Westinghouse

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August 22, 2002

Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

ATTN: Document Control Desk

Subject: Resubmitted application for License Amendments and to delete License Condition Number SG-2.2
(License Number SNM-33, Docket 70-36)

References: 1) Westinghouse Letter dated June 17, 2002 from A. J. Nardi to USNRC
2) Westinghouse Letter dated September 11, 2001 from A. J. Nardi to USNRC.

By letter dated June 17, 2002 (Reference 1) Westinghouse submitted an application for a license amendment. This letter replaces in its entirety that application and incorporates an additional request for a license amendment. Therefore in order to simplify the records, this application is a stand-alone submittal. The changes that have been incorporated into this submittal are identified below.

The Westinghouse Electric Company hereby submits this application for an amendment to License Number SNM-33 to:

1. Revise the requirement in Chapter 8 of the SNM-33 License Application for an Emergency Plan in accordance with the provisions of 10CFR70.22(i)(1)(i), and
2. Delete License Condition Number SG-2.2 which requires that surveillance tours be conducted of the UF_6 outdoor storage area.
3. Revise Sections 1.4 and 1.5 in Chapter 1 to change the possession limits and the list of authorized activities.

Discussion of requested changes:

1. Emergency Plan requirement

By Reference #2, Westinghouse notified the NRC that it had ceased principal licensed activities performed under License SNM-33 at the Hematite facility. Operations at the site are now limited to those associated with decommissioning activities.

NMSS01 Public

In accordance with the provisions of 10CFR70.22(i)(1)(i), an emergency plan is not required if the licensee can provide "an evaluation showing that the maximum exposure to a member of the public due to a release of radioactive material would not exceed 1 rem effective dose or an intake of 2 milligrams of soluble uranium". The current Emergency Plan provides an analysis of various accident scenarios including the bounding cases for a criticality, a UO_2 release and a UF_6 release. In that analysis the UF_6 release exceeded a 1 rem maximum effective dose. UF_6 has been removed from the site and the current authorized activities under the license would not permit future receipt of this material. With the continuing reduction in the uranium inventory on the site, the possibility of a criticality accident becomes even more unlikely than before. However, the possibility remains an evaluated accident. This analysis is provided in Section 2.1.8 of the Emergency Plan, which demonstrates that the radiation dose would not exceed 1 effective rem. The third accident considered in the Emergency Plan is a major UO_2 release associated with a fire and explosion associated with the sintering and dewaxing furnace area. This equipment is no longer being used. A reevaluation was made of potential bounding accidents appropriate for the site. Attachment 1 to this letter provides the analysis for a fire involving a bulk container containing uranium contaminated waste materials. The conclusion of that analysis is that the exposure associated with such a fire is less than 1 effective rem and an intake of less than 2 milligrams soluble Uranium. Based on these analyses, an Emergency Plan meeting the requirements of 10CFR70.22(i)(3) is no longer required for this license.

Attachment 2 to this letter provides revised license pages to reflect the removal of the requirement to have an Emergency Plan. This revision reflects telephone conversations held with Mr. G. M. McCann concerning the emergency preparedness program that would remain in place at the Hematite site during the decommissioning phase. The revised Chapter 8 provides a description of this emergency preparedness program.

2. Delete License Condition Number SG-2.2

The second requested license amendment is to delete License Condition SG–2.2 from the license. This condition requires that surveillance tours be conducted of the UF_6 outdoor storage area. This requirement is no longer applicable because no UF_6 is possessed on the site, and the current authorized activities for the license prohibit the receipt of such materials.

3. Revise License Possession Limits and Authorized activities

License Amendment #42 approved a revision of Sections 1.4 and 1.5 of the license as requested by an application (Reference 2). Attachment 2 to this letter provides revised pages to Chapter 1 of the license application that reflects additional changes being requested. The requested possession limits have been revised to:

1. Decrease the possession limits for Items A and C of the Table to reflect the continued removal of licensed material present on the site.
2. Remove the possession limit for the ^{252}Cf sources (Item G) as these sources have been removed from the site.
3. Increase the possession limit for Item F from 200 microCuries to 400 microCuries to provide for the receipt of used shipping containers that are contaminated with Byproduct Material. Section 1.5 has been revised to change the Authorized Activities for Item F to allow for the receipt of contaminated shipping containers. This change

is requested because the wording of the current license only provides for the receipt of shipping containers that are contaminated with SNM and/or Source Material.

