



## **GUIDELINE 16 – OPERATION OF INERT WASTE LANDFILLS**

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### **I. Introduction**

Many communities in North Dakota may wish to develop sites for disposing inert wastes routinely generated by their citizens and businesses. The purpose of this guideline is to illustrate the requirements of state rules and describe the proper operation and maintenance of inert waste landfills. The North Dakota Department of Environmental Quality, Division of Waste Management (telephone: 701-328-5166) administers the North Dakota Solid Waste Management Rules, which regulate such facilities.

Inert waste includes construction and demolition material such as metal, wood, bricks, masonry, and cement concrete; asphalt concrete; tires; metal; tree branches; bottom ash from coal fired boilers; and waste coal fines from air pollution control equipment. Metal wastes such as washers, dryers, and other scrap metal may be stockpiled at an inert waste landfill for recycling. Inert wastes are those types of bulky wastes that normally do not pose significant hazards of environmental degradation. Inert waste will not generally contaminate water or form a contaminated leachate and does not serve as food for vectors.

The Department has established two categories for operation of inert waste landfills. Inert waste landfills operated for municipalities servicing populations of less than 1,000 people are eligible to operate under the Permit-By-Rule provision. These communities need only submit a notifying form and adhere to the applicable rules. Communities of more than 1,000 people or commercial entities are required to obtain an inert waste landfill permit.

The first seven sections (I through VII) of this guidance document apply to all inert waste landfills. Sections VIII and IX apply to permitted landfills, but "Permit-By-Rule" landfills may consider following these sections as well. Section XII describes permit application procedures for operators of inert waste landfills requiring a permit.

### **II. Site Selection**

An inert waste disposal site must be carefully selected so that it is relatively high (ravines, potholes, and sloughs are not suited for landfills), well drained, and dry. The site should be underlain with clay-rich soil to help reduce any hazard of groundwater contamination. The following characteristics define a suitable site:

- A. Site slope: 6 percent maximum.
- B. Minimum distance to surface water: 200 feet.
- C. Minimum distance to residences or buildings: site-specific; in general, 200 feet.
- D. Minimum depth of 15 or more feet to seasonal high-water table for most soils.

- E. Soil characteristics: Slow to moderate permeability, less than 2 inches per hour. Areas underlain by highly permeable soils or sodium affected soils should be avoided.

Published soil survey information available through local Natural Resource Conservation Service (NRCS) offices (formerly the Soil Conservation Service) provides an excellent reference for some of the necessary site characteristics such as site slope, depth to groundwater, and soil type for most locations in North Dakota. If specific soil information is not available or if more detailed soil information is required, a Professional Soil Classifier can be used to determine site-specific soil conditions.

NDAC section 33.1-20-04.1-01 states that landfills may not be located in areas which are unsuitable because of topographic, geologic, hydrologic, or soil conditions. The Department considers the following locations unsuitable, in most cases, for development of inert waste landfills:

- A. Where waste is disposed within an aquifer;
- B. Within a public water supply designated wellhead protection area;
- C. Within a one-hundred-year flood plain;
- D. Where geologic or manmade features, including underground mines, may result in differential settlement or failure of the structural integrity of the facility;
- E. On the edge of or within channels, ravines, or steep topography whose slope is unstable due to erosion or mass movement;
- F. Within woody draws;
- G. In areas designated as critical habitats for endangered or threatened species of plant, fish, or wildlife;
- H. Over or immediately adjacent to principal glacial drift aquifers identified by the state engineer;
- I. Closer than 1000 feet [304.8 meters] to a down-gradient drinking water supply well;
- J. Closer than 200 feet [60.69 meters] horizontally from the ordinary high-water elevation of any surface water or wetland;
- K. Within final cuts of surface mines; or
- L. Closer than 1000 feet [304.8 meters] to any state or national park.

### **III. Site Construction/Development**

Disposal sites must be properly constructed and must provide for adequate cover of disposed wastes. As necessary, the following must be addressed:

- A. Topsoil and subsoil must be carefully removed from disposal areas, properly segregated and stockpiled for final reclamation. Cover material should also be stockpiled in

strategic areas for eventual use during site operations. All earthen material must be maintained on site unless removal from the site is authorized by the Department.

- B. Careful consideration should be given to site drainage so as to preclude surface water run-on or runoff from creating any problems. All surface water resulting from run-on, runoff, snowmelt, or direct precipitation should be controlled to avoid any concentration of water on or in the waste and to minimize infiltration of water into the waste material.
- C. Trenches should be planned and excavated for disposal of appropriate wastes.
- D. Provisions must be made for proper revegetation of the site with suitable grass and plant seed mixtures as portions of the site are reclaimed.
- E. Tree planting and windbreak planting are desirable to prevent the site from becoming a blight of the landscape.

