Chapter NR 550

ENVIRONMENTAL RESPONSE AND REPAIR

Note: Chapter NR 184 as it existed on December 31, 1986 was repealed and a new chapter NR 550 was created effective January 1, 1987.

Subchapter I — General

NR 550.01 Purpose. The purpose of these rules is to establish the Wisconsin environmental response and repair plan which contains:

(1) The methods for establishing and maintaining an inventory of sites or facilities which cause or threaten to cause environmental pollution; and for conducting investigations and analysis to determine the extent of pollution at a site or facility;

(2) The criteria for ranking the sites and facilities contained on the inventory;

(3) The criteria for determining whether a site or facility poses a substantial danger to the public health or welfare, or the environment;

(4) The methods for determining cost-effective repair actions to reduce, eliminate, or mitigate existing environmental pollution, and prevent future environmental pollution at sites which pose a substantial danger to the public health, welfare, or safety, or the environment;

(5) The methods to insure that the costs of response and repair actions do not exceed the benefits derived from those actions; and

(6) The appropriate roles and responsibilities of federal, state, and local governments, and for interstate and nongovernmental entities for responding to sites or facilities which cause or threaten to cause environmental pollution.

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.02 Statutory authority. These rules are adopted pursuant to ss. 144.442, 144.431 (1) (c) and 227.11 (2) (a), Stats.

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.03 Applicability. These rules are applicable to sites or facilities which cause or threaten to cause environmental pollution. The rules will be used to determine the extent of pollution at a site or facility, and to determine whether a site or facility poses a substantial danger to the public health or welfare, or the environment and the potential urgency of taking repair actions. If delay results in an imminent risk to the public health or safety, or the environment, the department may take emergency response and repair actions at the site or facility.

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.04 Definitions. The following definitions apply to this chapter.

(1) "Construction" means the labor, equipment, and materials necessary to assemble, erect, build, or otherwise put into place the physical facilities, monitoring devices, wells, barriers, liners, berms, caps, or other materials, devices or equipment needed to put a repair action into effect.

(2) "Department" means the department of natural resources.

(3) "Disposal" means the discharge, deposit, injection, dumping or placing of any hazardous substance, hazardous waste, or solid waste into or on any land or water in a manner which may permit the hazardous substance, hazardous waste, or solid waste, or any constituent, to be emitted into the air, to be discharged into any waters of the state or otherwise to enter the environment.

(4) "Environmental contaminant" or "pollutant" means any substance which causes environmental pollution.

(5) "Environmental pollution" has the meaning found in s. 144.01 (3), Stats.: "the contaminating or rendering unclean or impure the air, land or waters of the state, or making the same injurious to public health, harmful for commercial or recreational use, or deleterious to fish, bird, animal or plant life."

(6) "EPA" means the U.S. environmental protection agency.

(7) "ERF" means the environmental repair fund established in s. 25.46, Stats.

(8) "Hazardous substance" has the meaning found in s. 144.01 (4m), Stats.: "any substance or combination of substances including any waste of a solid, semisolid, liquid or gaseous form which may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or which may pose a substantial present or potential hazard to human health or the environment because of its quantity, concentration or physical, chemical or infectious characteristics. This term includes, but is not limited to, substances which are toxic, corrosive, flammable, irritants, strong sensitizers or explosives as determined by the department."

(9) "Hazardous waste" means a solid waste which meets the definition of hazardous waste in s. NR 181.12.

(10) "Imminent risk" means any existing or impending condition which causes or may cause an immediate threat which, if not controlled, would have severe or irreversible consequences, which may or may not be immediate, to the public health or safety, or the environment.

(11) "In-field conditions study" means a comprehensive survey and analysis of a site or facility which poses a substantial danger to the public health or welfare, or the environment, to determine the nature and extent of environmental pollution at the site or facility.

Note: In-field conditions studies are similar in scope and content to remedial investigations performed under the superfund act.

(12) "National priorities list" means the list established under s. 105 (8) (b) of the superfund act, 42 USC 9601, et seq.

(13) "Person" has the meaning found in s. 144.01 (9m), Stats.: "an individual, owner, operator, corporation, partnership, association, municipality, interstate agency, state agency, or federal agency."

(14) "Professional services" means the consulting activities offered by licensed engineers and architects, geologists, hydrogeologists, scientists, lawyers or others who by training and experience possess an expertise for defining, analyzing, and solving specific technical problems.

(15) "Release" means, but is not limited to, the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injection, leaching, dumping or disposal into the environment of any substance which causes environmental pollution.

(16) "Repair" or "repair action" means any action taken to control or reduce the environmental pollution resulting from the release of an environmental contaminant.

Note: Repairs include, but are not limited to, confinement, storage, site modifications, removal, redisposal, treatment, or destruction of the waste.

(17) "Repair options plan" means a study for developing, analyzing, evaluating and selecting the appropriate repair action for a site or facility which poses a substantial danger to the public health or welfare, or the environment.

Note: Repair options plans are similar in scope and content to the feasibility studies performed under the superfund act.

(18) "Respond" or "response" means any action, investigation, or analysis taken to: identify sites or facilities; determine the extent of environmental pollution; study possible repair actions; determine the total present worth of costs of repair actions; or to determine responsibility for repair actions.

(19) "Responsible person" or "person responsible" means a person who may be held responsible for conditions which present a substantial danger to the public health or welfare, or the environment, and from whom incurred costs to reduce or eliminate the substantial danger may be recovered under the provisions of s. 144.442 (9), Stats.

(20) "Site or facility" has the meaning found in s. 144.442 (1), Stats.: "an approved facility, an approved mining facility, a nonapproved facility or a waste site."

(21) "Solid waste" has the meaning found in s. 144.01 (15), Stats.: "any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded or salvageable materials, including solid, liquid, semi-solid or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not in-

clude solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under ch. 147, Stats., or source, special nuclear or by-product material as defined under s. 140.52, Stats."

(22) "Substance" has the meaning found in s. 160.01 (8), Stats.: "any solid, liquid, semisolid, dissolved solid or gaseous material, naturally occurring or man-made, chemical, or parameter for measurement of water quality or biological organism which, in its original form, or as a metabolite or a degradation or waste product, may degrade the quality of the environment."

(23) "Superfund act" means the comprehensive environmental response, compensation, and liability act of 1980, 42 USC 9601, et seq.

(24) "Surface water" means those portions of Lake Michigan and Lake Superior within the boundaries of Wisconsin, all natural and man-made lakes, bays, rivers, streams, springs, ponds, impoundments, marshes, water courses, and drainage courses, public or privately owned, within the state or under its jurisdiction.

(25) "Waste" means any solid waste, hazardous waste, hazardous substance spill residual, domestic sewage, or industrial discharge.

(26) "Waste site" has the meaning found in s. 144.442 (1), Stats.: "any site, other than an approved facility, an approved mining facility or a nonapproved facility, where waste is disposed of regardless of when disposal occurred."

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.05 Requirements for certified or registered laboratory. Samples taken as part of response or repair actions under this chapter shall be analyzed by a certified or registered laboratory certified or registered under ch. NR 149, except that microbiological and radiological samples shall be analyzed by the state laboratory of hygiene or at a laboratory approved or certified by the department of health and social services. The following tests are excluded from this requirement:

(1) Physical tests of soil, such as density, degree of compaction, porosity, plasticity, Atterberg limits, moisture content, particle size distribution, permeability, and classification;

(2) Physical tests of wastes, such as density, degree of compaction, and physical state of waste;

(3) Air quality tests;

(4) Gas tests;

(5) Field pH tests;

(6) Field conductivity tests;

(7) Nutrient tests of soils and wastes;

(8) Turbidity tests;

(9) Water and groundwater elevations;

(10) Product or construction quality tests;

(11) Temperature;

(12) Waste and containment compatibility tests; and

(13) Other tests which the department may exclude on a case-by-case basis.

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.06 Public participation. (1) PUBLIC INFORMATION. (a) *Public records.* Under the provisions of s. 19.35, Stats., reports or other information furnished to or obtained by the department as part of response and repair activities are public records.

(b) *Confidentiality.* Confidential status may be granted to reports or other information furnished to or obtained by the department as part of response and repair actions. It is the responsibility of the persons seeking confidential status to demonstrate to the department that confidentiality is necessary to protect trade secrets or other information entitled to confidentiality under the standards and procedures contained in s. NR 2.19. The department may not grant confidential status to information concerning the kind or the extent of pollution, nor the hazards or risks the pollution poses.

(2) PUBLIC NOTICES. (a) *Site inventory.* The site inventory, and any amendments, compiled and maintained in accordance with s. NR 550.20 shall be published as a class 1 notice under ch. 985, Stats.

(b) *Hazard ranking list.* The hazard ranking list compiled and maintained in accordance with s. NR 550.21 shall be published as a class 1 notice under ch. 985, Stats.

(c) *Planned repair actions.* All planned repair actions selected in accordance with the procedures contained in s. NR 550.33 shall be published as a class 1 notice under ch. 985, Stats.

(3) PUBLIC HEARINGS. The department shall hold a public informational, noncontested case hearing under s. NR 2.135 on the hazard ranking list, or any amendments, or for any planned repair action if a hearing is requested within 30 days after the notice required in sub. (2) is published. As provided in s. 144.442 (4) (c) 4., Stats., notwithstanding s. 227.42, Stats., the public hearing may not be converted to a contested case hearing. The hearing notice shall be published at least 10 days prior to the hearing as a class 1 notice under ch. 985, Stats.

(4) INFORMATIONAL MEETING. In addition to the requirements of subs. (2) and (3), the department may hold an informal informational meeting for planned repair actions.

(5) EMERGENCY RESPONSES. (a) *Minimum notification.* The department shall, without undue delay, issue public information or news releases pertaining to any emergency response or repair taken by the department under this chapter. At a minimum, this information or news release shall contain:

1. A description of the hazard or imminent risk;

2. The potential danger to the public health or safety, or the environment;

3. Actions underway to contain or reduce the hazard or imminent risk; and

4. Any precautions which residents of the area should take.

(b) *Additional notification.* Depending on the circumstances of the imminent risk, the department may:

1. Contact local government, law enforcement, emergency response, and health officials to inform them of the circumstances and department actions;

2. Prepare radio and television announcements;

3. Hold public informational meetings;

4. Post notices in the vicinity of the site or facility;

5. Leaflet door-to-door; or

6. Establish an information clearinghouse or hotline number.

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.07 Superfund cost sharing. (1) USE OF SUPERFUND ACT. To the extent possible, the department shall promote the use of available federal resources for repair action if the site or facility is listed on the national priorities list.

