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Dow **News Release**

FOR FURTHER INFORMATION
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FOR IMMEDIATE RELEASE

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MICHIGAN DIVISION THORIUM DISPOSAL PROJECT

INTRODUCTION: The Michigan Division of The Dow Chemical Company is applying to the Nuclear Regulatory Commission (NRC) for a new license to dispose of a low activity, radioactive slag by-product that has been stored on Dow property at the Bay City and Midland sites under a NRC license for over forty years. Following is a summary of the Company's plan to permanently dispose of this material in the Salzburg Landfill. The plan will be announced to the general public on Thursday, December 7th.

HISTORY: From the early 1940's and continuing into the 1970's, The Dow Chemical Company produced a lightweight magnesium alloy used in aircraft applications. Production took place in Midland and Bay City, Michigan.

As a by-product, the production process yielded a slag material consisting mainly of magnesium and less than 2 percent of thorium, a naturally occurring radioactive element. The thorium imparted strength to improve the structural properties of the alloy.

The magnesium-thorium slag material, which is regulated as a radioactive material, is mixed with 52,000 cubic yards of soil and has been stored on Dow property in Bay City and Midland under the current NRC license. The license allows storage of up to 10 curies (a measurement of radioactivity) of thorium. After studying alternative disposal plans, Dow has recently applied to the NRC for a new license to dispose of the slag/soil mixture in the Salzburg Landfill.

DISPOSAL AT THE SALZBURG LANDFILL: Because of its unique design, the Salzburg Landfill meets all requirements necessary for the safe disposal of this extremely low activity, radioactive waste material. The Landfill is located on a 152-acre parcel of land owned by Dow and is considered a state-of-the-art hazardous and non-hazardous waste disposal facility, complete with a computer-controlled leak detection system. No liquid wastes are disposed at the Landfill, and operation of the facility is regulated by Federal and State government. In 1985, the Landfill was recognized by the National Society of Professional Engineers as one of the top ten outstanding engineering achievements in the United States.

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THORIUM - A COMMONLY USED RADIOACTIVE MATERIAL: Thorium has been used extensively in industry since its identification in 1828. It is added to the tungsten filaments of light bulbs to enhance metallurgical properties, and can be found in the mantle of a common camping lantern. Glass containing thorium oxide finds application in high quality lenses for cameras and scientific equipment. Thorium is naturally present in soil and can be found in nature at concentrations up to 8 percent.

RADIOACTIVITY OF THE MAGNESIUM-THORIUM SLAG: Even though the slag material contains enough radioactivity to require special storage and handling, because it is mixed with a significant amount of soil, the potential for exposure is minimized.

This low activity thorium-containing material (now less than .2% thorium as a slag/soil mixture) is quite uniform in physical state, will not dissolve in water, and is very stable. The magnesium-thorium waste material is in the lowest regulatory category of radioactivity concentration. In fact, for transportation purposes, the Department of Transportation does not consider this low concentration to be radioactive.

The exposure or dosage received from a radioactive material depends on many factors, including the proximity to the source and the length of time exposed. A person would have to stand within the storage site for 48 hours to receive the equivalent exposure of a chest x-ray (about 10 millirem.) A millirem is a measurement of radiation exposure. At the edge of the site there is no exposure above background, which for this area is estimated at 70 mrem per year.

THE TRANSPORTATION PLAN: To assure the safe transportation of the slag material from the storage locations at Dow's Bay City and Midland plant sites to the Landfill, a variety of safety measures will be taken. These include:

* A carefully chosen transportation route fully communicated to the public
* Securely covered trucks
* Vehicle inspection before departure from controlled areas
* Proper protective clothing for workers
* A comprehensive safety plan establishing criteria for removal and transfer of the magnesium-thorium slag material

Upon arrival at the Salzburg Landfill, the magnesium-thorium material will be placed in an individual cell or containment and will be isolated from other wastes. All operational systems will be continuously monitored by computers and Dov personnel and will be inspected frequently by regulatory agencies.

A LONG-TERM SOLUTION: A range of alternatives were carefully examined before considering the Salzburg Landfill facility. This option safeguards the environment and meets regulatory objectives.

Dov hopes to obtain government agency approval for the plan in 1990. Cell construction at Salzburg would begin in 1991 and be completed in 1992. Actual transportation of the slag material would not occur until late 1992 or early 1993.

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December 1989

Thorium Disposal At Dow

Beginning in the early 1940's and continuing into the early 1970's, The Dow Chemical Company produced a metallic magnesium alloy used in aircraft applications. The alloy was a lightweight material with improved high temperature strength. Production took place at two locations — in Bay City, Michigan, and in Midland, Michigan.

The production process yielded slag material as a by-product. This slag is now mixed with soil and contains less than 0.2% thorium. Thorium is a naturally occurring radioactive element found in soils and rocks and was used to improve the structural properties of the alloy.

