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DEPARTMENT OF PUBLIC HEALTH

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GLORIA R. SMITH Ph.D., M.P.H., F.A.A.N. Director

October 31, 1984

Mr. Roland Lickus
U. S. Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Lickus:

The Michigan Department of Natural Resources has recently asked this Department for comments regarding two operating license applications under Michigan's Hazardous Waste Management Act (Act 64 P.A. 1979). Both applicants are currently and/or have in the past handled radioactive materials. This has raised several questions for us regarding what NRC licenses the facilities may have and how handling, treatment, storage, and disposal of radioactive materials are regulated by the NRC at the facilities. We would greatly appreciate your assistance in obtaining answers to the questions we have posed in this letter.

The Dow Chemical Company, Midland, Michigan has applied for a renewal of their license to operate a hazardous waste landfill. The landfill accepts a wide variety of hazardous wastes including ash from Dow's hazardous waste incinerator. Dow is licensed by the NRC to incinerate certain radioactive materials such as scintillation fluids. 1a). Is Dow licensed to dispose of contaminated ash in the landfill? 1b). Is Dow licensed to dispose of any radioactive material in the landfill? 1c). If yes to either question, are there radionuclide concentration limits established for the landfill leachate? 1d). What are the radioactive material disposal requirements that Dow is subject to? 1e). What environmental safeguards are required? 1f). Is Dow in compliance with its NRC licenses?

Drug and Laboratory Disposal, Inc., Plainwell, Michigan, has applied for an operating license for a hazardous waste treatment and storage facility. The facility is currently licensed under an operating license held by A-1 Disposal, Inc., Plainwell, Michigan. A-1 Disposal has incinerated scintillation fluid and Drug and Laboratory Disposal has handled scintillation fluid in the past. 2a). Will Drug and Laboratory be required to obtain a separate NRC license? 2b). Is Drug and Laboratory Disposal licensed to handle radioactive material? 2c). What are the

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*Mike:
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letter next Tuesday?
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Mr. Roland Licitis
October 31, 1984
Page 2

radioactive material disposal requirements that Drug and Laboratory are subject to? 2d). What environmental safeguards are required? 2e). Is Drug and Laboratory Disposal in compliance with the appropriate NRC licenses?

The application reviews are subject to strict statutory time schedules. We would appreciate your assistance in these matters as quickly as possible. The person in charge of this Department's review is Mr. Eric M. Schwing, and he can be reached at (517) 373-1578, should you need to discuss this further. Thank you for your cooperation.

Sincerely,

BUREAU OF ENVIRONMENTAL
AND OCCUPATIONAL HEALTH



George W. Bruchmann, Chief
Division of Radiological Health

GWB/CMh

OCT 12 1984

Dow Chemical U.S.A.
ATTN: Gordon W. Engdahl
Co-Radiation Safety Officer
1803 Building
Midland, MI 48640

License No. 21-00265-06

Gentlemen:

This refers to the special safety inspection conducted by Mr. W. J. Slawinski of this office on August 9, 1984, of activities at Dow Chemical Midland, Michigan authorized by NRC Material Licenses No. 21-00265-06, No. SNM-1451, No. 21-08362-08, No. 21-08362-09, No. 21-08362-05 or No. 21-08362-12. and to the discussion of our findings with you, Dr. Fred Blanchard, and Mr. Gerald Wasserman at the conclusion of the site inspection and to the telephone conversations with Schlumberger, Birdwell, and Michigan Department of Natural Resources representatives on August 17 and 20, 1984.

The purpose of the inspection was to investigate third party allegations concerning licensee use and disposal of radioactive materials in chemical and brine deep well systems. The enclosed copy of our inspection report identifies areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, and interviews with personnel.