(2) COOPERATIVE AGREEMENTS AND STATE CONTRACTS. The department may enter into cooperative agreements or state contracts with the EPA for the purposes of taking repair action under the superfund act. The department may use money from ERF to pay the required state share of any repair action taken in agreement with the EPA.

(3) CRITERIA FOR COST SHARING. (a) *General.* The department shall consider the criteria listed in pars. (b) to (i), in descending order of importance, to determine whether or not to enter into a cooperative agreement or state contract with EPA for taking repair action.

(b) *Benefits to be derived from the repair action.* The department shall review the risk assessment, focused feasibility study, and other reports prepared by EPA to evaluate proposed repair actions. The department may not commit the required state share for a repair action unless the department is in substantial agreement with EPA's assessment of the effectiveness of the proposed repair action to protect public health, welfare, and safety, and environmental quality, and to restore the environment to the extent practicable.

(c) *Money available in ERF.* The department shall consider the money available in ERF taking into account the following:

1. At the beginning of each fiscal year, the department shall reserve adequate funds for planned state-funded investigations, hazardous substance spill response, abandoned container cleanup, and emergency response.

2. The department shall consider the timing of expenditures from ERF in relation to the end of the fiscal year and the availability of new appropriations. When nearing the end of a fiscal year, the department may use funds earlier reserved for hazardous substance spill response, abandoned

container cleanup, and emergency response to commit the state share of repair actions taken in agreement with EPA.

(d) *Money available from other sources.* The department shall consider the money available from other sources to pay the capital cost and annual operations and maintenance costs for repair actions taken in ageement with EPA. These sources include:

1. Responsible persons who are willing and able to pay part of the project costs;

2. Other federal grant or loan programs which have money immediately available;

3. The Wisconsin well compensation program, and for mining facilities, the investment and local impact funds;

4. Closure bonds or other financial responsibility proofs; and

5. Local governments willing to financially support the repair action.

(e) *Potential of cost recovery from responsible person.* The department shall consider the potential for cost recovery from a responsible person under federal or state law. In general, if a responsible person exists the department shall favor repair action where cost recovery from the responsible person is likely rather than repair action where cost recovery is unlikely.

(f) *Ownership of site.* 1. The department shall establish whether the site or facility is privately or publicly owned.

Note: The superfund act requires states to commit 10% of the repair costs for actions taken at private sites, and at least 50% of the repair costs for actions taken at publicly-owned sites.

2. To receive the greatest benefit of funds under the superfund act and to maximize the benefits to the state of the monies available in ERF, the department shall favor cost sharing of repair actions taken at private sites or facilities over cost sharing of repair actions taken at public sites or facilities.

(g) *Timing of repair actions.* The department shall consider:

1. Whether or not the repair action may be more effective if started at another time of year; and,

2. Whether or not the environmental hazards at the site or facility will become greater if action is delayed.

(h) *Preclusion of other projects.* The department shall consider whether the department's ability to take repair action at other sites or facilities will be precluded by committing ERF funds for the state share of repair actions taken in agreement with EPA.

(i) *Other criteria.* The department may consider other appropriate criteria.

(4) NOTIFICATION. After consideration of the criteria listed in sub. (3), the secretary of the department shall notify EPA in writing whether or not the department will commit the required state share for repair action taken under the superfund act.

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.08 Cost recovery. (1) APPLICABILITY. The department shall attempt to identify the persons responsible for sites or facilities which pose a substantial danger to the public health or welfare, or the environment, and recover costs of response and repair actions to the extent allowed by state law.

(2) RESPONSIBLE PERSONS. (a) *Discovery.* The department or its agents and contractors shall attempt to identify potentially responsible persons during all phases of response and repair actions by:

1. Interviewing local officials, neighboring residents, persons involved with the operations of the site or facility, and past and present site or facility owner or operator;

2. Reviewing operational records of the site or facility;

3. Reviewing department records;

4. Determining current and past ownership of the site or facility; or,

5. Other appropriate means.

(b) *Determination.* Based on the information obtained, the department in consultation with the department of justice shall determine if the criteria contained in s. 144.442 (9), Stats., are met, and if under s. 144.442 (9) or (11), Stats., there is a person responsible for any site or facility which poses a substantial danger to the public health or welfare, or the environment.

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

Subchapter 2 — Hazard Ranking System

NR 550.20 Inventory of sites or facilities. (1) GENERAL. (a) *Inventory.* The department shall compile and maintain an inventory of sites or facilities which cause or threaten to cause environmental pollution.

(b) *Information.* The inventory shall contain the following information:

1. Site or facility name;

2. Site or facility owner, operator, or other potentially responsible persons;

3. Department district where the site or facility is located;

4. County where site or facility is located;

5. The town or city where site or facility is located;

6. An address or legal description of site or facility; and

7. Routes of actual or potential environmental pollution associated with the site or facility;

(2) PUBLICATION. (a) *Requirement.* The department shall publish the inventory and any amendments to the inventory as required by s. 144.442 (4), Stats.

(b) *Initial inventory.* The department shall publish the initial inventory within 180 days after January 1, 1987.

(c) *Amendments.* Amendments to the inventory shall be published no later than December 31 of every even numbered year after the initial inventory is published.

(3) LISTING A SITE OR FACILITY ON THE INVENTORY. (a) *Listing.* A site or facility may be listed on the inventory after the department has determined that the site or facility causes or threatens to cause environmental pollution using the screening process described in sub. (5). Only sites or facilities which have a high potential of causing or threatening to cause environmental pollution shall be listed on the inventory, except that all Wisconsin sites nominated for or contained on the national priorities list shall be included on the inventory.

(b) *Exceptions.* 1. Except as provided in subd. 2., the department may not list on the inventory sites or facilities which are regulated under department permit or approval under ss. 144.43 to 144.79, Stats., s. 144.04 and ch. 147, Stats., ss. 144.30 to 144.426, Stats., ss. 144.04 and ch. 162, Stats., ch. 30, Stats., or other approvals or permits issued by the department.

2. a. If the regulation of a site or facility under department approval or permit is failing to correct any environmental threats at the site or facility, the department may consider the site or facility for listing on the inventory.

b. The department may list regulated sites or facilities on the inventory if the department determines that the site owner or operator is not responsible for environmental pollution which results from an unanticipated release.

(4) DELISTING A SITE OR FACILITY FROM THE INVENTORY. (a) *Delisting.* 1. Any site or facility may be removed from the inventory if the department determines that the site or facility no longer causes or threatens to cause environmental pollution.

2. The department shall delist an individual site or facility from the inventory by excluding the site or facility from the next inventory amendment published subsequent to the department's decision. The department shall use the screening process contained in sub. (5) to decide that a site or facility neither causes nor threatens to cause, or no longer causes or threatens to cause, environmental pollution.

(b) *Reasons for delisting.* Reasons for delisting a site or facility from the inventory include, but are not limited to, the following:

1. Additional information gathered by the department, or received from any person, allows the department to determine that the site or facility neither causes nor threatens to cause environmental pollution;

2. The department, the EPA, responsible person, or other person completes repair action at the site or facility and such action has eliminated the actual or potential environmental pollution at the site or facility.

(5) SCREENING SITES OR FACILITIES. (a) *Site identification.* Sites or facilities which may cause or threaten to cause environmental pollution may be identified through department observations or inspections, referrals by other government agencies, referrals by local governments, or by other persons.

(b) *Initial assessment.* The department shall conduct an initial assessment of each site or facility which the department suspects causes or threatens to cause environmental pollution. The department shall gather the following information during the initial assessment:

1. Type of wastes disposed at the site or facility;

2. Estimated quantities of wastes disposed;

3. The volume and areal size of the site or facility;

4. Estimated depth to groundwater;

5. The distance to private water supply wells, and public water supply systems;

6. Population living within ¼ mile of facility or site;

7. Types of surface and underlying soils;

8. The distance from the site or facility to the nearest surface water, including wetlands;

9. The extent which the site or facility may be in a floodplain or known flood hazard area; and,

10. Estimated air emissions from the site or facility.

(c) *High potential.* Based on the information gathered during the initial assessment, the department shall assign a high potential of causing or threatening to cause environmental pollution to a site or facility which meets any of the following criteria:

1. Groundwater pollution within 1200 feet of a site or facility exceeds a preventive action limit for any substance of public health concern or public welfare concern listed in ss. NR 140.10 and 140.12;

2. Surface water pollution within 1200 feet of the site or facility violates the water quality standards contained in chs. NR 102, 103, and 104;

3. Air pollution within 1200 feet of the site or facility violates the air quality standards contained in chs. NR 400 to 499; or

4. An assessment of the size of the site, the depth to groundwater, the surface and underlying soils, the distance to nearest private or public water supply, population within ¼ mile of site or facility, waste characteristics and volume, proximity to protected natural resources or environments, and other appropriate factors leads the department to conclude that there is a high potential that the site or facility may cause or threaten to cause environmental pollution.

(d) *Low potential.* A low potential may be assigned to any site or facility not classified as a high potential after considering the following criteria:

1. Waste disposal at the site or facility consists solely of concrete, brick, wood, coal ash, foundry sand, inert material, or other demolition debris which does not contain hazardous substances;

2. Waste is disposed over an areal extent of less than 5 acres and the distance to the nearest water supply used for human consumption is greater than 600 feet;

3. Waste is disposed over an areal extent of less than 10 acres and the distance to the nearest water supply used for human consumption is greater than 1200 feet.

4. A minimum 5 foot continuous layer of silt or clay exists below the site and separates the bottom of the site from bedrock or the groundwater table; or

5. Other appropriate information which leads the department to conclude that there is a low potential that the site or facility causes or theatens to cause environmental pollution.

(e) *Unknown potential.* Any site or facility which cannot be classified as being a high or low potential shall be classified as an unknown potential. In this circumstance, the department or its contractor, or other person shall obtain the information needed to complete the screening process.

(f) *Additional information.* The department shall collect additional information for each site or facility classified as a high potential or unknown potential. The information shall include:

1. The name of the person or persons who presently own or operate the site or facility;

2. The names of potentially responsible persons;

3. Site or facility operational status;

4. The approximate length of time the site or facility was operated;

5. Surface soil permeability;

6. Depth to bedrock;

7. Depth to groundwater;

8. The number of private water supply wells and public water supply systems within 3 miles of the site or facility;

9. The population served by private water supply wells and public water supply systems within 3 miles of the site or facility;

10. Other information which may assist the department in determining the extent of actual or potential environmental pollution from the site or facility.