If you have any questions concerning this submittal, please contact me at (412) 374-4652 or by email at nardiaj@westinghouse.com.

Sincerely,

A. Joseph Nardi, Supervisory Engineer
Environment, Health and Safety

Attachment

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ATTACHMENT 1

ESTIMATED DOSE FOR A TRASH FIRE AT THE WESTINGHOUSE HEMATITE FACILITY

ESTIMATED DOSE FOR A BULK CONTAINER FIRE AT THE HEMATITE FORMER FUEL CYCLE FACILITY

for the

Hematite Former Fuel Cycle Facility
3300 State Road P
Festus, MO 63028

Prepared by:

BNFL Inc.
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June 17, 2002

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1.0 INTRODUCTION

The computer code HOTSPOT 98 was utilized to estimate the off-site dose under the worst case scenario of a fire in a bulk container located at the Former Fuel Cycle Facility (FFCF) Remediation Project in Hematite, Missouri.

The HOTSPOT code for a fire was used to estimate the downwind radiological impact following the release of radioactive material from a bulk container fire. This code is designed for short-term (less than 24 hours) release durations. It utilizes the well-established Gaussian plume model to determine the atmospheric dispersion of the fire cloud.

2.0 SCOPE

The scope of this analysis includes a fire in the bulk container stored outside at the FFCF. The 50-year Cumulative Effective Dose Equivalent (CEDE) was determined at the nearest off-site inhabitant, located 290 meters to the west-northwest of the site.

3.0 CALCULATION

It is assumed that unknown quantities of nitric acid were used in cleanup activities and could be present on the trash and debris stored in the bulk containers. Nitric acid-contaminated cellulosic materials can spontaneously ignite, and, if any trace moisture is present with other trace waste, an exothermic reaction could lead to ignition of combustible material. While this is an extremely improbable scenario a dose estimate was performed to determine the worst case off-site release for the FFCF. Two waste streams for bulk container waste storage exist. The first is a bulk container storing up to 307 kg U of dry active waste (DAW) and the other is a container storing high efficiency particulate air (HEPA) filters containing up to 460 kg U.

The following parameters are required by HOTSPOT in order to determine the off-site 50-year CEDE. A summary of these parameters can be found in Table 1 as an attachment to this document. The descriptions were taken from *HOTSPOT Health Physics Codes for the PC* (Reference 5.1) with details for the site specific parameters provided.

3.1 Total Release

The total release is the amount of uranium in kilograms that is released during the fire. The uranium inventory of the bulk container containing DAW is 307 kg and for a bulk container containing HEPA filters is 460 kg.

3.2 Deposition Velocity

The deposition velocity in centimeters per second is empirically defined as the ratio of the observed deposition rate [uCi/(m2-s)] and the observed air concentration near the ground surface (uCi/m3). This value has an input range from zero (0) cm/s to forty (40) cm/s. The larger this parameter, the lower the calculated maximum CEDE. Using a value of zero (0) assumes no ground surface deposition and results in a lower dose. Therefore, the default value of 1 was used as a conservative value.

3.3 Specific Activity

The specific activity (Ci/g) is calculated as a function of the U-235 enrichment (ε) as follows:

$$S = \left(0.4 + 0.38\varepsilon + 0.0034\varepsilon^2\right)\left(10^{-6}\right)$$

Knowing the maximum value of U-235 enrichment present at the Hematite FFCF for the current inventory is less than 5% (Reference 5.5), the value of 5% was used to calculate the specific activity as:

$$S = \left(0.4 + 0.38(5\%) + 0.0034(5\%)^2\right)\left(10^{-6}\right) = 2.39\text{ E-6 Ci/g}$$

3.4 Release Fraction

The airborne release fraction (ARF) is the fraction of the total quantity of material involved in the fire that is respirable and available for dispersion into the atmosphere. This respirable fraction is defined as the fraction of the release material associated with an Activity Median Aerodynamic Diameter (AMAD) of 1 micrometer.

Reference 5.2, DOE-HDBK-3010-94, *Airborne Release Fraction/Rates and Respirable Fractions for Nonreactor Nuclear Facilities* was used as a reference to determine the ARF. Reference 5.2 provides a systematic compilation ARFs from experimental data for nonreactor nuclear facilities. This reference was also used as the basis for the ARFs in Reference 5.3, NUREG/CR-6410, *Nuclear Fuel Cycle Facility Accident Analysis Handbook*, and as such, the values quoted NUREG/CR-6410 (Ref. 5.3) are the same values in DOE-HDBK-3010-94 (Ref. 2).

