OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
SAFETY EVALUATION REPORT
RELATED TO A REQUEST TO REVISE AUTHORITY TO DISPOSE OF CONTAMINATED DEMOLITION DEBRIS PURSUANT TO 10 CFR 20.2002
CONSUMERS ENERGY COMPANY
BIG ROCK POINT RESTORATION PROJECT
DOCKET NO. 50-155

1.0 BACKGROUND

On March 14, 2001, the licensee submitted a request to dispose of low-activity demolition debris from the Big Rock Point (BRP) Restoration Site pursuant to 10 CFR 20.2002 in a Type II sanitary landfill, approximately 100 km (60 mi) from the site, licensed by the State of Michigan . The licensee later revised the request on May 18, 2001 and June 20, 2001. The U.S. Nuclear Regulatory Commission (NRC) approved the request in May, 2002, and BRP began shipping material to the landfill.

Subsequently, debris, mainly structural steel, coated with polychlorobiphenyl (PCB)-contaminated paint was identified during demolition. The State of Michigan Type II landfill currently accepting the debris contaminated with residual radioactivity does not accept PCB bulk product waste. Therefore, on September 15, 2004, the licensee submitted a revised request to dispose of about 1.4 million kilograms (three million pounds) of low-activity PCB bulk product waste in an alternate landfill, approximately 445 km (275 mi) from the site, licensed by the State of Michigan and the U.S. Environmental Protection Agency (EPA) to accept PCBs.

The licensee will continue to ship low-activity demolition debris that is not contaminated with PCB to the original Type II landfill.

2.0 TECHNICAL EVALUATION

NRC staff evaluated the licensee's analyses of disposal in an alternate landfill to demonstrate compliance with 10 CFR 20.2002(d) using the general guidance for dose modeling in the NUREG-1757, Vol. 2, Section 5.2, supplemented by the decommissioning-specific guidance of the license termination rule. Section 5.2 states the NRC staff will review the following information provided by the licensee:

- Identification of the Source Term
- Description of the Exposure Scenario(s)
- Identification, Description, and Justification of the Mathematical Model(s)
- Discussion of the Effects of Uncertainty

2.1 SOURCE TERM

In its initial request in 2001, the licensee indicated that it analyzed over 200 core borings to estimate the types of residual radioactive contamination and the distance residual radioactivity has penetrated the borings. In addition, the licensee reports results from portions of 14 core samples for approximately 37 radionuclides. The licensee, in its recently revised request, reports analyses indicate only Co-60, Cs-137, and H-3 are present at levels greater than the lower limit of detection and distinguishable from naturally occurring background concentrations. The licensee uses the average concentrations of each of these three radionuclides to develop its source term.

Specifically, the licensee divides the source term into two distinct groupings: shallow surface contamination and deep surface contamination. The licensee defines shallow surface contamination as no surface contamination but a detectable radionuclide concentration to a depth of 2.5 cm (1 in.). The licensee defines deep subsurface contamination as highly contaminated surfaces prior to remediation with no detectable contamination after remedial action, but with some detectable radionuclide concentration to a depth of 15 cm (6 in.). The licensee calculates that approximately 122 m^3 (4,320 ft^3) of shallow and 144 m^3 (5,100 ft^3) of deep surface contamination will be present in the entire 14,700 m^3 (519,000 ft^3) of potentially impacted debris. For its analyses, the licensee assumes the entire volume is contaminated at a uniform concentration. Using the dose-to-source ratio (DSR) for 1 pCi/g gamma emitters (0.83 Co plus 0.17 Cs), the resulting the total activity is given in Table 1.

Table 1. Impacted Demolition Debris Total Activity (14,700 m^3) for DSR of 1 pCi/g γ

RADIONUCLIDE	CONCENTRATION (pCi/g)	TOTAL ACTIVITY (mCi)
Co-60	0.83	18.4
Cs-137	0.17	3.8
H-3	7.86	175
TOTAL	8.85	197

As previously approved, the licensee uses a bounding gamma emitter concentration limit of 0.185 Bq/g (5 pCi/g) and, therefore, scales the DSR for the concentrations listed in Table 1 by five. This results in the final calculated concentrations and total activity listed in Table 2. NRC staff continues to expect these assumptions to lead to a conservative source term and considers this a valid approach for conducting a bounding analysis.

