

07000036
R-3/D-2#38



December 16, 1991
ML-91-048

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

Mr. Charles J. Haughney, Chief
Fuel Cycle Safety Branch
Division of Industrial and Medical Nuclear Safety
Office of Nuclear Materials Safety and Safeguards
U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

**Subject: Response to Environmental Questions Regarding Materials License
No. SNM-33 Renewal Application**

Reference: (A) Letter, G.H. Bidinger (NRC) to J.A. Rode (C-E)
dated September 5, 1991

(B) Letter, J.F. Conant (C-E) to C.J. Haughney (NRC)
ML-91-046, dated October 11, 1991

Dear Mr. Haughney:

In Reference (A), several questions were forwarded to Combustion Engineering, Inc. (C-E) regarding environmental information included in Chapters 5 and 13 of the Hematite SNM-33 Renewal Application. In Reference (B), a partial response to the questions was provided. Enclosure I to this letter provides the remainder of the responses to NRC comments. Enclosure II provides additional information requested by the NRC. Enclosure III provides change pages for the Renewal Application. Six copies of Enclosures I, II, and III are included for your use.

ABB Combustion Engineering Nuclear Power

II-8

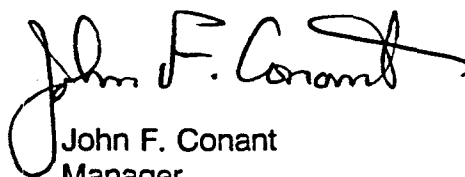
Mr. C.J. Haughney
December 16, 1991

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Page 2

If you have any questions regarding this matter, please do not hesitate to call me or Mr. Thomas Cameron of my staff at (203) 285-5109.

Very truly yours,

Combustion Engineering, Inc.

A handwritten signature in black ink, appearing to read "John F. Conant". The signature is written in a cursive style with a long, sweeping tail on the final letter.

John F. Conant
Manager
Nuclear Materials Licensing

JFC:kll

Enclosures: As Stated

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

Enclosure I to
ML-91-048

**COMBUSTION ENGINEERING, INC. RESPONSE TO
NRC COMMENTS ON THE HEMATITE RENEWAL APPLICATION
DATED NOVEMBER 22, 1989**

DECEMBER 1991

RESPONSES TO NRC COMMENTS

COMMENT NO.

RESPONSE

1. Provided in October 11, 1991 response.

2. Provided in October 11, 1991 response.

3a. The operational Environmental Monitoring Program is structured to develop long term trends of radioactivity uptake or migration in surface or ground water, soil, and vegetation originating from the Hematite site. As data is collected, analyzed, and tabulated the trend is monitored for continuous increasing levels of radioactivity. Often, water samples found in monitoring wells will yield erroneously high radioactivity results in summer months due to low water levels in the wells. An increasing trend in the environmental monitoring program data would indicate a degradation in plant controls/programs/practices for limiting radioactivity releases. A degradation would first be apparent in the weekly gaseous and liquid effluent analysis.

It is not warranted to put "action levels" in Table 5-1 for the Operational Environmental Monitoring Program and would be inconsistent with other licensees whose applications were renewed. A sentence will be added to Section 5.2, "Should a significant continuous upward trend be noted in any of the sampling data, corrective actions will be taken to investigate the cause. Remedial actions will be taken as appropriate."

3b. Provided in October 11, 1991 response.

4. As identified in Chapter 13, the gaseous effluents originate from the facility exhaust stacks. Liquid effluents containing trace amounts of uranium are discharged via the storm sewers (run-off from restricted areas of the site) and the sewage treatment facility (filtered water from laundry and showers). Table 5-1 describes the environmental sampling points, method, frequency, and type of analysis performed.

Table 5-1 has been expanded to include a reference to the applicable data table in Chapter 13. This has been included for information only, and should not make the Chapter 13 information conditions of the license. Also, the sample location map from Chapter 13 has been divided into three (3) separate figures to more clearly depict sample types and locations. Each figure

includes a table to correlate sample location with the appropriate Data Table(s).

5. The offgas effluents released from the oxide conversion stack (#114) are primarily soluble. The remainder of the gaseous effluents are essentially insoluble. The isotopes present in the gaseous effluents are U-234, U-235 and U-238.

Enclosure II to
ML-91-048

**COMBUSTION ENGINEERING, INC. RESPONSE TO
NRC REQUEST FOR ADDITIONAL INFORMATION ON
HEMATITE RENEWAL APPLICATION DATED NOVEMBER 22, 1989**

DECEMBER 1991

**RESPONSE TO NRC REQUEST FOR
ADDITIONAL INFORMATION**

ITEM NO.

RESPONSE

1. Provided in October 11, 1991 response.
2. The lung doses were calculated for the nearest neighbor who lives approximately 290 meters to the east-southeast of the Hematite plant. The wind frequency and average wind speed were taken from Table 1 which is from hourly observations taken in St. Louis between 1951 - 1960.

The lung dose was for the nearest resident and was calculated assuming the person was breathing the same average concentration being discharged from the plant. The persons breathing rate was 2.66×10^{-4} cubic meters/second. The lung dose is very conservative since it assumes the person is outside his home for the entire year and breathing the average concentration. Further, the concentration would be reduced below the stack discharge concentration during the transport by further diffusion and position. The lung dose was calculated using the ICRP-30 for Type Y (insoluble) uranium compounds.

