

**From:** Downey, Heath [HTDowney@mactec.com]  
**Sent:** Thursday, June 04, 2009 9:21 AM  
**To:** Schmidt, Jim  
**Cc:** john.conant@us.abb.com  
**Subject:** Dose Estimate  
**Attachments:** DP Rev1 dose estimate.pdf

06-00217-06  
03003754  
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Jim

Attached is the dose estimate for workers during decommissioning activities as discussed the other day.

Please feel free to call with any questions.

Regards,

Heath

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### E-mail Properties

Mail Envelope Properties (32FFCAC47FF1564C92CC12DCA062FC9788786E)

**Subject:** Dose Estimate  
**Sent Date:** 6/4/2009 9:21:11 AM  
**Received Date:** 6/4/2009 9:21:11 AM  
**From:** Downey, Heath

**Created By:** HTDowney@mactec.com

**Recipients:**

Jim.Schmidt@nrc.gov (Schmidt, Jim)  
Tracking Status: None  
john.conant@us.abb.com (john.conant@us.abb.com)  
Tracking Status: None

**Post Office:**  
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MESSAGE	73577	6/4/2009
DP Rev1 dose estimate.pdf	71448	

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## Monitoring and Dose to the Workers during Decommissioning

A prospective dose assessment for workers during decommissioning activities at the CE Windsor Site is needed in order to evaluate the need for individual monitoring. The requirement for individual monitoring is "Adults likely to receive, in 1 year from sources external to the body, a dose in excess of 10 percent of the limits" (10 CFR 20.1502).

Based on the RESRAD modeling as part of "Derivation of the Site-Specific Soil DCGLs" (MACTEC, 2003), the potential for the dose to workers to be near the monitoring threshold is very low. From the model, the construction worker scenario is representative of the typical conditions that will be encountered during decommissioning of the Site. For the construction worker exposure scenario, all activities take place outdoors for eight hours per day during six months of the year. This high-intensity short-term exposure makes the earth workers the critical exposure group for the construction worker scenario. The key parameters for the construction worker scenario are listed in Table 3-8 of the DCGL report. The results of the RESRAD modeling for the construction worker scenario were 6,079 pCi/g for enriched uranium or 31.3 pCi/g for Co-60 as a projected total effective annual dose of 25 mrem. For enriched uranium, 89% of the total dose is from direct gamma radiation while 6% is from inhalation and 5% is from soil ingestion. For Co-60, the entire dose is from direct gamma radiation. A summary of the soil characterization data of the major decommissioning areas is presented in the table below.

In addition, there exists the potential for elevated concentrations of residual radioactive material within the waste lines that will be removed as part of decommissioning activities. The maximum concentration of total uranium in the waste lines from characterization data is 97,000 pCi/g. Materials within the waste lines will be wet and the likelihood of it becoming airborne will be limited. The removal process will be performed in a manner that will contain the material in the pipes until it is placed in the disposal container. During previous decommissioning activities at the CE Windsor Site, no elevated airborne radioactivity was generated. No airborne radioactivity is expected during the current phase since the same operations and procedures will be applied, only in different portions of the Site.

Summary of Major Decommissioning Areas Soil Data

	Uranium (pCi/g)			Cobalt 60 (pCi/g)		
	Mean	Standard Deviation	Max	Mean	Standard Deviation	Max
Building 3 Complex	103	1,074	13,190	0.01	0.02	0.09
Building 6 Complex	462	2,053	13,850	0.00	0.00	0.03
Woods Area	679	5,350	110,236	0.00	0.01	0.10
Drum Burial Pit	104	1,147	16,000	0.02	0.03	0.10
Clamshell Pile	294	411	1,392	0.08	0.06	0.25
Equipment Storage Yard	82	196	842	0.04	0.02	0.07

The soil characterization data indicate that Co-60 concentrations are insignificant and do not have any potential contribution to radiological exposure. In addition, total uranium concentrations for the decommissioning areas combined have an average 451 pCi/g, which is on the order of 2 mrem per year using the RESRAD modeling for the construction worker scenario. The maximum total uranium concentrations are less than the monitoring threshold equivalent concentration of approximately 120,000 pCi/g of total uranium or 600 pCi/g of Co-60. This data clearly shows that the soil concentrations are well below the monitoring threshold of 10 percent of the limits based on the calculated dose from concentration in the soil using the construction worker scenario. The potential for radiological exposure from the buildings to be addressed during decommissioning is also insignificant as the residual contamination levels are very low. In addition, there is limited potential for internal dose due to inhalation or ingestion due to the low concentrations of residual radioactivity and physical characteristics of the materials that minimize the possibility of airborne contamination.

The potential radiological exposure to workers during decommissioning operations is on the order of 2 mrem per year and it is highly unlikely that any materials will be encountered during decommissioning that would exceed 120,000 pCi/g of uranium or 600 pCi/g of Co-60. Therefore it is highly unlikely that any workers would exceed the monitoring threshold in 10 CFR 20.1502 during any decommissioning activities at the Site.