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.21 Hazard ranking system. (1) APPLICABILITY. (a) *Sites or facilities to be scored.* All sites or facilities listed on the inventory under s. NR 550.20 shall be scored using the hazard ranking procedures listed in ss. NR 550.22 to 550.27.

(b) *Rescoring.* The department shall evaluate the information obtained from the in-field conditions study under s. NR 550.34, or other investigation performed under s. 144.442 (4) (c), Stats., for any site or facility, and if appropriate rescore the site or facility using the hazard ranking procedures listed in ss. NR 550.22 to 550.27.

(c) *Substantial danger.* 1. All sites or facilities which receive a migration route score equal to or greater than 15.0 using the procedures listed

in ss. NR 550.22 to 550.25 shall be considered by the department to pose a substantial danger to the public health or welfare, or the environment.

2. The secretary, or the secretary's designee, may, on a case-by-case basis, determine that a site or facility not scored, or receiving a migration route score of less than 15.0, nevertheless poses a substantial danger to the public health or welfare, or the environment, based on relevant information which is not otherwise considered in the hazard ranking system. The department shall maintain a written record of the secretary's decision which shall include a detailed explanation of the factors considered to determine that a substantial danger exists.

(2) HAZARD RANKING LIST. (a) *Ranking list.* The department shall publish a hazard ranking list of sites or facilities scored using the procedures listed in ss. NR 550.22 to 550.27.

(b) *Publication.* 1. The department shall publish the hazard ranking list, and any amendments, as required by s. 144.442 (4), Stats.

2. The initial hazard ranking list shall be published within 360 days of January 1, 1987.

3. Amendments to the hazard ranking list shall be published no later than December 31 of every odd numbered year after the initial hazard ranking list is published.

(c) *List information.* For each site scored, the hazard ranking list shall contain the following information:

1. Site or facility name;

2. Department district where site or facility is located;

3. The migration route score, the fire and explosion score, and the direct contact score;

4. A notice whether the site or facility poses a substantial danger to the public health or welfare, or the environment;

5. A brief description of the reason why the substantial danger exists; and,

6. A statement whether repair actions have been taken at the site or facility, and whether the repair actions have been completed.

(d) *Other substantial danger sites or facilities.* The hazard ranking list shall also contain those sites or facilities which have been designated to pose a substantial danger to the public health or welfare, or the environment, under sub. (1) (c) 2.

(3) SCORING. (a) *General.* The hazard ranking system assigns 3 scores to a site or facility. These are the migration score, the fire and explosion score, and the direct contact score.

(b) *Migration score.* 1. The migration score, S_M, reflects the potential for harm to humans or the environment from migration of substances away from the site or facility by routes involving groundwater, surface water, or air. It is a composite of separate scores for each of the 3 routes. The migration score is computed by the following equation;

$$S_M = \frac{1}{1.73} (S_{gw}^2 + S_{sw}^2 + S_a^2)^{0.5}$$

where: S_{gw} = groundwater route score
S_{sw} = surface water route score
S_a = air route score

2. The effect of combining the route scores is to emphasize the highest scoring route while giving some additional consideration to the other routes. The factor 1/1.73 is used to reduce S_M scores to a 100-point scale.

(c) *Fire and explosion.* The fire and explosion score, S_{FE}, reflects the potential for harm from substances that can explode or cause fires.

(d) *Direct contact.* The direct contact score, S_{DC}, reflects the potential for harm from direct contact with substances at the site or facility.

Note: The hazard ranking system does not quantify the probability of harm from a site or facility or the magnitude of the harm that could result, although the factors have been selected in order to approximate both those elements of risk. It is a procedure for ranking facilities in terms of the potential threat they pose by describing the manner in which the substances of concern are contained, the route by which they would be released, and the likely impacts on humans or natural resources.

(4) RATING FACTORS. The score for each hazard mode (migration, fire and explosion and direct contact) or route is obtained by considering a set of factors that characterize the potential for the site or facility to cause harm (Table 1). Each factor is assigned a numerical value according to the procedures set forth in ss. NR 550.22 to 550.27. This value is then multiplied by a weighting factor yielding the factor score. The factor scores within each category are added, and the total scores for each factor category are multiplied together to develop a score for groundwater, surface water, air, fire and explosion, and direct contact. In computing the fire and explosion, direct contact, or an individual migration route score, the product of its factor category scores is divided by the maximum possible score and multiplied by 100 to reduce scores to a 100-point scale.

(5) RANKING. (a) *Repair action.* The migration route score shall be used to determine substantial danger under sub. (1), and for establishing repair priorities under s. NR 550.33 (3).

(b) *Emergency action.* Fire and explosion, and direct contact scores will be used to help identify sites or facilities requiring emergency response under s. NR 550.32.

(6) INFORMATION. Use of the hazard ranking system requires considerable information about the site or facility, its surroundings, the substances present, and the geological character of the area. Where there are no data for a factor, it should be assigned a value of zero. However, if a factor with no data is the only factor in a category (e.g., containment) then the factor is given a score of 1. If data are lacking for more than one factor in connection with the evaluation of either any migration or exposure route that route score is set at zero. Figure 1 illustrates the format for recording general information regarding the site or facility being evaluated. It will also serve as a cover sheet for the work sheets used in the evaluation.

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

TABLE 1 — COMPREHENSIVE LIST OF RATING FACTORS

HAZARD MODE	FACTOR CATEGORY	Factors: GROUNDWATER ROUTE	SURFACE WATER ROUTE	AIR ROUTE
Migration	Route Characteristics	° Depth to Groundwater ° Infiltration Potential ° Permeability of Unsaturated Zone ° Physical State of Waste	° Facility Slope and Intervening Terrain ° Run-off Potential ° Distance to Nearest Surface Water ° Physical State of Waste	
	Containment	° Containment	° Containment	
	Waste Characteristics	° Toxicity/Persistence ° Leachate Strength ° Hazardous Waste Quantity/Total Waste Quantity	° Toxicity/Persistence ° Leachate Strength ° Hazardous Waste Quantity/Total Waste Quantity	° Reactivity/Incompatibility ° Toxicity ° Hazardous Waste Quantity/Total Waste Quantity
	Potential Impacts	° Groundwater Use ° Distance to Nearest Well/ Population Served	° Surface Water Use ° Distance to Sensitive Environment ° Population Served/Distance to Water Intake Downstream	° Land Use ° Population Within 4-Mile Radius ° Distance to Sensitive Environment
Fire and Explosion	Containment	° Containment		
	Waste Characteristics	° Direct Evidence ° Ignitability ° Reactivity ° Incompatibility ° Hazardous Waste Quantity/Total Waste Quantity		
	Potential Impacts	° Distance to Nearest Population ° Distance to Nearest Building ° Distance to Nearest Sensitive Environment ° Land Use ° Population Within 2-Mile Radius ° Number of Buildings Within 2-Mile Radius		
Direct Contact	Observed Incident	° Observed Incident		
	Accessibility	° Accessibility of Hazardous Substances		
	Containment	° Containment		
	Waste Characteristics	° Toxicity		
	Potential Impacts	° Population Within 1-Mile Radius ° Distance to Critical Habitat		

NR 550.22 Groundwater migration route. (1) OBSERVED RELEASE. (a) *Scoring.* If a release is observed using the criteria listed in par. (b), enter a score of 45 on line 1 of the groundwater route worksheet (Figure 2), and do not evaluate the route characteristics and containment factors (lines 2 and 3). If direct evidence of a release is lacking, enter a value of zero on line 1 and proceed with scoring the route characteristics and containment factors as described in subs. (2) and (3).

(b) *Direct evidence.* Direct evidence of release must be analytical. If a contaminant is measured, regardless of frequency, in groundwater or a well in the vicinity of the site or facility at a higher level than the background level, then quantitative evidence exists, and a release has been observed. For the purpose of this paragraph the following methods may be used to judge an observed release.

1. In the vicinity of the site or facility, the concentration of a substance of public health or welfare concern exceeds the preventive actions limits contained in Table 1, s. NR 140.10, or Table 2, s. NR 140.12;

2. In the vicinity of the site or facility, the concentration of an indicator parameter exceeds a preventive action limit for that parameter as established in s. NR 140.20;

Site or facility name:_____

Location:_____

DNR District:_____

Person(s) in charge of the site or facility:_____

_____

_____

Name of Reviewer:_____ Date:_____

General description of the site or facility:

(For example: landfill, surface impoundment, waste pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

_____

_____

_____

_____

_____

_____

_____

_____

_____

Scores: S_M = (S_{gw} = S_{sw} = S_a =)

S_{FE} =

S_{DC} =

Figure 1

HRS COVER SHEET

GROUNDWATER ROUTE WORKSHEET					
Rating Factor	**Assigned Value (circle one)**	**Multiplier**	**Score**	**Max. Score**	**Ref. Section**
[1] Observed Release	0 45	1		45	sub. (1)
If observed release is given a score of 45, proceed to line [4]. If observed release is given a score of 0, proceed to line [2].					
[2] Route Characteristics					sub. (2)
Depth to Groundwater	0 1 2 3	2		6	
Infiltration Potential	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	
	Total Route Characteristics Score			15	
[3] Containment	0 1 2 3	1		3	sub. (3)
[4] Waste Characteristics					sub. (4)
Toxicity/Persistence	0 3 6 9 12 15 18	1		18	
Leachate Strength	0 2 4 6 8 10	1		10	
Waste Quantity/Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			26	
[5] Potential Impacts					sub. (5)
Groundwater Use	0 1 2 3	3		9	
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 30 32 35 40	1		40	
	Total Potential Impacts			49	
[6] If line [1] is 45, multiply [1] × [4] × [5] If line [1] is 0, multiply [2] × [3] × [4] × [5]				57,330	
[7] Divide line [6] by 57,330 and multiply by 100			S_{gw} =		

Figure 2

GROUNDWATER ROUTE WORKSHEET

3. In the vicinity of the site or facility, a sample contains a detectable concentration of a substance not detected in a background sample; or,

4. The department determines by using other appropriate information that the increase in the concentration of a substance in the vicinity of the site or facility is from the site or facility.

Note: Tables 12 and 15 contained in sub. (4) and Tables 1, 2 and 3 contained in ch. NR 140, list substances which may be used for determining an observed release.

(c) *Qualitative evidence.* Qualitative evidence of release, e.g., an oily or otherwise objectionable taste or smell in well water, constitutes direct evidence only if it can be confirmed that it results from a release at the site or facility in question.