Some of the Hematite FFCF bulk containers contain high efficiency particulate air (HEPA) filters. The impact of heat on loaded HEPA filters was analyzed by Reference 5.2. The ARF from the heat-induced damage to HEPA filters is estimated to be small due to the filter mediums softening and melting when heated which tends to retain materials adhering to the fibers. The bounding ARF for the impact of heat upon a loaded HEPA filter were assessed to be 1E-4.

Other bulk containers contain contaminated DAW. Reference 5.4 provides ARFs for the burning of contaminated combustible solids as 5.3E-4 for powder contaminant.

In summary, the ARF for the storage of 460 kg U in HEPA filter media is take as 1.0E-4 and as 5.3E-4 for a bulk container containing DAW with a maximum of 307 kg U.

3.5 Enrichment of U-235

The maximum value of U-235 enrichment at the Hematite FFCF for the current inventory is 5% (Reference 5.5). Although higher enrichments are anticipated in the form of contamination in buildings and soils, the current enrichment is being used as the bounding enrichment for this analysis.

3.6 Filter Mitigation

The filter mitigation percent is the mitigation factor for the entered radionuclide. The default is 0%, i.e., none of the radionuclides are trapped. This value was chosen as 0%.

3.7 Effective Release Height

The actual plume height may not be the physical release height. Plume rise can occur because of the velocity of emission, and the temperature differential between the effluent and the surrounding air. The rise of the plume results in an increase in the release height. This increase in release height is the effective release height.

The effective release height leads to lower integrated concentrations at ground level. HOTSPOT calculates the effective release height as a function of the buoyancy flux. The buoyancy flux is determined from the heat emission rate. The calculation is as follows:

$$Q_H = \frac{3785 V \rho H_c (1-f)}{t}$$

Where:

Q_H = Heat emission rate (cal/s)

3785	=	Volume conversion factor (cm^3/gal)
V	=	Volume of fuel (gal) burned in time, t(s)
ρ	=	Fuel density (g/cm^3)
H_c	=	Heat of combustion (cal/g)
f	=	Fraction of the heat combustion radiated.
t	=	Duration of fuel fire (s)

In HOTSPOT it is assumed that 30% of the heat of combustion is radiated, the fuel density is 0.81 g/cm^3. This calculation assumes a fuel volume of 10 gallons (see Section 3.11) and a heat of combustion of 4.72 E+4 (see Section 3.13) and a fire duration of 30 minutes (see Section 3.12). This results in the following heat emission rate:

$$Q_H = \frac{(3785\ cm^3/gal)(10\ gal)(0.81\ g/cm^3)(4.72\ E+4\ cal/g)(1-.3)}{180\ seconds} = 5.63E+4\ cal/s$$

From this heat emission rate the buoyancy flux is calculated as:

$$F_B = \frac{gQ_H}{\pi\ c_p \rho_a T_a}$$

Where:

Q_H	=	Heat emission rate (cal/s)
g	=	Gravatational accelleration (m/s^2)
c_p	=	Specific heat of effluent gas (cal/g-K)
ρ_a	=	Density of air (g/m^3)
T	=	Ambient air temperature (K)

The value for the heat emission rate is taken from the previous equation as 5.63E+4 cal/s. HOTSPOT assumes that specific heat of effluent gas is 0.24 cal/g-K. The gravitational acceleration is 9.8 m/s^2 and the density of air is 1.29E+3 g/m^2 and the default ambient temperature is 293 K (see Section 3.10). This calculates the following buoyancy flux:

$$F_B = \frac{(9.8\ m/s^2)(5.63E+4\ cal/s)}{\pi\ (0.24 cal/g-K)(1.29E+3\ g/m^2)(293\ K)} = 1.94\ m^4/s^3$$

Lastly, the buoyancy flux is used to calculate the effective release height for stability classification F (see Section 3.15) as

$$H_{eff} = 2.6\left(\frac{F_B}{\mu(2)\cdot S}\right)^{1/3}$$

Where:

H_{eff} = Effective release height (m)

$\mu(2)$ = Surface wind speed at 2-m height

And S is calculated based on a stability class F as:

$$S = \frac{0.035g}{T_a} = \frac{(0.035\,\text{K-s}^2/\text{m})(9.8\,\text{m/s}^2)}{293\,\text{K}} = 1.17E-3$$

Giving an effective release height of:

$$H_{eff} = 2.6\left(\frac{1.94\,\text{m}^4/\text{s}^3}{(1\,\text{m})(1.17E-3)}\right)^{1/3} = 30.7\text{m}$$

3.8 Release Radius

The release radius is the radius of the release. For this analysis, the radius of 6.5 meters was used. This is half the length dimension of the container. Using the length of the container instead of the width dimension yields a higher radiation dose and is therefore conservative.