The allegations were not substantiated. No items of noncompliance with NRC requirements were identified during the course of this inspection.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC's Public Document Room. If this report contains any information that you (or your contractors) believe to be exempt from disclosure under 10 CFR 9.5(a)(4), it is necessary that you (a) notify this office by telephone within ten (10) days from the date of this letter of your intention to file a request for withholding; and (b) submit within twenty-five (25) days from the date of this letter a written application to this office to withhold such information. If your receipt of this letter has been delayed such that less than seven (7) days are available for your review, please notify this office promptly so that a new due date may be established. Consistent with Section 2.790(b)(1), any such application must be accompanied by an affidavit executed by the owner of the information which identifies the document or part sought to be withheld, and which contains a full statement of the reasons which are the bases for the claim that the information should be withheld from public disclosure. This section further requires the statement to address with specificity the considerations listed in 10 CFR 2.790(b)(4). The information sought to be

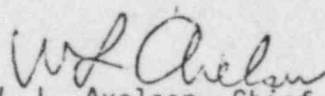
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withheld shall be incorporated as far as possible into a separate part of the affidavit. If we do not hear from you in this regard within the specified periods noted above, a copy of this letter and the enclosed inspection report will be placed in the Public Document Room.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,


W. L. Axelson, Chief
Nuclear Materials Safety and
Safeguards Branch

Enclosure: Inspection Report
No. 030-04783/84-01(DRSS)

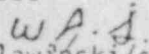
cc w/encl:

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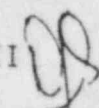
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
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U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 030-04783/84-01(DRSS)

Docket No. 030-04783

License No. 21-00265-06

Category: EIA

Priority: 3

Licensee: Dow Chemical U.S.A.

Inspection At: Dow Chemical U.S.A.
Midland, MI 48640

Site Inspection Conducted: August 9, 1984

Telephone Contacts: August 17 and 20, 1984

Inspector: W. J. Slawinski *W.J. Slawinski*
Radiation Specialist

10/5/84
Date

Reviewed By: D. J. Sreniawski, Chief *D.J. Sreniawski*
Nuclear Materials Safety
Section 2

10/5/84
Date

W.L. Axelson
Approved By: W. L. Axelson, Chief
Nuclear Materials Safety
and Safeguards Branch

10/10/84
Date

Inspection Summary

Site Inspection on August 9, 1984 (Report No. 030-04783/84-01(DRSS))

Areas Inspected: Special, announced safety inspection to investigate third party allegations regarding Dow Chemical's disposal of radioactive materials into its deep well systems and unauthorized use of radioactive tracer materials in these wells. The inspection involved five inspector-hours onsite by one NRC inspector.

Results: The allegations were not substantiated. No violations of license conditions or regulatory requirements were identified.

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DETAILS

1. Persons Contacted

- *Gordon Engdahl, CIH, Industrial Hygienist and Co-Radiation Safety Officer, Dow Chemical
- *Fred Blanchard, Ph.D., Associate Scientist and Radiation Safety Committee Member, Dow Chemical
- *Gerald Wasserman, Manager, Industrial Hygiene Services, Dow Chemical
- Ronald Gallow, Well Superintendent, Dow Chemical
- Daniel Schultz, Water Quality Specialist, Michigan Department of Natural Resources
- Harold Fitch, Ground Water Geologist, Michigan Department of Natural Resources
- **Al Rarick, Acting Chief, Mineral Wells Unit, Michigan Department of Natural Resources
- **Joseph Karabots, Field Engineer, Schlumberger Technology Corporation
- **James Hall, Field Engineer, Schlumberger Technology Corporation
- **Richard Cook, Vice President of Operations, Dart Oil and Gas Company. (Former Production Supervisor of Wells Department, Dow Chemical)
- **James Camburn, Chief, Division of Radiological Health, Michigan Department of Public Health

*Denotes those Dow Chemical employees interviewed on August 9, 1984.

**Denotes those contacted by telephone only.

2. Purpose of Inspection

This was a special inspection to investigate Dow Chemical's alleged disposal of radioactive materials through their deep well systems and unauthorized use of radioactive tracer materials in these wells. Allegations were submitted to the NRC Region III office. Additional information was relayed to the NRC inspector by other associated allegeders in a telephone conversation on August 8, 1984.