Table 2. Impacted Demolition Debris Bounding (5 pCi/g γ) Activity (14,700 m^3)

RADIONUCLIDE	CONCENTRATION (pCi/g)	TOTAL ACTIVITY (mCi)
Co-60	4.15	92.1
Cs-137	0.85	19.0
H-3	39.3	875
TOTAL	44.3	986

2.2 EXPOSURE SCENARIOS

The licensee, in its revised request, proposes that disposal take place at a State of Michigan licensed Type II landfill or in a alternate landfill licensed for PCB waste disposal by the State of Michigan and EPA. The identified site is approximately 440 km (275 mi) from the facility, compared to about 95 km (60 mi) for the first disposal site. The licensee analyzes three distinct scenarios: I) a transportation worker, ii) a landfill worker, and iii) a post-closure residential farmer. NRC staff continues to consider these three scenarios and the associated pathways appropriate for the revised request.

The transportation worker scenario considers the dose to truck drivers responsible for hauling demolition debris from BRP to the particular landfill. For transportation to the State of Michigan licensed Type II landfill, the licensee continues to assume three drivers, each hauling equal amounts of debris to the Type II landfill. For transportation to the licensed PCB landfill, the licensee assumes two drivers will each haul equal amounts of debris to the alternate landfill. NRC staff continues to agree the only applicable exposure pathway for this scenario is direct radiation from the demolition debris.

The landfill worker scenario considers the potential dose to a bulldozer operator responsible for positioning and spreading the demolition debris and required 15 cm (6 in.) soil cap. The licensee reports the State of Michigan licensed Type II landfill currently employs three operators, and assumes each operator experiences equal exposure time. The licensee apportions dose to the PCB-licensed landfill based on the weight proportion of demolition debris expected to be disposed at this landfill. NRC staff continues to agree that the licensee's primary pathways for this scenario, inhalation and external exposures, are applicable.

The residential farmer scenario considers a residence placed atop a burial cell containing the disposed demolition debris, 30 years after closure of the landfill. The resident maintains a vegetable garden and spends approximately 75-percent of its time on site. The licensee apportions dose to the PCB-licensed landfill based on the weight proportion of demolition debris expected to be disposed at this landfill and evaluates all default pathways. NRC staff continues to agree this scenario is reasonably appropriate for long-term exposure assessment.

2.3 MATHEMATICAL ANALYSES

The licensee evaluates the transportation worker scenario using Microshield, Version 5.05 and RESRAD, Version 6.0, for both the landfill worker and residential farmer scenarios. NRC staff considers the parameters and assumptions for the transportation and landfill worker scenarios reasonable and bounding. Based on these assessments, the licensee reports the transportation worker scenario results in revised doses of 3.20 μSv/yr (0.320 mrem/yr) for a driver to the current State of Michigan licensed Type II landfill and 1.78 μSv/yr (0.178 mrem/yr) for a driver to the alternate licensed PCB landfill.

Additionally, the licensee reports the landfill worker scenario results in revised doses of 2.91 μSv/yr (0.291 mrem/yr) for a worker at the current State of Michigan licensed Type II landfill and 0.182 μSv/yr (0.0182 mrem/yr) for a worker at the alternate licensed PCB landfill.

NRC staff considers the licensee's use of parameters reasonable, but continues to consider some assumptions reliant upon partial performance of the landfill design and requirements. The licensee's initial dose assessments for this scenario are 0.178 μSv/yr (0.0178 mrem/yr) for a resident living at the Type II landfill site and 0.01 μSv/yr (0.001 mrem/yr) for a resident living at the licensed PCB landfill site. NRC staff's initial review of an alternate scenario in which waste is carried to the surface as part of the building of the house resulted in a dose estimate of approximately 10 μSv/yr (1 mrem/yr) for a resident living at the Type II landfill site. Based on the recently revised request for consideration of an alternate disposal landfill, NRC staff estimates a dose, for its alternate scenario, of approximately 4 μSv/yr (0.4 mrem/yr) for a resident living at the Type II landfill site and 0.02 μSv/yr (0.002 mrem/yr) for a resident living at the alternate PCB-licensed landfill using the licensee's weight-apportionment assumption. The results are summarized in Table 3 below.