3.9 Heat Emission Rate

The heat emission rate in calories per second is used to calculate the effective release height due to buoyant plume rise. This value was calculated in Section 3.7 as 5.63E+4 cal/s.

3.10 Air Temperature

The default air temperature is 20 °C (293 K). This air temperature is used to calculated the buoyancy flux as previously discussed. Slight changes in this air temperature (±10 °C) have no effect on the effective release height therefore the default is considered adequate.

3.11 Fuel Volume

HOTSPOT utilizes a volume of fuel (i.e., nitric acid-contaminated cellulosic material) to determine the heat emission rate. It is not certain how much of the cellulosic material is contaminated with nitric acid. The fuel volume is used in determining the heat emission rate. Larger volumes of fuel enable a larger heat emission rate and in turn a higher effective release height. A conservative value of 10 gallons was used for the analysis.

3.12 Burn Duration

The burn duration is the time duration of the fire. The bulk container is filled with highly flammable material such as used PPE and it is estimated that the trash would burn rather quickly if ignited. Therefore, a value of 30 minutes is used in the analysis.

3.13 Heat of Combustion

The heat of combustion refers to the material in the bulk container. The container is completely filled with EPA Type 0 waste. EPA Type 0 waste consists of a mixture of highly combustible waste such as paper, cardboard, cartons, wood boxes and combustible floor sweepings, containing approximately ten per cent moisture and five per cent incombustible solids. The mixtures may contain up to ten per cent by weight of plastic bags, coated paper, laminated paper, treated corrugated cardboard, oily rages and plastic or rubber scraps. Type 0 waste has a heating value of approximately 8500 British Thermal Units per pound as fired that equates to 4,722 cal/g. This value of 4,722 cal/g was used for the heat of combustion in the analysis.

3.14 2-Meter Wind Speed

The wind speed that users input is the estimate for a height of 2 meters. This value was taken as 1.0 m/s per Reference 5.5.

3.15 Atmospheric Stability Class

Meteorologists distinguish several states of the atmospheric surface layer; unstable, neutral, and stable. These categories refer to how a parcel of air reacts when displaced adiabatically in the vertical direction. HOTSPOT allows the direct selection a particular stability classification. The atmospheric stability for this analysis was taken from the Emergency Plan as stability class F.

3.16 Wind Direction

This parameter is the direction from which the wind comes from in degrees. It is assumed as a conservative estimate that the wind blowing in the direction of the nearest inhabitant who is 290 meters WNW of the site. This in turn would mean the wind would come from the ESE and equates to 112.5 degrees.

3.17 Solar Information

This parameter is only used if the atmospheric stability class is unknown. As the stability class is known, this parameter is not used. See the Atmospheric Stability section for a description of the stability class.

3.18 Receptor Height

The receptor height was taken as 1.7 meters. This was assumed as an average height for a person.

3.19 Terrain

The standard terrain option was chosen for the analysis. Per Ref. 5.3, most of the fuel cycle licensee facility accident analyses will not need to address complex terrain. For the Hematite FFCF this is the case and the standard terrain option is sufficient for the analysis.

3.20 Wind Input Height

This is the height at which the windspeed was determined. However, the Gaussian plume equation requires the wind speed at the effective release height. HOTSPOT automatically calculates the windspeed variation for effective heights greater than 2 meters. It is assumed that the 2 meters is applicable to the Hematite site.

3.21 Mixing Layer

The mixing layer is the elevation at which the temperature gradient is inverted, i.e., the temperature begins to increase with increasing altitude. The inversion layer acts as a blanket that limits the vertical mixing of the released radioactive material. The region below the inversion layer is also referred to as the mixing layer. In HOTSPOT, the default value is 5,000 meters, which effectively means "no mixing layer." The mixing layer height is typically 300 to 3,000 meters and can significantly increase air-concentration values. As specific temperature gradient data for the site is unknown a value of 300 meters is used as a conservative assumption.

3.22 Sample Time

The equations for the standard deviation of the Gaussian concentration distribution in cross-axis direction (y) are representative of observing plume characteristics over a time period of 10 min. In HOTSPOT, this averaging time is referred to as the sampling time. Concentrations downwind from a source decrease with increasing sampling time primarily because of a larger y due to an increased meander of wind direction. In the HOTSPOT codes, the default release duration of radioactive material is 10 minutes. This value was considered sufficient for the analysis.