The magnesium-thorium slag material, which is regulated as a radioactive material, has been stored on Dow property at Bay City and Midland under a license from the Nuclear Regulatory Commission (NRC). After studying alternative disposal methods, Dow has recently applied to the NRC for a new license to dispose of the slag material in the Salzburg Landfill. Because of its unique design, the Salzburg Landfill, currently licensed for the disposal of hazardous and nonhazardous waste by the Environmental Protection Agency (EPA) and the Michigan Department of Natural Resources (DNR), is appropriate for disposal of this extremely low activity radioactive material.

The Salzburg Landfill not only offers a sound technical solution for safe disposal of this material, but this plan also is in keeping with Dow's environmental philosophy . . . Dow accepts responsibility for handling its own wastes. Additionally, by removing the material from the present magnesium-thorium storage sites, the land could be released for other uses.

Following are answers to questions which may be asked regarding Dow's handling of the thorium-containing waste.

Q: *What exactly is thorium and how is it used?*

A: Thorium is a naturally occurring radioactive metallic element that has been used extensively in industry since its identification in 1828. It is commonly added to the tungsten filaments of light bulbs to enhance metallurgical properties. Glass containing thorium oxide finds application in high quality lenses for cameras and scientific equipment.

Thorium is naturally present in soil and is about as abundant as lead. Thorium can be found in nature at concentrations up to 8%.

Thorium is obtained commercially from granite rock from the western United States. Another important commercial source of thorium is monazite sands, which contain from two to four percent thorium. Monazite occurs in various parts of the world. It is a major component of the black sands of Brazil. Interestingly, those sands attract thousands of vacationers every year because of the alleged curative properties of the radioactivity, which is based on the thorium content.

Q: *How does this material compare with "low-level" radioactive wastes we have been hearing so much about?*

A: Low-level radioactive waste is legally defined by what it is not. Low-level waste is not (1) spent nuclear reactor fuel; (2) high-level waste from the reprocessing of spent nuclear reactor fuel; (3) transuranic waste (nuclear weapons production by-products with atomic numbers greater than that of uranium); or (4) uranium mining and milling residues.

Most commonly, low-level radioactive waste is the by-product of the use of radioactive materials in medicine, research and industry. It can be contaminated lab equipment, protective clothing, wiping rags and the like. Generally, it contains relatively small amounts of radioactivity. However, low-level radioactive waste can be harmful if not properly handled, and, as such, its handling and disposal is carefully regulated by federal and state government agencies.

This magnesium-thorium waste material is in the lowest regulatory category of radioactivity concentration. In fact, for transportation purposes, the Department of Transportation does not consider this low concentration to be radioactive.

The low-level wastes you often hear about can be much higher in radioactivity content than the magnesium-thorium slag and can contain a wide variety of materials.

Q: *How is radioactivity measured?*

A: The radioactivity of a material is usually expressed in a unit of activity called a curie. The curie, named in honor of Marie Curie who is credited with the discovery of radium, measures the rate of radioactive decay from the substance. Simply put, the curie is a measurement of radioactivity just as a pound is a measurement of weight.

Q: *How radioactive is the thorium-bearing slag being stored by Dow?*

A: Dow's current NRC license allows storage of approximately 10 curies of thorium in Midland and Bay City. At the Midland site, about 0.5 curies of the slag material is contained in some 12,000 cubic yards of soil, and at the Bay City site, approximately 9.2 curies are stored in 40,000 cubic yards of soil.

The magnesium-thorium slag material is isolated, and because the total thorium (hence curie) amount is mixed with a significant amount of soil, the potential for exposure to significant levels of radiation is greatly minimized. The material can be safely handled with appropriate techniques and safeguards.

Q: *How does the magnesium-thorium slag compare with natural "background" radiation?*

A: Some exposure to natural or "background" radiation is inevitable wherever we may live. This exposure or dosage depends on many factors and has many sources. For example, we receive radiation exposure from cosmic radiation, and from radioactive materials naturally present in water, food and soil. We receive about 45 millirem (mrem) a year from cosmic radiation. For this area, the average background exposure is approximately 70 mrem per year. While a curie measures the amount of radioactivity within the thorium, the millirem is a measurement of radiation exposure.

In addition, diagnostic x-rays contribute to our exposure. For example, a chest x-ray contributes an exposure of 10 mrem. To illustrate how low the activity of the magnesium-thorium slag is, a person would have to stand within the storage site for 48 hours to receive the equivalent of a chest x-ray. At the edge of the site there is no exposure above background.

Q: *What safety measures has Dow considered?*

A: Safe transportation of industrial materials is a major concern of the general public and Dow. Because of this concern, Dow has identified areas where special precautions will be taken, and welcomes public comment on ways this procedure might be improved.

1. The transportation route will be carefully chosen and communicated to the public.

2. Trucks bearing slag and dirt traveling the short distance from the current storage sites to the Salzburg Landfill (approximately 25 miles from the Bay City site to the Landfill) will be covered with a secured tarp checked at departure and arrival.