The activity releases and the resulting lung dose for 1989 and 1990, and for the first six months of 1991 are shown in the following table.

<u>YEAR</u>	<u>RELEASE (μCi)</u>	<u>LUNG DOSE (Rem)</u>
1989	367.07	5.4×10^{-4}
1990	288.32	4.4×10^{-4}
1991 (6 months)	117.83	1.9×10^{-4}

3. Provided in October 11, 1991 response.
4. The amount of HF released to the environment is as follows:
- 1989 - 18,800 lbs.
1990 - *7,200 lbs.
1991 - 10,987 through 11/1/91

* The decrease in 1990 was a result of installing more efficient ammonia crackers.

5. Table 1 provides average meteorology of site.
6. The population estimates for areas within a 50 mile radius of the Hematite Facility are identified on Figures 1 & 2. This information was obtained from Missouri Economic Development Department and the University of Missouri.
7. Provided in October 11, 1991 response.
8. Provided in October 11, 1991 response.
9. Dose calculations to demonstrate compliance with 40 CFR 190.10 for 1984 through 1990.

The maximum doses for 1984 through 1990 were calculated and are shown in the following table, as well as the per cent of 40 CFR 190.10 limit.

<u>YEAR</u>	<u>DOSE</u>	<u>% OF LIMIT</u>
1984	3.4×10^{-4}	1.4
1985	4.5×10^{-4}	1.8
1986	5.6×10^{-4}	2.2
1987	9.0×10^{-4}	3.6
1988	1.2×10^{-3}	4.8
1989	1.2×10^{-3}	4.8
1990	1.0×10^{-3}	4.0

The lung body burden to dose was taken from ICRP for Type Y material. The wind frequency was taken for the maximum direction, which is south.

10. The height of the plant stacks is shown on Figure 3. Stacks are in operation essentially 100% of the time.
11. The nearest resident to the Hematite site is 290 meters east-southeast of the site boundary.
12. Yes, near iso-kinetic sampling is conducted for measuring stack effluents.

13.

The environmental and effluent data consistently remains within acceptable levels. Elevated results periodically appear which are more than likely a result of dry periods in the local weather. Fluctuations are also noted in the data which relate to varying levels of production throughout the years. The effects of replacing the ammonia cracker and installation of HEPA filters during the facility revitalization project can also be seen. NOTE: Several Table Nos. have changed as a result of providing responses to NRC questions. The revised Table No. is included in ().

TABLE 13-1

1. Each data point represents total microcuries released for a specific month.
2. Data represents variations in production. In 1983 & 1984, no pellets were produced. With the recent addition of HEPA filters, releases are noticeably lower.
3. Site boundary calculations are generally calculated following the NRC methodology from the document "Radiological Assessment of Individual Dose Resulting from Routine Operation - Demonstration of Compliance with 40CFR190," Enclosure to Amendment No. 5 to Materials License No. SNM-33 on Docket No. 70-36, signed by R. E. Cunningham (NRC), January, 1980.

TABLE 13-2

1. The units are 10^{-15} microcuries/milliliter.
2. The derated results during 1985 and 1986 were more than likely due to an insufficient waiting period for thorium products to decay.

TABLE 13-8

- 1&2. Elevated Alpha/Beta results for the periods in questions were more than likely a result of low water levels in the sample wells during dry periods and a failure to filter solids adequately prior to analysis.

TABLE 13-11 (13-14)

1. Current sampling at the "outfall" is liquid only. Future plans call for implementing a routine sediment sampling program at this location.

TABLE 13-14 (13-17)

1. The annual plant shutdown is scheduled during the month of July.
2. Higher production combined with the inefficiency of the old ammonia crackers (since replaced).

TABLE 13-16 (13-19)

Elevated fluoride levels are randomly distributed throughout the vegetation monitoring data and more than likely result from extended dry periods prior to sampling. 1983 - 4th Quarter, Station #14, contains a typographical error. The correct value is "48". A change page has been provided.

14. Approximately 436 feet above sea level. Section I of the license (SNM-33) identifies areas within the Hematite Facility where authorized activities are permitted.
15. No X/Q is available for the Hematite site as the equipment for this type of determination is not available at the site. It is felt that this type of information is not necessary for the normal release, as they are averaged over the year and the atmospheric stability can be represented by Pascal D. Accident analysis stability is almost always specified in Reg. Guides as Pascal F.
16. November 1990.
17. Using the 10CFR20 formula for calculating specific activities (SA), the U-234/U-235 ratio averages approximately 26. We do not believe this ratio should be included in the Safety Demonstration section of our license.
18. 500 - 600 tons of spent limestone are produced annually.