See an example of a [Typical Landfill Layout](#).

Access to the disposal site must be controlled with a fence and a lockable gate. The site must be locked when it is not open for use and the responsible parties should not loan out the keys or have duplicate keys made for any persons other than the landfill operators or supervisors.

A road leading to the site should be established such that it is adequate for all weather conditions. Provisions should be made so that access to the disposal site cannot be gained by driving around the gate or through the fence.

A permanent sign must be posted at the entrance of the facility, which indicates the following:

- A. The name of the facility's owner;
- B. The name and telephone number of a person responsible for the facility;
- C. The wastes accepted at the facility; and
- D. The days and hours the facility is open for access.

Signs are available through Roughrider Industries in Bismarck or you may wish to make your own.

#### **IV. Waste Acceptance and Disposal Practices**

Disposal at the inert waste landfill must be limited to inert wastes only. Some guidelines on waste acceptance and management include:

- A. Clean-burning wastes such as trees and branches generated by a small community can be stockpiled in one or more separate aboveground piles. Clean, non-diseased wood can be made available to the public for firewood. Similarly, lumber, doors, windows, and reusable materials may be segregated for reuse. The Department promotes responsible reuse and recycling of materials.

Acceptance of pallets and other "trade waste" should be avoided as these materials should be properly managed by the company generating such materials. Such materials should be reused or recycled ([see list of Wood Processing/Recycling Facilities and Equipment Vendors](#)). The Department may deny burn variances for woodpiles that have large amounts of "trade waste."

If wood cannot reasonably be used as described above and/or if it is diseased wood that cannot be reasonably processed (shredded), the Department may consider an application for a one-time burn variance conditioned upon demonstration of the unusual or exceptional circumstance combined with reasonable efforts by the facility to promote waste reduction and reuse. Thus, a modest amount of clean, unusable lumber, demolition lumber, and wooden furniture may also be burned, but if quantities of "wood waste" become excessive, the Department may deny a variance. Do not mix other materials such as plastic, shingles, tires, grass, leaves, garbage, and other waste that may generate toxic emissions or excessive smoke; rather, limit the piles to clean-burning (non-treated) wood only.

The landfill owner/operator should coordinate with the local fire department to ensure protection should their services be needed. The burn variance application should have coordination approval of the local fire chief and the District Health Unit if the county is a member of a district.

- B. Concrete, bricks, mortar, plaster, asphalt roofing, tires, shingles, upholstered furniture, and other inert wastes which cannot be burned can be disposed in a disposal trench.
- C. Metal wastes such as automobiles, major appliances, demolition metals, etc., may be stockpiled in a separate area for eventual recycling. Major appliances and scrap metal are prohibited from disposal and must be stockpiled for recycling. Please note that any refrigerant must be appropriately removed and collected. Intentionally venting refrigerants (such as Freon®) to the open air is prohibited under [Section 608 of the Clean Air Act of 1990](#).
- D. Yard waste (grass and leaves). Yard waste collection or composting sites may be established at inert waste landfills. Do not mix grass and leaves with clean wood. See Section VIII for additional information.
- E. Scrap tires. Recycling markets are developing for scrap tires, but land filling is still an approved disposal practice. See Section IX for additional information.
- F. The facility shall not be used for the disposal of household garbage or putrescible waste; liquids of any type; asbestos; soluble wastes (fly ash, salt, etc.); animal carcasses; waste grain, seed and elevator screenings; treated grain; pesticide containers; lead-acid batteries; used oil; greases; oil filters; PCB waste/oils; hazardous wastes [i.e., ignitables (solvents, paints and fuels), corrosives (acids and alkalis), reactives, toxicity characteristic and listed wastes]; electronic waste (televisions, computers, monitors, printers, copiers, materials containing circuit boards, ballasts, capacitors, etc.); mercury-containing devices (fluorescent lighting, switches, thermometers, thermostats, etc.); hazardous materials; sludges; manure; septic tank pumping's; special waste (oilfield and/or coal combustion waste); industrial waste; radioactive waste; or infectious wastes. Any such wastes arriving at the site for

disposal must be sent back with the generator of the waste for proper disposal. If appreciable problems arise in such wastes arriving at the site, the site operator or responsible party should contact the Division of Waste Management, North Dakota Department of Environmental Quality (telephone: 701-328-5166) for further guidance. Local law enforcement officials should also be contacted regarding such problems. It is sometimes beneficial to provide a separate roll-off container or dumpster for putrescible wastes (garbage) brought to the site so these wastes can be routinely transported to a permitted municipal waste landfill.