(2) ROUTE CHARACTERISTICS. (a) *Depth to groundwater.* Depth to groundwater is measured vertically from the lowest point of the substances of concern to the highest seasonal groundwater level. This factor is one indicator of the ease with which a pollutant from the facility could migrate to groundwater. Values for depth to groundwater are shown in Table 2.

TABLE 2

DEPTH TO GROUNDWATER

Depth to Groundwater	Assigned Value
>150 feet	0
76 to 150 feet	1
21 to 75 feet	2
<21 feet	3

(b) *Infiltration potential.* Infiltration potential is a measure of the site characteristics which encourage, or allow, the accumulation of water on the site surface and movement of water through the wastes or hazardous substances generating leachate. Infiltration potential is a function of the available water at the site, the slope of the site surface, the type of surface soils, and the vegetative cover. Infiltration potential is assigned a value from Table 3. The infiltration score is determined by adding the individual values obtained from Tables 4 and 5, and Figure 3.

TABLE 3

INFILTRATION POTENTIAL

Infiltration Potential	Infiltration Score	Assigned Value
Low	(0-6)	0
Moderately Low	(7-11)	1
Moderately High	(12-17)	2
High	(18-22)	3

TABLE 4

SLOPE/VEGETATIVE COVER

Vegetative Cover	Site Surface Slope			
	<3%	3-5%	5-8%	>8%
None	9	7	6	5
Poorly Established < (Sparse, Root Zone 6")	8	6	5	4
Established (Good, Root Zone 6-12")	6	4	3	2
Well Established > (Lush, Root Zone 12")	4	2	1	0

TABLE 5

Soil Score	Infiltration
Surface Soil Type	Value
Sand	8
Silty Sand	7
Sandy Loam	6
Silty Loam	5
Peaty Topsoil	4
Clay Loam	3
Silty Clay	2
Clay	1

TABLE 6

PERMEABILITY OF UNDERLAYING GEOLOGICAL MATERIALS

TYPE OF MATERIAL	APPROXIMATE RANGE OF HYDRAULIC CONDUCTIVITY	ASSIGNED VALUE
Unfractured clay, cemented till, shale; unfractured metamorphic and igneous rocks	10^{-7} cm/sec	0
Silt, loess, silty clays, silty loams, clay loams; less permeable limestone, dolomites, and sandstone; moderately permeable till; fractured clay	10^{-5} – 10^{-7} cm/sec	1
Fine sand and silty sand; sandy loams; moderately permeable limestone, dolomites, and sandstone (no karst); moderately fractured igneous and metamorphic rocks, some coarse till	10^{-3} – 10^{-5} cm/sec	2
Gravel, sand; highly fractured igneous and metamorphic rocks; permeable basalt and lavas; karst limestone and dolomite	10^{-3} cm/sec	3

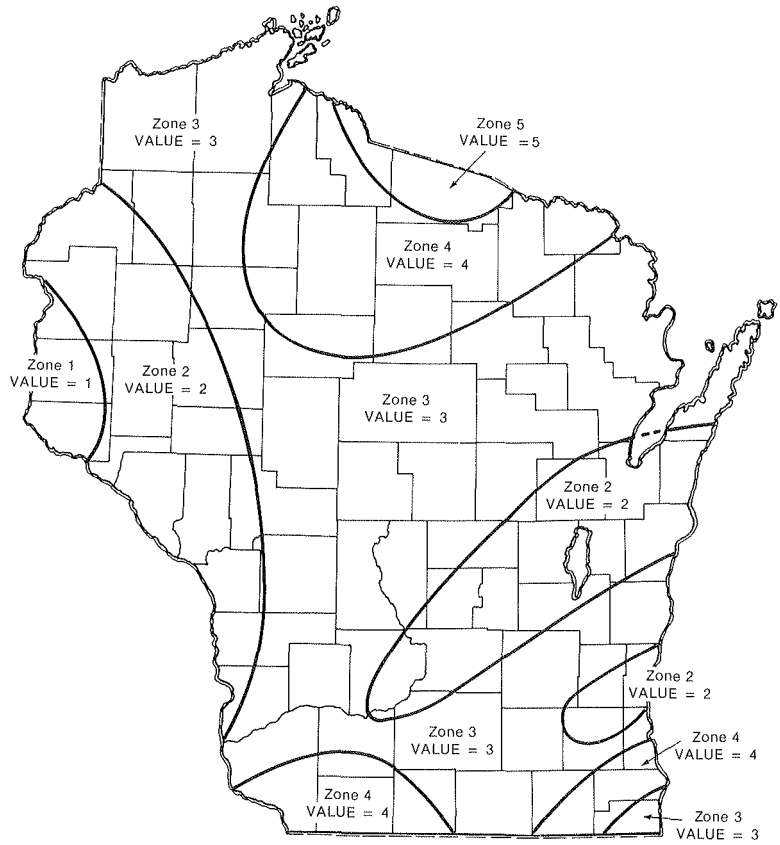

Figure 3 — Water Balance Values

(c) *Subsurface permeability.* Permeability of unsaturated zone (or intervening geological formations) is an indicator of the speed at which a contaminant could migrate from a site or facility. Values for permeability are shown in Table 6.

(d) *Physical state of waste.* Physical state refers to the state of the substances of concern at the time of disposal, except that gases generated by the substances in a disposal area should be considered in rating this factor. Values for the physical state of the substance are shown in Table 7.

TABLE 7

PHYSICAL STATE

Physical State	Assigned Value
Solid, consolidated or stabilized	0
Solid, unconsolidated or unstabilized	1
Powder or fine material	2
Liquid sludge or gas	3

(3) CONTAINMENT. Containment is a measure of the natural or artificial means that have been used to minimize or prevent a substance from entering groundwater. Examples include liners, leachate collection systems, and sealed containers. Containment values are shown in Table 8. Consideration must be given to all ways in which substances are stored or disposed at the site or facility. If the site or facility involves more than one method of storage or disposal, assign the highest from among all applicable values, e.g., if a landfill has a containment value of 1, and, at the same location, a surface impoundment has a value of 2, assign containment a value of 2.

TABLE 8

CONTAINMENT VALUE FOR GROUNDWATER ROUTE

Assign containment a value of 0 if: (1) all the hazardous substances at the site or facility are underlain by an essentially nonpermeable surface (natural or artificial) and adequate leachate collection systems and diversion systems are present; or (2) there is no groundwater in the vicinity. The value "0" does not indicate no risk. Rather, it indicates a significantly lower relative risk when compared with more serious sites. Otherwise, evaluate the containment for each of the different means of storage or disposal at the site or facility using the following guidance.

A. Surface Impoundment	Assigned Value
Sound run-on diversion structure, essentially nonpermeable liner (natural or artificial) compatible with the waste, and adequate leachate collection system.	0
Essentially nonpermeable compatible liner with no leachate collection system; or inadequate freeboard.	1
Potentially unsound run-on diversion structure; or moderately permeable compatible liner.	2
Unsound run-on diversion structure; no liner; or incompatible liner.	3

B. Containers	Assigned Value
Containers sealed and in sound condition, adequate liner, and adequate leachate collection system.	0
Containers sealed and in sound condition, no liner or moderately permeable liner.	1
Containers leaking, moderately permeable liner.	2
Containers leaking and no liner or incompatible liner.	3

C. Piles	Assigned Value
Piles uncovered and waste stabilized; or piles covered, waste unstabilized, and essentially nonpermeable liner.	0
Piles uncovered, waste unstabilized, moderately permeable liner, and leachate collection system.	1
Piles uncovered, waste unstabilized, moderately permeable liner, and leachate collection system.	2
Piles uncovered, waste unstabilized, and no liner.	3

D. Landfill	Assigned Value
Essentially nonpermeable liner, liner compatible with waste, and adequate leachate collection system.	0
Essentially nonpermeable compatible liner, no leachate collection system, and landfill surface precludes ponding.	1
Moderately permeable, compatible liner, and landfill surface precludes ponding.	2
No liner or incompatible liner; moderately permeable compatible liner; landfill surface encourages ponding; no run-on contol.	3

(4) WASTE CHARACTERISTICS. (a) *Scoring.* The waste characteristics score is evaluated using the most hazardous substances, or the strength of collected leachate, at the site or facility which could migrate to groundwater. Take the substance with the highest score as representative of the potential hazard due to waste characteristics. Note that the substance that may have been observed in the release category can differ from the substance used in rating waste characteristics.

(b) *Toxicity and persistence.* Toxicity and persistence have been combined into a matrix because of their important relationship. Determine the matrix toxicity/persistence value for a substance using Table 12, or evaluate each factor individually as discussed in pars. (c) and (d). Match the individual values assigned from Tables 10 and 11 with the values in Table 9 for the combined rating factor. Evaluate several of the most hazardous substances at the facility independently and enter only the highest score from Table 9 or 12 on the work sheet.

TABLE 9

TOXICITY AND PERSISTENCE

	Value for persistence			
Value for toxicity	0	1	2	3
0	0	0	0	0
1	3	6	9	12
2	6	9	12	15
3	9	12	15	18

(c) *Toxicity.* The toxicity of each substance being evaluated is given a value using the rating schemes shown in Table 10. Specific information about chemical toxicity is given in Table 13 or 14.

TABLE 10

TOXICITY

Toxicity Level from Table 13 or Table 14	Assigned Value
Level 0	0
Level 1	1
Level 2	2
Level 3 or 4	3

(d) *Persistence.* Persistence of each substance is evaluated based on its biodegradability. Persistence values are shown in Table 11. Specific information about chemical persistence is given in Table 15.

TABLE 11

PERSISTENCE

Persistence of Substance	Assigned Value
Easily biodegradable compounds	0
Straight chain hydrocarbons	1
Substituted and other ring compounds	2
Metals, polycyclic compounds and halogenated hydrocarbons	3

(e) *Leachate strength.* Leachate strength may be used to estimate the potential environmental pollution caused by the site or facility. Values for leachate strength are based on chemical oxygen demand, COD, and are given in Table 16. Only one of the 2 estimates, toxicity/persistence or leachate strength, is to be used.

