3M Health Physics Services
3M Center Bldg. 224-2E-06
St. Paul, MN 55144-1000
612/736 0498
FAX 612/736 2285

cc to:
R. Cowan
T. Parker
10/16/92

October 1, 1992

U. S. Nuclear Regulatory Commission, Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

Attention: Darrel G. Wiedeman

Dear Darrel:

Since your July 20, 1992 visit to 3M's Kerrick, MN site, we have reviewed our files to reevaluate the estimates of amounts of Th-232, U-235 and U-238 present in the contaminated equipment buried there. Since the actual survey data for the items is no longer available, the review consisted of examining documents summarizing the particulars of the burials.

Based on the information available, we have concluded that the estimates for the Th-232 and U-238 content of the burials should remain as originally reported, i.e., 1.51 and 3.11 millicuries, respectively.

By assigning no U-235 activity to the containers showing no detectable activity during the preshipment surveys, we have reduced the estimate for the U-235 content of the burials to 11.99 millicuries.

We have also reviewed the listing of "RESRAD" parameters and where available provided site specific data as shown in the attachment. The soil concentration estimates shown on Input Form Number R012 have been determined by using the above activity estimates and assuming this activity is dispersed in soil infiltrating the total burial volume of 12,000 cubic feet.

Sincerely,

Robert G. Wissink

Robert G. Wissink, Manager
Health Physics Services

RGW/ckm
attachment

nrcker.doc

ATTACHMENT A
PAGE 1 of 1 PAGES

STATE OF MINNESOTA
Water Pollution Control Commission
Minnesota Department of Health Building
University Campus
MINNEAPOLIS
55440

October 10, 1966

Mr. Joseph T. Ling, Ph.D., Manager
Water and Sanitary Engineering Department
Minnesota Mining and Manufacturing Co.
900 Bush Avenue, Building 42-2W
St. Paul, Minnesota 55101

Dear Mr. Ling:

On October 6, the Water Pollution Control Commission approved plans and authorized issuance of a permit for construction and operation of a waste disposal system in Pine County. A copy of the permit is enclosed.

If you have any questions concerning the permit, please let us know.

Yours very truly,

Lyle H. Smith
Executive Engineer

cc: Arthur C. Budd, Chairman
Park Township Board
Dr. E. C. Hubin, H. O.
Park Township
Ervin L. Nelson, Chairman
Pine County Board
Warren R. Lawson, M. D.
Chief,
Section of Radiation and
Occupational Health
H. N. Ledin, County Attny.

MINNESOTA WATER POLLUTION CONTROL COMMISSION
Minnesota Department of Health Building
University Campus
Minneapolis, Minnesota
55440

Permit No. WPC 5227

PERMIT FOR CONSTRUCTION AND OPERATION OF WASTE DISPOSAL SYSTEM

Minnesota Mining and Manufacturing Company
Park Township, Pine County

Pursuant to authorization by the Minnesota Water Pollution Control Commission at a meeting on October 6, 1966, and in accordance with provisions of the State Water Pollution Control Statutes (Sec. 115.01-115.53), plans are approved and a permit is hereby granted to the Minnesota Mining and Manufacturing Company, Inc., of St. Paul, for construction and operation of a liquid and solid waste disposal system in Section 34, Township 45 North, Range 17 West, Park Township, Pine County, subject to the conditions given below.

The facilities will consist of a diked and fenced area of approximately two acres for permanent containment of liquid wastes such as spent solvents and sludges, and areas for burying solid wastes such as scrap plastic materials. The facilities are intended for supplementary and intermittent use. The project is described

in a letter from Joseph T. Ling, Ph.D., Manager, Water and Sanitary Engineering Department, Minnesota Mining and Manufacturing Company, dated September 8, 1966, and shown on company drawings KERR-888-C100 and KERR-888-C-200 dated May 12, 1966, and June 12, 1966, respectively. An inspection of the proposed site was made by a representative of the Department of Health on August 5, 1965.

General Conditions

1. This permit shall not release the permittee from any liability or obligation imposed by Minnesota statutes or local ordinances and shall remain in force subject to all conditions and limitations now or hereafter imposed by law. The permit shall be permissive only and shall not be construed as estopping or limiting any claims against the permittee for damage or injury to person or property or to any waters of the state resulting from any acts, operations, or omissions of the permittee, its agents, contractors or assigns, for damage to state property, or for any violation of the terms or conditions of this permit.
2. No assignment of this permit shall be effective until it is executed in writing and signed by the parties thereto and thereafter filed with the Water Pollution Control Commission.

