

Memo To Files

Review and Inspection of the Dow-Wellman Thorium Sludge Pile,
Bay City, Michigan.

From: J. A. Finn and W. Grant

Period of Review: August 31, 1977 to September 20, 1977.

REASON FOR REVIEW

The State of Michigan raised some questions about the existing sludge pile. Review of the history of the pile, and inspection of the pile were conducted. Dow and Wellman representatives were interviewed, the pile was visited and radiation measurements and site samples were taken.

HISTORY

December 1956- License No. 002782 issued to Dow for use at Midland and Bay City, Michigan, and at Madison, Illinois.

A/79

February 1, 1961, Dow transferred the Pay City plant and 1053 pounds of thorium to Wellman Bronze and Aluminum Company. 11
Wellman's license (No. 2-4539) did not authorize use at Pay City and Wellman was so notified. 21

March 10, 1961, License STP-136 issued to Wellman, authorizing use of thorium at Pay City. License STP-136 (Docket 40-1790) issued 3/21/61 (?) to Wellman Bronze and Aluminum Company (later changed to Wellman Dynamics Corporation)- authorized use of thorium for making magnesium-thorium alloy at 801 Andre Street, Pay City, Michigan. This facility was formerly operated by the Metal Products Division, Dow Chemical Company, and comprised some 16 buildings on a 25-acre site. Approximately 650 Dow Chemical employees transferred to Wellman.

In accordance with an agreement with Dow, thorium-bearing sludge was transferred to Dow at a nearby site at Pay City. License No. STP-527 (Docket 40-17) issued to Dow Chemical authorizes storage at the site. Dow stopped accepting sludge transfers sometime in 1971.

Wellman purchased facilities in Creston, Iowa, from Hills-McCanna Company late in 1971 and the Hills-McCanna license (STR-133, Docket 40-564) was transferred to Wellman by Amendment No. 2 on January 7, 1972.

Production in Bay City was stopped in September 1971 and a skeleton crew was left to transfer equipment and unused thorium to the Creston facility. Thorium sludge was buried at the Bay City facility. 6/

On March 7, 1972, a survey of the Bay City facility was conducted by G. Hoyte Whipple and T. Jordan Powell. 4/ This was submitted by Wellman to DTL by letter dated April 14, 1972, 6/ requesting termination of license No. STR-136. License STR-136 was terminated by letter from DTL dated May 12, 1972. 7/

The Whipple report references a letter dated September 2, 1970, from James Camburn (State of Michigan) to S. J. Simmons documenting a disposal "agreement". The letter 5/ discusses 0.5% thorium in the sludge and states that that concentration is exempt from registration.

INSPECTION

On September 30, 1977, Region 3 representatives visited Dow, Midland, to discuss the status of the thorium sludge at Dow's Bay City site. On October 1, 1977, the Bay City site was visited radiation measurements were made and soil, sludge and water samples were taken. The samples were taken at locations where Dow and the State of Michigan had previously sampled. The samples were analyzed at Argonne National Laboratory.

- 7 -

4

SITE DESCRIPTION

Dow's Ray City property is located north of Ray City and ^{west} east of the Saginaw River. Access to the property is controlled partially by a cyclone fence with guarded gates and partially by the Saginaw River.

The thorium sludge is contained in a single area on this property and is surrounded by a single wire fence. The area is posted "Caution Radiation Area" and "Caution Radioactive Material." The area is patrolled several times each day.

The sludge "pile" consists of numerous individual piles, each representing a dumpster load. Dow representatives states that some sludge had been dumped at another location on the site but was later moved to the single location.

The pile includes some non-thorium bearing sludge.

The site is approximately $1\frac{1}{2}$ miles from the nearest residential area.

Radiation measurements were made by a Region 3 representative using a Victoreen Thyac III GM survey meter with closed window. The measurements agreed with those made previously by the licensee (Dow).

At the fenceline (single wire fence) radiation levels varied with from near background of 0.03 mr/hr to 0.3 mr/hr, a level of at the section of the pile. 2 mr/hr ~~was found at the section of the pile~~ Direct measurements on the pile showed levels up to 4 mr/hr.

EXHIBITS

1. Excerpts from the March 9-10, 1961 inspection of Dow.
2. Ltr Eber Price to Wellman dtd January 5, 1962
3. Inspection of Dow, April 1959- describes Pay City usage.
4. Report dated April 5, 1972 of survey of Pay City Facilities by T. J. Powell and G. Hoyte Whipple.
5. Letter dated September 2, 1970 from James Camburn (State of Michigan) to S. J. Simmons, Wellman Dynamics.
6. Letter dated April 14, 1972- Simmons (Wellman) to DML,ATC requesting termination of License STR-136 and release of Pay City facilities (Wellman) for unrestricted use.
7. Letter dated May 17, 1972, R. L. Layfield (DML-ATC) to Wellman Dynamics terminating License STR-136.
8. Dow report dated April 23, 1971 entitled "Evaluation of Pay City Storage of Magnesium Thorium Sludge"
9. Thorium regulations before and after July 29, 1974.
10. Sample Results

DOW SAMPLES WE TOOK
AT BAY CITY 9/1/77

* Normal
thru air
~ 1 pg/gm

		Direct 6m Road MR 1/10	pg/gm direct road 4/228	% thru air
W-1	WATER INLET CANAL	BGD	*	—
W-2	WATER POND	BGD	*	—
S-1	SOIL NEAR ROAD	BGD	*	—
S-2	SOIL SOUTH DRAINAGE TO INTAKE CANAL	BGD	*	—
S-3	SOIL - EAST OF ROAD	P6D	5	.004
S-4	SOIL - NORTH THORPUM PIKE RD. 2	0.3	780	0.7
S-5	SOIL - THORPUM PIKE AC. 1	0.5	1200	1.1
S-6	SOIL - WEST OF PIKE AC. 1	0.06	10	0.01
S-7	SOIL - WEST OF PIKE	BGD	*	
S-8	SOIL - NORTH OF PIKE	BGD	1.2	0.001
S-9	THORPUM PIKE AC.	2.5	3700	3.3

CMD: -----

LMS APPLICATION FORM

810331

DOCKET NO: 04000017

LICENSE NO: STB-527-----

FEDERAL GOV'T: N

INSTITUTION CODE: 00265

LICENSE REGION: 0

STATUS: 0

NAME: DOW CHEMICAL CO.
DEPT/BUREAU: MICHIGAN DIVISION
BUILDING: -----
STREET: 474 BUILDING
CITY: MIDLAND STATE: MI ZIP: 48640
ATTN: -----

MAIL CONTROL NO: 319583

RECEIPT DATE: 810331

ACTION TYPE: 4

(YYMMDD)

PRIORITY PROCESSING FLAG: N

000 000

phone call w/ Bill Crow
on 8/6/85.

- ① Action to move waste from Midland to Bay City. State objects to this. HQ has not taken any final action. We are holding on to this until Dow lets us know what they want to do.
- ② This action was to consolidate 2 waste sludge sites in one location.

- ③ Suggest for Crow that we @ close out his up drawl of previous request
(b) what are Dow's long range plans

2/4/87
Project mng.
HQ - Gerry Laroche
301-427-4510
FTS

A/93



ARGONNE NATIONAL LABORATORY

October 10, 1977

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

Dear Jim:

Attached are results for analyses performed on samples submitted by members of the Region III staff. The results were previously reported by phone to the requester. This letter is to provide your office with a record of the results. If you have any questions on the data, please call.

Sincerely,

Jacob Sedlet
Occupational Health & Safety

JS:rk
Attachment

OCT 13 1977

A/80

Soil and Water Samples
Packing Lists No. AE 458 and 459 (9/2/77)

<u>Sample No.</u>	<u>Result</u>
PTS-1648 W 1	Normal Gamma Activity
PTS-1649 W 2	Normal Gamma Activity
PTS-1639 S 1	Normal Thorium Activity
PTS-1640 S 2	Normal Thorium Activity
PTS-1641 S 3	5 pCi ²²⁸ Th/g
PTS-1642 S 4	780 pCi ²²⁸ Th/g
PTS-1643 S 5	1200 pCi ²²⁸ Th/g
PTS-1644 S 6	10 pCi ²²⁸ Th/g
PTS-1645 S 7	Normal Thorium Activity
PTS-1646 S 8	1.2 pCi ²²⁸ Th/g
PTS-1647 S 9	3700 pCi ²²⁸ Th/g

NOTE: All measurements were made by gamma-ray spectrometry, so results for thorium-228 are based on the measurement of its decay products. The amount of thorium-232 depends on the time since the last separation of radium-228 (the first daughter of thorium-232) from thorium. The thorium-232/thorium-228 ratio reaches a maximum of about 2.4 about five years after the separation. This is the maximum error in a thorium-232 measurement based on thorium-228 when the state of equilibrium is unknown.

Changes in Thorium Regulations

Prior to 7/29/74, thorium activity was defined as 9000 kg of natural
 thorium equals 1 curie of throrium natural(ie 1 curie of thorium 232
 plus 1 real curie of thorium 228)

Burial pursuant to 10 CFR 20.304, prior to 7/29/74

12burials per year

1000 time 100 uCi , or 100 mCi per burial in real curies (4/30/75)

Appendix B Thorium natural

	Table I		Table II	
	Col 1	Col. 2	Col. 1	Col. 2
	air	water	air	water
	uCi/ml	uCi/ml	uCi/ml	uCi/ml
Prior to 7/29/74 (thorium curies)	S 3 E-11 I 3E-11	3E-5 3E-4	1E-12 1E-12	1E-6 1E-5
After 7/28/74 (real curies)	S 6E-11 I 6E-11	6E-5 6E-4	2E-12 2E-12	2E-6 2E-5

Appendix C

Prior to 7/29/74 50 mCi throrium natural in throrium curies

After 7/28/74 100 mCi throrium natural in real curies

De Minimum Limits for natural thorium

4/70	10,000 dpm/100 cm ² total	
	1000 dpm/100 cm ² removable	
12/75	1000 dpm/100 cm ² average	
	3000 dpm/100 cm ² maximum	
	200 dpm/100 cm ² removable	

DEC 15 1977

MEMORANDUM FOR: G. Wayne Kerr, Assistant Director
for State Agreements Program
Office of State Programs

FROM: Donald A. Nussbaumer, Assistant Director
for Material Safety and Licensing
Division of Fuel Cycle and
Material Safety

SUBJECT: DOW CHEMICAL COMPANY, RADIOACTIVE WASTE
RETENTION (NRC LICENSE NO. STB-527)

The Dow Chemical Company License No. STB-527 will expire March 31, 1978. A renewal notice will be forwarded to the Dow Company on or about February 1, 1978.

At the time of license renewal, we intend to carefully evaluate the licensee's plans for ultimate disposal of radioactive waste. We shall keep you informed of the actions to be taken with respect to the ultimate disposal of sludge now in storage under the provisions of License No. STB-527.

Original signed by
Donald A. Nussbaumer

Donald A. Nussbaumer, Assistant Director
for Material Safety and Licensing
Division of Fuel Cycle and
Material Safety

OFFICE	FCRL <i>EW</i>	FCRL <i>NB</i>	FCRL <i>BS</i>	FCRL <i>DW</i>		
SURNAME	EGWright:bjp	NBassin	BSinger	DANussbaumer		
DATE	12/12/77	12/12/77	12/12/77	12/14/77		

A/81

INSPECTION AND ENFORCEMENT



DOW CHEMICAL U.S.A.

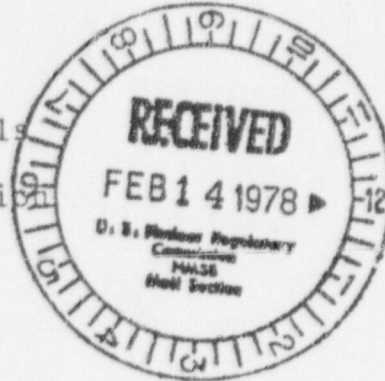
40-17

RECEIVED

MIDLAND, MICHIGAN 48640

2-8-78
February 8, 1978 03

U. S. ATOMIC ENERGY COMM.
REGULATORY
MAIL SECTION
Director, Division of Materials
Licensing
US Nuclear Regulatory Commission
Washington, DC 20555



Dear Sir:

This is regarding The Dow Chemical Company's Midland, Michigan, source material license STB-527 which expires March 31, 1978.

