

Mr. Duane C. Hall, Manager
Ionizing Radiation, Health Physics Services
Minnesota Mining and Manufacturing Company
3M Center, Building 220-3W-06
P.O. Box 33283
St. Paul, MN 55133-32383

August 20, 1997

Dear Mr. Hall:

This letter is a follow-up to our May 4, 1995, letter regarding overall management of the Minnesota Mining and Manufacturing Company (3M) site near Kerrick, MN. As indicated in the letter, NRC agreed to defer a decision on overall site management until revisions to Part 20 were promulgated and the Shieldalloy Draft Environmental Impact Statement (DEIS) was completed. The Shieldalloy DEIS was completed in July 1996. However, it does not provide information useful in making a decision on decommissioning the Kerrick, MN site. On July 21, 1997, NRC revised Part 20 - Standards for Protection Against Radiation, by publishing Subpart E - Radiological Criteria for License Termination, in the Federal Register. Subpart E, which became effective on August 20, 1997, establishes a 25 mrem/year radiological criteria for unrestricted use and also establishes criteria for license termination under restricted conditions.

The criteria provided in 10 CFR Part 20, Subpart E, provide additional decommissioning options for consideration. 3M should consider the available options and prepare a Decommissioning Plan for the Kerrick, MN site. The Decommissioning Plan must demonstrate how 3M will meet the radiological criteria for unrestricted release or the criteria for license termination under restricted conditions. As recommended in your May 4, 1995, letter, NRC, State of Minnesota, and 3M should meet to discuss your Decommissioning Plan before it is finalized. 3M should submit a schedule for completion of the Decommissioning Plan within 45 days of the date of this letter.

If you have any questions regarding the contents of this letter, please call me at (301) 415-6607.

Sincerely,

[Original signed by]
John T. Buckley, Project Manager
Low-Level Waste and Decommissioning
Projects Branch
Division of Waste Management
Office of Nuclear Material Safety and
Safeguards

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Docket No.: 070-00832
040-01020

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 20, 1997

Mr. Duane C. Hall, Manager
Ionizing Radiation, Health Physics Services
Minnesota Mining and Manufacturing Company
3M Center, Building 220-3W-06
P.O. Box 33283
St. Paul, MN 55133-323J3

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Sincerely,

A handwritten signature in cursive script that reads "John T. Buckley".

John T. Buckley, Project Manager
Low-Level Waste and Decommissioning
Projects Branch
Division of Waste Management
Office of Nuclear Material Safety and
Safeguards

Docket No.: 070-00832
040-01020

Minnesota Mining and Manufacturing Co. (3M)

Docket: 070-00832
040-01020

Mr. Duane C. Hall, Manager
Ionizing Radiation, Health Physics Services
Minnesota Mining and Manufacturing Company
3M Center, Building 220-3W-06
P.O. Box 33283
St. Paul, MN 55133-32383

Mr. Timothy D. Donakowski
Minnesota Department of Health
Section of Radiation Control
121 E. Seventh Place, Suite 220
P.O. Box 64975
Minneapolis, MN 55164-0975

Mr. Dale Trippler
Water Quality Division
Minnesota Pollution Control Agency
520 Lafayette Rd.
St. Paul, MN 55155-4194

3M-KERRICK BRIEFING SUMMARY

Contamination

- * 674 Drums (55 gal) and various unpackaged waste
- * Total activity at the site
 - $U_{238} = 3.11 \text{ mCi}$
 - $Th_{232} = 1.51 \text{ mCi}$
 - $U_{enr} = 11.99 \text{ mCi}$
- * Waste emplaced in 4 burials under 10 CFR 20.304 between December 1966 and November 1968
- * U_{enr} and Th_{232} concentrations exceed limits of Option 2 of 1981 BTP
 U_{238} concentrations exceed Option 3 of 1981 BTP
- * Chemical waste disposal area also present at the site

Site

- * Entire site is 520 acres
- * Waste disposal area is 30 ft x 70 ft hole with clay bottom and sides
- * Disposal area located inside 100 ft x 200 ft fenced area
- * site sits over glacial deposits
- * Hydrologic monitoring for radioactivity has not been done.

Licensing and Decommissioning History

- Early 1989 3M petitioned to Minnesota Pollution Control Agency (MPCA) to remove site from Minnesota permanent list of priorities
- 12/13/89 MPCA requests NRC review 3M, "Report on Uranium and Thorium at 3M Property Section 34, T45N, R17W Pine County, Minnesota." Also requested info from NRC on long-term monitoring requirements for disposal sites of radioactive waste.
- 8/9/90 Treby to Austin memo giving OGC opinion on 20.304 burials. (1) 20.304 did not exempt burial of waste from NRC jurisdiction, but rather granted general license for burial, (2) possessor of land containing burial is in possession of nuclear material and subject to Commissions authority, (3) If there is public health and safety hazard, NRC may impose order even if license has been terminated.