3. No major alterations or additions to the waste disposal facilities shall be made without the written consent of the Water Pollution Control Commission.

4. The use of the facilities shall be limited to the treatment and/or disposal of the waste materials or substances described in the plan and/or permit applications and associated material on file with the Department of Health.

5. This permit is subject to modification or revocation as provided by law, and may be suspended at any time for failure to comply with the conditions stated herein or the provisions of any applicable regulation of the Water Pollution Control Commission.

6. The permittee or assigns shall defend, indemnify and hold harmless the State of Minnesota, its officers, agents and employees, officially or personally, against any and all actions, claims or demands whatsoever which may arise from or on account of the issuance of this permit, or the construction or maintenance of any facilities hereunder.

Special Conditions

1. There shall be no discharge of wastes from within the diked area under any conditions or at any time.

2. Reports describing the types and quantities of wastes

disposed of at this site shall be submitted to the Commission every month, together with pertinent information on the operation of the disposal system.

3. The deposit or storage of waste materials, either liquid or solid, and the operation of the waste disposal system, shall be controlled so as to avoid causing pollution of any waters of the state as defined by law, or creation of a hazard to wildlife, livestock or humans, or development of a nuisance in the vicinity.

4. The special conditions given above do not apply to radioactive wastes which must be disposed of in accordance with applicable regulations and rules of the U. S. Atomic Energy Commission. The disposal of radioactive wastes at this site is not prohibited if done in conformance with U. S. Atomic Energy Commission requirements, but the Minnesota Water Pollution Control Commission by the issuance of this permit, assumes no responsibility for the enforcement of, or for obtaining compliance with, such federal regulations or other federal requirements relating to radioactive wastes.

This permit is issued subject to modification or revocation as provided by law and does not estop subsequent establishment of further requirements for additional safeguards or treatment.

MINNESOTA WATER POLLUTION CONTROL COMMISSION

Lyle H. Smith, Executive Engineer

Dated: October 7, 1966

STATE OF MINNESOTA

DEPARTMENT MPCA

Office Memorandum

TO : Tim K. Scherkenbach, Chief
Compliance and Enforcement Section

DATE: August 17, 1977

FROM : Jack Ferman, Ph.D.
Nuclear Engineer JF

PHONE:

SUBJECT: SUMMARY OF MEETING WITH 3M OFFICIALS ON AUGUST 16, 1977

3M stated that ERDA had declassified the total amount of U-235 processed during 1961-1966. That amount was 2350 kg; the 16 kg MUF represents 0.68% of the total, a most excellent performance for the type of processing involved.

Based on a review of their records 3M reiterated the disposal quantities and activities cited in their September 1970 report transmitted to John Badalich from Dr. J. T. Ling, but with the following additions (underlined).

1. July 1967 burial

   508.3 gms 0.0356 Ci 473 55g-drums + 22 30g-drums

2. November 1968 burial

   50 gms 0.0035 Ci materials not drummed

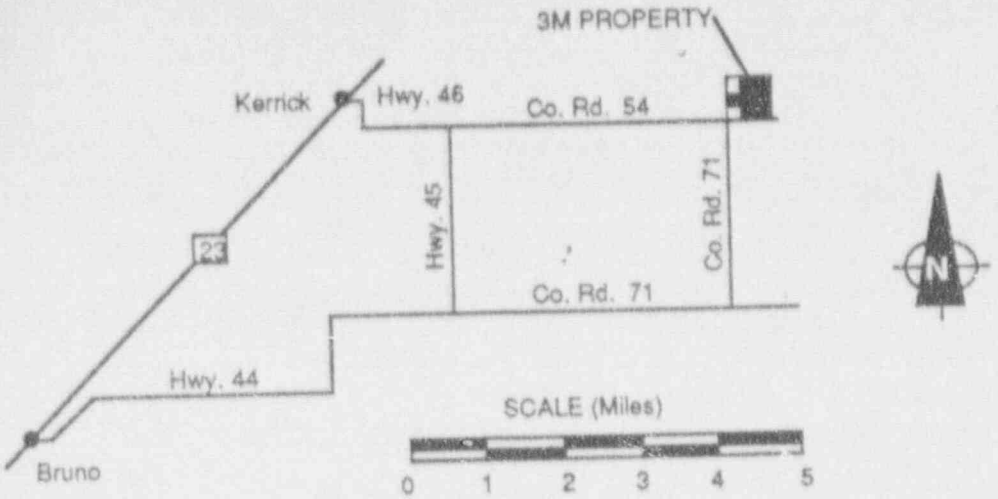
3M emphasized that the above figures are based on physical measurements conducted at the time of burial. The shade over 0.5 kg U-235 buried amounts to only 3.5% of the 16 kg MUF or to only 0.02% of the U-235 thru-put in five years.