TABLE 12

WASTE CHARACTERISTICS VALUES

Toxicity/Persistence

CHEMICAL/COMPOUND	GROUNDWATER & SURFACEWATER	AIR	IGNITABILITY	REACTIVITY	VOLA-BILITY
Acenapthene	9	3			
Acetaldehyde	6	6	3	2	3
Acetic Acid	6	6	2	1	1
Acetone	6	6	3	0	3
2-Acetylaminofluorene	18	9			
Aldrin	18	9	1	0	0
Ammonia	9	9	1	0	3
Aniline	12	9	2	0	1
Anthracene	15	9			
Arsenic	18	9			
Arsenic Acid	18	9			
Arsenic Trioxide	18	9			
Asbestos	15	9			
Barium	18	9			
Benzene	12	9	3	0	3
Benzidine	18	9			
Benzo(a)pyrene	18	9			
Benzopyrene, NOS	18	9			
Beryllium & Compounds, NOS	18	9			
Beryllium Dust, NOS	18	9			
Bis (2-Chloroethyl) Ether	15	9			
Bis (2-Ethylhexyl) Phthalate	12	3			
Bromodichloromethane	15	6			
Bromoform	15	6			
Bromomethane	15	9			
Cadmium	18	9	0		
Carbon Tetrachloride	18	9	0	0	3
Chlordane	18	9			
Chlorobenzene	12	6	3	0	1
Chloroform	18	6	0	0	3
3-Chlorophenol	12	6			
4-Chlorophenol	15	9			
2-Chlorophenol	12	6			
Chromium	18	9			
Chromium, Hexavalent (Cr^{+6})	18	9			
Chromium, Trivalent (Cr^{+3})	15	6			
Copper & Compounds, NOS	18	9			
Cresote	15	6			
Cresols	9	6	2	0	1
4-Cresol	12	9	1	0	1
Cupric chloride	18	9			
Cyanides (soluble salts), NOS	12	9			
Cyclohexane	12	6	3	0	3
DDE	18	9			
DDT	18	9			
Diaminotoluene	18	6			
Dibromochloromethane	15	6			
1,2-Dibromo, 3-chloropropane	18	9			
Di-N-Butyl-Phthalate	18	6			
1,4-Dichlorobenzene	15	6			
Dichlorobenzene, NOS	18	6			
1,1-Dichloroethane	12	6			
1,2-Dichloroethane	12	9			
1,1-Dichloroethene	15	9			
1,2-cis-Dichloroethylene	12	3			
1,2-trans-Dichloroethylene	12	3			
Dichloroethylene, NOS	12	3			
2,4-Dichlorophenol	18	6			
2,4-Dichlorophenoxyacetic Acid	18	9			
Dicyclopentadiene	18	9			
Dieldrin	18	9			

Toxicity/Persistence

CHEMICAL/COMPOUND	GROUNDWATER & SURFACEWATER	AIR	IGNITABILITY	REACTIVITY	VOLA-BILITY
2,4-Dinitrotoluene	15	9			
Dioxin	18	9			
Endosulfan	18	9			
Endrin	18	9	1	0	0
Ethylbenzene	9	6	1	0	0
Ethylene Dibromide	18	9			
Ethylene Glycol	9	6			
Ethyl Ether	15	6			
Ethylmethacrylate	12	6			
Fluorine	18	9			
Formaldehyde	9	9	2	0	3
Fromic Acid	9	6	2	0	2
Heptachlor	18	9			
Hexachlorobenzene	15	6			
Hexachlorobutadiene	18	9			
Hexachlorocyclohexane, NOS	18	9			
Hexachlorocyclopentadiene	18	9			
Hydrochloric Acid	9	6			
Hydrogen Sulfide	18	9			
Indene	12	6			
Iron & Compounds, NOS	18	9			
Isophorone	12	6			
Isopropyl Ether	9	3	0	0	3
Kelthane	15	6			
Kepone	18	9			
Lead	18	9			
Lindane	18	9	1	0	0
Magnesium & Compounds, NOS	15	6			
Manganese & Compounds, NOS	18	9			
Mercury	18	9			
Mercury Chloride	18	9			
Methane	6		3	0	3
Methoxychlor	15	6			
4,4-Methylene-Bis-(2-Chloroaniline)	18	9			
Methylene Chloride	12	6			
Methyl Ethyl Ketone	6	6	3	0	2
Methyl Isobutyl Ketone	12	6			
4-Methyl-2-Nitroaniline	12	9			
Methyl Parathion	9	9	3	2	2
2-Methylpyridine	12	6			
Mirex	18	9			
Naphthalene	9	6	2	0	1
Nickel & Compounds, NOS	18	9			
Nitric Acid	9	9	0	0	3
Nitroaniline, NOS	18	9			
Nitrogen Compounds, NOS	12	0			
Nitroquanidine	12	9			
Nitrophenol, NOS	15	9			
m-Nitrophenol	15				
o-Nitrophenol	12				
p-Nitrophenol	15				
Nitrosodiphenylamine	12	6			
Parathion	9	9	1	2	0
Pentachlorophenol	18	9			
Pesticides, NOS	18	9			
Petroleum, Kerosene	12	0	2	0	1
Phenanthrene	15	9			
Phenol	12	9	2	0	1
Phosgene	9	9			

CHEMICAL/COMPOUND	Toxicity/Persistence GROUNDWATER & SURFACEWATER	AIR	IGNITABILITY	REACTIVITY	VOLA-BILITY
Polybrominated Biphenyl (PBB), NOS	18	9			
Polychlorinated Biphenyls (PCB), NOS	18	9			
Potassium Chromate	18	9			
Radium & Compounds, NOS	18	9			
Radon & Compounds, NOS	15	9			
RDX, (Cyclonite)	15	0			
2,4-D, Salts & Esters	18	9			
Selenium	15	9			
Sevin (Carbaryl)	18	9			
Sodium Cyanide	12	9			
Styrene	9	6			
Sulfate	9	0			
Sulfuric Acid	9	9	0	2	1
2,4,5-T	18	9			
1,1,2,2-Tetrachloroethane	18	9			
Tetrachloroethane, NOS	18	9			
1,1,2,2-Tetrachloroethene (Tetrachloroethylene)	12	6			
Tetraethyl Lead	18	9			
Tetrahydrofuran	15	6			
Thorium & Compounds, NOS	18	9			
Toluene	9	6	3	0	2
TNT	12				
Toxaphene	18	9			
Tribomomethane	18	9			
1,2,4-Trichlorobenzene	15	6	1	0	1
1,3,5-Trichlorobenzene	15	6	1	0	1
1,1,1-Trichloroethane	12	6			
1,1,2-Trichloroethane	15	6			
Trichloroethane, NOS	15	6	1	0	3
Trichloroethene	12	6			
1,1,1-Trichloropropane	12	6			
1,1,2-Trichloropropane	12	6			
1,1,2-Trichloropropane	12	6			
1,2,3-Trichloropropane	15	9			
Uranium & Compounds, NOS	18	9			
Varsol	12	6			
Vinyl Chloride	15	9			
Xylene	18	6	3	0	1
Zinc & Compounds, NOS	18	9			
Zinc Cyanide	18	9			

Note: The source of this table is 40 CFR 300, Appendix A and guidance from EPA using information from:

- Sax, N.I.; *Dangerous Properties of Industrial Materials*, 4th Edition, 1975.
- JRB Associates, Inc.; *Methodology for Rating the Hazard Potential of Waste Disposal Sites*, May 5, 1980.
- National Fire Protection Association, *National Fire Codes*, Vol. 13, No. 49, 1977.
- Professional judgement based on information contained in the U.S. Coast Guard CHRIS Hazardous Chemical data, 1978, and existing literature.

Values given for ignitability, reactivity, and volatility in the Table are taken from 40 CFR 300, Appendix A. The above-referenced documents, or EPA, should be referred to for values not shown in the table.

TABLE 13

TOXICITY RATINGS

Level 0 = No Toxicity

This designation is given to materials which fall into one of the following categories:

(a) Materials which cause no harm under any conditions of normal use.

(b) Materials which produce toxic effects on humans only under the most unusual conditions or by overwhelming dosages.

Level 1 = Slight Toxicity

(a) Acute local. Materials which on single exposures lasting seconds, minutes, or hours cause only slight effects on the skin or mucous membranes regardless of the extent of the exposure.

(b) Acute systemic. Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which produce only slight effects following single exposures lasting seconds, minutes, or hours, or following ingestion of a single dose, regardless of the quantity absorbed or the extent of the exposure.

(c) Chronic local. Materials which on continuous or repeated exposures extending over periods of days, months, or years cause only slight and usually reversible harm to the skin or mucous membranes. The extent of exposure may be great or small.

(d) Chronic systemic. Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which produce only slight and usually reversible effects extending over days, months, or years. The extent of the exposure may be great or small.

In general, those substances classified as having "slight toxicity" produce changes in the human body which are readily reversible and which will disappear following termination of exposure, either with or without medical treatment.

Level 2 = Moderate Toxicity

(a) Acute local. Materials which on single exposure lasting seconds, minutes, or hours cause moderate effects on the skin or mucous membrane. These effects may be the result of intense exposure for a matter of seconds or moderate exposure for a matter of hours.

(b) Acute systemic. Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and produce moderate effects following single exposures lasting seconds, minutes, or hours, or following ingestion of a single dose.

(c) Chronic local. Materials which on continuous or repeated exposures extending over periods of days, months, or years cause moderate harm to the skin or mucous membranes.

(d) Chronic systemic. Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which produce moderate effects following continuous or repeated exposures extending over periods of days, months, or years.

Those substances classified as having "moderate toxicity" may produce irreversible as well as reversible changes in the human body. These changes are not of such severity as to threaten life or to produce serious physical impairment.

Level 3 = Severe Toxicity

(a) Acute local. Materials which on single exposure lasting seconds or minutes cause injury to skin or mucous membrane of sufficient severity to threaten life or to cause permanent physical impairment or disfigurement.

(b) Acute systemic. Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which can cause injury or sufficient severity to threaten life following a single exposure lasting seconds, minutes, or hours, or following ingestion of a single dose.

(c) Chronic local. Materials which on continuous or repeated exposures extending over periods of days, months, or years can cause injury to skin or mucous membranes of sufficient severity to threaten life or cause permanent impairment, disfigurement, or irreversible change.

(d) Chronic systemic. Materials which can be absorbed into the body by inhalation, ingestion or through the skin and which can cause death or serious physical impairment following continuous or repeated exposures to small amounts extending over periods of days, months, or years.

Note: The source of this table is 40 CFR 300, Appendix A, Table 6, and is based on information taken from: Sax, N.I.; *Dangerous Properties of Industrial Materials*, 4th Edition, 1975, and 5th Edition, 1979.