The site supervisor should ensure that citizens dispose various wastes in the appropriate areas. Signs erected within the site guiding the disposal of different wastes are beneficial. In addition, the sign at the gate should stipulate the proper disposal of the different waste types.

## **V. Site Operation and Maintenance**

A community or business establishing the disposal site should have adequate equipment available for excavating disposal trenches and for routine compaction and covering of disposed waste as needed. In addition, inert waste landfill operators should have access to a 2-inch or larger water pump. Any liquid in the disposal trench should be pumped out into a separate holding pond. The pumping will reduce the amount of water in contact with wastes in the trench. Under no circumstances may pit water be discharged into ditches, wetlands, or other drainage ways, or off landfill property.

The site supervisor must ensure that all persons involved in the disposal operation are knowledgeable of state waste management rules and regulations, the contents of this guideline, and any specific issues concerning facility compliance.

The disposal site should be open only during specific days and times of the week. During these times a site supervisor or operator must be present to supervise disposal and they should ensure that spilled debris is properly cleaned up. The site must be locked at all other times so as to prevent unauthorized access and unauthorized disposal. It is suggested that a notice in the local newspaper be published at regular intervals stating the times the landfill is open, specifying the types of waste accepted, and other appropriate rules for the site.

The working face or open area of a landfill must be limited in size to as small an area as practicable. Spread the waste in layers not to exceed two feet in thickness and compact the waste by running over the layers four to five times with heavy equipment to reduce the volume. Sequential partial closure must be implemented as necessary to keep the disposal area as small as practicable and to close filled areas in a timely manner. See an example of a [Landfill Development Sequence](#). "Closing as you fill" will invariably save money in the long run.

All loads brought to the site must be properly contained and covered so as to prevent any spillage or windblown debris leaving the transport vehicle. The cooperation of local law enforcement officials and the landfill supervisor in monitoring loads of waste hauled to the site is essential to prevent any littering, unauthorized disposal, or the disposal of wastes that are not allowed to be disposed at the site.

The community, township, or county in which the disposal site is located may choose to have appropriate ordinances and fines enacted for nonconforming disposal, unauthorized disposal, or littering at the site. Such information should be posted at the gate to the facility.

Inert waste disposal sites require regular care and maintenance. Wastes must be covered at minimum every six months, but more often if necessary. Proper precautions should be taken for final site drainage. Closed areas should be properly sloped so as to promote surface water drainage.

Vector control measures, in addition to the application of cover material, must be instituted whenever necessary to prevent the transmission of disease, prevent bird hazards to aircraft, and otherwise prevent and reduce hazards created by rats, flies, snakes, insects, birds, cats, dogs, and skunks.

## **VI. Site Closure and Postclosure Care**

Prior to the application of final cover, the site should be graded to minimize erosion and optimize drainage of precipitation falling on the landfill. The slopes may not be less than 3 percent, nor more than 15 percent. The landfill must be closed with a final cover designed to minimize precipitation run-on from adjacent areas while providing a surface drainage system which does not adversely affect drainage from adjacent lands.

The owner/operators of inert waste landfills have two cover system options for final closure. The owner/operators may choose: a 2-foot thick (or thicker) cover consisting of at least 12 inches of compacted clay-rich soil, at least 6 inches of uncompacted clay-rich soil, and at least 6 inches of topsoil; or a 4-foot thick (or thicker) cover consisting of at least 32 feet of uncompacted clay-rich soil and at least 6 inches of topsoil.

After the site is covered and graded to promote runoff, it must be seeded with shallow rooted native grasses. Deep-rooted vegetation such as alfalfa and trees should not be planted on filled areas. Your local NRCS office can assist you in selecting an appropriate seed mix.

Closed solid waste management units may not be used for cultivated crops, heavy grazing, buildings, or any other use which might disturb the protective vegetative and soil cover.

Owners/operators of inert waste landfills must conduct postclosure care for a period of five years after closure. Postclosure care consists of performing at minimum, annual inspections to ensure the integrity and effectiveness of the final cover and making repairs to the cover to correct effects of settlement, subsidence, and other events, and preventing run-on and runoff from eroding or otherwise damaging the final cover.

## **VII. Record of Notice**

At the start of landfill operation, the owner or operator shall record a notarized affidavit with the county recorder. The affidavit must specify that this facility, as noted in the legal description, is permitted to accept solid waste for disposal. This affidavit must specify that another affidavit must be recorded upon the facility's final closure. See an example of an [Affidavit of Solid Waste Disposal Facility](#).