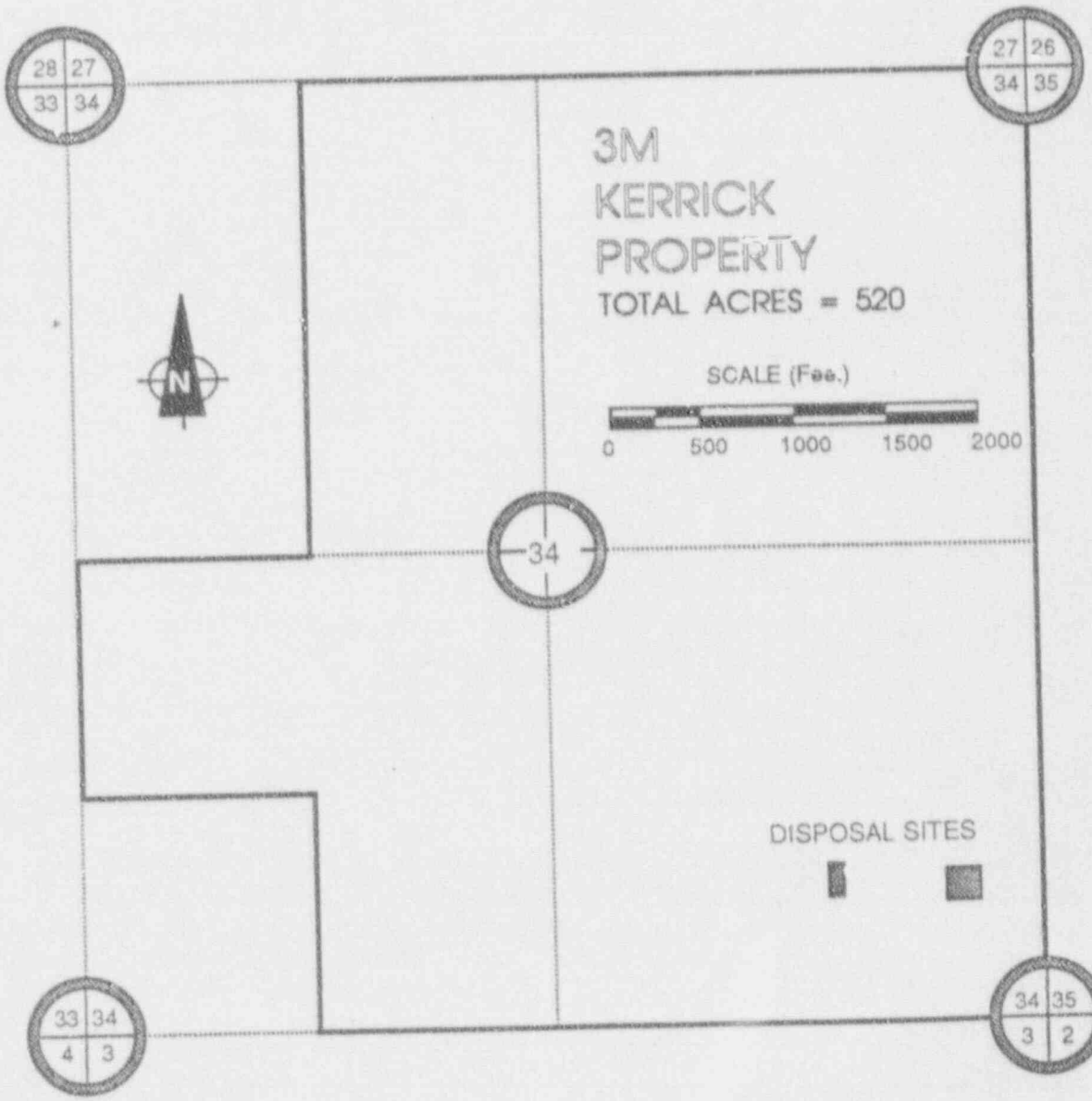
3M pointed out that the burials were conducted in a manner more conservative than AEC requirements as was explained in the 1970 report. The total surface area over which the burials occurred was estimated at 10,000 sq. ft. or about 0.25 acre. 3M further reiterated that the buried U-235 was in the form of slightly contaminated equipments that had not been in direct contact with U-235 during processing. Direct contact materials such as furnace tubes, crucibles, and filters were returned to AEC Los Alamos. 3M stated that post burial site area radiation surveys showed that radiation surveys levels were not in excess of natural background levels.

