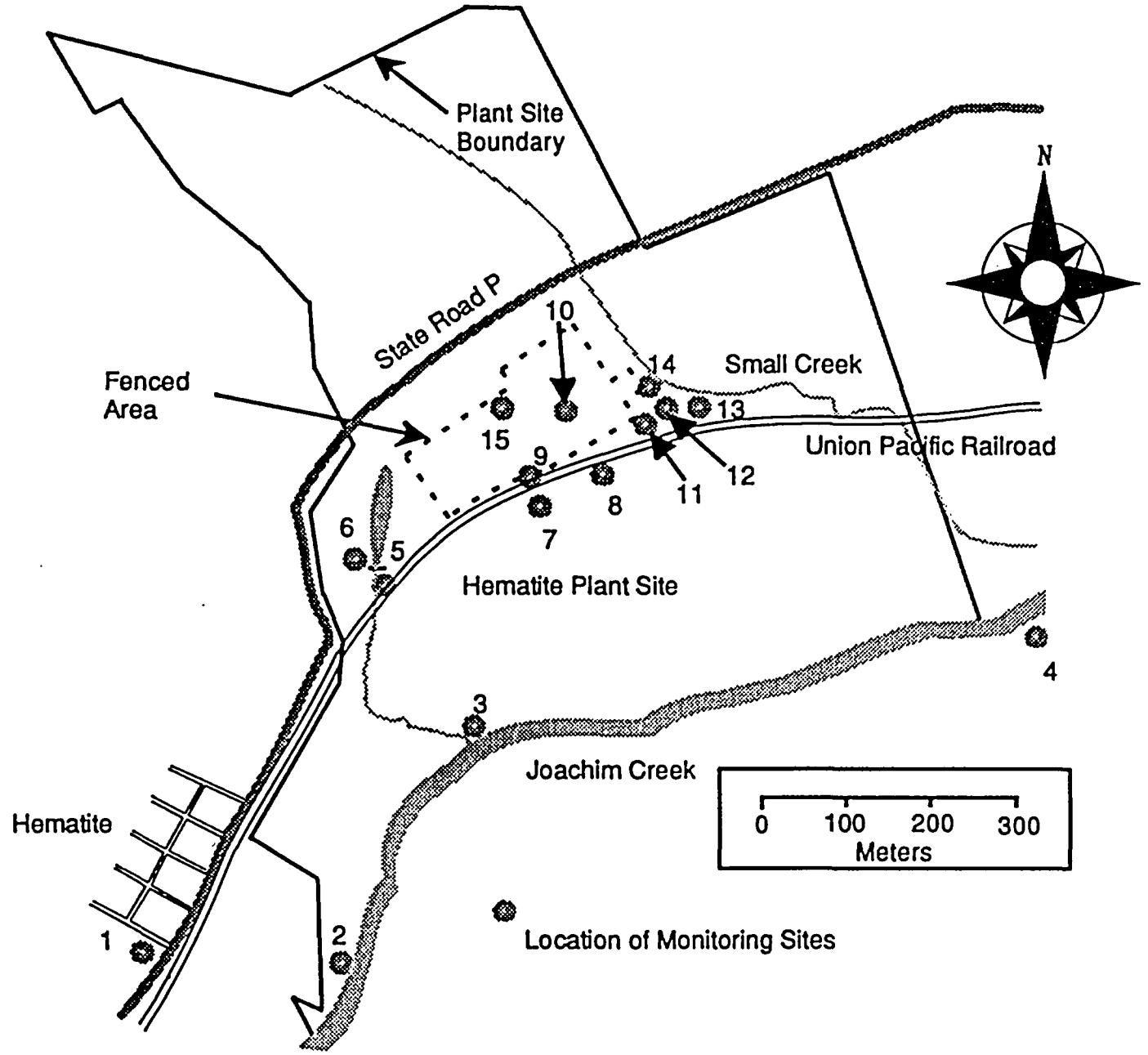
YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
1st Quarter												
Station 12	12	14	35	16	6	14	12	<10	<10	23	10	48
Station 13	11	9	23	51	46	55	9.2	11	22	52	<10	28
Station 14	<10	12	67	19	41	20	18	<10	16	21	<10	24
Station 15	25	16	47	<10	14	51	33	<10	24	25	<10	21
2nd Quarter												
Station 12	13	8	<10	<10	4	<10	<10	<10	<10	8	<10	24
Station 13	11	29	<10	10	21	<10	<10	24	<10	17	13.6	31
Station 14	18	15	<10	10	30	31	10	<10	<10	23	12	66
Station 15	22	19	<10	<10	24	38	11	23	<10	23	46	44
3rd Quarter												
Station 12	14	15	10	<10	48	<10	<10	<10	<10	10	6.2	11
Station 13	<10	70	16	32	20	<10	<10	<10	<10	21	22	13
Station 14	<10	29	6	29	16	<10	<10	<10	<10	25	14	16
Station 15	12	31	7	<10	23	<10	12	11	12	20	14	17
4th Quarter												
Station 12	14	54	13	22	5	<10	2.4	22	10	15	8.4	
Station 13	14	39	43	11	17	14	4.6	14	96	37	17	
Station 14	12	480	74	22	7	<10	3	16	<10	32	9.6	
Station 15	5	72	50	50	33	<10	3.4	20	<10	28	37	

(1) For location, see Figure 13-3.