TABLE 1
PERCENTAGE FREQUENCIES OF WIND DIRECTION AND SPEED DISTRIBUTION
IN ST. LOUIS, MISSOURI (1951-1960)

HOURLY OBSERVATIONS OF WIND SPEED* (In Miles Per Hour)											
Direction	0-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	47+	Total	Average Speed
N	0.4	1.7	1.7	0.7	+	+	+			4.5	8.4
NNE	0.2	1.3	1.3	0.4	+					3.2	8.1
NE	0.4	1.7	1.4	0.4	+	+				3.9	7.9
ENE	0.2	1.2	1.3	0.4	+	+				3.2	8.5
E	0.4	1.2	1.6	0.7	0.1	+				3.9	9.1
ESE	0.4	1.9	2.0	0.8	0.1	+			+	5.2	8.7
SE	0.7	2.3	2.2	1.4	0.3	0.1	+	+	+	7.0	9.4
SSE	0.4	1.5	2.8	2.3	0.4	0.1	+	+		7.6	11.2
S	0.6	2.9	4.2	2.7	0.4	0.1	+	+		10.8	10.2
SSW	0.3	1.8	2.5	1.4	0.2	+	+			6.2	9.7
SW	0.4	2.0	2.7	1.0	0.1	+	+			6.3	9.0
WSW	0.3	1.5	2.0	1.1	0.2	0.1	+			5.0	9.9
W	0.4	2.0	2.1	1.2	0.3	0.1	+			6.2	9.9
WNW	0.3	2.1	3.0	2.4	0.5	0.1	+			8.4	11.0
NW	0.4	2.5	3.4	2.7	0.4	+	+			9.4	10.5
NNW	0.3	1.6	2.1	2.1	0.1	+	+			5.3	9.5
CALM	3.8									3.8	
TOTAL	9.9	29.3	36.3	20.7	3.1	0.6	0.1	+	+	100.0	9.3

*Based on 10 years and 87,672 observations (Reference 7).

*Indicates more than zero, but less than 0.05 percent.

TABLE 2**Towns and Settlements Within a Five Mile Radius**

<u>Town</u>	<u>General Direction From Site</u>	<u>Distance (miles) From Site</u>	<u>Population 1990 Estimate</u>
Crystal City	E	4.5	4088
Deerfield	E	1.5	95*
DeSoto	SW	5.0	5993
Festus	E	3.5	8105
Hematite	SW	0.5	125
Hillsboro	NW	5.0	1625
Horine	NE	5.0	1043
Lake Wauwanoka	NW	3.5	800*
Mapaville	N	3.5	100
Olympia Village	S	5.9	752
Victoria	SW	3.0	100