Table 3. Calculated Doses (μSv/yr)

	CE ORIGINAL	CE NEW PLAN		NRC ALTERNATE	
	Landfill 1	Landfill 1	Landfill 2	Landfill 1	Landfill 2
Waste Vehicle Driver	3.48	3.20	1.80	-	-
Landfill Worker	2.76	2.91	0.18	-	-
Resident Farmer	0.11	0.18	0.01	4.00	0.02

2.4 UNCERTAINTY ANALYSIS

NRC staff continues to consider the licensee's analyses bounding in nature. Therefore, no uncertainty analyses are required since the assumptions have clearly continued to bound the dose assessment, particularly through the overestimation of the source term.

3.0 SUMMARY AND CONCLUSIONS

Based on the above analyses, Consumer Energy, the licensee, has demonstrated, and the NRC staff has confirmed, that the proposed 10 CFR 20.2002 disposal is expected to result in minimal risk to workers and the public. The licensee calculated dose estimates for three distinct scenarios, including a truck driver hauling debris to the landfills, a bulldozer operator working at the landfill sites, and a residential farmer located at the landfill sites following closure. The analyses relied upon conservative bounding analyses. None of the scenarios evaluated result in doses exceeding 10 uSv/yr (1mrem/yr). Therefore, the staff recommends approval of this modification to the licensee's authority to dispose of waste in accordance with 10 CFR 20.2002. Further, in accordance with the provisions of 10 CFR 30.11 and 70.17, "the Commission may, upon application by an interested person or upon its own initiative, grant such exemptions from the requirements of the regulations. . .as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest." Based on the above analyses and the environmental assessment (70 FR 3072), this material authorized for disposal poses no danger to public health and safety, does not involve information or activities that could potentially impact the common defense and security of the United States, and it is in the public interest to dispose of wastes in a controlled environment such as that provided by the licensed landfills. Therefore, to the extent that this material authorized for disposal in this 20.2002 authorization is otherwise licensable, the staff concludes that the material is exempt from further Atomic Energy Act (AEA) and NRC licensing requirements.

Docket No.: 050-155
License No.: DPR-006

CONTACT: J. C. Shepherd, NMSS/DWMEP
301-415-6712

2.4 UNCERTAINTY ANALYSIS

NRC staff continues to consider the licensee's analyses bounding in nature. Therefore, no uncertainty analyses are required since the assumptions have clearly continued to bound the dose assessment, particularly through the overestimation of the source term.

3.0 SUMMARY AND CONCLUSIONS

Based on the above analyses, Consumer Energy, the licensee, has demonstrated, and the NRC staff has confirmed, that the proposed 10 CFR 20.2002 disposal is expected to result in minimal risk to workers and the public. The licensee calculated dose estimates for three distinct scenarios, including a truck driver hauling debris to the landfills, a bulldozer operator working at the landfill sites, and a residential farmer located at the landfill sites following closure. The analyses relied upon conservative bounding analyses. None of the scenarios evaluated result in doses exceeding 10 uSv/yr (1mrem/yr). Therefore, the staff recommends approval of this modification to the licensee's authority to dispose of waste in accordance with 10 CFR 20.2002. Further, in accordance with the provisions of 10 CFR 30.11 and 70.17, "the Commission may, upon application by an interested person or upon its own initiative, grant such exemptions from the requirements of the regulations. . .as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest." Based on the above analyses and the environmental assessment (70 FR 3072), this material authorized for disposal poses no danger to public health and safety, does not involve information or activities that could potentially impact the common defense and security of the United States, and it is in the public interest to dispose of wastes in a controlled environment such as that provided by the licensed landfills. Therefore, to the extent that this material authorized for disposal in this 20.2002 authorization is otherwise licensable, the staff concludes that the material is exempt from further Atomic Energy Act (AEA) and NRC licensing requirements.

Docket No.: 050-155
License No.: DPR-006

CONTACT: J. C. Shepherd, NMSS/DWMEP
301-415-6712

DISTRIBUTION:
DWMEP r/f DD r/f WSnell, R III

ML043550242 *See previous concurrence

OFC	DWMEP*	DWMEP*	DWMEP*	OGC*	DWMEP
NAME	JShepherd	TMixon	CCraig	STreby	DGillen
DATE	12/23/04	12/29/04	01/11/05	12/23/05	01/19/05

OFFICIAL RECORD COPY