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MEMORANDUM FOR: John B. Hickman, Project Manager  
Project Directorate III-3  
Division of Reactor Projects

FROM: LeMoine J. Cunningham, Chief  
Radiation Protection Branch  
Division of Radiation Safety  
and Safeguards

SUBJECT: ONSITE DISPOSAL OF SLIGHTLY CONTAMINATED  
SLUDGE AT THE D.C. COOK NUCLEAR PLANT  
UNITS 1 AND 2 (TAC NOS. M81885/81886)

By letter dated October 9, 1991, Indiana Michigan Power Company (I&M) submitted a request pursuant to 10 CFR 20.302 for the onsite disposal of slightly contaminated sludge at D.C. Cook. We have completed our review of the request and find the licensee's procedures, including amendments, to be acceptable. This approval is granted provided that the enclosed SER is permanently incorporated as an appendix to the licensee's Offsite Dose Calculation Manual (ODCM). Any future modifications to these amendments shall be reported to the NRC. This completes our review of TAC Nos M81885/81886.

151

LeMoine J. Cunningham, Chief  
Radiation Protection Branch  
Division of Radiation Safety  
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**SAFETY EVALUATION  
D.C. COOK NUCLEAR PLANT UNITS 1 AND 2  
DISPOSAL OF SLIGHTLY CONTAMINATED SLUDGE**

**1. INTRODUCTION**

By letters<sup>1</sup> dated October 9 and October 23, 1991, and September 29, 1992, Indiana Michigan Power Company (I&M) requested approval pursuant to Section 20.302 of Title 10 of the Code of Federal Regulations (CFR) for the onsite disposal of licensed material not previously considered in the D.C. Cook Final Environmental Statement (FES) dated August 1973. Specifically, this request addresses a situation (1982) in which approximately 942 cubic meters of slightly contaminated sludge were removed from the turbine room sump absorption pond and pumped to the upper parking lot located within the exclusion area of the D.C. Cook plant. The contaminated sludge was spread over an area approximately 4.7 acres. The sludge contains a total radionuclide inventory of 8.86 millicuries (mCi) of Cesium-137, Cesium-136, Cesium-134, Cobalt-60 and Iodine-131.

In its submittal, the licensee addressed specific information requested in accordance with 10 CFR 20.302(a), provided a detailed description of the licensed material, thoroughly analyzed and evaluated information pertinent to the impacts on the environment of the proposed disposal of licensed material, and committed to follow specific procedures to minimize the risk of unexpected exposures.

**2. DESCRIPTION OF WASTE**

The turbine room sump absorption pond is a collection place for water released from the plant's turbine room sump. The contamination was caused by a primary-to-secondary steam generator leak that entered the pond from the turbine building sump, a recognized release pathway. Sludge, consisting mainly of leaves and roots mixed with sand, built up in the pond. As a result, the licensee dredged the pond in 1982. The radioactive sludge removed by the dredging activities was pumped to a containment area located within exclusion area. The total volume of 942 cubic meters of the radioactive sludge that was dredged from the bottom of the turbine room absorption pond was subsequently spread and made into a graveled road over the upper parking lot (see attachment 1) area of approximately 4.7 acres.

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<sup>1</sup> I&M letter from E.E. Fitzpatrick to the NRC Document Control Desk, October 9, and 23, 1991, September 29, 1992, and NRC Inspection Reports 50-315/91015 (DRSS) and 50-316/91015 (DRSS).

The principal radionuclides identified in the dredged material are listed below.