* Denotes 1980 Census

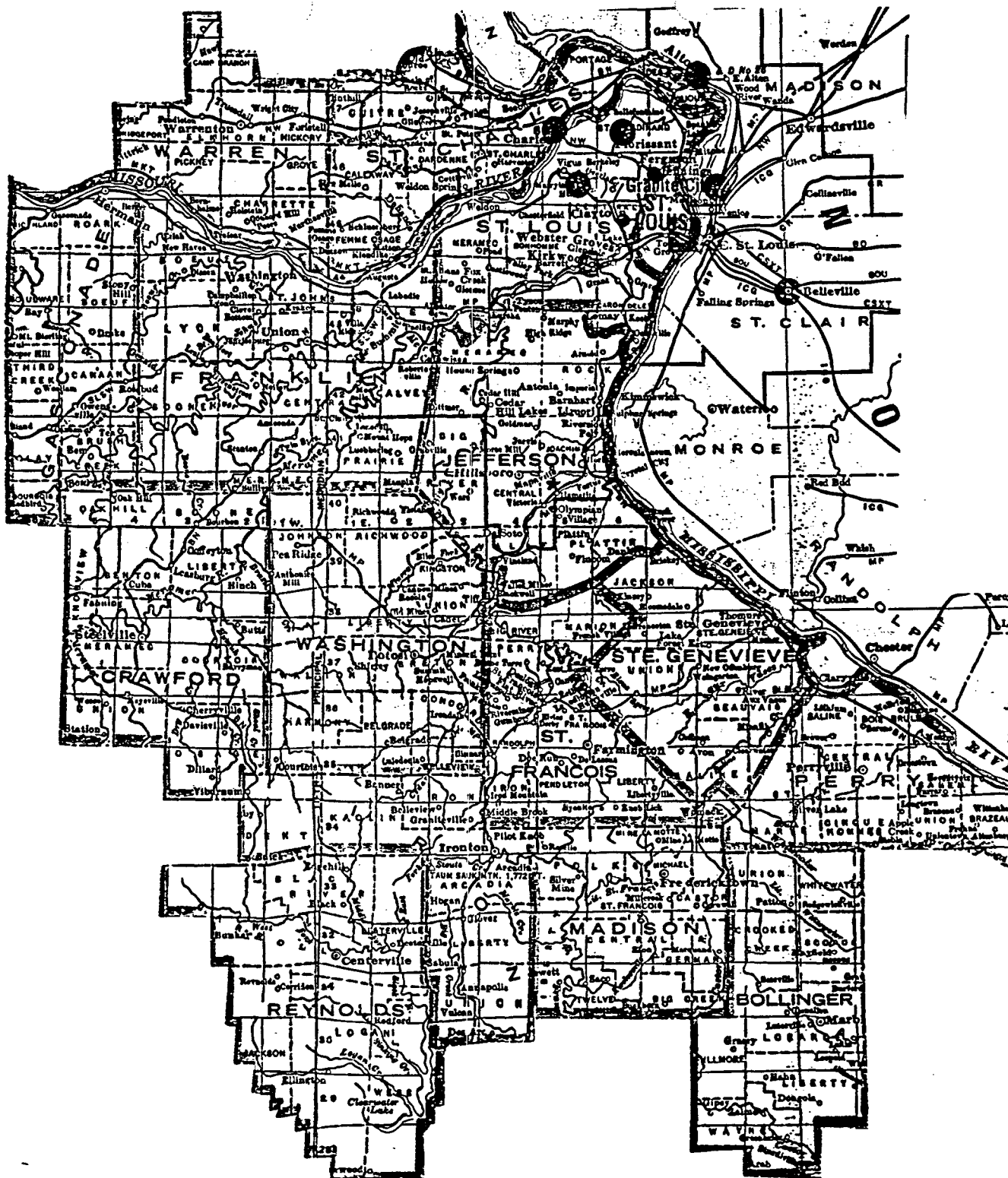
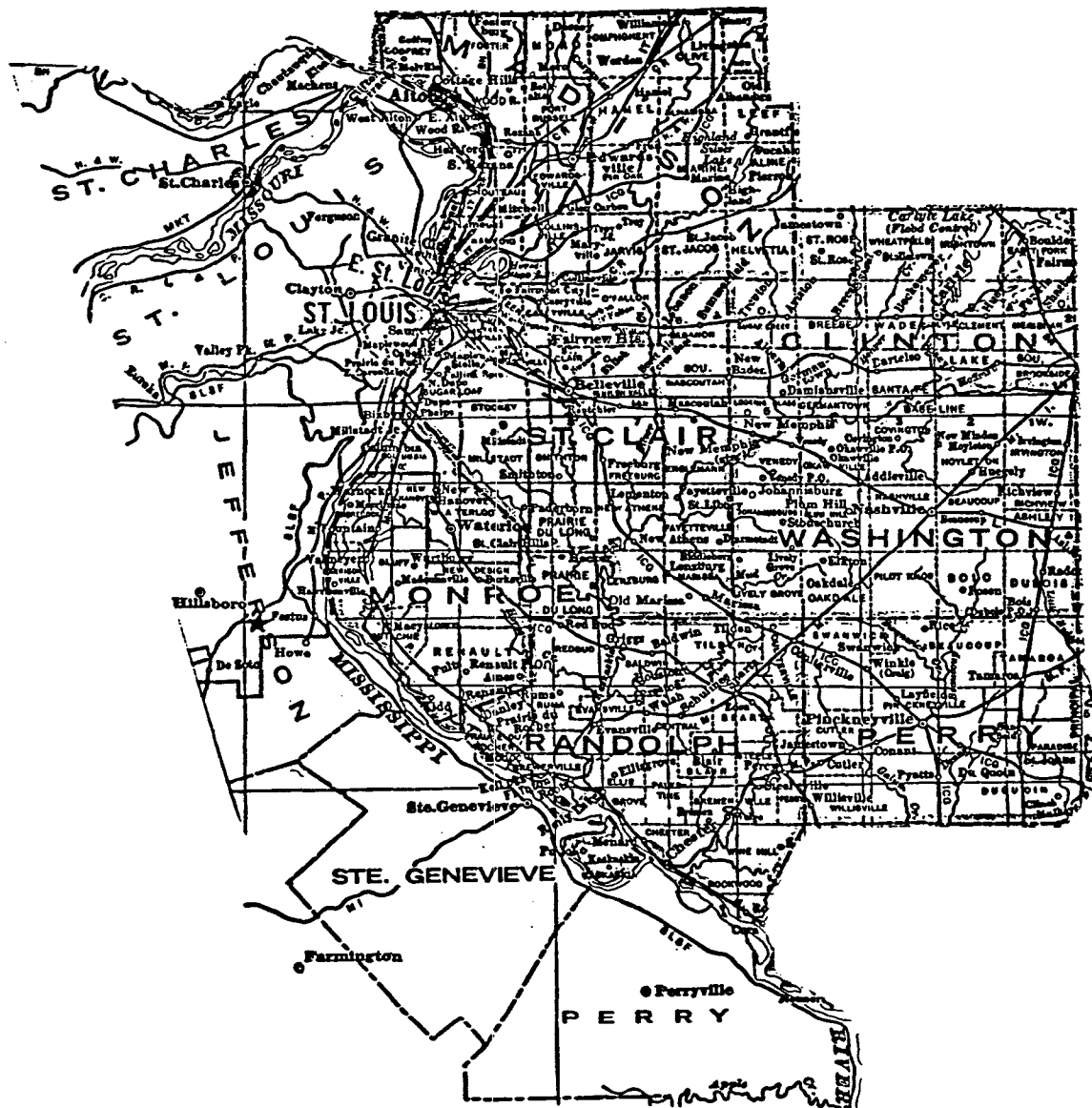


FIGURE 1: POPULATION FOR MISSOURI COUNTIES WITHIN A 50 MILE RADIUS FROM THE HEMATITE FACILITY

Scale 1:1,013,800
 1 inch = 16 Statute Miles
 1 Centimeter = 10.1 Kilometers



County	Population (est. 1990)	Area (Sq. Mile)
Jefferson	171,380	661
St. Genevieve	16,037	504
St. Francois	48,904	451
Washington	20,380	762
Franklin	80,603	922
St. Louis	993,529	505
St. Charles	212,907	558
Warren	19,534	429
Gasconade	14,006	521
Crawford	19,173	744
Reynolds	6,661	808
Iron	10,726	552
Madison	11,127	497
Bollinger	10,619	621



Scale 1:1,013,800
 1 inch = 16 Statute Miles
 1 Centimeter = 10.1 Kilometers



County	Population (est. 1990)	Area (sq. Miles)
Monroe	22,422	388
St. Clair	262,852	672
Madison	249,238	728
Clinton	33,944	472
Washington	14,965	563
Perry	21,421	442
Randolph	34,583	583