3. Allegations

Allegations transmitted in letter dated June 26, 1984, were primarily two-fold: 1) Dow Chemical in Midland, Michigan may have disposed of radioactive materials through its deep well method of disposal and 2) may have used radioactive materials in their deep wells as tracers.

These allegations reference an April 1979 report prepared by the Michigan Department of Natural Resources, Water Quality Division, entitled "Investigation of Groundwater Quality in the Hemlock Area of Saginaw County." This report states on page 13, referring to Dow Chemical activities in October 1978. "They demonstrated the well to be intact by conducting casing inspection and cement bond logs and a radioactive tracer survey."

Additional related information was provided to the NRC inspector in telephone conversations on August 8, 1984. Such information concerned the observance of unidentified trucks in 1979 or early 1980, with radioactive material placards, near Dow Chemical's deep wells in the Porter Township Area of Midland County. These individuals also relayed to the inspector hearsay allegations wherein radioactive tracers were inserted into Dow's deep well system and aerial radiation surveys were performed to determine if the well's pipelines were intact and to follow the tracers migration thru the substrata. These latter activities were alleged to have been performed in the 1978-1980 period.

No other specific information concerning these alleged activities was provided. Allegers doubted whether these activities are current practices.

4. Dow Chemical's Deep Well System

For over a century, widespread well drilling activities have been conducted in the Saginaw County of Michigan to explore and develop the natural resources in this area. Since as early as 1859, brine was being mined from the Marshall Sandstone formation in Saginaw. This formation, some 2000 feet below the surface, required drilling deep wells to find and use this resource. Over the years, several companies have been involved in this enterprise with varying degrees of success.

Dow Chemical owns and operates two distinct deep well systems located in the Midland Michigan area. These systems are the brine wells or solution mining wells and their chemical wells. The latter are used for chemical waste disposal and are located completely within the confines of the Dow plant. These wells were said to have been last used in 1982 and sealed in early 1983. Brine wells consist of production and reinjection wells, totaling about 100 wells, and encompass some 150 miles of transmission pipeline in the Midland area and throughout outlying areas.

The Dow brine wells, under pressure of about 171 psi, pump natural brine deposits from the substrata back to the Dow plant for processing (production wells). These wells, in use since the 1950's, are typically 3000 to 5500 feet below ground level. Processing involves extraction of calcium chloride, bromines, magnesium and other materials from the brine. Spent brine is then returned to the substrata from which it originated via the brine reinjection or disposal wells. Since the early 1970's, these operations have been regulated by the Geological Survey Division of the Department of Natural Resources under the Mineral Well Act.

Spent brine is sent to Dow's onsite brine pit,, termed lagoon pit No. 6, which discharges at 5000 gallons per minute thru a single outlet and into transmission lines. Transmission lines are parallel pipelines, one carrying brine from production wells to the Dow plant in Midland and the other returning spent brine from the plant to the reinjection wells. The lines are buried about 3-6 feet below ground surface.

In the mid 1970's, brine production operations began making greater use of a deeper strata, the Sylvania formation, some 7000 feet below ground surface. ReInjection of spent brines into the 5500 foot depth Dundee formation is being phased out.

Most of the brine wells have a small pond constructed next to them. These ponds serve as fresh water sources that can be added to saturated brines withdrawn by production wells so that the salts do not precipitate out as the brines cool. Ponds are also used to catch any spilled brine when accidental losses at the well head occur.

Well sites normally consist of a large pump, associated gauges, and about six inch diameter transmission pipelines emanating from the ground. Access to these pumping stations are usually restricted by a locked fence.

5. Interview of Licensee Personnel

On August 9, 1984, the inspector interviewed Dow Chemical employees identified in Section 1 of this report. Mr. Engdahl has been employed at Dow Chemical in Midland for nearly eleven years and involved in radioactive material usage from 1973-1976, 1979 and 1983 to present. Dr. Blanchard has been employed by Dow since 1957 and involved in radioactive material usage since this time. Mr. Wasserman began working at Dow in 1976, the last four months in his current capacity.