TABLE 14

TOXICITY RATINGS

Level	Material
0	Materials which on exposure under fire conditions would offer no health hazard beyond that of ordinary combustible material.
1	Materials only slightly hazardous to health. It may be desirable to wear self-contained breathing apparatus.
2	Materials hazardous to health, but areas may be entered freely with self-contained breathing apparatus.
3	Materials extremely hazardous to health, but areas may be entered with extreme care. Full protective clothing, including self-contained breathing apparatus, rubber gloves, boots, and bands around legs, arms and waist should be provided. No skin surface should be exposed.
4	A few whiffs of the gas or vapor could cause death; or the gas, vapor, or liquid could be fatal on penetrating the fire fighters' normal full protective clothing which is designed for resistance to heat. For most chemicals having a Health 4 rating, the normal full protective clothing available to the average fire department will not provide adequate protection against skin contact with these materials. Only special protective clothing designed to protect against the specific hazard should be worn.

Note: The source of this table is 40 CFR 300, Appendix A, Table 7, and is based on information taken from: National Fire Protection Association, *National Fire Codes*, Vol. 13, No. 49, 1977.

TABLE 15

PERSISTENCE (BIODEGRADABLILITY) OF SOME ORGANIC COMPOUNDS

VALUE = 3 HIGHLY PERSISTENT COMPOUNDS

aldrin	heptachlor
benzopyrene	heptachlor epoxide
benzothiazole	1,2,3,4,5,7,7-heptachloronorbornene
benzothiophene	hexachlorobenzene
benzyl butyl phthalate	hexachloro-1,3-butadiene
bromochlorobenzene	hexachlorocyclohexana
bromoform butanol	hexachloroethane
bromophenyl phyntl ether	methyl benzothiazola
chlordane	pentachlorobiphenyl
chlorohydroxy benzephenone	pentachlorophenol
bis-chloroisoprophyl ether	1,1,3,3-tetrachloroacetone
m-chloronitrobenzene	tetrachlorobiphenyl
thiomethylbenzothiazole	1,3-dimethyl naphthalene
DDT	trichlorobenzene
dibromobenzene	trichlorobiphenyl
dibutyl phthalate	trichlorofluoromethane
1,4-dichlorobenzene	2,4,6-trichlorophenol
dichlorodifluouroethane	triphenyl phosphate
dieldrin	bromodichloromethane
diethyl phthalate	bromoform
di(2-ethylhexyl)phthalate	carbon tetrachloride
dihexyl phthalate	chloroform
di-isobutyl phthalate	chloromochloromethane
dimethyl phthalate	dibromodichloroethane
4,6-dinitro-2-aminophenol	tetrachloroethane
diproply phthalate	1,1,2-trichloroethane
endrin	

VALUE = 2 PERSISTENT COMPOUNDS	
acenaphthylene	cis-2-ethyl-4-methyl-1,3-dioxolane
strazine	trans-2-ethyl-4-methyl-1, 3-dioxolane
(diethyl) atrazine	graiacol
barbital	2-hydroxyadiponitrile
borneol	isophorone
bromobenzene	indene
camphor	isoborneol
chlorobenzene	isopropanyl-r-isoproply benzene
1,2-bis-chloroethoxy ethane	2-methoxy biphenyl
b-chloroethyl methyl ether	methyl biphenyl
chloromethyl ether	methyl chloride
chloromethyl ethyl ether	methylindane
3-chloropyridine	methylene chloride
di-t-butyl-p-benzoquinone	nitroanisole
dichloroethyl ether	nitrobenzene
dihydrocarvone	1,1,2-trichloroethylene
dimethyl sulfoxide	trimethyl-trioxo-hexahydro-triazine isomer
2,6-dinitrotoluene	

VALUE = 1 SOMEWHAT PERSISTENT COMPOUNDS	
acetylene dichloride	isoprophyl benzene
behenic acid, methyl ester	limonene
benzene	methyl ester of lignoceric acid
benzene sulfonic acid	methane
butyl benzene	2-methyl-5-ethyl-pyridine
butyl bromide	methyl naphthalene
e-caprolactam	methyl palmitate
carbon-disulfide	methyl phenyl carbinol
o-cresol	methyl stearate
decane	naphthalene
1,2-dichloroethane	nonane
1,2-dimethoxy benzene	octane
pentane	octyl chloride
1,4-dimethyl phenol	phenyl benzoate
dioctyl adipate	phthalic anhydride
n-dodecane	propylbenzene
ethyl benzene	1-terpineol
2-ethyl-n-hexane	toluene
o-ethyltoluene	vinyl benzene
isodecane	xylene

VALUE = 0 NONPERSISTENT COMPOUNDS	
acetaldehyde	methyl benzoate
acetic acid	3-methyl butanol
acetone	methyl ethyl ketone
acetophenone	2-methylpropanol
benzoic acid	octadecane
di-isobutyl carbinol	pentadecane
docosane	pentanol
eicosane	propanol
ethanol	propylamine
ethylamine	tetradecane
hexadecane	n-tridecane
methanol	n-undecane

Note: The source of this table is 40 CFR 300, Appendix A, Table 5., and is based on information from: JRB Associates, Inc. *Methodology for Rating the Hazards Potential for Waste Disposal Sites,* May 5, 1980.

TABLE 16

LEACHATE STRENGTH

Leachate COD in mg/l	Assigned Value
<1,000	0
1,000-10,000	2
10,000-20,000	4
20,000-30,000	6
30,000-40,000	8
>40,000	10

(f) *Waste quantity.* Waste quantity includes all hazardous and nonhazardous substances received at a site or facility. Do no include amounts of contaminated soil or water; in such cases, the substance may be estimated. On occasion, it may be necessary to convert data to a common unit to combine them. In such cases, 1 ton = 1 cubic yard = 4 drums and for the purpose of converting bulk storage, 1 drum = 50 gallons. Values for waste quantity are shown in Table 17.

TABLE 17

WASTE QUANTITY

Hazardous Substance Quantity		Total Waste Quantity				
		0	1-500	501-2000	2001-8000	>8000 Drums
Drums	Tons or yd^3	0	1-125	126-500	501-2000	>2000 tons or yd^3
0	0	0	1	2	3	4
1-500	1-125	-	2	3	4	5
501-2000	126-500	-	-	4	5	6
2001-8000	501-2000	-	-	-	6	7
>8000	>2000	-	-	-	-	8

(5) POTENTIAL IMPACTS. (a) *Groundwater use.* Groundwater use indicates the nature of the use made of groundwater within 3 miles of a substance of concern, including the geographical extent of the measurable concentration of the substance in the groundwater. Groundwater use values are shown in Table 18.

TABLE 18

GROUNDWATER USE

Groundwater Use	Assigned Value
Commercial, industrial or irrigation; and another water source presently available : groundwater not used, but usable for drinking water	1
Drinking water with municipal water from alternate unthreatened sources presently available (i.e., minimal hookup requirements); or commercial, industrial or irrigation with no other water source presently available	2
Drinking water; no municipal water from alternate unthreatened sources presently available	3

(b) *Distance to wells and population.* Distance to nearest well and population served have been combined in the matrix shown in Table 19 to reflect the important relationship between the distance of a population from substances of concern and size of the population served by groundwater that might be contaminated by those substances. To determine the overall value for this combined factor, score each factor individually as discussed in pars. (c) and (d). Match the individual values assigned with the values in the matrix for the total score.

TABLE 19

SERVICE VALUES

	Value for Distance to Nearest Well				
Value for population served	0	1	2	3	4
0	0	0	0	0	0
1	0	4	6	8	10
2	0	8	12	16	20
3	0	12	18	24	30
4	0	16	24	32	35
5	0	20	30	35	40

(c) *Distance to nearest well.* Distance to nearest well is measured from the substance of concern to the nearest water supply well. If the actual distance to the nearest well is unknown, use the distance between the substance and the nearest occupied building not served by a public water supply. Distance values are shown in Table 20.

TABLE 20

DISTANCE TO NEAREST WELL

Distance to Well	Assigned Value
>3 miles	0
2 to 3 miles	1
1 to 2 miles	2
2,000 feet to 1 mile	3
<2,000 feet	4

(d) *Population served.* Population served by groundwater is an indicator of the population at risk, which includes residents as well as others who would regularly use the water such as workers in factories or offices and students. Include employes in restaurants, motels, or campgrounds but exclude customers and travelers passing through the area in autos, buses or trains. If aerial photography is used, and residents are known to use groundwater, assume each dwelling unit has 2.8 residents. Where groundwater is used for irrigation, convert to population by assuming 1.5 persons per acre of irrigated land. The well or wells of concern must be within 3 miles of the substances, including the area of known groundwater contamination, but the "population served" need not be since water supplies may be distributed over a wider area. Likewise people within 3 miles who do not use water from the groundwater are not to be counted. Population values are contained in Table 21.

TABLE 21

POPULATION AT RISK-GROUNDWATER

Population	Assigned Value
0	0
1 to 100	1
101 to 700	2
701 to 1500	3
1,501 to 5,000	4
>5,000	5

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.23 Surface water route. (1) OBSERVED RELEASE. Direct evidence of release to surface water, including wetlands, may be quantitative evidence that the facility is releasing contaminants into surface water or visual evidence of an active discharge which flows to a surface water. Quantitative evidence could be the measurement of levels of contaminants from a site or facility in surface water, either at the site or facility or downhill from it, that represents an increase over background levels. Visual evidence of a discharge must flow to a surface water which is readily identifiable in the field, from topographic maps, or from air photographs. If direct evidence of release has been obtained (regardless of frequency), enter a value of 45 on line 1 of the work sheet (Figure 5) and omit the evaluation of the route characteristics in sub. (2) and containment factors in sub. (3). If there is no direct evidence of release, enter a value of zero on line 1 and continue with the scoring procedure discussed in sub. (2).

(2) ROUTE CHARACTERISTICS. (a) *Slope.* Facility slope and intervening terrain are indicators of the potential for contaminated runoff or spills at a site or facility to be transported to surface water. The site or facility slope is an indicator of the potential for runoff or spills to leave the site or facility. Intervening terrain refers to the average slope of the shortest path which would be followed by runoff between the site or facility boundary and the nearest downhill surface water. The rating factor can be assessed using topographic maps. Table 22 shows values assigned to various facility conditions.