According to MWPCC Permit #5227, October 6, 1966, the 3M burial site is located in Section 34, Township 45 North, Range 17 West, Nickerson Township, Pine County. This location is five to six miles east of Kerrick, Minnesota and lies within the Nemadji State Forest.

Based on the information provided and the lack of population in the burial area, the approximately 0.5 kg U-235 that remains in Minnesota is judged to pose no hazard to the health and safety of the public.

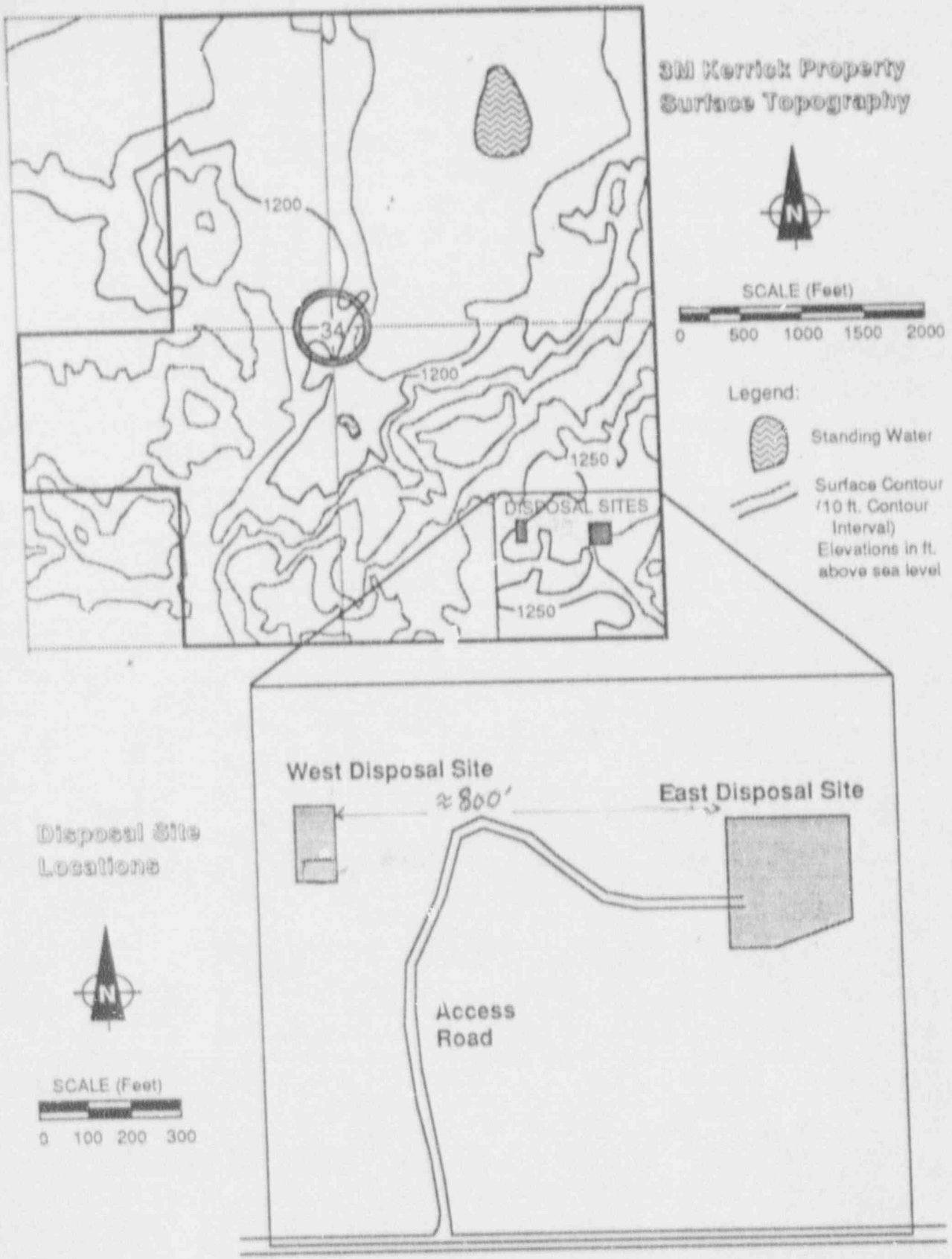
JF:jb
CC: Sandra S. Gardebring, Executive Director
Gail Gendler, PIO
Jocelyn F. Olson, SAAG