3.23 Source Geometry

This parameter allows specification of a simple or complex source geometry. Simple geometry is appropriate for this scenario.

3.24 DCF Selection

The ICRP dose conversion factors (DCFs) were selected.

3.25 Holdup Time

This is the amount of time before the source is released into the atmosphere. This value was chosen as 0, which means the source is immediately released. In fact, a fire in the container would not result in an immediate release; however, this value was used to ensure a conservative result.

3.26 Breathing Rate

The breathing rate is the rate in cubic meters per second that the receptor breathes. The default breathing rate is 3.33 E-4 m^3/s which equates to the EPA (1990) recommended value of 30 m^3/d (Ref. 5.6) for the worst-case adult inhalation rate for unknown activity patterns. As this is a worst-case value it was used for the calculation.

4.0 RESULTS

HOTSPOT used the parameters specified in Section 3 to calculate the 50-year CEDE of 8.83 E-5 rem maximum occurring at a distance of 0.95 km from the HEPA filters fire and 3.12 E-4 rem also at a distance of 0.95 km from the DAW fire. The results of the HEPA filter fire and DAW calculations can be found in Tables 2 and 3, respectively. The nearest inhabitant to the site resides at a distance of 0.3 km that equates to a dose of 2 E-4 rem for the DAW fire and 5.7 E-5 rem for the HEPA filter fire. 10 CFR Part 70.22(i)(1)(i), (Reference 5.7), specifies that the maximum total effective dose equivalent to a member of the public offsite must be less than 1 rem a year as a result of the accident evaluation. Since the dose due to ground shine is typically several orders of magnitude less than the CEDE due to plume passage (Ref. 5.1) the HOTSPOT calculated CEDE is compared to the 10 CFR Part 70 limit and found to be well within the 1 rem limit.

10CFR Part 70.22(i)(1)(i) also specifies that the maximum intake of soluble uranium must be less than 2 milligrams. Assuming that the uranium released is all in the soluble form, a dose conversion factor (Reference 5.8, Table 2.1) of 2.45 rem/μCi (6.62 E-7 Sv/Bq) and the specific activity of 2.39 μCi/g per Section 3.3, the equivalent intake of uranium is calculated as:

$$m_{solubleU} = \frac{H_E}{DCF \cdot S_a} = \frac{3.12\ E-4\ rem}{2.45\ rem/\mu Ci \cdot 2.39\ \mu Ci/g} = 5.33\ E-5\ g = 0.053\ mg$$

This value of 0.053 milligrams is less than the 2-milligram limit for intake of soluble uranium.

In addition, a parametric study was performed for those factors that may have a large impact on the dose results. As the DAW fire resulting in a larger off-site dose than the HEPA fire, this scenario was used to evaluate the various parameters and their effect on dose. A summary of the results can be found in Table 4 as an attachment to this document. This table shows the various off-site doses that could occur with a change in parameters. In summary, the ARF and the release height are the highest contributors to the off-site dose.

5.0 REFERENCES

5.1 Homann, Steven G., *HOTSPOT Health Physics Codes for the PC*, UCRL-MA-106315, March 1994.

5.2 *Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities*, DOE-HDBK-3010-94.

5.3 NUREG/CR-6410, *Nuclear Fuel Cycle Facility Accident Analysis Handbook,* March 1998.

5.4 NUREG-1320, *Nuclear Fuel Cycle Facility Accident Analysis Handbook*, May 1988.

5.5 Hematite Nuclear Fuel Manufacturing Facility, *Emergency Plan*, Revision 1, 1/15/99.

5.6 Yu, C., et. al., *Data Collection Handbook to Support Modeling Impacts of Radioactive Materials in Soil*, April 1993.