FIGURE 2: POPULATION FOR ILLINOIS COUNTIES WITHIN A 50 MILE RADIUS FROM THE HEMATITE FACILITY

Stack Number	Identification	Height of Stack Top Above Grade (Ft)
S 050	Pellet Plant West System	21
S 051	Pellet Plant East System	21
S 103	Powder Unload Hoods-West Bank	58
S 106	Oxide East Bank	58
S 114	Dry Scrubber Exhaust	54.5
S 228	Red Room Dry Side	24.5
S 230	Red Room Wet Side	26.5
S 232	Green Room-Incinerator	25.5
S 301	Building 254 East Pellet Line Powder Preparation, Pressing	46
S 302	Building 254 West Pellet Line Powder Preparation, Pressing	46
S 303	Building 254 East Pellet Line Furnace Area	40.5
S 304	Building 254 West Pellet Line Furnace Area	40.5
S 305	Building 254 Grinders, Pellet Loading	40.5
S 401	Building 253 Recycle Loading	26
S 120	Oxide General Area Ventilation	58
S 052	Bldg. 255 Pelletizing Area	25
S 053	Bldg. 255 Furnace Area	25

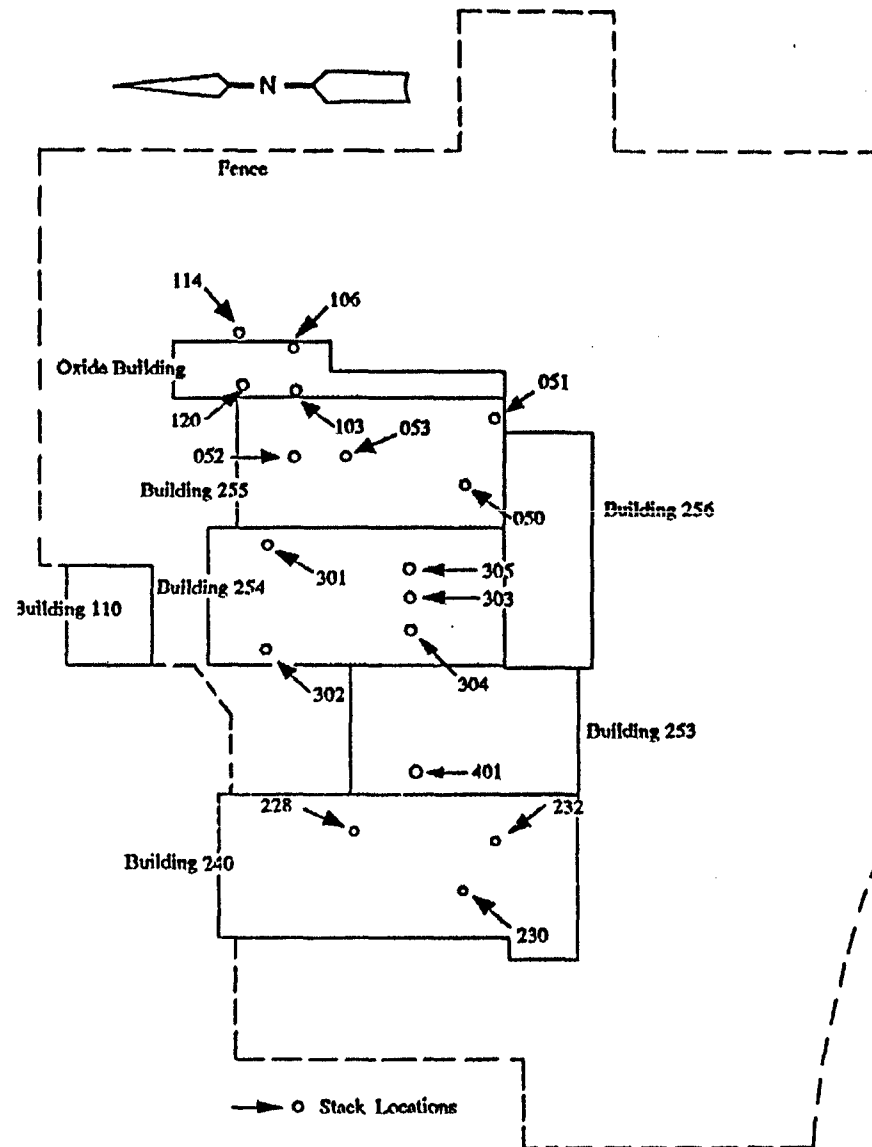


FIGURE 3. EXHAUST STACK LOCATIONS AND HEIGHTS

**Enclosure III to
ML-91-048**

**COMBUSTION ENGINEERING, INC.
REVISED PAGES IN RESPONSE TO NRC REQUEST
FOR ADDITIONAL INFORMATION ON HEMATITE RENEWAL APPLICATION
DATED NOVEMBER 22, 1989**

DECEMBER 1991

COMBUSTION ENGINEERING, INC.

SPECIAL NUCLEAR MATERIAL LICENSE NO. SNM-33, DOCKET NO. 70-36

PART I LICENSE CONDITIONS

A further control limit for liquid effluent streams which discharge to Joachim Creek (NPDES Outfalls 001 and 002) shall be:

Alpha - 3.0×10^{-6} Ci/ml
Beta - 2.0×10^{-6} Ci/ml

If these control limits are exceeded, averaged over a calendar quarter, an investigation shall be conducted and corrective action taken.