The inspector questioned each individual regarding the allegations. Their responses were as follows:

Allegation: Has Dow Chemical in Midland, Michigan ever disposed of licensed radioactive material thru its deep well systems? This includes both intentional or accidental releases in either the chemical or brine well systems.

Response: All individuals stated that, to the best of their knowledge, Dow Chemical has never disposed of licensable quantities of radioactive materials into their deep well systems. This includes the brine production/reinjection wells and the chemical wells. They stated Dow has three authorized methods for disposal of radioactive materials. One of these three methods is always used.

1. Incineration, authorized by NRC License No. 21-00265-06.
2. Transfer to an authorized disposal agency for eventual burial at a licensed disposal site.
3. Storage of short lived materials for decay until natural background levels are achieved.

Allegation: Have radioactive materials ever been used in wells for tracer studies? Specifically, were radioactive tracers used in wells in 1977-1980?

Response: Well logging operations have been periodically conducted in Dow's well system by outside contractors. No specific information on 1977-1979 logging operations (i.e., isotopes, quantities, etc.) was available. The individuals stated that such operations probably involved the use of sealed well logging sources and perhaps tracer materials commonly used by logging companies. The inspector was informed that Schlumberger Technology Corporation of Mt. Pleasant, Michigan performed logging services for Dow in 1978 and 1979 (Refer to Section 6).

Allegation: Radioactive tracers were inserted into Dow's well system and aerial radiation monitoring was performed to follow the migration of the tracers.

Response: Tracer studies have been performed by licensed well logging companies to check well casing integrity but no aerial radiation monitoring was ever performed for this purpose.

Dow routinely performs aerial flyovers of its wells to check for visible damage, breaks, leaks, etc. This is a visual surveillance and is not for the purpose of radiation monitoring. Such flyovers were typically performed on a weekly basis using a helicopter.

Allegation: An unidentified truck, placarded with radioactive material signs, was observed near a Dow well in the Porter Township area of Midland County in or about 1979. Allegers believe radioactive materials may have been disposed into the wells at this time.

Response: Such a vehicle was probably a well loggers truck contracted by Dow to perform well logging operations. No disposals of radioactive material were ever made into wells.

6. 1977 - 1979 Well Logging Activities

Dow Chemical does not maintain records of specific logging operations performed of its wells. They indicated that any logging operations utilizing radioactive materials that were performed in 1977-1979, were contracted to Schlumberger or perhaps Birdwell, both working out of regional offices in Mt. Pleasant, Michigan.

a. Schlumberger Technology Corporation

Schlumberger out of Houston, Texas is licensed by the NRC to possess and use specified byproduct and special nuclear materials for well logging purposes. Authorization includes use of iodine-131, in any form, for tracer studies in well logging at temporary job sites anywhere in the U.S. where the NRC maintains jurisdiction.

The inspector was informed by Schlumberger representatives that records of specific well logging operations were typically maintained for about one year. Documentation of activities prior to 1983 are

no longer maintained. However, a Schlumberger employee was identified by Dow as having performed logging work for them on October 5, 1978. This individual, still employed by Schlumberger, recalled performing a radioactive tracer study in a Dow deep well sometime in late 1978. This appears to coincide with the alleged radioactive tracer studies performed during this same time period. He recalled this particular job because of the irritating mechanical noise level present at the time, perhaps from the well's pump.

This individual indicated that he performed a radioactive tracer study at one of Dow's brine wells, number unknown, to determine if the well's casing was intact. He stated that 15-20 millicuries of liquid iodine-131 was deposited into the well and radiation surveys were performed to evaluate possible breaches in the well's encasement. He recalls no breaks or leaks being detected and the well was found to be sound. The individual stated that this type/quantity of radioactive material is routinely used in many tracer studies. He does not recall any other tracer studies or logging activities using radioactive material being performed for Dow during the 1977-1979 period.

b. Birdwell Wireline Services

Birdwell Wireline Services, a division of Seismograph Service Corp., is a well logging company out of Tulsa, Oklahoma licensed by the NRC to possess and use byproduct and special nuclear materials for well logging purposes. They too are authorized to use licensed material at temporary job sites anywhere in the U.S. where the NRC maintains jurisdiction. Like Schlumberger, they normally maintain records of completed logging activities for approximately one year.