5.7 10 CFR Part 70, *Domestic Licensing of Special Nuclear Material*

5.8 Federal Guidance Report No. 11, *Limiting Values of Radionuclide Intake and Air Concentrations and Dose Conversion Factors for Inhalation, Submersion, and Ingestion,* 1988

Table 1: Summary of Input Parameters

Parameter	Units	Value
Total Release (release source term)	kg U	307/460
Deposition Velocity	cm/s	1
Specific Activity	Ci/g	2.39 E-6
Release Fraction	unitless	5.3E-4/1E-4
Enrichment of U-235	%	5
Filter Mitigation	%	0
Effective Release Height	meters	30.7
Release Radius	meters	6.5
Heat Emission Rate	cal/s	5.63E+4
Air Temperature	degrees C	20
Fuel Volume	gallons	10
Burn Duration	minutes	30
Heat of Combustion	cal/g	4,722
2-Meter Wind Speed	m/s	1.0
Atmospheric Stability Class	unitless	F
Wind Direction	degrees	112.5
Solar Information	unitless	not used
Receptor Height	meters	1.7
Terrain	unitless	standard terrain
Wind Input Height	meters	2
Mixing Layer	meters	300
Sample Time	minutes	10
Source Geometry	unitless	Simple
DCF Selection	unitless	ICRP
Holdup Time	minutes	0
Breathing Rate	m^3/s	3.33E-4

Table 2: HOTSPOT Output for HEPA Fire

```
Hotspot 98  Version 1.0 Uranium Fire

Source Material          : Uranium
Source Term              : 460 kg
Release Fraction         : 1.00E-04
Specific Activity        : 2.39E-06 Ci/g  U-235 = 5.000 %
Release Radius           : 6.5 m
Effective Release Height : 31 m
Wind Speed (h=2 m)       : 1.0 m/s
Wind Direction           : 112.5 degrees  Wind from the ESE
Distance Coordinates     : All distances are on the Plume Centerline
Avg Wind Speed (h=H-eff) : 4.49 m/s
Stability Class          : F
Deposition Velocity      : 1.00 cm/s
Receptor Height          : 1.7 m
Inversion Layer Height   : 300 m
Sample Time              : 10.000 min
Maximum Dose Distance    :   0.95 km
MAXIMUM CEDE             : 8.83E-05 rem
```

DISTANCE km	C E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	ARRIVAL TIME (hour:min)
0.050	2.3E-05	5.7E-10	5.7E-06	< 00:01
0.100	3.0E-05	7.4E-10	7.4E-06	< 00:01
0.200	4.4E-05	1.1E-09	1.1E-05	< 00:01
0.300	5.7E-05	1.4E-09	1.4E-05	00:01
0.400	6.8E-05	1.7E-09	1.7E-05	00:01
0.500	7.6E-05	1.9E-09	1.9E-05	00:01
0.600	8.2E-05	2.0E-09	2.0E-05	00:02
0.700	8.5E-05	2.1E-09	2.1E-05	00:02
0.800	8.7E-05	2.1E-09	2.1E-05	00:02
0.900	8.8E-05	2.2E-09	2.2E-05	00:03
1.000	8.8E-05	2.2E-09	2.2E-05	00:03
2.000	6.1E-05	1.5E-09	1.5E-05	00:07
4.000	2.7E-05	6.5E-10	6.5E-06	00:14
6.000	1.3E-05	3.3E-10	3.3E-06	00:22
8.000	8.1E-06	2.0E-10	2.0E-06	00:29
10.000	5.6E-06	1.4E-10	1.4E-06	00:37
20.000	5.9E-07	1.4E-11	1.4E-07	01:14
40.000	1.6E-08	3.9E-13	3.9E-09	02:28
60.000	6.3E-10	1.5E-14	1.5E-10	03:42
80.000	6.3E-11	1.5E-15	1.5E-11	04:56

Table 3: HOTSPOT Output for DAW Fire

```
Hotspot 98  Version 1.0 Uranium Fire

Source Material           : Uranium
Source Term               : 307 kg
Release Fraction          : 5.30E-04
Specific Activity         : 2.39E-06 Ci/g  U-235 = 5.000 %
Release Radius            : 6.5 m
Effective Release Height  : 31 m
Wind Speed (h=2 m)        : 1.0 m/s
Wind Direction            : 112.5 degrees  Wind from the ESE
Distance Coordinates      : All distances are on the Plume Centerline
Avg Wind Speed (h=H-eff)  : 4.49 m/s
Stability Class           : F
Deposition Velocity       : 1.00 cm/s
Receptor Height           : 1.7 m
Inversion Layer Height    : 300 m
Sample Time               : 10.000 min
Maximum Dose Distance     :   0.95 km
MAXIMUM CEDE              : 3.12E-04 rem
```

