

February 5, 2002

Mr. Kurt M. Haas
General Manager
Big Rock Point Plant
Consumers Energy Company
10269 US-31 North
Charlevoix, MI 49720

SUBJECT: BIG ROCK POINT PLANT - PROPOSED DISPOSAL PROCEDURES IN
ACCORDANCE WITH 10 CFR 20.2002 (TAC NO. MB1463)

Dear Mr. Haas:

By letter dated March 14, 2001, as supplemented by letters dated May 18 and June 20, 2001, you requested U. S. Nuclear Regulatory Commission approval for the proposed disposal of demolition debris originating from decommissioning activities at Big Rock Point Plant, in accordance with the provisions of 10 CFR 20.2002. We have completed our review of your request and our safety evaluation is enclosed. We have found that your proposed disposal of demolition debris in a State of Michigan landfill is acceptable.

Sincerely,

/RA/

John A. Zwolinski, Director
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-155

Enclosure: Safety Evaluation

cc w/encls: See next page

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**See previous concurrence

ACCESSION NUMBER: ML020250402

*No substantive changes from SE input

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Big Rock Point Plant

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO A REQUEST TO DISPOSE OF
CONTAMINATED DEMOLITION DEBRIS PURSUANT TO 10 CFR 20.2002
CONSUMERS ENERGY COMPANY
BIG ROCK POINT PLANT
DOCKET NO. 50-155

1.0 INTRODUCTION

By letter dated March 14, 2001, as supplemented by letters dated May 18 and June 20, 2001, Consumers Energy Company (the licensee) submitted a request, pursuant to 10 CFR 20.2002, to dispose of approximately 42.25 million pounds of predominately concrete debris originating from decommissioning activities at the Big Rock Point Plant in a State of Michigan licensed Type II landfill.

2.0 BACKGROUND

The Big Rock Point Plant was permanently shut down on August 29, 1997, for decommissioning. As part of the decommissioning process, the licensee plans to dismantle the individual structures after they have been decontaminated and radiologically surveyed. The licensee estimates that there will be total of 84.5 million pounds of predominately concrete debris from the entire decommissioning project. Approximately one half of this material is non-impacted (i.e., has never had the potential for neutron activation or been exposed to licensed radioactive material). The other half has a potential to contain residual licensed radioactive material and/or neutron activation products in a limited quantity, and is the subject of this evaluation pursuant to 10 CFR 20.2002.

3.0 EVALUATION

The licensee, as required by 10 CFR 20.2002, performed a comprehensive physical and radiological evaluation of the demolition debris material.

The demolition debris, which includes flooring materials, concrete, rebar, roofing materials, structural steel, soils associated with digging up foundations, and concrete and/or asphalt pavement or other similar solid materials, will originate from the demolition and removal of structures and paved surfaces at the plant site, after the structure/surface has been decontaminated and surveyed as required.

The physical form of the material will be that of bulk material with various screen sizes, ranging from particles the size of sand up to occasional monoliths with a volume of several cubic feet. The licensee, for the calculations, assumed the material to be a homogenous mixture with a density of 150 pounds per cubic foot. The material will be dry solid waste containing no absorbents or chelating agents.

The licensee estimates that the mass of both contaminated and non-contaminated material will total approximately 84.5 million pounds. With an assumed density of 150 pounds per cubic foot, the estimated volume of material disposed at the State of Michigan-licensed landfill will be approximately 563,000 cubic feet. This value represents approximately two percent of the annual volume of waste disposed at the landfill that is expected to receive the material.

The disposal of the material is expected to be completed within one year. The material will not be isolated or dedicated to a single burial cell at the landfill. Rather, it will be co-mingled with other landfill materials. The material will be covered with an interim six-inch layer of soil each day, in accordance with landfill requirements.

The licensee's radiological evaluation of the buildings, structures, and other materials to be disposed included over 200 core borings in locations expected to have the highest contamination potential. Each core material was analyzed on-site by gamma spectrometry and direct radiation survey to determine what radionuclides are present and how far the contaminants have penetrated into the concrete. In addition, portions of 14 core samples were analyzed by an off-site laboratory (General Engineering Laboratories) at detection levels consistent with environmental monitoring, using alpha and gamma spectrometry and liquid scintillation monitoring to analyze for the presence of the following radionuclides:

Ac-227	Ac-228	Ag-108m	Ag-110m	Am-241	C-14
Cd-109	Ce-144	Cm-242	Cm-243/244	Co-60	Cs-134
Cs-135	Cs-137	Eu-152	Eu-154	Fe-55	H-3
I-129	K-40	Mn-54	Ni-59	Ni-63	Nb-94
Pb-214	Pm-147	Pu-241	Pu-238	Pu-239/240	Ru-106
Sb-125	Sr-90	Tc-99	U-233/234	U-235/236	U-238
Zn-65					

The results of the laboratory analysis identified only Co-60, Cs-137, and H-3. In addition, K-40, Pb-214, U-233/234, and U-238 were identified, but at levels that were indistinguishable from naturally occurring background levels measured in plant concrete samples that were not contaminated by licensed radioactive materials.