3M GEOLOGY DEPARTMENT	PROPERTY LOCATION & PLOT PLAN KERRICK, MN

ATTACHMENT D
PAGE 1 of 2 PAGES



3M GEOLOGY DEPARTMENT	SURFACE TOPOGRAPHY & DISPOSAL SITE LOCATIONS KERRICK, MN	DRWN: 02/28/89 B.W.KRAMER	FIGURE 2

STATE OF MINNESOTA
DEPARTMENT OF HEALTH

0772

Room 114
504 E. 2nd Street
Duluth, Minnesota 55901

Mr. Cliff Granlund
Kerrick, Minnesota 55756

Dear Mr. Granlum:

As you will recall on October 5, 1972, Mr. Eugene Jourdan of this Department collected samples of water from various points in the area for chemical and radiological analysis to ascertain if any indications of contamination which might be attributed to the waste from the disposal pond were found in the samples examined. Details relative to the analysis are as follows.

Sample No. 6929 represents water collected from the culvert on the road near the disposal pond. The chemical analysis of this sample showed a soft water with a very high iron and a very low manganese content. The amounts of chloride, fluoride, nitrate nitrogen and sulphate were low. No significant amount of surfactant was found.

Sample No. 6930 represents water collected from the Otto Martinek well showed a moderately hard water with an extremely high iron and a very low manganese content. The amounts of chloride, fluoride, sulphates and nitrate nitrogen were low. No significant amount of surfactant was found.

Sample No. 6938 represents water collected from the Elliot Swenson well. The chemical analysis of this sample showed a soft water with an extremely high iron content and a very low manganese content. The amounts of chloride, fluoride, nitrate nitrogen and sulphate were low. No significant amount of surfactant was found.

Sample No. 6939 represents water collected from the Cliff Granlund well. The chemical examination of this sample showed a soft water with a trace of iron and manganese. The amounts of chloride, fluoride, sulphates and nitrate nitrogen were low. No significant amount of surfactant was found.

Analyses made for the trace metals of copper, cadmium, lead, nickel and zinc showed the concentration of these elements (reported in micrograms per liter) to be within acceptable limits for all of the samples. In addition an analysis for radioactivity made on all of the samples showed that alpha and beta emissions (reported in picocuries per liter) were within the normal

ATTACHMENT E
PAGE 1 of 3 PAGES

STATE OF MINNESOTA
DEPARTMENT OF HEALTH

range for natural radiation.

As previously indicated, the analyses carried out indicate that the samples are within the ranges normally found in ground and surface waters for the indicated determinations.

If you have any questions on the above data, please call or write this office.