DISTANCE km	C E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	ARRIVAL TIME (hour:min)
0.050	8.3E-05	2.0E-09	2.0E-05	< 00:01
0.100	1.1E-04	2.6E-09	2.6E-05	< 00:01
0.200	1.6E-04	3.8E-09	3.8E-05	< 00:01
0.300	2.0E-04	5.0E-09	5.0E-05	00:01
0.400	2.4E-04	5.9E-09	5.9E-05	00:01
0.500	2.7E-04	6.6E-09	6.6E-05	00:01
0.600	2.9E-04	7.0E-09	7.0E-05	00:02
0.700	3.0E-04	7.4E-09	7.4E-05	00:02
0.800	3.1E-04	7.6E-09	7.6E-05	00:02
0.900	3.1E-04	7.6E-09	7.6E-05	00:03
1.000	3.1E-04	7.6E-09	7.6E-05	00:03
2.000	2.2E-04	5.3E-09	5.3E-05	00:07
4.000	9.4E-05	2.3E-09	2.3E-05	00:14
6.000	4.7E-05	1.2E-09	1.2E-05	00:22
8.000	2.9E-05	7.0E-10	7.0E-06	00:29
10.000	2.0E-05	4.8E-10	4.8E-06	00:37
20.000	2.1E-06	5.1E-11	5.1E-07	01:14
40.000	5.7E-08	1.4E-12	1.4E-08	02:28
60.000	2.2E-09	5.4E-14	5.4E-10	03:42
80.000	2.2E-10	5.5E-15	5.5E-11	04:56

Table 3: Parametric Study Comparison for a HEPA Fire

Parameter	Base Model Value	Parametric Value	Max. Off-Site Dose* (rem)
Deposition Velocity (cm/s)	1	0	3.17E-4 @ 0.96 km
Deposition Velocity (cm/s)	1	10	2.79E-4 @ 0.83 km
Release Fraction	5.3E-4	1E-2	5.89E-3 @ 0.95 km
Release Fraction	5.3E-4	1E-5	5.89E-6 @ 0.95 km
Effective Release Height	30.7	0	0.16E-0 @ 0.03 km
Fuel Volume (gallons)	10	5	6.18E-4 @ 0.67 km
Fuel Volume (gallons)	10	100	2.19E-5 @ 3.00 km
Burn Duration (minutes)	30	15	1.48E-4 @ 1.10 km
Burn Duration (minutes)	30	60	6.18E-4 @ 0.67 km
2-Meter Wind Speed (m/s)	1	3	3.08E-4 @ 0.56 km
2-Meter Wind Speed (m/s)	1	9	2.91E-4 @ 0.35 km
Wind Input Height (meters)	2	4	4.55E-4 @ 0.94 km
Wind Input Height (meters)	2	10	7.43E-4 @ 0.93 km
Mixing Layer (meters)	300	150	3.12E-4 @ 0.95 km
Mixing Layer (meters)	300	1,00	3.12E-4 @ 0.95 km
Sample Time (minutes)	10	5	3.59E-4 @ 0.95 km
Sample Time (minutes)	10	100	1.97E-4 @ 0.95 km
Holdup Time (minutes)	0	15	3.12E-4 @ 0.95 km

* Base model off-site dose = 3.12 E-4 rem @ 0.95 km

ATTACHMENT 2

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Enclosure II to EHS02/065

WESTINGHOUSE ELECTRIC COMPANY LLC
HEMATITE FACILITY
LICENSE APPLICATION
LIST OF EFFECTIVE PAGES
Date: August 22, 2002

Westinghouse Electric Company LLC provides changes to the Hematite License application. The following is a List of Effective Pages summarizing the latest applicable submittal dates for each page of the application.

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1.3 License Number and Period of License

This application is for Special Nuclear Material License (SNM) No. SNM-33 (NRC Docket 70-36). License SNM-33 was renewed July 28, 1994 for a period of ten (10) years.

1.4 Possession Limits

Westinghouse Electric Company LLC requests authorization to possess the following quantities of Special, Source and Byproduct material under License SNM-33.

Item	Material	From	Quantity
A	Uranium enriched to a maximum of 5.0 weight percent in the ^{235}U isotope	Any (excluding metal powders)	1,250 kilograms ^{235}U
B	Uranium to any enrichment in the ^{235}U isotope	Any (excluding metal powders)	350 grams ^{235}U
C	Source Material, natural or depleted Uranium	Any (excluding metal powders)	2,000 kilograms
D	Cobalt 60	Sealed Sources	40 milliCuiries total
E	Cesium 137	Sealed Sources	500 milliCuiries total
F	Byproduct Material including ^{241}Am	Any	400 microCuries total
G			
H	Special, Source and Byproduct Material as residual contamination	Any	All residual contamination existing at the Hematite site on July 1, 2001

1.5 Authorized Activities

This license application requests authorization for Westinghouse Electric Company LLC to:

1) Receive, possess, use, store and transfer Special Nuclear Material under Part 70 of the Regulations of the Nuclear Regulatory Commission.
2) Receive, Possess, use, store, and transfer Source Material under Part 40 of the Regulations of the Nuclear Regulatory Commission.
3) Receive, Possess, use, store, and transfer Byproduct Material under Part 30 of the Regulations of the Nuclear Regulatory Commission.