Please regard this letter as a request for renewal of that license at this time.

Form AEC-2 was forwarded to me at my request via a telephone conversation on January 27, 1978. However, the form is unreadable as it is a photo copy and cannot be used to apply for renewal at this time. If it is necessary to reapply using the form please forward a suitable copy.

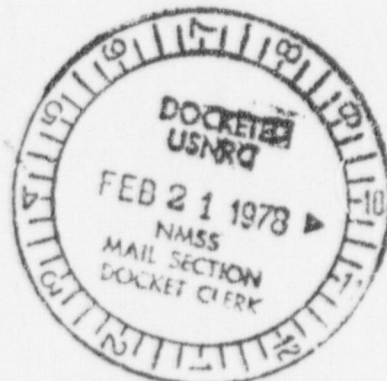
Sincerely,

D. L. Barsten

D. L. Barsten
H&ER Industrial Hygiene
1803 Building
517/636-3677

bjd

RECEIVED BY LFMB	
Date	2/16/78
By	C. G. [unclear]
From	
By to	
Action Compl.	2/16/78



08628



MAR 2 1978

Dow Chemical Company
ATTN: D. L. Barsten
1803 Building
Midland, Michigan 48640

REFERENCES:

- (1) Correspondence dated 2-8-78
- (2) License No. SYB-E27
- (3) Guide(s) GUIDE FOR THE PREPARATION
OF APPLICATIONS FOR LICENSES TO PROCESS
SOURCE MATERIAL
- (4) Mail Control 08528

Gentlemen:

This refers to your correspondence (Reference 1 above) requesting the renewal of your material license (Reference 2).

Since the Nuclear Regulatory Commission issues material licenses for five year periods, the renewal application should be complete in all respects and reflect your program at the time of the renewal. Therefore, you are requested to submit a complete up-to-date application, without reference to any previously submitted information, supplying all of the information as outlined in the guide (Reference 3).

We will continue our review upon receipt of the completed application, in duplicate, as indicated above. Please refer to your assigned mail control number (Reference 4) in your reply. Your current license will not expire until final action has been taken on the license renewal.

Sincerely,

Earl G. Wright

Radioisotopes Licensing Branch
Division of Fuel Cycle and
Material Safety

A/83

FCLMB:PG
(08798)

APR 30 1979

040-00017

Dow Chemical Company
ATTN: D. L. Barsten
1803 Building
Midland, MI 48640

Gentlemen:

This refers to your applications dated February 8, and February 22, 1978, for renewal of License No. STB-527 (Docket No. 040-00017). Additional information is needed in support of your application concerning control of the stored thorium wastes.

Please provide the following information:

1. A general description of the storage area for the thorium-magnesium sludge.
2. A description of the form of the waste (powders, solid metal, slag, etc.).
3. A description of your controls to prevent formation of dusts and other thorium wastes, from your storage pile, into other areas on Dow Chemical property and into other surrounding areas. We are interested in your methods of controlling spread of contamination from dusts and liquids.
4. A general description of your radiation survey program for the stored wastes.

Our review of your application will continue upon receipt of the above information. Please provide two copies of your reply and reference your assigned Mail Control No. 08798.

Sincerely,

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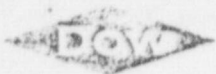
Paul R. Guinn
License Management Branch
Division of Fuel Cycle and
Material Safety

A/84

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4/30/79

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PRGuinn:en
4/ /79

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DOW CHEMICAL U.S.A.

RECEIVED

Region III

May 17, 1979

MIDLAND, MICHIGAN 48640

JUN 5 11 10 34

Mr. Paul R. Guinn
License Management Branch
US Nuclear Regulatory Commission
Division of Fuel Cycle &
Material Safety
Washington, DC 20555

REG.
SECTION

13063

Dear Mr. Guinn:

MAIL CONTROL NO. 08798, DOCKET NO. 040-00017

The purpose of this letter is to supply the Nuclear Regulatory Commission additional information concerning the renewal of License No. STB-527 (Docket No. 040-00017).

The magnesium-thorium sludge pile is located at the Bay City Plant of The Dow Chemical Company. Since the material is located on Dow property, access to the storage site is limited because access to the entire plant is restricted. The perimeter of the storage site is bounded by a chain-link fence which controls storage site area access. Radiation caution signs are placed on the fence at clearly visible, intermittent locations.

The magnesium-thorium sludge pile is located in the northeast corner of the Dow plant site, approximately 900 feet from the Saginaw River. The location is immediately adjacent to a pond and about 450 feet east of a road going toward a US Coast Guard Station. The sludge pile is north of an inlet canal which supplies water to the Dow plant site.

The waste form is a magnesium-thorium sludge or slag which resulted from the casting of magnesium and magnesium alloys. To prevent the formation of dusts and other thorium wastes, the magnesium-thorium slag piles were pushed together, leveled by a bulldozer, covered with several inches of earth and coated with a road sealant.

FREE EXEMPT
add 2 info

AN OPERATING UNIT OF THE DOW CHEMICAL COMPANY

JUL 19 1979



A/85

7907120492 2PD

May 17, 1979

Several comprehensive radiation surveys of the environmental impact of the magnesium-thorium slag pile have been conducted. Radiation exposure levels inside and outside the fenced site were evaluated. Ground water samples immediately around the site were analyzed. Surface soil, pond sediment, inlet canal sediment, river sediment, pond water, river water and inlet canal water samples were taken in conjunction with the Nuclear Regulatory Commission, the Michigan Department of Natural Resources, and the Michigan Department of Public Health to determine if the thorium was migrating or being leached outside of the storage site.

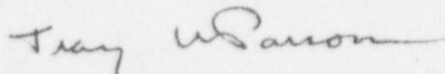
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The results of these surveys indicated the following:

1. There was no significant migration of thorium or thorium daughters from the storage site.
2. Radiation levels at the fence boundary did not exceed 0.1 mR/hr.

Based on past monitoring and research, the magnesium-thorium storage site does not pose a significant health hazard to Dow employees or the general public.

Sincerely,



Tracy W. Parsons
Industrial Hygiene Laboratory
1803 Building
517/636-3205

bjd

FTS
378 5621



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

June 18, 1979

MEMORANDUM FOR: Region III Files

FROM: J. A. Pagliaro, Chief, Materials Radiological
Protection Section No. 2

SUBJECT: DOW CHEMICAL CO.
LICENSE NO. STB-527
BURIAL OF THORIUM SLAG RESIDUE

During our next inspection, check on the licensee's burial of Magnesium-Thorium slag residue at Saginaw or Bay City, Michigan. Paul Guinn of NMSS, during review of an application for renewal, came upon the licensee's request for permission to bury, which was not approved. It is believed that such burial was performed.

for *Chief Pagliaro*
J. A. Pagliaro, Chief
Materials Radiological
Protection Section No. 2

A/86

68508296029-12

OCT 9 1979

40-0017

FCMLB:PG
(08798)

Dow Chemical Company
ATTN: Dennis L. Barsten
1803 Building
Midland, MI 48640

Gentlemen:

This refers to your letter dated May 17, 1979, providing additional information concerning the renewal of License No. STB-527 (Docket No. 040-00017). Your letter has raised additional questions concerning your activities under License No. STB-527.

Your May 17, 1979 letter refers to storage only at your Bay City, Michigan plant whereas your current license also references your facilities in Midland, Michigan and Madison, Illinois. If you have abandoned or returned to unrestricted use facilities in which licensed material was used and/or stored at your Midland, Michigan and/or Madison, Illinois plants, we need information concerning your decontamination and radiation survey activities in accordance with the enclosed guide, GUIDELINES FOR DECONTAMINATION OF FACILITIES AND EQUIPMENT PRIOR TO RELEASE FOR UNRESTRICTED USE OR TERMINATION OF LICENSES FOR BYPRODUCT, SOURCE, OR SPECIAL NUCLEAR MATERIAL. For areas in your Midland, Michigan and/or Madison, Illinois facilities which contained soil contamination, we need information showing that all source material present in the soils was identified and removed from those areas prior to abandonment or return to unrestricted use.

Your May 17, 1979 letter also states that magnesium-thorium wastes are stored in the northeast corner of your plant site in Bay City, Michigan, and that these wastes were... "covered with several inches of earth and coated with a road sealant." Our review of your applications referenced in your license revealed no information concerning storage of magnesium-thorium wastes in the manner described in your May 17, 1979 letter. Your application dated February 23, 1968, for example, specifies that thorium wastes are "generally" disposed of in compliance with 20.303 and 20.304. We are not certain that the method for storage of magnesium-thorium wastes described in your May 17, 1979 letter is an adequate method for storage of wastes containing licensed material and may constitute burial of waste in a manner which is beyond the scope of Section 20.30 in 10 CFR Part 20. In any event, our records show that you have been authorized to store wastes containing source materials for more than seven years and for this reason we do not believe that it is in the public interest to continue this authorization. In view of this, we request that you submit, for our approval, a

A/87

comprehensive plan for removal and disposal of all magnesium-thorium wastes now in your possession including soils containing thorium contamination. To assist you in providing this information we have, in addition to the above referenced guide, enclosed copies of Guide 10.4 GUIDE FOR THE PREPARATION OF APPLICATIONS FOR LICENSES TO PROCESS SOURCE MATERIAL, Guide 8.11, APPLICATIONS OF BIOASSAY FOR URANIUM and Guide 8.15 ACCEPTABLE PROGRAMS FOR RESPIRATORY PROTECTION. You should refer to each of these guides and provide information which is applicable to your activities and in accordance with the guidelines in each guide. Examples of the kinds of information needed are as follows:

1. Radiation surveys and analysis of samples. We need a description of your procedures for performing radiation surveys, including instrument surveys, wipe or contamination surveys and analysis of wastes including soil samples. This information should include an outline of a comprehensive sampling program to assure that all wastes containing source material and soils containing source material contamination have been removed from Dow Chemical property. Refer to Item 12(c) in Guide 10.4. and the previously referenced survey and decontamination guide.
2. Removal of magnesium-thorium waste. We need a description of your program for removal of the magnesium-thorium wastes and soil contamination which have been identified as a result of your radiation surveys and analysis program. You should include a description of your methods for packaging of the wastes for removal from your premises. If you plan to utilize a commercial waste disposal agency, please provide the name of this company, and describe the specific activities they will perform. Refer to Item 13 in Guide 10.4.
3. Transportation. If your waste disposal agency will transport the waste material please specify this. If the Dow Chemical Company will transport licensed material, we need sufficient information describing your transportation methods to assure us that you will meet all requirements of the U.S. Department of Transportation.
4. Radiation survey instruments. Please describe your radiation survey instruments to be used in conducting radiation surveys and describe your calibration procedures. Refer to Item 11.f. in Guide 10.4.
5. Measuring instruments. We need a description of the instruments used to analyze soil samples and your procedures for calibration of this instrument. If analysis of soil samples is performed by someone other than the Dow Chemical Company, please provide the name of this company or person and the license number which authorizes this analysis. Refer to Item 11.f. in Guide 10.4.
6. Personnel monitoring. Describe your program for monitoring personnel for exposures to external radiation. If you use film badges and/or TLD's, please state the frequency of exchange and identify your supplier. Refer to Item 11.g. in Guide 10.4.