5.2 Environmental Monitoring

Location of air particulate, soil, vegetation, well water, surface water and liquid effluent sampling stations shall be established and kept as part of the Demonstration Section of this license.

Monitoring locations may be changed only if a documented evaluation by NLS&A demonstrates that a new location provides data that are as representative (or more representative) of conditions likely to impact on the general public, as was the data from the original location.

Environmental samples shall be collected and analyzed as shown in Table 5-1. Sample frequency may vary due to inclement weather, plant shutdown, or operating conditions. More frequent or additional samples may be taken as required for special studies and evaluations. Should a significant continuous upward trend be noted in any of the sampling data, corrective actions will be taken to investigate the cause. Remedial actions will be taken as appropriate.

**TABLE 5-1
ENVIRONMENTAL MONITORING PROGRAM**

<u>Sample Medium</u>	<u>Sampling Points</u>	<u>Collection & Analysis Frequency</u>	<u>Sample Type</u>	<u>Type of Analysis</u>	<u>Action Level</u>	<u>Table No.*</u>
Operational Effluents Monitoring Program:						
Air Effluent	Exhaust Stacks	Continuous & Analyze Weekly	Particulate	Gross Alpha	2 Wk Avg MPC	13-1
Air Effluent	Conversion Offgas Stack	Continuous & Analyze Weekly	Gaseous & Particulate	Fluoride & Gross Alpha		13-17 **
Liquid Effluent	Site Dam	Continuous & Analyze Weekly	Composite	Gross Alpha & Beta, Fluoride	Above 10% MPC	13-3, 13-18
	Sewage Treatment Outfall	Weekly	Grab	Gross Alpha & Beta	Above 10% MPC	13-14
Operational Environmental Monitoring Program:						
Air	3 Onsite Remote	Continuous & Analyze Weekly	Particulate	Gross Alpha		13-2
Surface Water	Joachim Creek Aboved & Below Site Creek Outfall	Monthly	Grab	Gross Alpha & Beta		13-4, 13-5
	Joachim & Site Creek Confluence	Quarterly	Grab	Gross Alpha & Beta		13-6
Groundwater	Plant Well	Monthly	Grab	Gross Alpha & Beta		13-10
	Offsite Well (Hematite)	Quarterly	Grab	Gross Alpha & Beta		13-6
	3 Monitoring Wells for Evaporation Ponds	Monthly	Grab	Gross Alpha & Beta		13-7, 13-8, 13-9
	South Vault Sample Monitoring Well	Monthly	Grab	Gross Alpha & Beta		13-11
	4 Burial Ground Monitoring Wells	Monthly	Grab	Gross Alpha & Beta		13-12, 13-13
Soil	4 Locations Surrounding Plant	Quarterly	Grab	Gross Alpha & Beta		13-15
Vegetation	4 Locations Surrounding Plant	Quarterly	Grab	Gross Alpha & Beta & Fluoride		13-16, 13-19

*A column has been added to correlate sample points with data tables in Chapter 13. This has been added "for information only."
 **Monitoring results for this stack are included in Table 1 as "Total Microcuries" released for all stacks.

PART I
LICENSE CONDITIONS

COMBUSTION ENGINEERING, INC.
 SPECIAL NUCLEAR MATERIAL LICENSE NO. SNM-33, DOCKET NO. 70-36

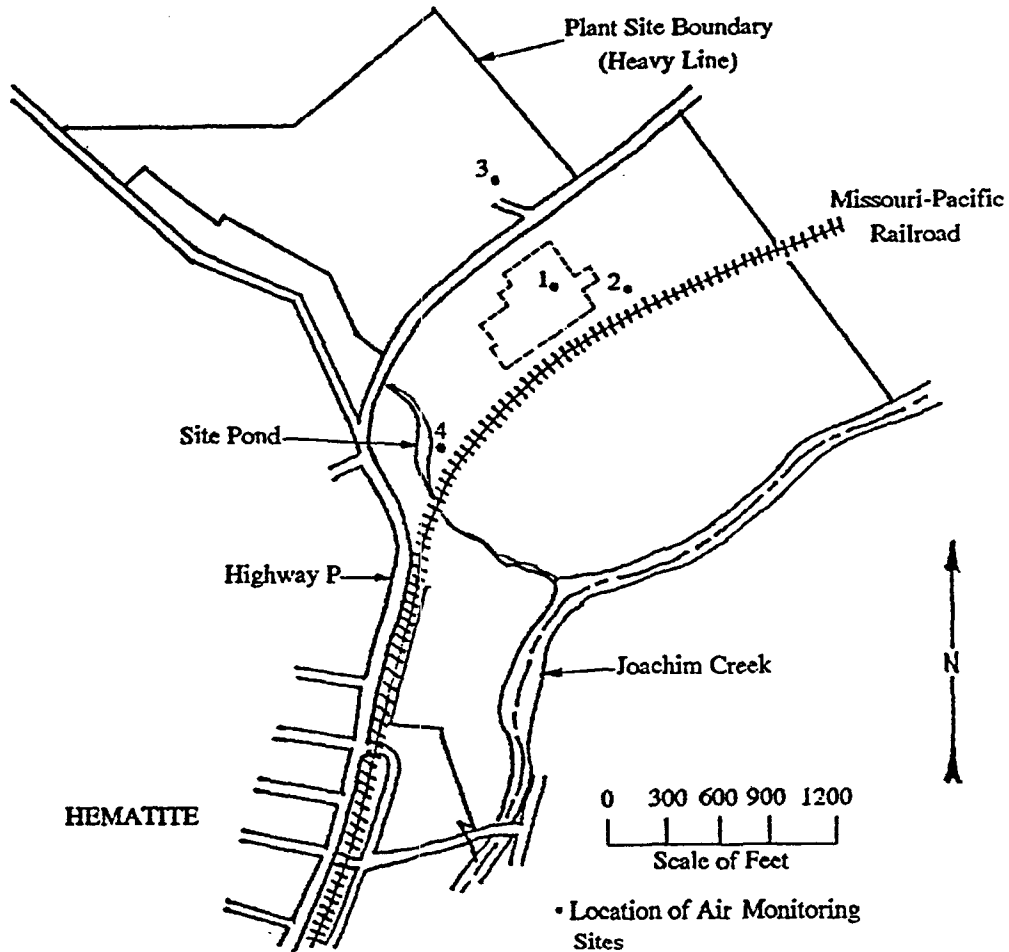
TABLE 13-19
VEGETATION MONITORING - FLUORIDE
 (PARTS PER MILLION)

