



Westinghouse Electric Company
Nuclear Fuel
Columbia Fuel Site
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Your ref:
Our ref: LTR-EHS-13-10

Cc: Carl Snyder, Wayne Sepitko, Elle Binns

Date: February 8, 2013

Subject: Assessment of Public Radiological Dose from Liquid and Gaseous Effluents for Calendar Year 2012

Effluents released from plant operations are monitored to determine the quantities of radio nuclides discharged into the environment. The accumulated activities for the period starting 1-1-2012 and ending 12-31-2012 were summarized and input into dose models developed by the NRC/EPA to estimate commitment rates from the following pathways:

- Air Effluents by Direct Inhalation – Estimated by running EPA's COMPLY Code at level 2 complexity. The organ dose was estimated by calculating the X/Q factor used in the COMPLY analysis of stack number 12 using the measured release quantity and dose conversion factors from Federal Guidance Report No 11, "Limiting Values of Radionuclide Intake and Air concentration Factors for Inhalation, Submersion, and Ingestion"(FGR 11) for inhalation.
- Liquid Effluents by Ingestion of Potable Water – Estimated from formulas and recommended values in Regulatory Guide 1.109, Doses from Liquid Effluent Pathways (RG1.109). Dose conversion factors were taken from FGR 11.
- Liquid Effluents by Ingestion of Fish – Estimated from formulas and recommended values in RG 1.109. Dose conversion factors were taken from FGR 11.
- Liquid Effluents by Irradiation from Shoreline Deposits – Estimated from formulas and recommended values in RG 1.109. Dose conversion factors were taken from Federal Guidance report No 12, "External Exposure to Radionuclides in Air, Water, and Soil"

The radiological impacts were assessed by calculating the maximum total body dose and selected organ doses at the nearest site boundary.

- The inhalation dose is determined at the nearest site boundary at a distance of 595 meters.
- The ingestion dose from liquid and external dose from sediment is determined at the point at which the liquid effluent leaves the diffuser in the Congaree River.

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The release rates (source term) for gaseous effluent used in all of the calculations are taken from measured values obtained from daily air samples, one per stack for 47 stacks, measured for gross alpha. The release rates (source term) for liquid effluent, used in all of the calculations, is taken from monthly composite liquid effluent samples which are sent to an off-site lab for isotopic analysis. There is potential for technetium in our feed material and the liquid effluent is also tested for this isotope. Air samples were also tested for Tc-99 and no detectable quantities were found.

The total activities measured and /or estimated for calendar year 2012 were:

431.5 μ Ci of Uranium released as gaseous effluent
2.9 mCi of Uranium released in liquid effluent
18.5 mCi of Technetium released in liquid effluent

For airborne effluents released into the environment, the pathways considered for the individual dose calculations included direct inhalation and an estimate of the dose to the maximally exposed organ (lung and bone). For liquid effluent releases, the pathways included potable water, aquatic food (fish) and shoreline deposition. The models and various assumptions used in the liquid effluent environmental pathways are taken from Regulatory guide 1.109 and the details of both the gaseous and liquid dose calculations are documented in the attached spreadsheets listed below:

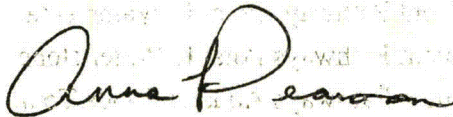
Attachment 1:	Dose From Gaseous Effluents
Attachment 2:	Lung/Bone Organ Dose for Gaseous Effluent
Attachment 3:	Dose from Liquid Effluent Pathways Potable Water Total
Attachment 4:	Dose from Liquid Effluent Pathways Potable Water Bone
Attachment 5:	Dose from Liquid Effluent Pathways Aquatic Foods Total
Attachment 6:	Dose from Liquid Effluent Pathways Aquatic Foods Bone
Attachment 7:	Dose from Liquid Effluent Pathways Sediment
Attachment 8:	2012 Liquid Effluent Totals
Attachment 9:	Uranium Specific Activity

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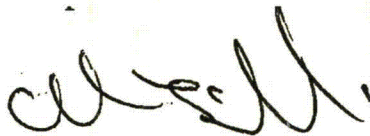
The results summarized in the table below indicate that the critical pathway is due to inhalation resulting in a maximum whole body dose of 0.160 mRem/yr and a lung dose of 1.54 mRem/yr. These doses are well below both the 25 mrem annual dose limit as well as the 10 mrem ALARA limit.

Results			
Pathways	Total Body (mRem/yr)	Organ Dose (mRem/yr)	Organ Dose (mRem/yr)
		Bone	Lung
Air Effluents			
Direct inhalation*	0.16	5.86-03	1.54
Liquid Effluents			
Potable Water	7.10E-05	1.01E-03	
Aquatic Food(Fish)	4.95E-06	5.84E-05	
Shoreline Deposit	2.47E-08		
Total (mRem/Yr)	0.16	6.93E-03	1.54

* 80 % residence time



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Technical Review by Chuck Finkenbine
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