7. Bioassay program. We need a description of your bioassay program to determine employee uptakes of thorium. If you have determined that bioassays are not necessary for your program, you should provide information in support of your decision. If bioassays are collected and analyzed by an outside service company, please identify this company and describe your procedures for collection of bioassay samples. Refer to Guide 8.11. Please note that although this guide refers to bioassays for uranium the same guidelines will apply to thorium bioassays.
8. Contamination surveys. Please describe your program for preventing contamination of workers and for conducting radiation surveys of workers to determine the contamination levels. If employees are required to wear shoe covers, gloves, etc., please describe these requirements, and provide details concerning your program for monitoring personnel for contamination. Refer to Items 11.c., and 12(c)a.(1) in Guide 10.4.
9. Control and evaluation of air contamination. We need to know how you will control and evaluate the concentrations of thorium in air during your removal and/or decontamination activities. Included should be information concerning air sampling, use of respirators, etc. If you have concluded that air sampling is not necessary for your activities, you should provide information in support of your decision. Please note that if you use respirators, and this use is taken into account in determining levels of personnel exposure to airborne concentrations, your respirator program should be in accordance with the enclosed Guide 8.15. Also refer to Items 11.e. and 12(c)a.(3) in Guide 10.4.

Our review of your application will continue upon receipt of the above information. Please provide two copies of your reply and reference your assigned Mail Control No. 08798.

Sincerely,

Paul R. Guinn
Material Licensing Branch
Division of Fuel Cycle and
Material Safety

Enclosures: As stated

CRESS:WILL
MC#262103:gtw

FCML
PRGuinn:gtw

FCML
NBassin

fcml
VLMiller

10/1/79

10/ /79

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Kig. III 90-0017
DOW CHEMICAL U.S.A.

RECEIVED

December 19, 1979

DEC 27 AM 9 39

MIDLAND, MICHIGAN 48640

U.S. NUCLEAR REG.
COMMISSION
MASS MAIL SECTION

Mr. Paul Guinn
Material Licensing Branch
Division of Fuel Cycle & Material Safety
US Nuclear Regulatory Commission
Washington, DC 20555

15033

Dear Mr. Guinn:

MAIL CONTROL NO. 08798, DOCKET NO. 040-00017

This letter is in reference to your letter of October ⁹8, 1979, and telephone conversation of December 11, 1979, with Mr. L. G. Silverstein of The Dow Chemical Company regarding renewal of License STB-527.

Mr. James Kuszaj, Legal Department, is replying under separate cover, concerning the status of the Madison, Illinois, facility.

Mr. Harmon's letter of March 23, 1979, attached, describes the status of the Bay City magnesium thorium pile and summarizes our past studies and efforts related to it.

In the interest of resolving all aspects of our License STB-527, we are looking forward to a meeting with you in January, 1980. I would like to contact you after January 7, 1980, to arrange a time and date convenient for you.

Have a nice holiday season.

Sincerely,

Tracy W. Parsons

Tracy W. Parsons, for
Ralph R. Langner, Chairman
Radiation Safety Committee
1803 Building
517/636-3205

bjd

COPIES SENT TO OFF. OF
INSPECTION AND ENFORCEMENT

AN OPERATING UNIT OF THE DOW CHEMICAL COMPANY

FEB 1 1980



3001250312 SPP



DOW CHEMICAL U.S.A.

March 23, 1979

BAY CITY PLANTS - MICHIGAN DIVISION

P. O. BOX 516

BAY CITY, MICHIGAN 48707

517 - 684-1330

Mr. D. E. Van Farowe, P.E., Chief
Division of Radiological Health
State of Michigan Department of Health
3500 North Logan
Lansing, MI 48909

RECEIVED
APR 11 1979
MICHIGAN DEPT. OF HEALTH

REF: MAGNESIUM - THORIUM SLUDGE PILE IN BAY CITY

Dear Mr. Van Farowe:

This letter is in response to your correspondence of March 12. I have been in Dow's Bay City Plants now for approximately ten months and a considerable amount of activity has been centered around the sludge pile during that time. This activity has included upgrading the physical site, performing additional research work, and investigating disposal methods. This letter will address each of these areas.

Upgrading Existing Site: During the summer of 1978 the entire existing sludge pile was surrounded with a chain link fence equipped with a locked gate. The fence was equipped with signs warning of radioactivity. In addition the entire sludge pile was covered with an oil-based sealant to prevent light particles from becoming airborne. The combination of these improvements have rendered the pile inaccessible to unauthorized personnel and prevented potential dusting problems.

Technical Data Review Methods: A comprehensive survey of the environmental impact of the magnesium-thorium slag storage site in Bay City was completed in 1971. Soil samples were taken by the Michigan Department of Public Health and Dow at various distances from the storage site. A drainage area on the east side of the storage site forms a shallow pond which occasionally dries up. Samples of sediment and ice were taken from the area. The Bay City Plant inlet canal runs along the south side of the storage site. A water sample was taken from this canal. In addition to these samples, Dow took core samples of the soil directly beneath the storage site to determine if any leaching of thorium or thorium daughters into the soil had occurred. Water samples were also taken from the core drillings.

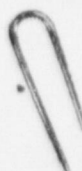
Results of the 1971 environmental survey indicated that the storage site was stationary and not migrating into the environment.

A second comprehensive environmental survey of the area around the thorium storage site was completed in 1977. Environmental samples were taken by the Michigan Department of Public Health,

Michigan Department of Natural Resources, Nuclear Regulatory Commission and Dow. Surface soil, pond sediment, pond water, inlet canal sediment, inlet canal water, and river sediment samples were taken. Again, the results indicated there was no significant migration of thorium or thorium daughters from the storage site.

In 1978, two research projects were completed to determine the potential for release of thorium or thorium daughters from the storage site. The first research project identified the leaching properties of the magnesium-thorium slag under laboratory conditions and was completed in February 1978. It was determined that under these most severe laboratory created conditions there was a potential for a slight amount of thorium and/or its daughters to leach into water. Because of this potential Dow has analyzed ground water samples from nine wells immediately around the storage site. No thorium or thorium daughters were found at the detection limit (2 pCi/L, based on lead-212). Analysis of these samples by gross beta counting indicated a concentration of radioactivity ranging from 30-800 pCi/L in various samples. A careful cross-check by gamma spectroscopy indicated that all of the gross beta activity could be accounted for by naturally occurring potassium-40. This checking of the water from the wells to insure that no leaching of radioactivity from the pile had occurred was completed in January of 1979, and confirmed work that had been done in March of 1978.

The second research project determined the thorium content of the respirable fraction of the magnesium-thorium slag. This research project proved to be much more difficult in that the analytical methods involved to insure accuracy of results had to be developed during the course of the project. This project was completed in November of 1978. It was determined that less than 0.1 percent of the slag was respirable. The thorium content of this respirable fraction of slag does not differ significantly from the rest of the magnesium-thorium slag, which is about 1.5 percent. On a mass basis, the Nuclear Regulatory Commission airborne exposure limit for thorium, as contained in this slag (1-3%) is higher than the American Conference of Governmental Industrial Hygienists nuisance dust limit. Therefore, based on the small respirable fraction, and low thorium content, the slag is not likely to be an inhalation hazard, except under unusually heavy, visible dust conditions. This judgment has been confirmed by past monitoring of bulldozing operations which have not generated detectable levels of airborne thorium. With the magnesium-thorium slag now covered with the sealant, the wind is prevented from blowing any slag from the storage site. In the past conversations there was apparently concern expressed that Dow has not used a statistical sample of the sludge for test purposes. It is Dow's practice to sample the sludge from the "hottest" area of the sludge pile. Based on all of this data the hazard of airborne thorium is very insignificant under the present storage conditions.



All of the research work associated with the magnesium thorium sludge was completed in February of 1979 and the final report is now being written. Based on past monitoring and research, the magnesium-thorium storage site does not pose a significant health hazard to Dow employees or the general public.

The present site is located 600 feet from the Saginaw River at an elevation of 5 feet above mean high water level so that flooding is not an issue. The general area is zoned industrial and both the plant property and the actual storage site are fenced. In any event the storage area is hardly an attractive nuisance. The closest residence is 4300 feet. The storage is not in a high traffic area.

Alternative Disposal Methods: There are four basic alternatives for permanent disposal of Bay City's magnesium-thorium sludge pile. They are: (1) shipment to a commercial nuclear waste burial site, (2) recovery of the thorium, (3) burial at a State of Michigan disposal site, and (4) continue storage at present site.

Burial of the magnesium-thorium sludge at a commercial site such as, Chem-Nuclear Systems, Inc. facility at Barnwell, South Carolina was explored as a possible alternative. First of all the future operation of this site is questionable at best. Secondly the cost to Dow for this alternative would exceed \$500,000, and would expose the public and workers involved to the radioactive material while it is being packaged into containers and transported. Dow does not feel that this approach and these costs are appropriate when the other alternatives and the minimal health hazards are considered. The only other commercial sites available are located in Beatty, Nevada and Richland, Washington. These sites are even less attractive economically than the site in South Carolina.

A considerable amount of time has been spent investigating the possibility of recovering the thorium from the sludge pile. Contacts have been made with the following companies: Kerr-McGee, W. R. Grace, United Mineral & Chemical, Tennessee Nuclear Specialties and Lynco. None of these companies would consider purchasing, storing, or processing the magnesium-thorium sludge under any terms. It is pertinent to note that only 200 to 300 lbs. per year of thorium are produced in the United States. Until the demand for thorium improves the recovery of the thorium is not an alternative disposal method.

The burial of the magnesium-thorium sludge at the Dow Bay City site and the subsequent deeding of the land to the State of Michigan was an alternative proposed in the Dec. 14, 1977, letter. As stated by both Dow and State of Michigan representatives, this proposal is environmentally sound. Such action would however, require that the NRC and Michigan provide guidelines or procedures to assure that this is a permanent disposition.

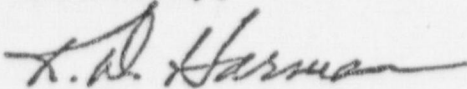
March 23, 1979

Dow believes that the current storage disposition is sufficient for long term temporary storage. As the State of Michigan representatives have stated, "the existing storage site actually presents minimal health hazards to the general public and to Dow Employees".

With this in mind the best present alternative is the existing temporary storage as presently administered until the State of Michigan can develop a site capable of receiving such materials and also obtains NRC clearance.

Hopefully this letter has addressed all aspects of your letter of March 12, 1979. Please, let us know if further data is required concerning environmental assessment or other matters covered in our discussion.

Sincerely,



Ken Harman
Manager

bps



Reg I.
DOW CHEMICAL U.S.A.

27 15527
MIDLAND, MICHIGAN 48640

February 5, 1980

FEB 11 2 1 49

U.S. POST OFFICE
COMM. DIV.
MAIL SECTION
Mr. Paul Guinn
License Management Branch
US Nuclear Regulatory Commission
Division of Fuel Cycle & Material
Safety
Washington, DC 20555

15434

Dear Mr. Guinn:

MAIL CONTROL NO. 08798, DOCKET NO. 040-00017

I would like to take this opportunity to thank you, Mr. Nathan Bassin and Mr. Vandy Miller for taking the time to participate in the meeting with Dr. L. W. Rampy and myself conducted on January 16, 1980, concerning the Dow Chemical Company's storage of magnesium-thorium sludge (NRC License STB-527). It is my understanding that all the issues were clarified and license renewal is contingent upon Dow's submission of records that outline our future plans. I would like to briefly summarize the major conclusions from our discussions. If we have misinterpreted the results from the meeting, please contact me to resolve the discrepancies.

1. Madison, Illinois storage site - The Dow facility located in Madison, Illinois was sold in 1971 to Phelps Dodge Aluminum Corporation which later merged with Consolidated Aluminum Corporation. At the time of sale Dow transferred all licensed thorium containing material at Madison, Illinois to the Consolidated Aluminum Corporation pursuant to their License STB-1097 (Docket No. 40-8088), in accordance with 10 CFR 40.51. The Madison, Illinois facility inadvertently continued to be listed on Dow's License STB-527.

We request that the Madison, Illinois storage site be removed from the Dow License STB-527.

2. Midland, Michigan storage site - From November, 1971 to January, 1972, all licensed thorium was removed from the Midland, Michigan storage site and transferred for burial at Moorehead, Kentucky, through the contractor, Nuclear Engineering Corporation (NECO). In addition to the licensed thorium, the topsoil from the storage site was packaged and shipped for burial as contracted through NECO. The stripped storage site area was surveyed with a GM counter and no residual radioactivity above background was detected.