Based on the radiological characterization of the buildings and structures to be demolished, the licensee calculated the approximate amount of licensed radioactive material that would be generated. For the 42.25 million pounds of debris, the total amount of radioactivity by radionuclide is as follows:

<u>Radionuclide</u>	<u>Total Activity, millicurie (mCi)</u>
Co-60	16.0
Cs-137	3.3
H-3	152

The 16.0 mCi of Co-60, 3.3 mCi of Cs-137, and 152 mCi of H-3 represent the realistic amount of licensed radioactive material that is expected to be contained in the 42.25 million pounds of debris. However, the licensee performed a more conservative bounding calculation, which used a principal gamma emitter concentration of 5 picocuries per gram (pCi/gm) for licensed radioactive material contained in the debris. Adjusting the total gamma activity upward to a bounding principal gamma emitter concentration value of 5 pCi/gm, results in the following values:

<u>Radionuclide</u>	<u>Total Activity (mCi)</u>
Co-60	80.0
Cs-137	16.5
H-3	760

For this 10 CFR 20.2002 application, the licensee used the bounding value of 5 pCi/gm principal gamma emitter concentration as a limit to ensure that radiological dose to workers and members of the public is kept As Low As Reasonably Achievable. To ensure that the 5 pCi/gm principal gamma emitter limit is not exceeded, radiological surveys will be performed on structural surfaces prior to demolition, to verify that radioactive surface contamination does not exceed 5000 decays per minute per 100 square centimeters (dpm/100 cm²), averaged over areas appropriate for the detection system used. All demolition debris will be monitored by a bulk assay radiation detection system with an alarm setpoint established at or below the 5 pCi/gm principal gamma emitter limit prior to disposal.

The licensee performed radiological calculations, which used the 5 pCi/gm principal gamma emitter concentration limit as the concentration of licensed radioactive material in the 42.25 million pounds of demolition debris being transported and disposed of in a State of Michigan-licensed Type II landfill. To perform these calculations, the licensee used readily available commercial dose assessment codes (MicroShield, Version 5.03, from Grove Engineering, and RESRAD, Version 6.0, from the U.S. Department of Energy) that are acceptable to the U.S. Nuclear Regulatory Commission (NRC).

Dose assessments were performed for the types of individuals who have the potential to receive the maximum dose: Transport Worker, Landfill Worker, and Landfill Resident/Farmer.

<u>Individual</u>	<u>Annual Dose, millirem (mrem)</u>
Transport Worker	0.366
Landfill Worker	0.290
Landfill Resident / Farmer	0.009

In addition to the NRC staff's evaluation of the licensee's data and radiological assessment, the NRC staff also performed independent dose assessment calculations. This evaluation used the RASCAL code and the licensee's radionuclide survey data, which confirmed the acceptability of the licensee's calculations. The NRC staff's calculated doses were in agreement with the licensee's calculations and verified that the potential annual dose to a worker or a member of the public would be less than 1 mrem.

4.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact related to the 10 CFR 20.2002 request was published in the *Federal Register* on December 7, 2001 (66 FR 63567). Accordingly, based upon the environmental assessment, the Commission has determined that approval of this request will not have a significant effect on the quality of the human environment.

5.0 CONCLUSION

The NRC staff finds that the licensee's application to dispose of approximately 42.25 million pounds of demolition debris in a State of Michigan-licensed Type II landfill will result in a calculated potential annual dose to a worker or a member of the public of less than 1 mrem. This calculated dose is well within the 10 CFR Part 20 annual dose limit of 100 mrem and less than the annual dose limit of 25 mrem for decommissioning, which will allow for license termination and unrestricted use of the land.

The NRC staff finds that the licensee's application, pursuant to 10 CFR 20.2002, will not have a significant impact on workers, the public, or the environment and that it is, therefore, acceptable.

Principal Contributor: S. Klementowicz

Date: February 5, 2002