Messrs. Cook and Rarick, identified in Section 1 of this report, indicated that Birdwell has periodically performed logging operations utilizing radioactive material for Dow Chemical. Both individuals recalled a well logging incident involving radioactive materials which occurred in one of Dow's wells in the late 1970's. This incident involved the loss and subsequent recovery of a cesium 137 sealed well logging source down one of Dow's brine wells. This incident was reported to the NRC and is documented in letters dated April 19, 1977 and July 1, 1977 (Attachment I). The source was retrieved intact and the matter was considered closed by the NRC, as documented in letter dated July 20, 1977 (Attachment II).

No violations of regulatory requirements were identified.

7. Brine Samples

Unrelated to the inspection, a 500 milliliter liquid sample was taken from each of three Dow brine reinjection wells by the Michigan Department of Natural resources on August 13, 1984. These samples were analyzed for chemical constituents by the Michigan Department of Natural Resources laboratory in Lansing, Michigan. The Commission arranged for these

samples to be analyzed for possible radioactive contents. Samples are being analyzed by the Michigan Radiological Health Department Laboratory for gross alpha, beta, and gamma activity. The results of this analysis will be sent under separate cover.

8. Conclusions

Based on interviews of Dow personnel and discussions with well logging firms and Mr. Rarick of the Michigan Department of Natural Resources, no evidence was found to indicate that Dow Chemical has disposed of licensable quantities of radioactive materials through its deep well systems. Dow Chemical maintains receipt, transfer, and disposal records for radioactive materials possessed by their Midland facility.

Radioactive tracer studies have been performed in Dow's brine wells by well logging companies licensed by the NRC or agreement states to provide such services. Such well logging companies are routinely inspected by the NRC or agreement states to review its radiation safety programs and determine if the licensee is conducting operations in accordance with license conditions and applicable state and federal regulations.

The April 1979 Department of Natural Resources report referenced in these allegations states that Dow performed a "radioactive tracer study" in October 1978 to demonstrate if well casings were sound. The NRC inspector determined that a radioactive tracer study was in fact performed in one of Dow's brine reinjection wells on October 5, 1978. This study was performed by Schlumberger Technology Corp. engineers out of Mt. Pleasant, Michigan. Specific records of this work are no longer maintained by either Dow or Schlumberger. However, the Schlumberger engineer who performed the October 1978 study for Dow recalled that 15-20 millicuries of liquid iodine-131 was used in the well. This is authorized by the NRC license.

Iodine-131 has a radioactive half-life of 8.04 days. Accordingly, all radioiodine inserted into the well, a typical amount used in such tracer studies, decayed to natural background levels within 90 days. Also, the large water flow of this well system, reported to be 5000 gallons per minute, easily diluted the radioactive concentration to below 10 CFR 20.106 limits.

The loss and subsequent recovery of the cesium-137 sealed source in 1977 is judged not to have adversely impacted the ground waters or substrata into which it fell. The source was recovered intact with no leakage of its contents detected.

We are aware of one overflight performed in Michigan for the purpose of conducting an aerial radiation monitoring survey. This was performed over the Kawkawlin, Michigan area in May 1980 of the Michigan Chemical Corporation and is documented in NRC Reports No. 40-17/83-01(DRMSP), No. 40-1790/83-01(DRMSP), and EG&G letter report, NRC-8103, dated April 19, 1981. The purpose of this overflight was to determine typical background radiation levels within the local area and to locate any areas which might contain above background levels.

No violations of regulatory requirements were identified.

9. Exit Interview

The inspector met with those Dow Chemical employees denoted in Section 1 at the conclusion of the site inspection on August 9, 1984. The discussion consisted of a review of the allegations and their responses. The inspector stated that other individuals would be contacted and the allegations reviewed in greater detail before a final determination was made. They were informed that a report, documenting the NRC's findings, would be sent to Dow Chemical and the alleged(s).

Attachments: As stated