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FEE EXEMPT

AN OPERATING UNIT OF THE DOW CHEMICAL COMPANY



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February 5, 1980

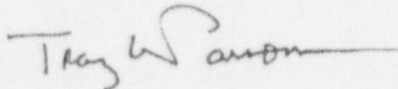
Although the Midland, Michigan storage site was decommissioned in accordance with 1971 NRC regulations, it is our belief that soil samples from the storage site should be taken and analyzed for residual thorium contamination now. Upon completion of the investigation, the results will be forwarded to the NRC.

If the soil sample results indicate that thorium contamination is sufficiently low we request that the Midland, Michigan storage location be removed from License STB-527.

3. Bay City, Michigan storage site - The magnesium-thorium slag storage area located near Bay City, Michigan is the only storage site listed on License STB-527 where licensed quantities of thorium are expected to be maintained. There seems to have been some confusion in the past regarding Dow's efforts related to the storage site; so we propose to submit to the NRC several items that will clarify all issues surrounding the magnesium-thorium storage site. These items consist of:
 - a. A description of the storage site that details the slag pile and its present condition.
 - b. A description of the surrounding environs.
 - c. A description of Dow's environmental monitoring program that will be inclusive of past survey results and future monitoring efforts.
 - d. Photographs of the slag storage site and surrounding area.
 - e. Available documentation of environmental monitoring performed by the State of Michigan.
 - f. Meteorological information on flooding probability.

Since no permanent radioactive waste disposal facility is currently available, we feel that the magnesium-thorium slag should remain at the Bay City, Michigan site with continued maintenance as will be described in our maintenance plan to be submitted.

Yours very truly,



Tracy W. Parsons
Industrial Hygiene Laboratory
Health & Environmental Sciences USA
1803 Building
517/636-3205

bjd



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

February 28, 1980

MEMORANDUM FOR: Region III Files

THRU: *ME* T. H. Essig, Chief, Environmental and Special
Projects Section

FROM: W. B. Grant, Radiation Specialist
R. L. Hague, Radiation Specialist
C. Roytek, Coop Student

SUBJECT: INSPECTION OF DOW CHEMICAL CORPORATION THORIUM RESIDUE
STORAGE AREA - BAY CITY, MICHIGAN - LIC. STB-527
(DOCKET NO. 40-17)

On September 26, 1979, Region III representatives visited the Dow Chemical Corporation's thorium residue storage area near Bay City, Michigan. Radiation measurements were made and soil, sludge, and water samples were taken. The samples were analyzed by RESL, Idaho Falls, Idaho.

Dow's storage area is located north of Bay City and west of the Saginaw River. It is in a remote section of another Dow Plant. Entrance to the plant is controlled by Dow Security. The plant property is controlled by a cyclone fence and the Saginaw River. The storage site (Figure 1) is completely cyclone fenced, with a locked gate.

Since Region III's last visit on October 1, 1977, the storage area has been fenced and the residue site covered with a road tar emulsion. Ground water sampling wells have been drilled to the North and East of the storage area. Water samples were taken from the three wells that had water in them. Water samples were also taken from the pond and the intake canal which approximate the North and West boundaries of the storage site. All water samples were counted for gross alpha activity. The results are shown in Table 1.

Radiation measurements were made at the fence line at locations S-2, S-3, S-4, and S-6 (See Figure 1). Readings were 0.02 - 0.03 mR/hr.

Soil samples were taken at locations S-1, S-2, S-3, S-4, S-5, and S-6. Sediments were taken from the pond and the intake canal. Gamma spectral analyses were made of both the soil and sediment. The results of the analyses are shown in Table 1.

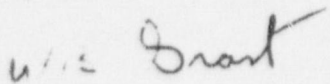
Earlier (September 1977) sampling data from similar soil locations showed levels of less than 1 to 5 pCi/g Th 228. Since the analyses of these soil and sediment samples show similar results (0.4 to 4 pCi/g), no migration of

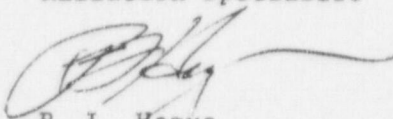
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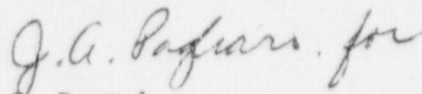
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February 28, 1980

thorium residues is indicated. In order to put these data into proper perspective, the average thorium concentration found in the earth's surface is about 1-2 pCi/g*. The 1979 canal, pond, and monitoring well sample analysis results, which were all less than 5 pCi/l, were consistent with the 1977 data, and indicated that thorium migration (if any) into ground or surface water was (and continues to be) extremely small.


W. B. Grant
Radiation Specialist


R. L. Mague
Radiation Specialist


C. Roytek
Coop Student

*NCRP-45 "Natural Background Radiation in the United States," 1975.

TABLE 1

DOW CHEMICAL THORIUM RESIDUE PILE

9/26/79

SAMPLES

<u>Sample No.</u>	<u>Location</u>	<u>Results</u>
S-1(Soil)	Road	3.0 pCi/g Th 238
S-2	SE Fence	2.8 pCi/g "
S-3	West Fence	1.3 pCi/g "
S-4	West Fence	0.9 pCi/g "
S-5	Well W-3	0.4 pCi/g "
S-6	NE Fence	0.8 pCi/g "
SED-1	Sediment Intake Canal	0.5 pCi/g "
SED-2	Sediment Pond	4.0 pCi/g "
W-C	Intake Canal (water)	3.7 pCi/l Gross 2
W-P	Pond Water	3.9 pCi/l "
W-1	Well #1	4.0 pCi/l "
W-2	Well #2	<2 pCi/l "
W-3	Well #3	3.0 pCi/l "

9/26/19
DOW TH RESIDUE ALE

SAGINAW RIVER

PUMP
HOUSE

SLOUGH

DIKE

CHAIN LINK FENCE

pond
w/p

WELLS →

←→

Water
table

ROAD

S-2

S-6

S-4

S-3

S-1

O-1

O-2

O-3
W-3
S-5



DOW CHEMICAL U.S.A.

September 18, 1980

LARKIN LABORATORY
1691 N. SWEDEN RD.
MIDLAND, MICHIGAN 48640

Mr. James R. Miller, Chief
Standardization and Special
Projects Branch
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

PRINCIPAL STAFF			
DIR		SAFE	
D/D		ADM	
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FFONS	w/attachment		
RC&ES			
RO&NS		FILE	

Dear Mr. Miller:

Per your request dated June 19, 1980, Dow Chemical U.S.A. has revised the Topical Report entitled, "The Dow System for Solidification of Low-Level Radioactive Waste from Nuclear Power Plants" dated March 1978, to include the information provided in Amendment 01 dated September 1978, Amendment 02 dated November 1978, and Amendment 03 dated February 1979. Special care was taken to assure that all information contained in the original report and each of the amendments was retained during the revision. At the same time it is our intent to provide a smooth flowing, understandable, complete working document, therefore, significant revision of Sections 3, 8, and 10 will be noted.

The accompanying carton marked DOW TRADE SECRETS, DNS-RSS-001-P-A contains 60 copies of the proprietary version of the report. These copies are also marked DNS-RSS-001-P-A and are to be handled in accordance with 10 CFR 2.790 as stated in your letter dated May 23, 1980.

The other carton marked DNS-RSS-001-NP-A contains 25 copies of the non-proprietary version of the report.

Efforts of the U.S. Nuclear Regulatory Commission staff which resulted in completing the review and acceptance of our Topical Report are appreciated. Please contact me if we can be of further assistance.

Sincerely,

J. B. Owen 8009220139
J. B. Owen
Group Leader
Solidification Processes R&D
517-636-3388

AN OPERATING UNIT OF THE DOW CHEMICAL COMPANY

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(08798)

Dow Chemical Company
ATTN: Tracy M. Parsons
1853 Building
Midland, MI 48640

Gentlemen:

This refers to your letter dated February 5, 1980, concerning your activities under License No. STB-527.

Your letter of February 5, 1980 (copy enclosed) was a followup to our meeting in Silver Spring, Maryland, in which we discussed various Dow Chemical Company facilities. In your letter you indicate that certain additional information would be forthcoming to us. We have not received this information to date. Please refer to Items 2 and 3 of your letter and provide the additional information which you specified will be sent to us. We will appreciate your attention to this matter since the renewal of License No. STB-527 has now been pending for more than 2 years. In your reply, please provide two copies of your letter and attachments and reference Mail Control No. 08798.

Sincerely,

Paul R. Guinn
Material Licensing Branch
Division of Fuel Cycle and
Material Safety

Enclosure: Dow Chemical Company
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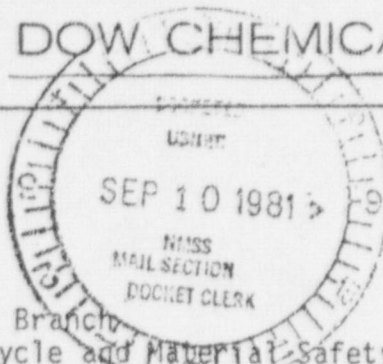
DOW CHEMICAL U.S.A.

Renewal
Region
3/31/81

August 24, 1981

MIDLAND, MICHIGAN 48640

FDH 85-26



Mr. William Crow
License Management Branch
Division of Fuel Cycle and Material Safety
U.S. Nuclear Regulatory Commission
Washington DC 20555

Dear Mr. Crow:

MAIL CONTROL NUMBER 08798/DOCKET NUMBER 040-00017

Enclosed is a letter dated February 5, 1980, from T. W. Parsons of The Dow Chemical Company to Mr. Paul Guinn. This letter (enclosure 1) summarizes the meeting of Dow and Nuclear Regulatory Commission (NRC) representatives conducted on January 16, 1980, concerning the renewal of NRC License STB-527. The purpose of my letter is to provide support information and documentation for the three items specified in that earlier letter.

Item 1. Removal of Madison, Illinois, Thorium Storage Site from NRC License STB-527.

The former Dow facility located at Madison, Illinois, was sold in 1971 to the Phelps Dodge Aluminum Corporation which was subsequently merged into the Consolidated Aluminum Corporation. The licensed thorium compounds were transferred at the time of the sale to NRC License STB-1097 (Docket Number 40-8088) held by Consolidated Aluminum Corporation in accordance with 10CFR40.51. See enclosure 2. Therefore, the Madison, Illinois, storage locations and its associated thorium source material should be deleted from NRC License STB-527 which is currently being renewed by The Dow Chemical Company.

Item 2. Summary of Soil Sample Analysis at the former Midland, Michigan, Thorium Slag Storage Site.

The Midland, Michigan, thorium slag storage site in The Dow Chemical Company plant was sampled in June, 1980. Eighteen one-gallon soil samples were collected by shovel from the top six inches of soil. The samples were evenly spaced over the entire forty by two-hundred foot former storage area. The analysis report for the samples is enclosed. See enclosure 3.

To summarize, the samples were analyzed for Th-232 content using a Ge(Li) gamma spectrometer with a detection limit of 2×10^{-8} uCi/gm. The Th-232 content of the soil samples ranged from 0.2 ± 0.1 to 1.8 ± 0.2 pCi/gm. As a reference, the average soil concentration of Th-232 from 200 North American locations is 1.0 pCi/gm with a range of 0.2 to 1.3 pCi/gm (NCRP 45).

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AN OPERATING UNIT OF THE DOW CHEMICAL COMPANY

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The former thorium slag storage site samples do not exceed naturally occurring background levels of Th-232. Additionally, they are less than the permissible contamination limit of 1000 dpm/100 cm² for Th-232 as identified in draft regulatory guide "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use of Termination of License for Byproduct, Source, or Special Nuclear Material."

Therefore, please remove the Midland, Michigan, thorium slag storage site from STB-527.

Item 3(a)(b). Description of the Present Dow Bay City Plant Thorium Slag Condition and the Surrounding Environments.

The pile consists of approximately 4.6 million pounds of magnesium/thorium slag with an average thorium concentration of 1.7×10^{-3} $\mu\text{Ci/gm}$. The thorium slag was graded and compressed to a 2-1/2 foot deep layer and covered with a tar-based road sealant in 1978.