Within sixty days of completion of final closure and prior to sale or lease of the property on which the facility is located, the owner shall comply with North Dakota Century Code section 23.1-08-21. The record or plat shall, in perpetuity, notify any person conducting a title search that the land has been used as a solid waste disposal facility. The record or plat must indicate the types and quantities of solid waste placed in the site and details on the site's construction, operation, or closure (including precautions against any building, earth moving, or tillage on the closed site) that are necessary to ensure the long-term maintenance and integrity of the closed facility. The Department must be provided a certified copy of any affidavit or plat within sixty days of recording. See an example of an [Affidavit and Notice of Disposal Facility](#).

## VIII. Yard Waste

Many communities provide collection or compost locations for grass clippings and leaves at their inert waste landfills. These communities have realized that disposal of yard waste in municipal waste landfills is expensive and consumes valuable landfill space. The Department encourages the separation of yard waste from the municipal waste stream and the establishment of yard waste collection/compost sites if the yard waste is appropriately managed. Yard waste should not be buried at inert waste sites since landfill space-saving advantages would be defeated. Additionally, yard waste usually may not be effectively burned at the landfill because of moisture and aeration problems in yard waste piles. Burn variances prohibit the burning of materials which will smolder. Inert landfill operators are then left with at least two methods to properly manage yard waste: composting and land incorporation.

Composting yard waste is a controlled decomposition process requiring active management and resulting in a useful end product (compost). A proper composting operation requires development of a suitable area for composting and active management of the composting pile. The landfill operator should develop a composting area by:

- A. Selecting a nearly level, easily accessible area;
- B. Constructing a berm or ditch around the composting area to divert surface water run-on and control surface runoff from the composting pile;
- C. Constructing a composting "pad" in the shape of an inverted "V" where yard waste will be "windrowed" on one ramp for composting and then placed on the other ramp when turned. The ramps allow surface water to be drained from the composting pile. See an example of [Composting](#) and a [Compost Area Layout](#).
- D. If the composting area is also a yard waste collection point, provide guidance signs instructing residents to keep plastic bags out of the yard waste and provide trash receptacles for bag disposal.

Proper management of the yard waste involves these fundamental steps by the landfill operator:

- A. Maintain a nutrient balance in the composting pile by mixing nitrogen-rich (grass) and carbon-rich (leaves, straw) material. Leaves collected in the fall may be saved for incorporation with grass the following summer. If leaves are not available, straw may



be mixed with grass during the summer months. Wood chips may also be used if leaves are not available.

- B. Maintain sufficient oxygen in the pile by turning the windrows on a regular basis (monthly during the growing season) and preventing accumulation of surface water near the piles (purpose of the ramps). The main complaint registered with composting piles arises from odors generated by oxygen-poor conditions in the pile. When turning the pile, the material should be lifted and allowed to “cascade” down, allowing the material to be properly aerated.
- C. Maintain moisture balance in the pile by adding water during dry periods of the year. If necessary, water should be added during the turning process. The material should be moist but it should not be possible to squeeze free water from a handful of yard waste.
- D. Maintain temperature of the pile by constructing windrows of sufficient size. Adequate heat is required in the pile for efficient yard waste decomposition. Piles 8 to 10 feet wide and 4 to 6 feet tall should be large enough to generate necessary heat. Piles should be peaked in the center to shed water.

Land incorporation is an alternative yard waste management method if a community determines composting is not feasible. Land incorporation of yard waste involves the cooperation of a local farmer and is simply the incorporation of yard waste into the soil surface of crop production fields.

The yard waste is usually collected at the landfill, cleaned of plastic bags, and loaded onto a truck for delivery to a field at the farmer’s convenience. During the summer months, yard waste is usually incorporated into Agricultural Stabilization and Conservation Service (ASCS) “set aside” acreage. The yard waste eventually decomposes in the soil and provides the benefits of added nutrients and organic matter to the soil.

The Department’s main concern with the land application method is the potential problem of litter if yard waste is not properly cleaned prior to land incorporation.

## **IX. Scrap Tires**

Scrap tires continue to be a problem waste for many landfills in North Dakota. Besides being a waste that is difficult to landfill, tire piles may pose a health threat by providing vector (mosquito, rat) breeding habitat. Tire piles may also pose an environmental hazard in the event they become ignited, releasing contaminants to the atmosphere, and possibly to surface and groundwater.