TABLE 1

NUCLIDE (half-life)	Activity (mCi) 1982	Activity (mCi) 1991
<sup>136</sup> Cs (13.2 d)	0.03	N.A
<sup>134</sup> Cs (2.1 y)	2.34	0.18
<sup>137</sup> Cs (30.2 y)	5.59	4.57
<sup>60</sup> Co (5.6 y)	0.9	0.27
<sup>131</sup> I (8.04 d)	0.03	N.A
TOTAL:	8.89	5.02

\* N.A. not applicable due to decay

### 3. RADIOLOGICAL IMPACTS

The licensee in 1982 evaluated the following potential exposure pathways to members of the general public from the radionuclides in the sludge: (1) external exposure caused by groundshine from the disposal site, (2) internal exposure caused by inhalation of resuspended radionuclide, and (3) internal exposure from ingesting ground water. The staff has reviewed the licensee's calculational methods and assumptions and finds that they are consistent with NUREG-1101, "Onsite Disposal of Radioactive Waste," Volumes 1 and 2, November 1986 and February 1987, respectively. The staff finds the assessment methodology acceptable. Table 2 lists the doses calculated by the licensee for the maximally exposed member of the public based on a total activity 8.89 mCi disposed in that year.

Table 2

<u>Pathway</u>	<u>Whole Body Dose Received by Maximally Exposed Individual (mrem/year)</u>
Groundshine	0.94
Inhalation	0.94
Groundwater Ingestion	0.73
Total	----- 2.61

No activity

3

appropriate

On July 5, 1991, the licensee re-sampled the onsite disposal area (attachment 2) to assure that no significant impacts and adverse effects had occurred. A counting procedure based on the environmental LLD of <sup>137</sup>Cs in sediment (180 pCi/kg dry weight) was used by the licensee; however, <sup>137</sup>Cs was not detected during the re-sampling<sup>2</sup>. The 1991 re-sampling process used by the licensee confirms that the environmental input of the 1982 disposal was very small. The staff finds the licensee's methodology acceptable.

Based on the above discussion by the licensee, the staff finds the licensee's procedures and amendments as documented in this SER acceptable. These amendments will be permanently incorporated as an appendix to the licensee's Offsite Dose Calculation Manual (ODCM), and that future modifications are reported to NRC in accordance with the applicable ODCM change protocol.

The licensee's proposal to dispose of the slightly contaminated sludge onsite in the manner described in the D. C. Cook submittals dated October 9 and 23, 1991, September 29, 1991 and September 29, 1993, is acceptable.

The guidelines used by the NRC staff for onsite disposal of licensed material and the staff's evaluation of how each guideline has been satisfied are given in Table 3.

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<sup>2</sup> I&M letter from E.E. Fitzpatrick to the NRC Document Control Desk, September 29, 1993

*maximally*  
TABLE 3

20.302 GUIDELINE FOR ON-SITE DISPOSAL <sup>3</sup>	STAFF'S EVALUATION
1. The radioactive material should be disposed of in a manner that it is unlikely that the material would be recycled.	1. Due to the nature of the disposed material, recycling to the general public is not considered likely.
2. Doses to the total body and any body organ of a <u>minimally</u> exposed individuals (a member of the general public or a non-occupationally exposed worker) from the probable pathways of exposure to the disposed material should be less than 1 mrem/year.	2. This guideline was addressed in Table 2. Although the 3 mrem/yr is greater than staff's guidelines, the staff finds it acceptable due to 9 yrs decay following analysis and no <del>ESTR</del> activity was detected in the 1991 survey.
3. Doses to the total body and any body organ of an inadvertent intruder from the probable pathways of exposure should be less than 5 mrem/year.	3. Because the material will be land-spread, the staff considers the maximally exposed individual scenario to also address the intruder scenario.
4. Doses to the total body and any body organ of an individual from assumed recycling of the disposed material at the time the disposal site is released from regulatory control from all likely pathways of exposure should be less than 1 mrem.	4. Even if recycling were to occur after release from regulatory control, the dose to maximally exposed member of the public is not expected to exceed 1 mrem/year, based on exposure scenarios considered to this analysis.

<sup>3</sup> E.F. Branagan, Jr. and F.J. Congel, "Disposal of Contaminated Radioactive Wastes from Nuclear Power Plants," presented at the Health Physics Society's Mid-Year Symposium on Health Physics Considerations in Decontamination/Decommissioning, Knoxville, Tennessee, February 1986, (CONF-860203).