The present thorium slag storage site, an area of approximately one acre, is located 800 feet east of D Street on the north side of Thirteenth Street within the Dow Bay City Plant site. The site is secured by a seven foot chain-link fence containing one locked gate. ✓ Radiation warning signs are posted at intermittent locations on the fence and gate. See enclosure 4.

The area surrounding the slag storage site contains no occupied buildings for a distance of over one-half mile; low grasses and second growth vegetation surround the storage site. A process water inlet canal is located 75 feet to the south of the storage site. An access gravel road, which continues past the storage site to the Saginaw River, is located immediately to the south of the storage site. The access road and storage site is at an elevation ranging from 582 feet to 585 feet.

Nine shallow ground water monitoring wells are located around the storage site at a distance of approximately 60 feet from the storage site fence. ✓

BCSS

Item 3(c). Past Survey Results and Future Monitoring Program
Summary of Past Survey Results

A comprehensive survey of the environmental impact of the magnesium/thorium slag storage site in Bay City was completed in 1971. Soil samples were taken by the Michigan Department of Public Health and Dow at various distances from the storage site. Samples of sediment and ice were taken from a drainage area on the east side of the storage site. The drainage area forms a shallow pond which occasionally dries up.

The Bay City Plant inlet canal parallels the south side of the storage site. A water sample was taken from this canal. In addition to these samples, Dow took core samples of the soil directly beneath the storage site to determine if any leaching of thorium or thorium daughters into the soil had occurred. Water samples were also taken from the core drillings.

Results of the 1971 environmental survey indicated that the thorium storage site was stationary and not migrating into the environment.

A second comprehensive environmental survey of the area around the thorium storage site was completed in 1977. Environmental samples were taken by the Michigan Department of Public Health, Michigan Department of Natural Resources, Nuclear Regulatory Commission and Dow. Surface soil, pond sediment, pond water, inlet canal sediment, inlet canal water, and river sediment samples were taken. Again, all results indicated there was no significant migration of thorium or thorium daughters from the storage site. ✓

In 1978, two research projects were completed to determine the potential for release of thorium or thorium daughters from the storage site. The first research project identified the leaching properties of the magnesium/thorium slag under laboratory conditions and was completed in February, 1978. It was determined that under these most severe laboratory-created conditions there was a potential for a slight amount of thorium and/or its daughters to leach into water. Because of this potential Dow has analyzed ground water samples from nine wells immediately around the storage site. No thorium or thorium daughters were found at the detection limit of 2 pCi/L, based on Pb-212. Analysis of these samples by gross beta counting indicated a concentration of radioactivity ranging from 30 to 800 pCi/L in various samples. A careful cross-check by gamma spectroscopy indicated that all of the gross beta activity could be accounted for by naturally occurring K-40.

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August 24, 1981

past monitoring of bulldozing operations which have not generated detectable levels of airborne thorium. With the magnesium/thorium slag now covered with the sealant, the wind is prevented from blowing any slag from the storage site. Based on all of this data, the hazard of airborne thorium is very insignificant under the present storage conditions. } ✓

In September, 1979, the Michigan Department of Public Health, the Nuclear Regulatory Commission (Region III) and Dow again sampled the immediately adjacent to the thorium slag storage site. Identical soil, sediment, and ground water samples were taken by each group and analyzed independently for Th-232 content. Again, results indicated there was no significant migration of thorium from the storage site. The samples analyzed by Dow contained Th-232 at a concentration within the normal background range for Th-232. Based on these data and past monitoring results, the thorium slag storage site does not pose a significant health hazard to Dow employees or the public. The analysis report for Dow samples is enclosed. See enclosure 5. } ✓

Furthermore, the Nuclear Regulatory Commission report on the September, 1979, survey concluded that "...no migration of thorium residues is indicated..." from the soil and sediment samples. The report also concluded that the ground water samples indicated "...thorium migration (if any) into ground or surface water was (and continues to be) extremely small." See enclosure 6.

Summary of Future Monitoring Activities

Since the previous surveys have indicated no surface migration of the thorium slag, and the slag is presently sealed to prevent blow-off, the most sensitive measure of thorium migration is ground water analysis. In 1979, Dow began a semiannual program of ground water sampling from the nine wells surrounding the slag storage site. Dow proposes to continue this monitoring program. } ✓

The ground water samples are analyzed by a Ge(Li) gamma spectrometer with a 2×10^{-8} $\mu\text{Ci/ml}$ detection limit which is less than 1% of the maximum permissible release rate of soluble natural thorium to unrestricted areas (10CFR20, Appendix B, Table II). ✓

Item 3(d). Photographs of the Site and Surrounding Area are Enclosed for Your Review. See enclosure 7.

Item 3(e). Available Documentation of Environmental Monitoring Performed by the Michigan Department of Public Health.

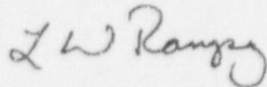
Enclosed is the Michigan Department of Public Health summary of the most recent Do/ Bay City thorium slag storage site sampling results. See enclosure 8.

August 24, 1981

Item 3(f): The January, 1979, U.S. Department of Housing and Urban Development Federal Insurance Administration, "Flood Insurance Study for Bangor Township of Bay County, Michigan," lists the base flood level as 580.2 feet. The Dow Bay City Plant thorium slag storage site is located in an area of Bangor Township at 582 to 585 feet.

Dow requests that STB-527 be renewed subject to the statements and information contained in this letter. If you have further questions, please feel free to contact Tracy W. Parsons, Radiation Safety Officer at 517/636-3205.

Cordially,



L. W. Rumpy, Chairman
Radiation Safety Committee
Industrial Hygiene Laboratory
Health and Environmental Sciences
1803 Building
517/636-6260

rwms

Enclosures

February 5, 1980

Mr. Paul Guinn
License Management Branch
US Nuclear Regulatory Commission
Division of Fuel Cycle & Material
Safety
Washington, DC 20555

Dear Mr. Guinn:

MAIL CONTROL NO. 08798, DOCKET NO. 040-00017

I would like to take this opportunity to thank you, Mr. Nathan Bassin and Mr. Vandy Miller for taking the time to participate in the meeting with Dr. L. W. Rampy and myself conducted on January 16, 1980, concerning the Dow Chemical Company's storage of magnesium-thorium sludge (NRC License STB-527). It is my understanding that all the issues were clarified and license renewal is contingent upon Dow's submission of records that outline our future plans. I would like to briefly summarize the major conclusions from our discussions. If we have misinterpreted the results from the meeting, please contact me to resolve the discrepancies.

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We request that the Madison, Illinois storage site be removed from the Dow License STB-527.

2. Midland, Michigan storage site - From November, 1971 to January, 1972, all licensed thorium was removed from the Midland, Michigan storage site and transferred for burial at Moorehead, Kentucky, through the contractor, Nuclear Engineering Corporation (NECO). In addition to the licensed thorium, the topsoil from the storage site was packaged and shipped for burial as contracted through NECO. The stripped storage site area was surveyed with a GM counter and no residual radioactivity above background was detected.

February 5, 1980

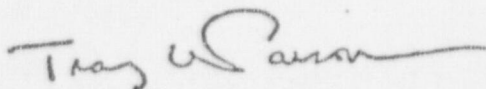
Although the Midland, Michigan storage site was decommissioned in accordance with 1971 NRC regulations, it is our belief that soil samples from the storage site should be taken and analyzed for residual thorium contamination now. Upon completion of the investigation, the results will be forwarded to the NRC.

If the soil sample results indicate that thorium contamination is sufficiently low we request that the Midland, Michigan storage location be removed from License STB-527.

3. Bay City, Michigan storage site - The magnesium-thorium slag storage area located near Bay City, Michigan is the only storage site listed on License STB-527 where licensed quantities of thorium are expected to be maintained. There seems to have been some confusion in the past regarding Dow's efforts related to the storage site; so we propose to submit to the NRC several items that will clarify all issues surrounding the magnesium-thorium storage site. These items consist of:
- a. A description of the storage site that details the slag pile and its present condition.
 - b. A description of the surrounding environs.
 - c. A description of Dow's environmental monitoring program that will be inclusive of past survey results and future monitoring efforts.
 - d. Photographs of the slag storage site and surrounding area.
 - e. Available documentation of environmental monitoring performed by the State of Michigan.
 - f. Meteorological information on flooding probability.

Since no permanent radioactive waste disposal facility is currently available, we feel that the magnesium-thorium slag should remain at the Bay City, Michigan site with continued maintenance as will be described in our maintenance plan to be submitted.

Yours very truly,



Tracy W. Parsons
Industrial Hygiene Laboratory
Health & Environmental Sciences USA
1803 Building
517/636-3205

bjd

*Don Davis
John Deek
Legal*

JAN 10 1972

THE DOW CHEMICAL COMPANY

RUSSELLVILLE PLANT
AIRPORT ROAD, ROUTE 1
RUSSELLVILLE, ARKANSAS 72801

DATE November 30, 1971

INVOICE NO. MISC.

04

CHARGED
TO:Consolidated Aluminum Company
Madison Works
College & Weaver Streets
Madison, Illinois 62060

TERMS—NET CASH—PLEASE MAIL REMITTANCE TO: RUSSELLVILLE, ARKANSAS

To transfer all Thorium - containing materials at Madison
as permitted under Dow AEC License Number STB-527 to
Consolidated Aluminum per your License Number 1097
including 10300 pounds of Thorium Hardner.

N/C

Refer to L. H. Washauer letter of 10/23/71 - copy to
C. Zollner.

FILE COPY

2020 Dow Center
Midland, Michigan
October 28, 1971

J. A. Van Deventer
Houston

cc: P. Eckert
R. Pingle
C. Zollner

THORIUM CONTAINING MATERIALS AT MADISON

Following up on my discussion with Charles Zollner, please issue an invoice or other document to Conalco transferring thorium containing materials at Madison (per Dow AEC License No. STB-527) to Conalco (per their License No. 1097).

This will be a no charge invoice. As in the past, Conalco will pay for thorium hardener as used. You will need to arrange with Madison for appropriate use and inventory records on hardener.

Please send to me a copy of the document you issue.
Thanks.

L. H. Washauer
Engineering & Metal Products Dept.

gjb



INDUSTRIAL HYGIENE REPORT

DATE July 9, 1981

TITLE

SAMPLING OF THE FORMER MICHIGAN DIVISION THORIUM SLAG STORAGE SITE,
MIDLAND MICHIGAN

AUTHOR

E. E. Bickel - T. W. Parsons
Industrial Hygiene Laboratory
Health and Environmental Sciences

DISTRIBUTION

William Crow, Nuclear Regulatory Commission, Washington, D.C.

SUMMARY

In June, 1980, Health and Environmental Sciences USA Industrial Hygiene Laboratory personnel sampled the soil and conducted a radiation survey of the former thorium storage site in the Michigan Division, Midland MI. Eighteen soil samples were collected from representative areas of the site. No thorium-232 was identified at greater than naturally occurring background levels. All radiation levels were below the detection limit of 0.1 mR/hr.

lkh

✓

RESTRICTED: for use within the Nuclear Regulatory Commission and
The Dow Chemical Company only.

PROBLEM

At the request of the U.S. Nuclear Regulatory Commission, Health & Environmental Sciences USA Industrial Hygiene Laboratory personnel sampled the soil and conducted a radiation survey of the former Michigan Division, Midland MI, thorium storage site.

CONCLUSIONS

1. No thorium concentrations were detected greater than either the naturally occurring background levels of thorium-232 (0.2-6.6 pCi/gm) or the applicable NRC guidelines for the decommissioning of thorium-232 utilizing facilities (1000 dpm/100 cm²).
2. External radiation levels at the former storage site were less than the detection limit (0.1 mR/hr) of the survey instrument.

BACKGROUND

The Midland MI thorium storage site, located 400 yards west of Gate 23 between 11th Street and the waste water ("shot") pond, was used between the early 1960's and 1971 for the storage of magnesium-thorium slag (approximately 3% Th-232). The magnesium-thorium slag had been shipped to Midland by Dow customers in 55 gallon steel drums. The drums were stored at the site until transferred in 1971 to the Nuclear Engineering Company (NECO) for disposal at a federally licensed burial site in Morehead KY. In addition, the top few inches of soil around and beneath the storage drums were similarly transferred to NECO for burial at that time.