1990 - 1991	NRC performed RESRAD analyses
1/22/92	MPCA asks if NRC has an ambient monitoring policy for past disposal sites. Informs NRC that chemical drums had been excavated during early 80's.
4/3/92	NRC responds to MPCA indicating that the NRC retains jurisdiction over burials
4/3/92	NRC informs 3M that analyses indicate that release criteria could be exceeded. NRC asks 3M for site specific transport coefficients.
3/24/93	3M requests that site be removed from the SDMP. 3M states that 1981 BTP addresses concentrations of material buried in soil, not in containers. 3M says if one considers containers, then burial meets release criteria.
6/22/93	NRC responds to 3/24/93 3M letter. NRC says thanks for information, but, will provide draft dose assessment for 3M review by 8/31/93.
10/14/94	NRC transmits copy of dose assessment to 3M for review. Document recommends exhuming waste and sending to LLW facility.
1/31/95	3M provides comments to NRC. 3M states that NRC's RESRAD analysis flawed. 3M recommends separating 60 acre site from remaining 460 acre parcel and setting deed restrictions.
5/4/95	NRC states that dose assessment is conservative. If 3M would like to submit additional information on the (1) form and solubility of the thorium and uranium and (2) distribution coefficients in the affected aquifer, then dose assessment could be redone.
	NRC goes on to say that a decision on overall site management could be deferred until revisions to Part 20 are promulgated and Shieldalloy DEIS completed.
Current	<p>The Shieldalloy DEIS was completed in July 1996. However, it does not provide information useful in making a decision on the site. NRC published, "Radiological Criteria for License Termination; Final Rule" in July 1997. The rule becomes effective on August 20, 1997.</p> <p>3M site has been evaluated against 10/25/96 screening methodology for burials, and the site does not meet criteria.</p>

APPLICATION OF 10/25/96 SCREENING METHODOLOGY FOR ASSESSING FORMER BURIALS

A. 3M-Kerrick Burial Data (from July 1994 Report)

DATE	ACTIVITY
12/7/66	3.11 mCi of U_{238} , 1.51 mCi of Th_{232}
7/18/67	4.94 mCi of U_{enr} (93% U_{235})
7/20/67	3.57 mCi of U_{enr} (93% U_{235})
11/27/68	3.48 mCi of U_{enr} (93% U_{235})

B. Analysis

Step 1 - Determine Total Activity for Each Isotope

$$U_{238} = 3.11 \text{ mCi} = 3110 \text{ uCi}$$

$$Th_{232} = 1.51 \text{ mCi} = 1510 \text{ uCi}$$

$$U_{enr} = 11.99 \text{ mCi} = 11990 \text{ uCi}$$

Step 2 - Concentration Calculation

$$U_{238} \quad C \text{ uCi/ml} = \frac{3.11 \text{ E3 uCi}}{9.1 \text{ E7 ml}} = 0.34 \text{ E-4 uCi/ml}$$

$$Th_{232} \quad C \text{ uCi/ml} = \frac{1.51 \text{ E3 uCi}}{9.1 \text{ E7 ml}} = 0.17 \text{ E-4 uCi/ml}$$

$$U_{enr} \quad C \text{ uCi/ml} = \frac{11.99 \text{ E3 uCi}}{9.1 \text{ E7 ml}} = 1.32 \text{ E-4 uCi/ml}$$

Step 3 - Dose Calculation

$$U_{238} \quad D \text{ mrem/yr} = \frac{(0.34 \text{ E-4 } \mu\text{Ci/ml}) (50 \text{ mrem/yr})}{3 \text{ E-7}} = 5667 \text{ mrem/yr}$$

$$Th_{232} \quad D \text{ mrem/yr} = \frac{(0.17 \text{ E-4 } \mu\text{Ci/ml}) (50 \text{ mrem/yr})}{3 \text{ E-8}} = 28,333 \text{ mrem/yr}$$

$$U_{enr} \quad D \text{ mrem/yr} = \frac{(1.32 \text{ E-4 } \mu\text{Ci/ml}) (50 \text{ mrem/yr})}{3 \text{ E-7}} = 22,000 \text{ mrem/yr}$$

Total Dose from all isotopes = 56,000 mrem/yr.

C. Conclusion: Criteria not met