Scrap tire recycling is developing in North Dakota, but is not established throughout the state (contact the Department for information on scrap tire haulers and tire recyclers). Land-filling tires, therefore, remains a viable and approved method of scrap tire disposal.

The North Dakota Solid Waste Management Rules describe strict management requirements for tire piles exceeding 1,300 tires. Landfill operators are therefore advised to maintain their scrap tire piles at less than 1,300 tires to be exempt from these requirements. The Department roughly estimates that a tire pile of 400 square feet with an average height of 4 feet will contain 1,300 tires.



The Department recommends that landfill disposal of tires be coordinated with a time when a new trench is excavated. The basis for this recommendation lies with the fact that tires do not compact well and create a buoyant or “springy” surface when buried near the surface. The problem of buoyancy can be reduced if tires are shredded prior to burial. If tires are not shredded, they should be placed in layers at the bottom of a trench and covered with denser material such as concrete debris. Tires should be buried beneath the frost line (about 4 feet) to prevent them from being heaved to the surface. Land-filled tires should be completely covered with soil to eliminate a mosquito breeding habitat and the potential for fires.

## **X. Plan of Operation**

The owner/operator of a permitted inert waste landfill must prepare and implement a written plan of operation. The plan of operation is similar to an owner’s manual for a vehicle or appliance; the plan should describe the facility’s operation to facility personnel and the facility must be operated in accordance with the plan.

The Plan of Operation must include, at minimum:

- A. A waste acceptance plan detailing the categories of wastes acceptable for disposal and the types of wastes that will not be accepted at the site;
- B. A description of facility inspection activities as required for proper record keeping and reporting. The owner/operator should keep an inspection log that includes, at minimum, the date of the inspection, the name of the inspector, observations made, and the date and type of any repairs or corrective action taken, if necessary. Inspections should be conducted at least monthly. See a sample [Inert Waste Landfill Inspection Checklist](#).
- C. A contingency plan describing what actions will be taken for unusual events such as fire, excessive dust, excessive precipitation, or any other potential emergencies at the facility; and
- D. A discussion of how partial closure will occur at the landfill.

## **XI. Recordkeeping and Reporting**

The owner/operator of a permitted landfill must keep records of the types and weights or volumes of wastes accepted at the facility. Inert waste landfills generally receive only a limited number of waste types. Categories might include wood, metal, concrete, compost, tires, and others.

The owner/operators must also prepare and submit an annual report to the Department by March first of each year. See a sample [Inert Waste Landfill Annual Report](#). The report must cover facility activities during the previous calendar year. The report must include the following: (1) name and address of the facility; (2) calendar period covered by the report; (3) annual quantity for each category of solid waste in tons or volume; (4) identification of occurrences and condition that prevented the compliance with the permit and North Dakota Solid Waste Management Rules; and (5) other items identified in the facility plans and permit.

## **XII. Permit Application Procedures**

### **A. Site Selection**

The first step in the permit application process for a new inert waste landfill involves selecting a site that is suitable for a landfill and that is acceptable to local zoning entities. NDAC subsection 1 of section 33.1-20-04.1-01 states:

“No solid waste management facility may be located in areas which result in impacts to human health or environmental resources or in an area which is unsuitable because of reasons of topography, geology, hydrology, or soils.”

Before proceeding with extensive plans, it is suggested that an applicant provide the Department with a facility description describing the proposed landfill location and projected size of the operation, in addition to providing a statement of approval from the local zoning authority. The site assessment should describe the natural features of the proposed site. The applicant can use soil survey, topographic, and geologic maps to characterize the site and illustrate the relationship of the site location to surrounding features such as wetlands, gravel pits, woody draws, etc., which may prevent the site from becoming permitted.

### **B. Permit Application**

Applications for permits or permit renewals for inert waste landfills must be submitted on Departmental forms and signed by the owner/operator.

Applications for new inert waste landfills must publish a public notice in the official county newspaper that an application has been submitted to the Department. Applications for new inert waste landfills completed after July 1, 1994, may be subject to approval by a county-wide vote if the Board of County Commissioners calls a special election.

The application for an inert waste landfill, in addition to the application form, must include the following supplementary information:

1. Description of types of waste accepted;
2. Description of soils and geology at the site;
3. Site development plans (layout);
4. Plan of operation;
5. Open burning and dust control methods;
6. Plans for separation of topsoil and subsoil;
7. Inspection and reporting methods;
8. Description of access control and facility signs; and
9. Written closure plan.

Routine permit renewals for inert waste landfills do not require publication of a public notice and only need address supplementary information requirements if the facility operation has significantly changed.