At the time of the transfer, a radiation survey using a GM probe was conducted by L. G. Silverstein. No detectable radiation above background levels was discernible.

DISCUSSION AND RESULTS

Thorium-232 is a naturally occurring radioactive material with a concentration of approximately 2 to 60 ppm (0.2 to 6.5 pCi/gm) depending on the rock and soil type. An average reported value for thorium-232 concentration from 200 USA locations is approximately 1 pCi/gm with a range of 0.2 to 13.0 pCi/gm.

In June, 1980, the Midland MI thorium slag storage site, an area of approximately 40 feet by 200 feet, was surveyed with an ion chamber by E. E. Bickel. Eighteen one gallon soil samples were collected. Samples consisted of approximately the first six inches of topsoil. The samples were placed in one gallon plastic containers and transported to Environmental Sciences Research (1702 Building) for analysis. A single control sample was similarly collected approximately 40 feet upgrate and north of the former storage site.

At the time of the soil sampling, each of the soil sample locations was surveyed with a calibrated Eberline RO-2 (SN492) ion chamber for external radiation exposure levels. The survey, at six inches and three feet above ground level, indicated no radiation exposure levels greater than the detection limit of 0.1 mR/hr.

Sampling locations and results are summarized in Figure I and Table 1, respectively. The average concentration of thorium-232 for samples A through K is 0.5 pCi/gm with a range of 0.2 ± 0.1 to 1.8 ± 0.2 pCi/gm. Sample S, the control sample, had a thorium-232 concentration of 0.3 ± 0.1 pCi/gm.

The soil sample analysis procedure is described in an unpublished report by T. D. Lickly of Dow Chemical USA Environmental Sciences Research. The analytical method consisted of a Ge(Li) gamma spectrometer analysis for lead-212, which was assumed to be in equilibrium with thorium-232. The accuracy of measurement, at the 90% confidence level, was reported to be $\pm 30\%$.

The NRC provided guidance for the decommissioning of facilities utilizing source material in the form of a Draft Regulatory Guide Entitled: Guidelines for the Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for By-Product, Source or Special Nuclear Material. The NRC guidelines for thorium-232 site decommissioning suggest an average surface thorium-232 concentration of 1000 dpm/100 cm², a maximum surface concentration of 3000 dpm/100 cm², and removable surface contamination of 200 dpm/100 cm².

The NRC acceptable surface contamination guidelines are not directly related to soil sampling procedures where the radioactivity of a mass of soil is measured. However, if it is assumed that the "removable surface contamination" is 0.01 cm thick and that average soil density is 1.5 gm/cm³, the most restrictive removable surface contamination guideline is calculated by the following equation:

$$\left(\frac{200 \text{ dpm}}{100 \text{ cm}^2}\right) \left(\frac{1}{0.01 \text{ cm}}\right) \left(\frac{1}{1.5 \text{ g/cm}^3}\right) = 133 \text{ dpm/g.}$$

The former thorium-232 slag storage site had a maximum and average reported thorium-232 concentration of 1.8 pCi/gm (4.0 dpm/gm) and 0.5 pCi/gm (1.1 dpm/gm) respectively.

Since all recorded thorium specific activities were less than the most restrictive NRC guidelines and consistent with reported natural background levels of thoriums, the former Midland MI storage site is considered free of radioactive contamination and is, therefore, usable as a nonrestricted area.

NOTICE

The information and recommendations contained herein are presented in good faith. However, no guarantee of accuracy or completeness is given. Data presented are believed factual unless otherwise indicated, but conclusions based on such data will not be valid if operations observed change. No representation is made that all existing or potential problems have been reported, or that recommendations made will solve the problem, or that laws or regulations will be construed by government agencies consistent with our understanding of them.

Signature: E. E. Bittel 7/23/81 TW Cannon 7/23/81 (Author)

Date: 7/23/81

Signature: Edmund J. Schneider (Reviewer)

Date: 8/5/81

Table 1. CONCENTRATIONS OF Th-232* IN SOIL SAMPLES A THROUGH S TAKEN AT FORMER MIDLAND MI THORIUM 232 SLAG STORAGE SITE, JUNE 1980

<u>Sample</u>	<u>Concentration</u> <u>(pCi/gm)</u>
A	1.5 \pm 0.2
B	0.5 \pm 0.2
C	0.6 \pm 0.1
D	0.3 \pm 0.1
E	0.3 \pm 0.1
F	0.4 \pm 0.1
G	1.8 \pm 0.2
H	0.5 \pm 0.1
I	0.4 \pm 0.1
J	0.3 \pm 0.1
K	0.4 \pm 0.1
L	0.4 \pm 0.1
M	0.4 \pm 0.1
N	0.2 \pm 0.1
O	0.6 \pm 0.1
P	0.2 \pm 0.1
Q	0.3 \pm 0.1
R	0.3 \pm 0.1
S (control)	0.3 \pm 0.1