	<u>STATION 12</u>	<u>STATION 13</u>	<u>STATION 14</u>	<u>STATION 15</u>
<u>1982</u>				
1ST QTR	12	11	<10	25
2ND QTR	13	11	18	22
3RD QTR	14	<10	<10	12
4TH QTR	14	14	12	5
<u>1983</u>				
1ST QTR	14	9	12	16
2ND QTR	8	29	15	19
3RD QTR	15	70	29	31
4TH QTR	54	39	48	72
<u>1984</u>				
1ST QTR	35	23	67	47
2ND QTR	<10	<10	<10	<10
3RD QTR	10	16	6	7
4TH QTR	13	43	74	50
<u>1985</u>				
1ST QTR	16	51	19	<10
2ND QTR	<10	10	10	<10
3RD QTR	<10	32	29	<10
4TH QTR	22	11	22	50
<u>1986</u>				
1ST QTR	6	46	41	14
2ND QTR	4	21	30	24
3RD QTR	48	20	16	23
4TH QTR	5	17	7	33

COMBUSTION ENGINEERING, INC.

SPECIAL NUCLEAR MATERIAL LICENSE NO. SNM-33, DOCKET NO. 70-36

PART II SAFETY DEMONSTRATION



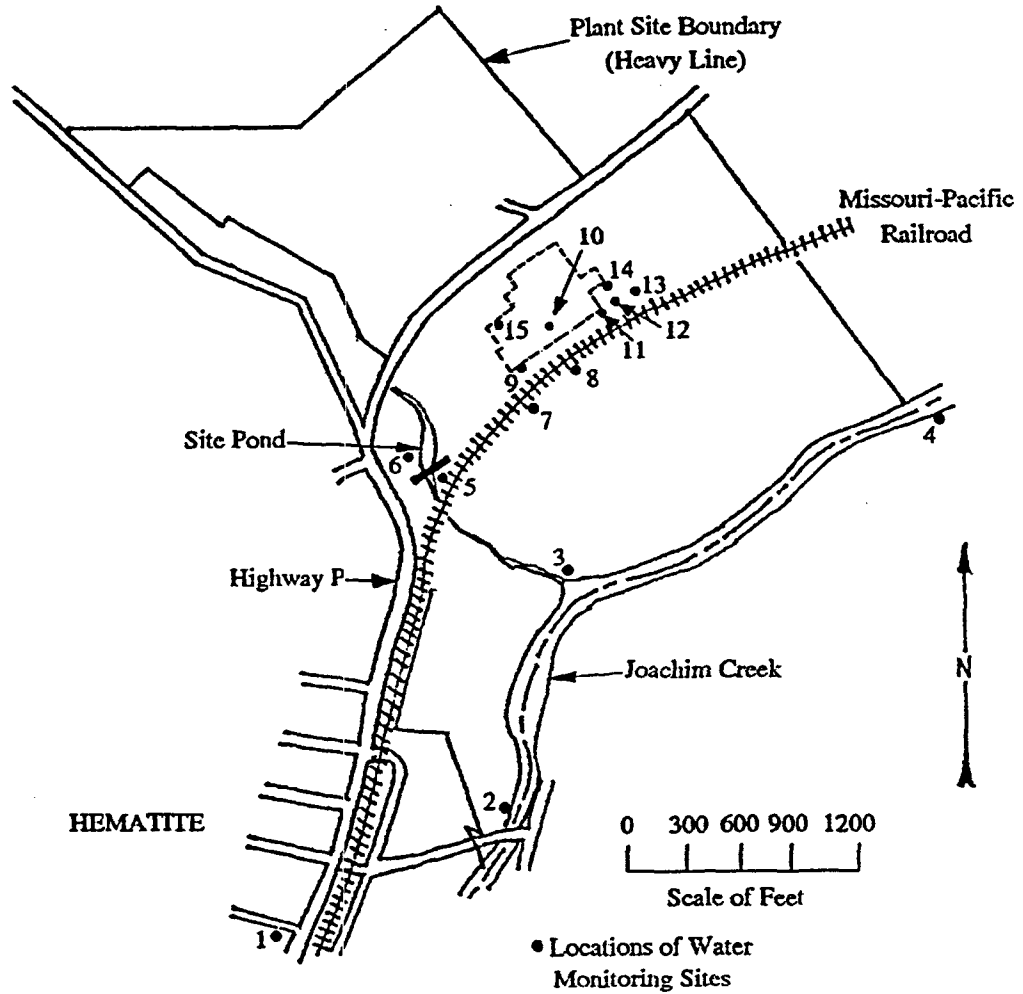
Sample No.	Table No.	Description
1	13-1	Stack Monitor
2	13-2	Environmental - Offsite Southeast
3	13-2	Environmental - Offsite East
4	13-2	Environmental - Offsite West