Yours very truly,

A. S. Starin
Public Health Engineer

AJS/hp
Enc.
cc: Division of Environmental Health
District VIII

MINNESOTA DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH

ANALYTICAL DATA

Samples Collected By Eugene Jourdan Report To

Field Number	Town, County, Etc.	Sampling Point and Source of Sample
6928	Kerrick	3M Disposal Pond
6929	"	Culvert on Road near Disposal Pond
6930	"	Otto Martinek Drilled Well about 80 - 90' deep
6938	"	Elliot Swenson Well, dug
6939	"	GranlundWell, drilled

This line for Lab. use only. Sample Number	6928	6929	6930	6938	6939
Date Collected	10-5-72	"	"	"	"
Time Collected					
Temperature °F					
Date Received by Lab.	10-11-72	"	"	"	"
Coliform group organisms M.P.N. per 100 ml.					
Con. ☐ Comp. ☐					
M.F.C. per 100 ml.					
Total Solids					
Turbidity					
Color					
Total hardness as $CaCO_3$	17	57	170	46	77
Alkalinity as $CaCO_3$	18	60	160	44	80
Lead ug/l	<10	<10	<10		
Iron	0.44	9.6	34	23	.04
Manganese	0.02	0.08	0.05	0.160	<.01
Chloride	1	2	1	3	2
Residual Chlorine					
Sulphate	<5	<5	<5	<5	<5
Fluoride	0.1	<.1	0.2	<1	<.1
Total Phosphorus	0.03	0.46	0.11	0.02	0.01
Nitrite Nitrogen					
Nitrate Nitrogen	0.07	<.05	<1	<1	1.6
Methylene Blue Active Sub. as ABS	<.1	<.1	<.1	<.1	<.1
Calcium as $CaCO_3$	<10	30	140	17	37
Sodium	1	4	5	4	5
Potassium	<1	2	1	1	<1
Spec. Cond. µmhos/cm @ 25 °C	22	76	200	67	130
pHs @ 50 °F					
Ammonia N	<.05	0.20	<.05	<.05	<.05
Trace Metals ug/l (Cu	<10	<10	13	<10	13
(Cd	<10	<10	10	<10	<10
(Ni	<10	<10	<10	<10	<10
(Zn	<10	34	2000	380	130
(Pb				<10	<10
Radio Act. Alpha pCi/l	<1	<3	<2	6±3	<1
Beta pCi/l	25±3	23±3	5±2	29±2	8±2

* Results are in milligrams per liter except as noted.

To: Waste Disposal - Kerrick File

From: D. C. Hall - Health Physics Services - 224-2E-06

Subject: 5/19/92 Water Sample Analysis

Date: July 22, 1992

On May 19, 1992, F. B. Entwistle and I visited the 3M Kerrick, MN site where we met Bruce Kramer, 3M geologist. Bruce Kramer explained in laymen's terms the general hydrology of the site and toured us through the area northwest of the west disposal site. Five water samples to be analyzed for isotopic uranium, thorium-232 and gross beta activity were taken as follows.

Sample #1. Surface water in swamp area just northwest of sampling well #7.

Sample #2. Surface water in swamp area to the northwest of the west disposal site.

Sample #3. Surface water in drainage ravine between the swamp area sampled by sample #2 and the small beaver pond.

Sample #4. Surface water in small stream entering south side of beaver pond.

Sample #5. Surface water from east side of beaver pond.

The samples were analyzed by Controls for Environmental Pollution, Inc. in Sante Fe, New Mexico under their Order Number 92-05-622. The reported analytical results are as listed below.

Sample #	U-238 (pCi/l)	U-235 (pCi/l)	U-234 (pCi/l)	Th-232 (pCi/l)	Gross Beta (pCi/l)
1	<0.6	<0.6	<0.6	<0.6	<3
2	4.8+/-3.3	<0.6	4.4+/-2.8	0.8+/-0.6	<3
3	<0.6	<0.6	<0.6	<0.6	<3
4	<0.6	<0.6	<0.6	<0.6	12+/-11
5	<0.6	<0.6	<0.6	..9+/-0.7	<3

Note 1: In sample #4, the gross beta nigh error limits are due to the large amounts of solids in the sample.

Note 2: All samples were one liter samples. Samples #2 and #3 (especially #2) had a large amount of solids in them because there was only very shallow pools of water from which to get the samples.

Note 3: For analysis, each sample was thoroughly mixed and then half was totally chemically digested and analyzed for radioactive content.

Isotopic uranium results all fall within the environmental groundwater level range reported for east central Minnesota by the EPA in 1983 and gross beta results are similar to those reported by the Minnesota Department of Health in 1972 for background well and surface water samples taken from the 3M Kerrick site area. (See 3M's October 1983 "Report on Uranium and Thorium at 3M Property Section 34, T45N, R17W Pine County, Minnesota".)