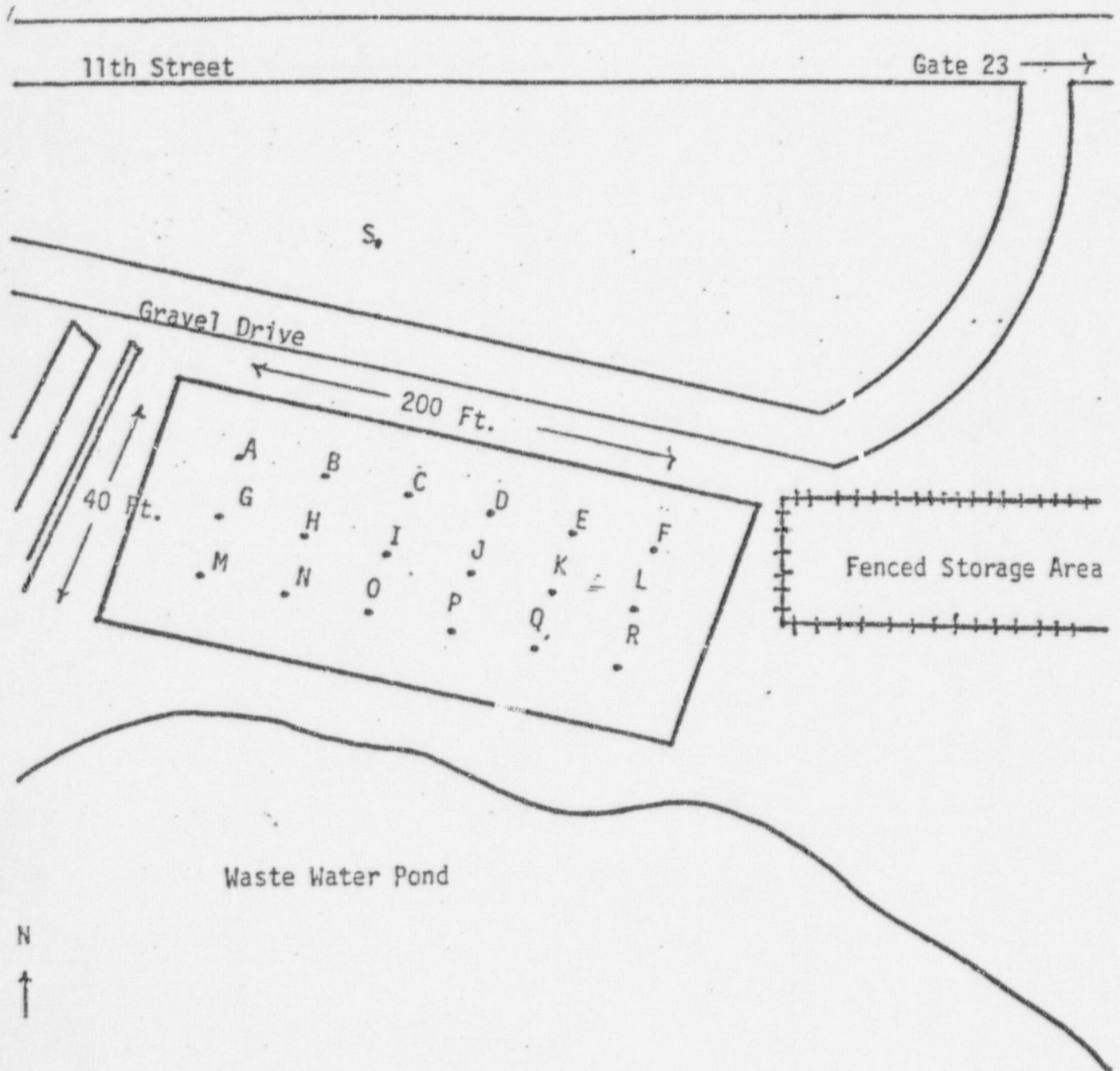
Average = 0.5 pCi/gm

Range = 0.2 to 1.8 pCi/gm

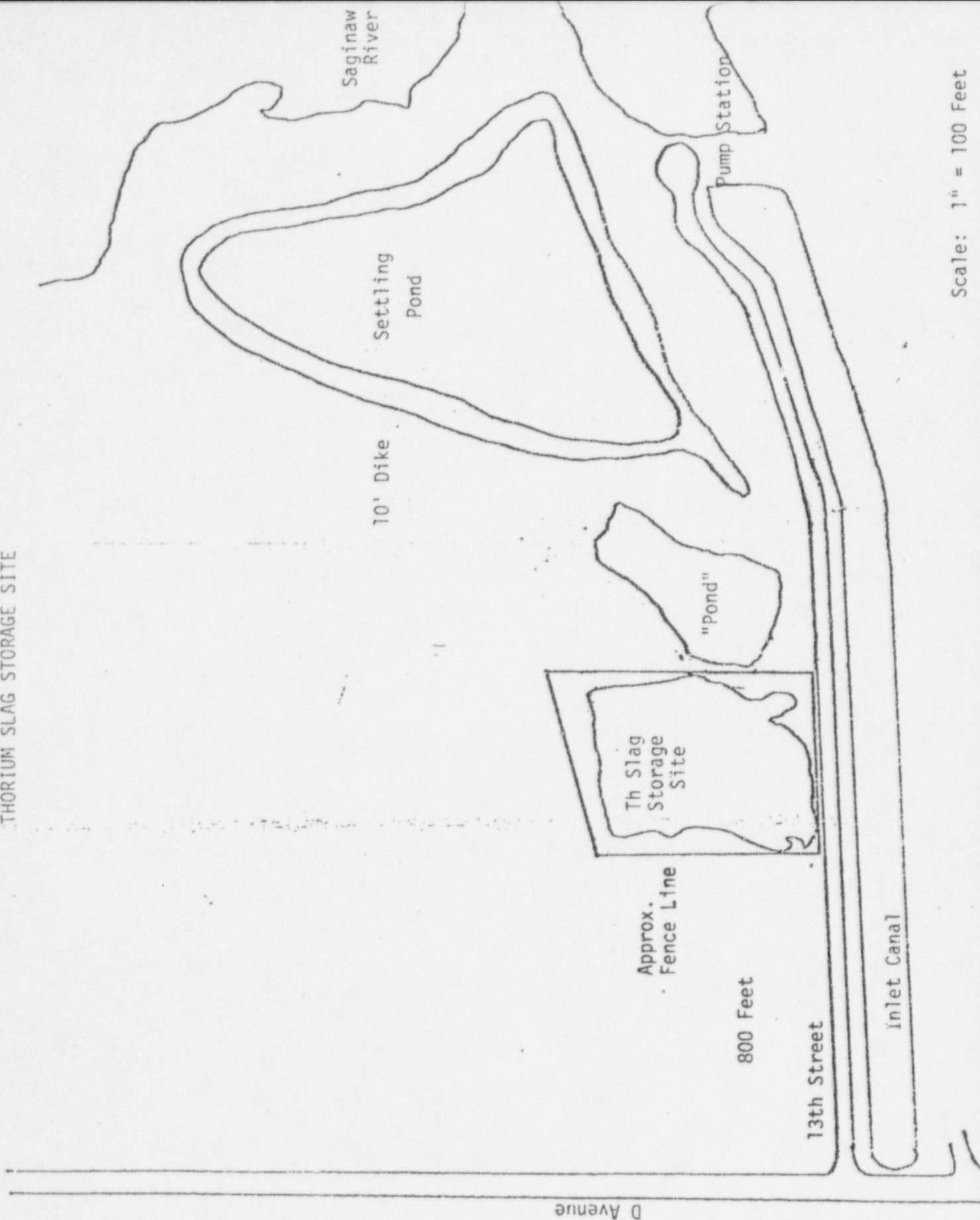
*assuming equilibrium with Pb-212

FIGURE 1

LOCATION OF SOIL SAMPLES A THROUGH S AT FORMER MIDLAND MI
THORIUM 232 SLAG STORAGE SITE, JUNE 1980



LOCATION OF DOW RAY CITY PLANT
THORIUM SLAG STORAGE SITE





INDUSTRIAL HYGIENE REPORT

DATE

July 9, 1981

TITLE

SAMPLING OF THE THORIUM SLAG STORAGE SITE, MICHIGAN DIVISION, BAY CITY,
MICHIGAN ON SEPTEMBER 26, 1979

AUTHOR

T. W. Parsons
Industrial Hygiene Laboratory
Health and Environmental Sciences

DISTRIBUTION

William Crow, U.S. Nuclear Regulatory Commission

SUMMARY

On September 26, 1979, personnel from Region III of the Nuclear Regulatory Commission (NRC), Michigan Department of Public Health (MDPH), and Dow Chemical U.S.A. Industrial Hygiene Laboratory inspected and sampled the Michigan Division Bay City Plant thorium slag storage site. The inspecting personnel each collected identical samples of soil, sediment and water from areas immediately surrounding the thorium slag storage site. The samples were independently analyzed for thorium-232 content.

Results indicate that thorium-232 was at naturally occurring background levels and, therefore, not migrating into the environment.

lkh

✓ RESTRICTED: for use within the U.S. Nuclear Regulatory Commission
and The Dow Chemical Company only.

PROBLEM

On September 26, 1979, the U.S. Nuclear Regulatory Commission (NRC) Region III requested permission to sample the areas immediately surrounding the Dow Bay City Plant thorium slag storage site. The Michigan Department of Public Health (MDPH) and USA H&ES Industrial Hygiene personnel also collected samples.

CONCLUSIONS

1. The thorium-232 content of the soil, sediment, and water samples collected from the immediately surrounding area of the Dow Bay City thorium slag storage site was within the naturally occurring background range of 0.2 to 6.5 pCi/gm.
2. The results of the NRC and MDPH samples agreed with the results of the Dow data.
3. The thorium-232 from the thorium slag storage site had not migrated to the surrounding soil or ground water run off areas.
4. The thorium-232 from the thorium slag storage site had not leached into the surrounding ground water.

EVALUATION CRITERIA

Thorium-232 (Th-232) is a naturally occurring radioactive isotope that is found in the earth's crust in concentrations ranging from 0.2 to 6.5 pCi/gm.

The maximum release of Th-232 to unrestricted or "public" areas is specified in 10 CFR 20.106. The maximum release greater than background levels for the water soluble forms of Th-232 is 2.0 pCi/gm (2000 pCi/l of H₂O). This release may be averaged over a period not to exceed one year.

ANALYSIS

Sample analysis procedure for Th-232 is detailed as unpublished data by Dow chemical USA Environmental Sciences Research. The analysis procedure consisted of counting the samples in a constant, geometry at a known efficiency with a lithium drifted germanium (GeLi) gamma spectrometer. Any Th-232 present in the samples was assumed to be in secular equilibrium with its daughter, lead-212 (Pb-212). The Pb-212 X-ray photopeak was used as a measure of Th-232 activity. The assumption of secular equilibrium was, at most, in error by 50% as the Th-232 had been chemically separated from its daughter approximately 10-15 years prior to the sample date.

The sample analysis procedures utilized by the NRC and the MDPH were not reported to Dow.

RESULTS AND DISCUSSION

On September 26, 1979, NRC, MDPH, and USA Industrial Hygiene personnel each collected samples of soil, sediment, and water from the locations shown in Figure I, at the Dow Bay City thorium slag storage site. The samples were taken from land areas immediately surrounding the thorium slag storage site. The sediment samples were taken from surrounding areas where Th-232 would be expected to accumulate following surface water run off. The water samples were collected from station (approximately 10' deep) wells that would be expected to contain Th-232 that may have leached from the storage site into the ground water.

Each of the agencies and Dow independently analyzed the samples for Th-232 content. The reported Th-232 concentrations and detection limits for each agency varied with their individual sample analysis procedures (Table 1). For sample number 13, the water supply was limited and only one sample was taken.

The four Dow soil or sediment samples above the detection limit of 0.6 pCi Th-232/gm averaged 1.3 pCi Th-232/gm. All four water samples taken by Dow were below the detection limit of 400 pCi Th-232/L.

The NRC soil or sediment samples averaged 1.71 pCi Th-232/gm for eight samples. No detection limit or assumption for determining the Th-232 concentrations in soil or sediment samples was reported. The NRC water samples, based on gross alpha particle counting techniques, averaged 3.6 pCi/L. The gross alpha count was conservatively assumed by the NRC to equal the Th-232 concentration. No detection limit was reported for the water sample analysis, but data did suggest a detection limit of approximately 2.0 pCi/L.

The MDPH soil and sediment samples averaged 1.6 pCi Th-232/gm for nine samples. The MDPH water samples averaged 11.3 pCi/L for the four reported values. No detection limit was reported, but the data did suggest a detection limit of 8.0 pCi/L. No method or assumption for determining the Th-232 concentration from the counting data was reported by the MDPH for either the soil, sediment or water samples.

Each of the inspecting agencies reported concentrations of Th-232 (0.3 to 4.5 pCi/gm) that were within the normal background range of Th-232 (0.2 to 6.5 pCi/gm).

Analysis results for the Th-232 soil concentration were very similar to the results of a 1971 and 1977 sampling of the areas immediately surrounding the thorium slag storage site. The 1971 survey reported Th-232 concentrations ranging from 0.7 to 2.0 pCi/gm. The samples were taken at the soil surface and at one foot below the surface. The 1977 survey reported Th-232 soil concentrations ranging from 1.0 to 4.0 pCi/gm. One soil sample had a Th-232 concentration of 24 pCi/gm from an area 10-20 feet north of the storage site. This sample was considered to be non-typical as it contained small amounts of the actual thorium slag.

The samples were taken from areas surrounding the Dow Bay City Plant thorium slag storage site. Normal background levels of Th-232 were not exceeded or increased from previous surveys. No measurable migration of Th-232 from the thorium slag storage site into adjacent land areas or water ways has taken place. Since background levels were not exceeded, the release rate specified in 10 CFR 20.106 was not exceeded.

TABLE 1. SUMMARY OF RESULTS FROM DOW, NRC, AND MDPH TH-232 ANALYSIS OF SAMPLES TAKEN FROM AREAS SURROUNDING DOW BAY CITY PLANT THORIUM SLAG STORAGE SITE ON 09/26/79

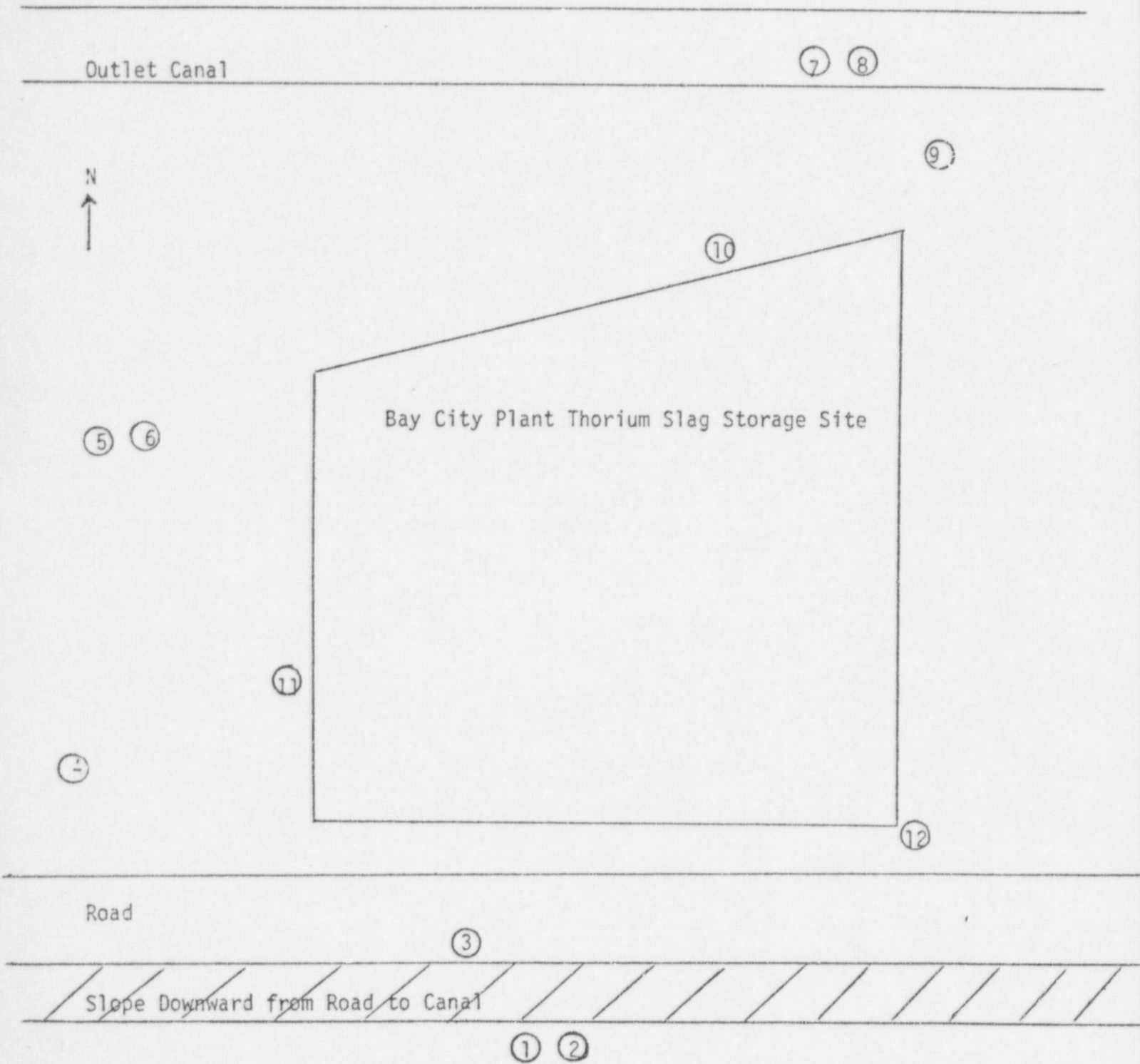
<u>Sample #</u>	<u>Description</u>	<u>DOW</u>	<u>NRC</u>	<u>MDPH</u>
1	Water inlet canal	ND @ 400 pCi/L	3.7 pCi/L*	14 ± 8 pCi/L
2	Sediment inlet canal	ND @ 0.5 pCi/gm	0.5 pCi/gm	3 ± 0.2 pCi/gm
3	Soil near road	ND @ 0.8 pCi/gm	0.3 pCi/gm	0.3 ± 0.3 pCi/gm
4	Water well #1	ND @ 300 pCi/L	<2.0 pCi/L*	15 ± 8 pCi/L
5	Water well #2	ND @ 400 pCi/L	3.0 pCi/L*	<8 pCi/L
6	Soil near well #2	ND @ 0.6 pCi/gm	0.4 pCi/gm	0.7 ± 0.3 pCi/gm
7	Water outlet canal	ND @ 400 pCi/L	3.9 pCi/L*	<8 pCi/L
8	Sediment outlet canal	2.1 ± 0.8 pCi/gm	4.0 pCi/gm	4.5 ± 0.3 pCi/gm
9	Soil NE corner	0.5 ± 0.2 pCi/gm	0.8 pCi/gm	0.6 ± 0.3 pCi/gm
10	Soil N fence	1.0 ± 0.3 pCi/gm	1.3 pCi/gm	1.1 ± 0.3 pCi/gm
11	Soil W fence	ND @ 0.6 pCi/gm	0.9 pCi/gm	0.5 ± 0.3 pCi/gm
12	Soil SE fence	1.6 ± 0.8 pCi/gm	2.8 pCi/gm	1.9 ± 0.3 pCi/gm
13	Water well #3	No sample	4.0 pCi/L*	No sample

ND=Non-detectable

*Th-232 reported as gross alpha

Figure 1

Th-232 Sample Locations at Dow Bay City Plant Thorium Slag Storage Site
(9/26/79)

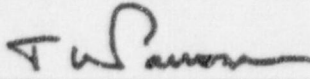


1. Inlet canal Water
2. Inlet canal sediment
3. Soil near road
4. Well water
5. Well water
6. Soil
7. Outlet canal water

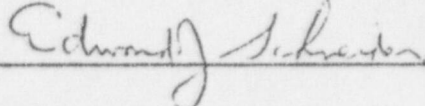
8. Outlet canal sediment
9. Soil
10. Soil
11. Soil
12. Soil

. NOTICE

The information and recommendations contained herein are presented in good faith. However, no guarantee of accuracy or completeness is given. Data presented are believed factual unless otherwise indicated, but conclusions based on such data will not be valid if operations observed change. No representation is made that all existing or potential problems have been reported, or that recommendations made will solve the problem, or that laws or regulations will be construed by government agencies consistent with our understanding of them.