The authorized principal licensed activity is to decommission the site in order to remove the facilities and site safely from service and to reduce residual radioactivity to a level that permits termination of the license. With the cessation of all nuclear fuel manufacturing operations on the site, authorized activities are limited to those in accordance 10CFR70.38(d) to decommission the site. These activities are being undertake in order that License SNM-33 can be terminated and that all facilities and outdoor areas on the site an be released in accordance with NRC Regulations (10CFR20, Subpart E, Radiological Criteria for License Termination). These authorized activities are conducted at any location on the Hematite site.

With respect to the specific possession limits of Section 1.4:

1). Item A, B and C – possession of this Special Nuclear Material and Source Material is limited to those activities necessary to process and package the materials into forms suitable for transfer to other licensed operations. Receipt of any additional materials in these categories is limited to that necessary to complete the decommissioning of the site and facilities. Examples of such receipts would be calibration sources and residual contamination on shipping containers and packages.

2). Item D – for instrument calibration and testing.

3). Items E and G – for possession only pending transfer to other licensed operations.

4.) Item F – for instrument calibration and testing and as residual contamination on shipping containers and packages.

5). Item H – possession of this residual contamination is limited to the activities associated with the decommissioning of the site.

Specific activities that would be covered under this license are:

1. Those activities necessary to reduce the current inventory of Special Nuclear Material, Source Material and Byproduct material from the site including but not limited to such activities as:
   - Preparation, packaging, and shipment of the remaining inventory of Special Nuclear and Source Material. Preparation of uranium will include processes such as oxidation, incineration, liquid waste solidification, size reduction, filter processing and wet-process uranium recovery operations.
   - Waste preparation, packaging, and shipment.
   - Equipment testing, clean-out and decontamination in preparation for packaging and shipment.

2. Those activities necessary to maintain the facilities and site in a safe condition pending license termination including but not limited to such activities as:
   - Facility maintenance, inspection, testing, and preventive maintenance activities necessary to maintain safe conditions such as ventilation control and operation, alarm systems, process controls, building maintenance etc.
   - Process equipment maintenance.

3. Those activities necessary to plan for the decommissioning of the site including but not limited to such activities as:
   - Site characterization

4. Those activities necessary to decommission the facilities and site including but not limited to such activities as:
    - Waste preparation, packaging, and shipment.
    - Equipment clean-out and decontamination.
    - Building surface decontamination.
    - Building demolition.
    - Soil and groundwater remediation.
    - Final status surveys.

As appropriate, the above activities will either be conducted in accordance with current license authorizations or be authorized by specific NRC approval such as a license amendment or an approved Decommissioning Plan.

(deleted)

CHAPTER 8 EMERGENCY PROCEDURE

The Westinghouse Hematite site is in the progress of decommissioning and has ceased manufacturing operations. Westinghouse has submitted an analysis of the consequences associated with postulated accidents. That evaluation showed that the maximum dose to a member of the public due to the release of radioactive material would not exceed the provisions of 10CFR70,22(i)(1)(i). An Emergency Plan is therefore not required to meet the provisions of 10CFR70.22(i)(1)(ii). However, the Hematite Site will continue to maintain emergency response capabilities for handling incidents involving radioactive materials that are commensurate with the hazards that are present. It is anticipated that the potential hazards may evolve as the decommissioning activities proceed. Minor spills or releases of radioactive materials that can be controlled and cleaned up by the worker(s) are not considered to be an emergency, and will be handled as operational issues.

Procedures will be established to postulate the types of accidents; accident classification; notification of appropriate site, local, state and federal authorities; organizational responsibilities; emergency response measures; emergency equipment; emergency preparedness; reports and records; and recovery activities. They will provide individuals with a clear understanding of their limitations and appropriate actions in an emergency. Emergency procedures are consistent with Appendix R of NUREG-1556 (Volume 11). Changes to these procedures may be made without NRC review or approval.