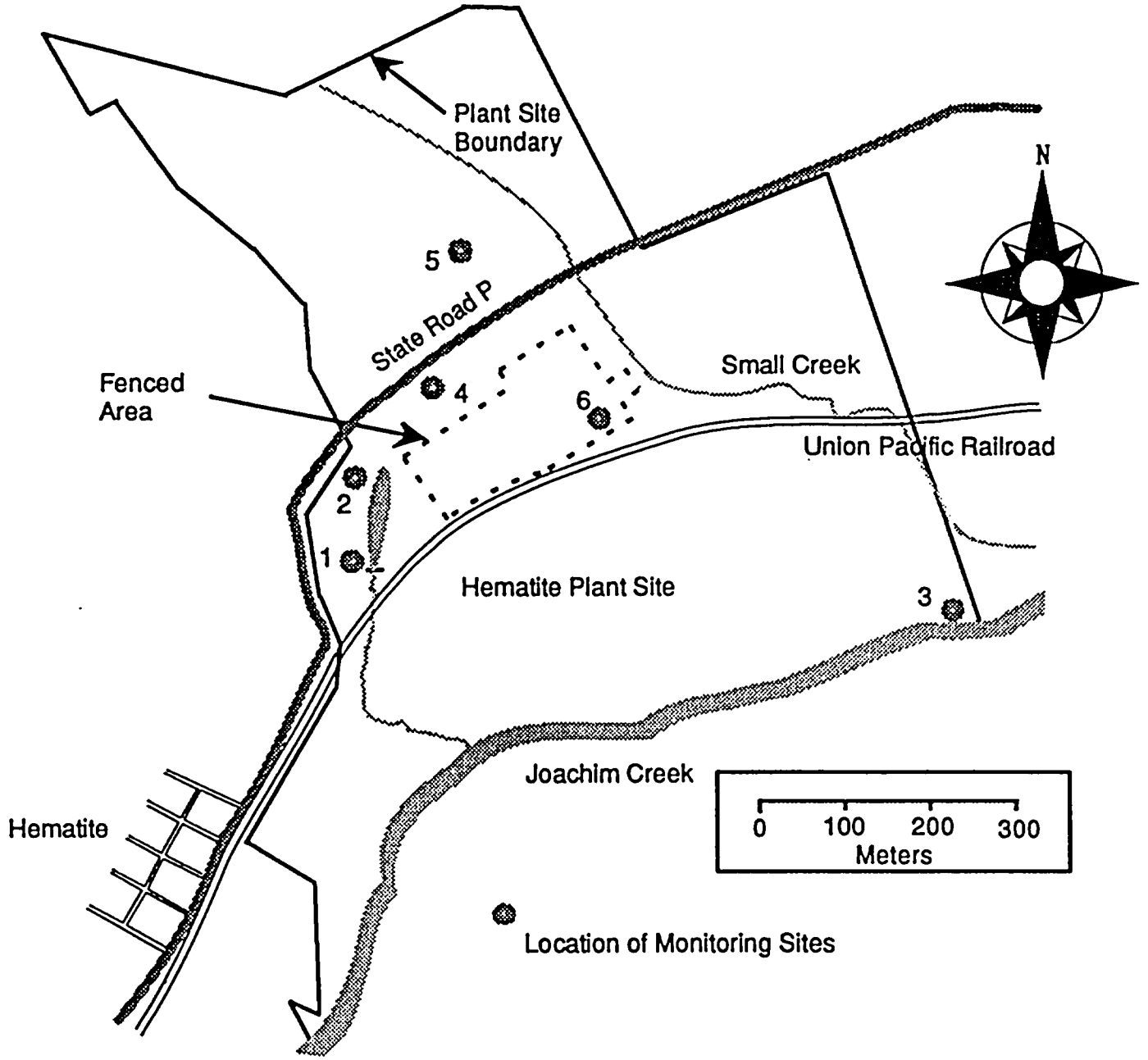
Sample No.	Table No.	Description
1	13-1	Stack Monitor
2	13-2	Environmental - Offsite Southeast
3	13-2	Environmental - Offsite East
4	13-2	Environmental - Offsite West

Figure 13-1
Locations of Air Monitoring Sites



Sample No.	Table No.	Description	Sample No.	Table No.	Description
1	13-6	Hematite Well	9	13-7	Retention Pond Well - North
2	13-4	Joachim Creek - Upstream	10	13-11	South Vault Well
3	13-6	Joachim Creek - Confluence	11	13-13	Burial Ground Well #4
4	13-5	Joachim Creek - Downstream	12	13-12	Burial Ground Well #1
5	13-14	Sewage Outfall	13	13-13	Burial Ground Well #3
6	13-3	Site Dam Overflow	14	13-12	Burial Ground Well #2
7	13-9	Retention Pond Well - Southwest	15	13-10	Site Well
8	13-8	Retention Pond Well - Southeast			

Figure 13-2 Locations of Water Monitoring Sites



Sample No.	Table No.	Description	Sample No.	Table No.	Description
1	13-15	Soil Station #14	4	13-15	Soil Station #15
	13-16	Vegetation Station #14		13-16	Vegetation Station #15
	13-19	Fluoride Station #14		13-19	Fluoride Station #15
2	13-18	Site Dam Overflow - Flouride	5	13-15	Soil Station # 13
3	13-15	Soil Station #12		13-16	Vegetation Station #13
	13-16	Vegetation Station #12		13-19	Fluoride Station #13
	13-19	Fluoride Station #12	6	13-17	Fluoride - Stack

Figure 13-3 Locations of Soil/Vegetation/Fluoride Monitoring Sites