FIGURE 13-1. LOCATIONS OF AIR MONITORING SITES

COMBUSTION ENGINEERING, INC.

SPECIAL NUCLEAR MATERIAL LICENSE NO. SNM-33, DOCKET NO. 70-36

PART II SAFETY DEMONSTRATION



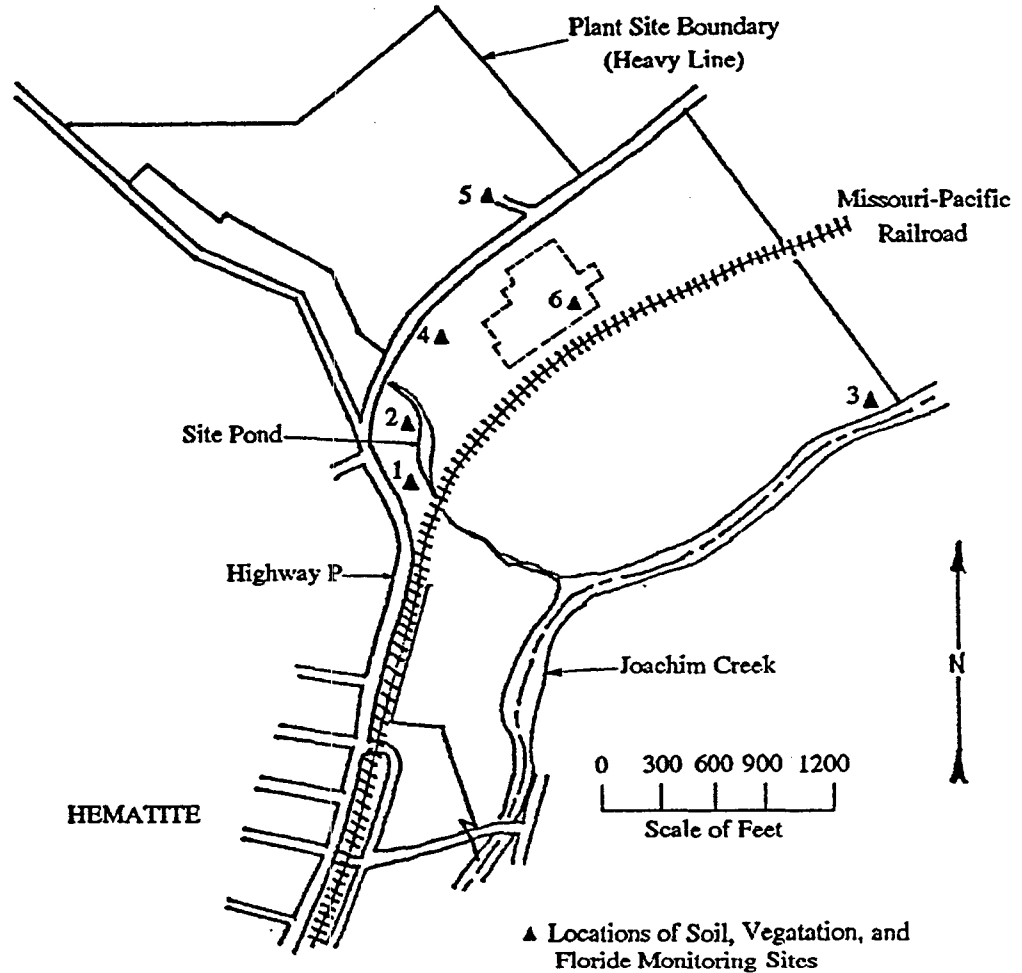
Sample Table No.	No.	Description	Sample Table No.	No.	Description
1	13-6	Hematite Well	9	13-7	Retention Pond Well-North
2	13-4	Joachim Creek - Upstream	10	13-11	South Vault Well
3	13-6	Joachim Creek - Confluence	11	13-13	Burial Ground Well #4
4	13-5	Joachim Creek - Down Stream	12	13-12	Burial Ground 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

COMBUSTION ENGINEERING, INC.

SPECIAL NUCLEAR MATERIAL LICENSE NO. SNM-33, DOCKET NO. 70-36

PART II SAFETY DEMONSTRATION



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 - Fluoride	5	13-15	Soil - Station #13
3	13-15	Soil - Station #12	6	13-16	Vegetation - Station #13
	13-16	Vegetation - Station #12		13-19	Fluoride - Station #13
	13-16	Fluoride - Station #12		13-17	Fluoride - Stack

FIGURE 13-3. LOCATIONS OF SOIL/VEGETATION/FLUORIDE MONITORING SITES