TABLE 22

VALUES FOR FACILITY SLOPE AND INTERVENING TERRAIN

		Intervening Terrain				
Facility Slope		Terrain Average Slope <3%; or Site Separated from Water Body by Areas of Higher Elevation	Terrain Average Slope 3-5%	Terrain Average Slope 5-8%	Terrain Average Slope >8%	Site in Surface Water
Facility is closed basin		0	0	0	0	3
Facility has average slope	<3%	0	1	1	2	3
Average slope	3-5%	0	1	2	2	3
Average slope	5-8%	0	2	2	3	3
Average slope	>8%	0	2	3	3	3

SURFACE WATER ROUTE WORKSHEET

Rating Factor	Assigned Value (circle one)	Multiplier	Score	Max. Score	Ref. Section
[1] Observed Release	0 45	1		45	sub. (1)
If observed release is given a score of 45, proceed to line [4]. If observed release is given a score of 0, proceed to line [2].					
[2] Route Characteristics					sub. (2)
Facility Slope and Intervening Terrain	0 1 2 3	1		3	
Run-off Potential	0 1 2 3	1		3	
Distance to Nearest Surface Water	0 1 2 3	2		6	
Physical State	0 1 2 3	1		3	
	Total Route Characteristics Score			15	
[3] Containment	0 1 2 3	1		3	sub. (3)
[4] Waste Characteristics					sub. (4)
Toxicity/Persistence	0 3 6 9 12 15 18	1		18	
Leachate Strength	0 2 4 6 8 10	1		10	
Hazardous Waste Quantity/Total Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			26	
[5] Potential Impacts					sub. (5)
Surface Water Use	0 1 2 3	3		9	
Distance to a Sensitive Environment	0 1 2 3	2		6	
Population Served/ Distance to Water	0 4 6 8 10 12 16 18 20	1		40	
Intake Downstream	24 30 32 35 40				
	Total Potential Impacts			55	
[6] If line [1] is 45, multiply [1] × [4] × [5]					
If line [1] is 0, multiply [2] × [3] × [4] × [5]				64,350	
[7] Divide line [6] by 64,350 and multiply by 100			S_{sw} =		

Figure 5

SURFACE WATER ROUTE WORKSHEET

(b) *Runoff potential.* Vegetative cover and surface soils at a site or facility are indicators of the potential of contaminated runoff or spills at a site or facility to be transported to a surface water. Table 23 shows the assigned values for runoff potential based on these 2 indicators.

TABLE 23

RUNOFF POTENTIAL

	Vegetative Cover			
Soil Type	None	Poorly Established (Sparse Cover)	Established (Good Cover)	Well Established (Lush)
Sand	2	1	0	0
Silty Sand	2	1	0	0
Sandy Loam	2	2	1	0
Silty Loam	2	2	1	0
Peaty Topsoil	3	2	1	1
Clay Loam	3	2	1	1
Silty Clay	3	3	2	1
Clay	3	3	2	1

(c) *Distance to surface water.* Distance to the nearest surface water is the shortest distance from the substance of concern, not the facility or property boundary, to the nearest downhill body of surface water, such as a lake, stream or intermittent stream, to which runoff can be expected to flow. This factor indicates the potential for pollutants flowing overland and into surface water bodies. In areas of extreme topographic relief, the migratory distance is to be estimated, and that distance used for determining a value. Values for distance to surface water are shown in Table 24.

TABLE 24

DISTANCE TO SURFACE WATER

Distance	Assigned Value
>2 miles	0
1 to 2 miles	1
1,000 feet to 1 mile	2
<1,000 feet	3

(d) *Physical state.* Physical state of the waste is assigned a value using the procedures in s. NR 550.22 (2) (d).

(3) CONTAINMENT. Containment is a measure of the means that have been taken to minimize the likelihood of a contaminant entering surface water either at the site or facility or beyond the site or facility boundary. Examples of containment are diversion structures and the use of sealed containers. If more than one type of containment is used at a site or facility, evaluate each separately using Table 25 and assign the highest score.

TABLE 25

CONTAINMENT VALUE FOR SURFACE WATER ROUTE

A. Surface Impoundment	Assigned Value
Sound diking or diversion structure, adequate freeboard, and no erosion evident	0
Sound diking or diversion structure, but inadequate freeboard.	1
Diking not leaking, but potentially unsound.	2
Diking unsound, leaking, or in danger of collapse.	3

B. Containers	Assigned Value
Containers sealed, in sound condition, and surrounded by sound diversion or containment system.	0
Containers sealed and in sound condition, but not surrounded by sound diversion or containment system.	1
Containers leaking and diversion or containment structures potentially unsound.	2
Containers leaking, no diversion or containment structures or diversion structures leaking or in danger of collapse.	3

C. Piles	Assigned Value
Piles are covered and surrounded by sound diversion or containment system.	0
Piles covered, waste unconsolidated, diversion or containment system not adequate.	1
Piles not covered, waste unconsolidated, and diversion or containment system potentially unsound.	2
Piles not covered, wastes unconsolidated, and no diversion or containment of diversion system leaking or in danger of collapse.	3

D. Landfill	Assigned Value
Landfill slope precludes runoff, landfill surrounded by sound diversion system, or landfill has adequate cover material.	0
Landfill not adequately covered and diversion system sound.	1
Landfill not covered and diversion system potentially unsound.	2
Landfill not covered and no diversion system present, or diversion system unsound.	3

(4) WASTE CHARACTERISTICS. Evaluate waste characteristics for the surface water route with the procedures described in s. NR 550.22 (4).

(5) POTENTIAL IMPACTS. (a) *Surface water.* Surface water use brings into the rating process the use of the surface water downstream from the site or facility. The use or uses of interest are those associated with water taken from surface waters within a distance of 3 miles from the location of the hazardous substance. Use values are contained in Table 26.

TABLE 26

SURFACE WATER USE

Surface Water Use	Assigned Value
Not currently used	0
Commercial or industrial	1
Irrigation, economically important resources commercial food preparation, or recreation	2
Drinking water	3

(b) *Sensitive environments.* Distance to sensitive environment refers to the distance from the substance of concern, not the site or facility boundary, to an area containing an important biological resource or to a fragile natural setting that could suffer an especially severe impact from pollution. Table 27 provides guidance on assigning a value to this rating factor.

(c) *Population.* Population served by surface water with water intake within 3 miles downstream from the site or facility, or 1 mile in static surface water such as a lake, is a rough indicator of the potential hazard exposure of the nearby population served by potentially contaminated surface water. Measure the distance from the probable point of contaminant entry to surface water following the surface flow. The population includes residents as well as others who would regularly use the water such as workers in factories or offices and students. Include employes in restaurants, motels, or campgrounds but exclude customers and travelers passing through the area in autos, buses and trains. The distance is measured from the substance of concern, including observations in stream or sediment samples, regardless of site or facility boundaries. Where only residential houses can be counted (e.g., from an aerial photograph), and residents are known to be using surface water, assume 2.8 individuals per dwelling unit. Where surface water is used for irrigation, convert to population by assuming 1.5 persons per acre of land irrigated. Population values are shown in Table 28.

TABLE 27

VALUES FOR SENSITIVE ENVIRONMENT — SURFACE WATER

Assigned Value =	0	1	2	3
Distance to wetlands or critical habitats of endangered species	> 2 mile	1 to 2 mile	½ mile to 1 mile	< ½ mile
Distance to national or state wildlife refuge, or state fish refuge	> 1 mile	½ to 1 mile	¼ to ½ mile	< ¼ mile
Distance to a Wild or Scenic River	> ½ mile	¼ to ½ mile	400 ft. to ¼ mile	< 400 ft.
Distance to designated Scientific Areas	> 1 mile	½ to 1 mile	¼ to ½ mile	< ¼ mile
Distance to designated Natural Areas	> ½ mile	¼ to ½ mile	500 ft. to ¼ mile	< 500 ft.

TABLE 28

POPULATION AT RISK — SURFACE WATER

	Distance to Water Intake				
Population	> 3 miles	2 to 3 miles	1 to 2 miles	2,001 feet to 1 mile	0 to 2,000 feet
0	0	0	0	0	0
1 to 100	0	4	6	8	10
101 to 700	0	8	12	16	20
701 to 1,500	0	12	18	24	30
1,501 to 5,000	0	16	24	32	35
> 5,000	0	20	30	35	40

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.24 Air route. (1) OBSERVED RELEASE. The only acceptable evidence of release for the air route is data that show levels of a contaminant at or in the vicinity of the site or facility that significantly exceed background levels, regardless of the frequency of occurrence. If such evidence exists, enter a value of 45 on line 1 of the air route worksheet — Figure 6. If an observed release is scored, complete the analysis as described in subs. (2) and (3). If observed release is assigned a zero value, then $S_a = 0$, and no additional analysis is done. Record the date, location, and the sampling methods and procedures for monitoring data on the worksheet. Data based on transitory conditions due to facility disturbance by investigative personnel are not acceptable.

(2) WASTE CHARACTERISTICS. (a) *General.* The substance observed for scoring the release category may be different from the substance used to score waste characteristics.

(b) *Reactivity and incompatibility.* 1. Reactivity and incompatibility are measures of the potential for sudden release of concentrated air pollutants. These factors are evaluated independently, and the highest value for either is recorded on the worksheet.

AIR ROUTE WORKSHEET

Rating Factor	Assigned Value (circle one)	Multiplier	Score	Max. Score	Ref. Section
[1] Observed Release	0 45	1		45	sub. (1)
Date and Location:					
Sampling Prodedures:					
If line [1] is 0, then $S_a = 0$. Enter on line [5]. If line [1] is 45, then proceed to line [2].					
[2] Waste Characteristics					sub. (2)
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity/Total Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Route Characteristics Score			20	
[3] Potential Impacts					sub. (3)
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
	Total Potential Impacts Score			39	
[4] Multiply [1] × [2] × [3]				35,100	
[5] Divide line [4] by 35,100 and multiply by 100			S^a =		

Figure 6

AIR ROUTE WORKSHEET

2. Reactivity provides a measure of the fire or explosion threat at a facility. Assign a value based on the reactivity classification given in Table 29. Reactivity ratings for a number of common chemicals are given in Table 12.

TABLE 29

REACTIVITY RATINGS

Level	Assigned Value
Materials which are normally stable even under fire exposure conditions and which are not reactive with water.	0
Materials which in themselves are normally stable but which may become unstable at elevated temperatures and pressures or which may react with water with some release of energy but not violently.	1
Materials which in themselves are normally unstable and readily undergo violent chemical change but do not detonate. Includes materials which can undergo chemical change with rapid release of energy at normal temperatures and pressures of which can undergo violent chemical change at elevated temperatures and pressures. Also includes those materials which may react violently with water or which may form potentially explosive mixtures with water.	2
Materials which in themselves are capable of denotation or of explosive decomposition or of explosive reaction but which requires a strong initiating source or which must be heated under confinement before initiation. Includes materials which are sensitive to thermal or mechanical shock at elevated temperatures and pressures or which react explosively with water without requiring heat or confinement.	3
Materials which in themselves are readily capable of denotation or of explosive decomposition or explosive reaction at normal temperatures and pressures. Includes materials which are sensitive to mechanical or localized thermal shock.	3

Note: The source of this table is 40 CFR 300, Appendix A, Table 11; and is based on information taken from: National Fire Protection Association, *National Fire Codes*, Vol. 13, No. 49, 1977.