Signature:  (Author)

Date: 7/28/81

Signature:  (Reviewer)

Date: 7/29/81

February 26, 1980

MEMORANDUM FOR Region III Files

THRU:

T. H. Essig, Chief, Environmental and Special
Projects Section

FROM:

W. B. Grant, Radiation Specialist
R. L. Hague, Radiation Specialist
C. Roytek, Coop Student

SUBJECT:

INSPECTION OF DOW CHEMICAL CORPORATION THORIUM RESIDUE
STORAGE AREA - BAY CITY, MICHIGAN - LIC. STB-527
(DOCKET NO. 40-17)

On September 26, 1979, Region III representatives visited the Dow Chemical Corporation's thorium residue storage area near Bay City, Michigan. Radiation measurements were made and soil, sludge, and water samples were taken. The samples were analyzed by RESL, Idaho Falls, Idaho.

Dow's storage area is located north of Bay City and west of the Saginaw River. It is in a remote section of another Dow Plant. Entrance to the plant is controlled by Dow Security. The plant property is controlled by a cyclone fence and the Saginaw River. The storage site (Figure 1) is completely cyclone fenced, with a locked gate.

Since Region III's last visit on October 1, 1977, the storage area has been fenced and the residue site covered with a road tar emulsion. Ground water sampling wells have been drilled to the North and East of the storage area. Water samples were taken from the three wells that had water in them. Water samples were also taken from the pond and the intake canal which approximate the North and West boundaries of the storage site. All water samples were counted for gross alpha activity. The results are shown in Table 1.

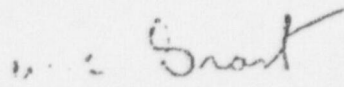
Radiation measurements were made at the fence line at locations S-2, S-3, S-4, and S-6 (See Figure 1). Readings were 0.02 - 0.03 mR/hr.

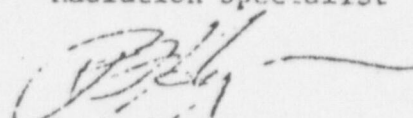
Soil samples were taken at locations S-1, S-2, S-3, S-4, S-5, and S-6. Sediments were taken from the pond and the intake canal. Gamma spectral analyses were made of both the soil and sediment. The results of the analyses are shown in Table 1.

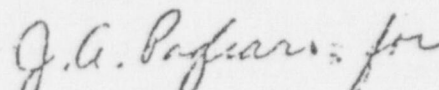
Earlier (September 1977) sampling data from similar soil locations showed levels of less than 1 to 5 pCi/g Th 228. Since the analyses of these soil and sediment samples show similar results (0.4 to 4 pCi/g), no migration of

February 28, 1980

thorium residues is indicated. In order to put these data into proper perspective, the average thorium concentration found in the earth's surface is about 1-2 pCi/g*. The 1979 canal, pond, and monitoring well sample analysis results, which were all less than 5 pCi/l, were consistent with the 1977 data, and indicated that thorium migration (if any) into ground or surface water was (and continues to be) extremely small.


W. B. Grant
Radiation Specialist


R. L. Hague
Radiation Specialist


C. Roytek
Coop Student

*NCRP-45 "Natural Background Radiation in the United States," 1975.

TABLE 1

DOW CHEMICAL THORIUM RESIDUE PILE

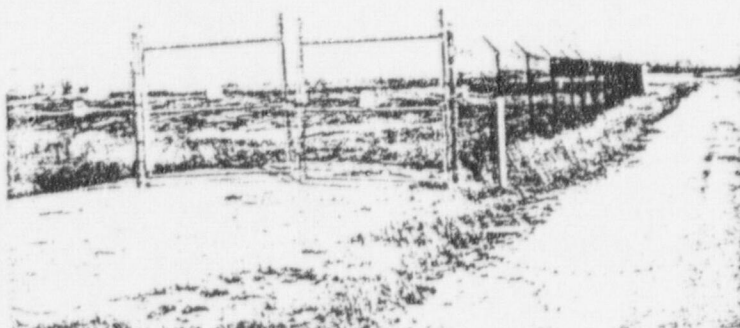
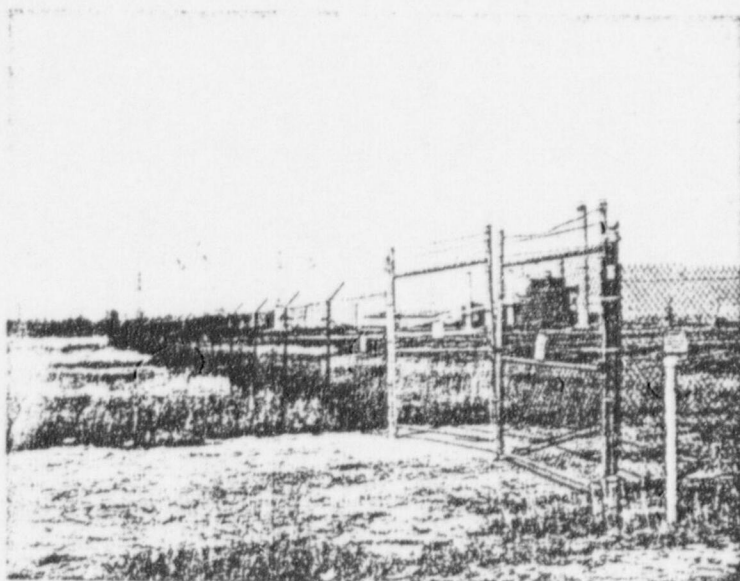
9/26/79

SAMPLES

<u>Sample No.</u>	<u>Location</u>	<u>Results</u>
\ S-1(Soil)(Road	3.0 pCi/g Th 230
S-2	SE Fence	2.8 pCi/g "
S-3	West Fence	1.3 pCi/g "
\ S-4	West Fence	0.9 pCi/g "
\ S-5	Well W-3	0.4 pCi/g "
\ S-6	NE Fence	0.8 pCi/g "
\ SED-1	Sediment Intake Canal	0.5 pCi/g "
\ SED-2	Sediment Pond	4.0 pCi/g "
\ W-C	Intake Canal (water)	3.7 pCi/l Gross
\ W-P	Pond Water	3.9 pCi/l "
W-1	Well #1	4.0 pCi/l "
\ W-2	Well #2	<2 pCi/l "
\ W-3	Well #3	3.0 pCi/l "

Enclosure 7

DOW BAY CITY PLANT SITE THORIUM SLAG STORAGE SITE ON APRIL 10, 1981



DOW CHEMICAL CO.

Y

THORIUM SLUDGE PILE SAMPLESCollection Date 09-26-79

<u>Sample No.</u>	<u>^{232}Th (pCi/l)</u>	<u>GR.α (pCi/l)</u>	<u>GR.β (pCi/l)</u>
1	14(8)	< 2	160(10)
2	3.0(0.2)	---	---
3	0.3(0.3)	---	---
4	15(8)	5(4)	160(10)
5	< 8	< 10	830(30)
6	0.7(0.3)	---	---
7	< 8	< 2	12(4)
8	4.5(0.3)	---	---
9	0.6(0.3)	---	---
10	1.1(0.3)	---	---
11	0.5(0.3)	---	---
12	1.9(0.3)	---	---

1. Water - Intake Canal - South of Pile
2. Sediment - Intake Canal - South of Pile
3. Soil - on Canal Bank - South of Pile
4. Water - Monitoring Well #2 - West of Pile
5. Water - Monitoring Well #2N - North of Pile
6. Soil - North of Monitoring Well #2N
7. Water - Saginaw River Bayou - North of Monitoring Well #2N
8. Sediment - Saginaw River Bayou - North of Monitoring Well #2N
9. Soil - Outside of Fence Northeast Corner - (Includes a few pieces of sludge)
10. Soil - Outside of Fence - North Side
11. Soil - Outside of Fence - East Side
12. Soil - Outside of Fence - South Side

No samples were taken of the sludge itself.

() - 2 σ error



STATE OF MICHIGAN

DEPARTMENT OF PUBLIC HEALTH

3500 N. LOGAN, P.O. BOX 30035, LANSING, MICHIGAN 48909

WILLIAM G. MILLIKEN, Governor

MAURICE S. REIZIN, M.D., Director

April 2, 1980

Mr. Tracy W. Parsons
Industrial Hygiene Laboratory
Health and Environmental Sciences
Dow Chemical U.S.A.
1803 Building
Midland, Michigan 48640

Dear Mr. Parsons:

Enclosed is a summary of the Thorium Sludge split sample analysis, forwarded per request. Samples were collected on September 26, 1979 and jointly split by the Department, the Nuclear Regulatory Commission, and Dow. A Gamma Scan analysis was made on all samples and liquid samples were tested by Gross Alpha and Beta analysis.

If we can be of further assistance, please let us know.

Sincerely,

BUREAU OF ENVIRONMENTAL
AND OCCUPATIONAL HEALTH

D. E. Van Farowe, P.E., Chief
Division of Radiological Health

DEV/ckf

Enclosure



"Equal Health Opportunity for All"



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

OCT 2 9 1981

MEMORANDUM FOR: Leo B. Higginbotham, Chief
Radiological Safety Branch
Division of Safeguards and
Radiological Safety Inspection, IE

FROM: R.G. Page, Chief
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety, NMSS

SUBJECT: REQUEST A CONFIRMATORY SURVEY AND CLOSEOUT
INSPECTION OF DOW CHEMICAL'S MIDLAND STORAGE
SITE COVERED BY LICENSE NO. STB-527, FOR
RELEASE FOR UNRESTRICTED USE

By letter dated August 24, 1981, Dow Chemical USA requested that their Midland, Michigan, storage site, which has held no licensed material since 1972, be removed from their license (No. STB-527). In support of this request, they submitted a survey report from Health and Environmental Sciences USA Industrial Hygiene Laboratory, dated June 1980. The report shows thorium concentration averaging .5 pCi/gm in a range of 0.2 to 1.8 pCi/gm. This is within the recommended guidelines for release for unrestricted use; therefore, verification of the information in this report and a close-out inspection will allow the evaluation procedure to continue.

License No. STB-527 is in the renewal process and will not be terminated because there is licensed material stored at Dow Chemical's Bay City, Michigan, site.

R.G. Page
R.G. Page, Chief
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety, NMSS

Enclosure: Dow Industrial Hygiene
Report dtd 07/09/81

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