3. Before leaving the controlled areas at Bay City and Midland, each vehicle will be inspected to ensure the tires and undercarriage of the vehicle will not spread contamination on the roadway.

4. An Environmental Health and Safety Plan (EHSP) will be implemented to establish safety criteria and procedures for workers involved in the removal and transfer of the magnesium-thorium slag material. Workers who will be handling the material will be suitably equipped and monitored to assure the transfer is carried out properly.

Q: *What options have been considered for disposal of the magnesium-thorium slag?*

A: Short-term, the material could be left in place using the existing monitoring and maintenance programs. Although this is an acceptable short-term storage solution, it is not, however, a feasible long-term disposal solution because concentrations at the Bay City site exceed the present NRC limit for permanent on-site disposal.

One alternative would be to transport the material and soil to an existing licensed commercial low-level radioactive waste (LLRW) disposal site. Currently, however, there are no licensed LLRW sites in Michigan and only three in the United States — in the states of Washington, Nevada and South Carolina. The cost of transporting this bulk of material to a site at one of these locations is estimated at between $80 and $100 million. Also, there is little likelihood the existing sites would accept this material because the space required would fill capacity that is badly needed for materials with much higher radioactivity.

Still another option would be to maintain the current status until at least the mid-1990's, when Michigan is expecting to have a low-level radioactive waste burial facility available. This would postpone the need for action, but could eventually still involve increased expense. And, simply because of the large volume of soil containing the magnesium-thorium slag, there is no guarantee that the material would be accepted for disposal. Costs for disposal in Michigan's potential facility range from $200 to $600 million.

Another solution would be to treat and process the materials and soil to recover the thorium, then bury the residues in a secure landfill. We do not know of a process suitable for recovering the thorium from the slag material. Even if the thorium could be extracted by a practical method, there is relatively little commercial demand for it, so it would still have to be disposed of.

The most practical alternative appears to be using the Salzburg Landfill. This option will meet environmental and regulatory agency objectives and concerns.

Q: *Why is disposal at the Salzburg Landfill the best choice for this material?*

A: Dow is seeking a license to dispose of the magnesium-thorium slag at the Salzburg Landfill because the facility meets all requirements necessary for the safe disposal of this waste material.

The Salzburg Landfill, located on a 152 acre parcel of land owned by Dow, is a state-of-the-art hazardous and nonhazardous waste disposal facility regulated by the state and federal governments. The facility is designed for disposal of incinerator ash, waste water treatment plant solids, and other solid production and demolition waste. Liquid wastes are not disposed at Salzburg. The Landfill was recognized by the National Society of Professional Engineers as one of the top ten outstanding engineering achievements in the United States in 1985.

Magnesium-thorium slag material and soil mixture would be placed in an individual "cell" or containment, and would be isolated from other wastes. Each cell in the Landfill has its own built-in leak detection system. The foundation of each cell is a three-foot layer of compacted clay, and the bottom and walls are coated with a solid layer of compacted clay five feet thick. The sloping sides of each cell are covered with a drainage mat consisting of a strong, puncture-resistant material covered above and below with felted polypropylene. The interior clay surfaces

are covered with a tough liner of 100-mil polyethylene, carefully welded and inspected to provide an unbroken, impermeable protective layer. When a cell has been completely filled, it is capped with another polyethylene liner, another drainage mat, another three feet of compacted clay, and finally with an 18-inch layer of topsoil planted with grass. Rainwater is carried off downgrade by drains which lead water away from the cap, eliminating erosion and the formation of gullies.

Q: *What guarantee is there that the system is really working?*

A: All operational systems are monitored by computers and Dow personnel, and are inspected frequently by regulatory agencies. Also, the monitored drainage layer under each cell and the water quality in 19 groundwater monitoring wells surrounding the landfill are checked regularly to ensure the system is working as designed.

Q: *When does Dow expect to have this project completed?*

A: Dow is working with the Nuclear Regulatory Commission, the U.S. Environmental Protection Agency, the Michigan Department of Natural Resources, the Michigan Department of Public Health, the Department of Transportation and the Army Corps of Engineers to obtain approval for this project. The following schedule is our best estimate for completion.

November 1989 ..... Submit application to agencies
1990 ..... Obtain agencies' approval
1991 ..... Begin construction of special cell in Salzburg Landfill
1992 ..... Complete construction of cell
1993 ..... Move slag material located in Midland and Bay City
Late 1993 ... Cap cell and decommission sites

Summary

Dow is proposing to permanently dispose of the magnesium-thorium material in a Salzburg Landfill cell which meets hazardous waste landfill design criteria. A comprehensive transportation and worker safety program will be in place.

Protecting the environment is a major concern of Dow. We welcome public input and comment concerning this plan.

For further information contact Pat Brink, The Dow Chemical Company, 636-5787.

Proposed Thorium Haul Routes