The above reported Th-232 levels are very low. We are not presently aware of any reported background levels of Th-232 for east central Minnesota.

Duane C. Hall

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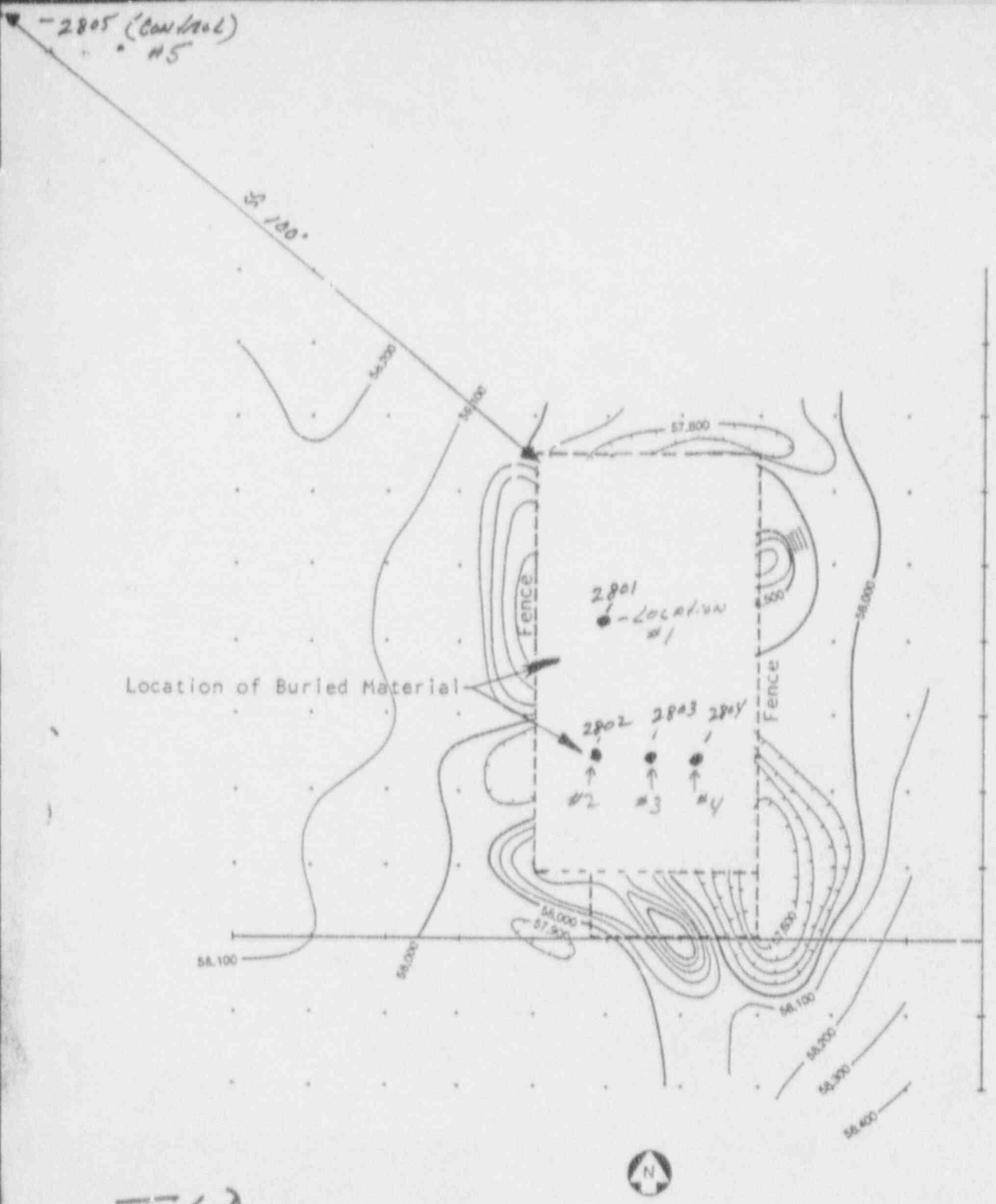

TLD Placement

0 50 100

Scale in Feet

Contour Interval 100 Gammas

3M - KERRICK MN

WEST DISPOSAL SITE

ATTACHMENT G

PAGE 1 OF 1 PAGES

Wiedeman

DEPARTMENT : HEALTH

STATE OF MINNESOTA

Office Memorandum

DATE : November 3, 1992

TO : Enrique Gentzsch
Ground Water and Solid Waste
Pollution Control Agency

FROM : Tim Donakowski TD
Section of Radiation Control
Department of Health

PHONE : 627-5065

SUBJECT : Results of Environmental Monitoring at the 3M Kerrick Disposal Site

We have completed the analysis and interpretation of the instrument surveys and environmental samples taken on July 20, 1992 and the dosimetry collected October 20.

Surveys using a Victoreen 450P micro R meter showed only background radiation levels at the site (10-20 micro R per hour).

I collected surface and ground water, soil, and vegetation samples. Our lab analyzed for gross alpha and beta, 37 different gamma emitters, tritium, and uranium. All the analyses were consistent with normal background amounts of radioactivity in the samples except for surface water collected 300 yards southwest of the site. This sample analyzed high for gross alpha and beta; GA was 59 pCi per liter +/- 7 and GB was 91 +/- 4. The sample also showed high levels of cesium-137 (40 pCi per liter). The sample was re-analyzed and similar results were obtained. For untreated Lake Superior water, a typical GB is 1.9 pCi per liter. We believe the high values are a result of dissolved solids in the sample (about one-fourth of the sample was sediment) and not because of high radioactivity in the sample.

The analyses did not show any thorium; low (background) levels of uranium-238 were found at both indicator and control locations. It is interesting to note that soil core samples did not show Cs-137, a fallout product present in almost all surface soil samples that we have collected. It also appears that the water collected from the residential well contains radon.

Two pairs of thermoluminescent dosimeters (Panasonic TLD Model UD814-AQ) were exposed on posts on the disposal site. Gamma exposure at station 1 is estimated to be 6.8 micro R per hour +/- 0.5; station 2 is estimated to be 6.5 micro R per hour +/- 0.2. For comparison, TLD readings around nuclear generating plants in Minnesota range from 4.8 to 6.1 micro R per hour. The higher values at the disposal site

ATTACHMENT H
PAGE 1 of 2 PAGES

may be due to higher background levels. Please note that NRC TLD readings are typically 25% higher than MDH because of a difference in calibration methods; therefore, I estimate NRC reported values for these stations to be 8.5 and 8.1 micro R per hour (18.4 and 17.5 mR per standard 90-day quarter).

Based on the above results and interpretations, we feel that there are no indications that the buried uranium and thorium waste is contaminating areas outside the disposal site.

cc: A. Dolezal Hennigan
D. Wiedeman (NRC RIII)
R. Wissink (3M)

TDD:tdd

ATTACHMENT 1
PAGE 1 of 1 PAGES

BURIALS of RADIOACTIVE WASTES by 3M KERRICK, MINNESOTA

DATE of Burial	NUCLIDES	QUANTITY/mCi/Lbs.	DESCRIPTION of WASTE
December 7, 1966	U natural (U-238)	10 Lbs.(3.11 mCi)	179-55 gallon drums and 3 crates (30"X30"x5') consisting of 3 semi-trailer loads weighing approximately 7,000 Lbs./trailer (21,000 Lbs. total)
	Thorium (Th-232)	30 Lbs.(1.51 mCi)	

TOTAL QUANTITY BURIED TO DATE= 4.62 millicuries

July 18 & 20, 1967	U enriched (U-238+235+234)	11.99mCi	On 7/18 281-55 gal. drums + 1-30 gal. drum On 7/20 192-55 gal. drums + 21-30 gal. drums A total of 7 semi-trailer trucks each weighing approximately 7,000 lbs. each (49,000 Lbs. total)

TOTAL QUANTITY BURIED TO DATE= 16.61 millicuries

November 27,1968	U enriched	(included above)	Approximately 4,000 Lbs. of (unpackaged) contaminated, oxygen cylinders,electrical motors, tools, piping & ventilation ducts (one semi-trailer)

TOTAL QUANTITY BURIED TO DATE= 16.61 millicuries

Estimated volume of waste=~20,000 ft^3
Estimated weight of waste=~74,000 Lbs.