3. Incompatibility provides a measure of the increased hazard when substances are mixed under uncontrolled conditions which may lead to production of heat, pressure, fire, explosion, violent reaction, toxic dusts, mists, fumes of gases, or flammable fumes or gases. Table 13 provides examples of incompatible combinations of materials. Incompatibility values are shown in Table 30.

TABLE 30

INCOMPATIBILITY

Incompatibility	Assigned Value
No incompatible substances are present	0
Present but do not pose a hazard	1
Present and may pose a future hazard	2
Present and posing an immediate hazard	3

(c) *Toxicity.* Toxicity should be rated for the most toxic of the substances that can reasonably be expected to be transported away from the site or facility via the air route. Using the information given in Tables 12, 13 and 14 (s. NR 550.22 (4) (d)), assign values as shown in Table 31.

TABLE 31

TOXICITY

Toxicity Level from Table 13 or Table 14	Assigned Value
Level 0	0
Level 1	1
Level 2	2
Level 3 or 4	3

(d) *Waste quantity.* Waste quantity is assigned a value as described in s. NR 550.22 (4) (e).

TABLE 32

INCOMPATIBLE MATERIALS

In the lists below, the mixing of a Group A material with a Group B material may have the potential consequence as noted.

Group 1-A

Acetylene sludge
Akaline caustic liquids
Alkaline cleaner
Alkaline corrosive liquids
Alkaline corrosive battery fluids
Caustic wastewater
Lime sludge and other corrosive alkalies
Lime wastewater
Lime and water
Spent caustic

Group 1-B

Acid sludge
Acid and water
Battery acid
Chemical cleaners
Electrolyte acid
Etching acid liquid or solvent
Pickling liquor and other corrosive acids
Spent acid
Spent mixed acid
Spent sulfuric acid

Potential consequences: Heat generation; violent reaction.

Group 2-A

Aluminum
Berylium
Calcium
Lithium
Potassium
Sodium
Zinc powder
Other reactive metals and metal hybrids

Group 2-B

Any waste in Group 1-A or 1-B

Potential consequences: Fire or explosion; generataion of flammable hydrogen gas.

Group 3-A	Group 3-B
Alcohols Water	Any concentrated waste in Groups 1-A or 1-B Calcium Lithium Metal hydrides Potassium SO_2Cl_2, $SOCl_2$, PCl_2, CH_3, $SiCl_3$ Other water-reactive waste

Potential consequences: Fire, explosion, or heat generation; generation of flammable or toxic gases.

Group 4-A	Group 4-B
Alcohols Aldehydes Halogenated hydrocarbons Nitrated hydrocarbons Unsaturated hydrocarbons Other reactive organic compounds and solvents	Concentrated Group 1-A or 1-B wastes Group 2-A wastes

Potential consequences: Fire, explosion, or violent reaction.

Group 5-A	Group 5-B
Spent cyanide and sulfide solutions.	Group 1-B wastes

Potential consequences: Generation of toxic hydrogen cyanide or hydrogen sulfide gas.

Group 6-A	Group 6-B
Chlorates Chlorine Chlorites Chromic acid Hyphochlorites Nitrates Nitric acid, fuming Perchlorates Permanganates Peroxides Other strong oxidizers	Acetic acid or other organic acids Concentrated mineral acids Group 2-A wastes Group 4-A wastes Othe flammable and combustible wastes

Potential consequences: Fire, explosion, or violent reaction.

Note: The sources of this table is 40 CFR 300, Appendix A, Table 12; and is based on information taken from: Hazardous Waste Management Law, Regulations, and Guidelines for the Handling of Hazardous Wastes, California Department of Health, February, 1975.

(3) POTENTIAL IMPACTS. (a) *Population.* Population within a 4-mile radius is an indicator of the population which may be harmed should substances be released to the air. The distance is measured from the location of the substances, not from the site or facility boundary. The population to be counted includes persons residing within the 4-mile radius as well as transients such as workers in factories, offices, restaurants, motels, or students. It excludes travelers passing through the area. If aerial photography is used in making the count, assume 2.8 individuals per dwelling unit. Select the highest value contained in Table 33 for this rating factor.

TABLE 33

AIR MIGRATION POPULATION AT RISK

	1 to 4 miles	½ to 1 mile	¼ to ½mile	0 to ¼ mile
0	0	0	0	0
1 to 100	9	12	15	18
101 to 700	12	15	18	21
701 to 1,500	15	18	21	24
1,501 to 5,000	18	21	24	27
>5,000	21	24	27	30

(b) *Sensitive environments.* Distance to a sensitive environment is an indicator of the likelihood that a region that contains important biological resources or that is a fragile natural setting would suffer serious damage if substances were to be released from the site or facility. Assign a value from Table 27.

(c) *Land use.* Land use indicates the nature and level of human activity in the vicinity of a site or facility. Assign highest applicable value from Table 34.

TABLE 34 — VALUES FOR LAND USE AIR ROUTE AND FIRE AND EXPLOSION

Assigned Value	0	1	2	3
Distance to Commercial-Industrial ...	>1 mile	½ to 1 mile	¼ to ½ mile	<¼ mile
Distance to National/State Parks, Forests, Wildlife Reserves, Scientific and Natural Areas, Wetlands and Residential Areas	>2 miles	1 to 2 miles	½ to 1 mile	<½ mile
Distance to Agricultural Lands (in Production within 5 years):				
Ag Land	>1 mile	½ to 1 mile	¼ to ½ mile	<¼ mile
Prime Ag Land	>2 miles	1 to 2 miles	½ to 1 mile	<½ mile
Distance to Historic/Landmark Sites (National Register of Historic Places and National Natural Landmarks)				Within view of site or if site is subject to significant impacts

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.25 Computing the migration hazard mode score, S_M. To compute S_M complete the worksheet, Figure 7, using the groundwater score, S_{gw}, obtained using the instructions in s. NR 550.22, the surface water score, S_{sw}, obtained using the instructions in s. NR 550.23, and the air route score, S_a, obtained using the instructions in s. NR 550.24.

Figure 7

WORKSHEET FOR COMPUTING THE MIGRATION SCORE, S_M

	S	S^2
Groundwater Route Score (S_{gw})		
Surface Water Route Score (S_{sw})		
Air Route Score (S_a)		
$S_{gw}^2 + S_{sw}^2 + S_a^2$		
$S_{gw}^2 + S_{sw}^2 + S_a^2)^{0.5}$		
$S_{gw}^2 + S_{sw}^2 + S_a^2)^{0.5}/ 1.73$	$S_M =$	

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.26 Fire and explosion. (1) NOTIFICATION. Compute a score for the fire and explosion hazard mode, S_{FE}, when the local fire chief has provided written notice to the department that the site or facility presents a significant fire or explosion threat to the public or to a sensitive environment. S_{FE} is also scored if there is a demonstrated fire or explosion threat based on field observations (e.g., combustible gas indicator readings). The threat must be documented to complete the worksheet for fire and explosion — Figure 8.

(2) CONTAINMENT. Containment is an indicator of the measures that have been taken to minimize or prevent substances at the site or facility from catching fire or exploding. Normally, it will be given a value of 3 on the worksheet shown in Figure 8. If no substances that are individually ignitable or explosive are present and those that may be ignitable or explosive in combination are segregated and isolated so that they cannot come together to form incompatible mixtures, assign this factor a value of 1.

FIRE AND EXPLOSION WORKSHEET

Rating Factor	Assigned Value (circle one)	Multiplier	Score	Max. Score	Ref. Section
[1] Containment	1 3	1		3	sub. (2)
[2] Waste Characteristics					sub. (3)
Direct Evidence	0 3	1		3	
Ignitability	0 1 2 3	1		3	
Reactivity	0 1 2 3	1		3	
Incompatibility	0 1 2 3	1		3	
Waste Quantity/Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Route Characteristics Score			20	
[3] Potential Impacts					sub. (4)
Population to Nearest Population	0 1 2 3 4 5	1		5	
Distance to Nearest Building	0 1 2 3	1		3	
Distance to Sensitive Environment	0 1 2 3	1		3	
Land Use	0 1 2 3	1		3	
Population With 2-Mile Radius	0 1 2 3 4 5	1		5	
Buildings Within 2-Mile Radius	0 1 2 3 4 5	1		5	
	Total Potential Impacts Score			24	
[4] Multiply [1] × [2] × [3] × [4]				1,440	
[5] Divide line [5] by 1,440 and multiply by 100			S_{FE} =		

Figure 8

(3) WASTE CHARACTERISTICS. (a) *Evidence.* Direct evidence of ignitability or explosion potential may exist in the form of measurements with appropriate instruments. If so, assign this factor a value of 3; if not, assign a value of 0.

(b) *Ignitability.* Ignitability is an indicator of the threat of fire at a site or facility and the accompanying potential for release of air contaminants. Assign this rating factor a value based on the classification schemes shown in Table 35 and Table 36. Table 12 gives ignitability values for a number of common chemicals.

TABLE 35

IGNITABILITY LEVELS AND ASSIGNED VALUES

Ignitability Level		Assigned Value
0	Materials that will not burn	0
1	Materials that must be preheated before ignition can occur. Most combustible solids have a flammability rating of 1	1
2	Liquids which must be moderately heated before ignition will occur and solids that readily give off flammable vapors	2
3	Liquids which can be ignited under all normal temperature conditions. Any materials that ignite spontaneously at normal temperatures in air	3
4	Very flammable gases, very volatile flammable liquids, and materials that in the form of dusts or mists readily form explosive mixtures when dispersed in air	3

Note: The source of this table is 40 CFR 300, Appendix A, Table 13, and is based on information taken from: National Fire Protection Association, *National Fire Codes,* Vol. 13, No. 49, 1977.

TABLE 36

IGNITABILITY

Ignitability Level from Table 35	Flashpoint	Assigned Value
Level 0	>200°F	0
Level 1	140°F to 200°F	1
Level 2	80°F to 140°F	2
Level 3 or 4	<80°F	3

(c) *Reactivity.* Reactivity values are assigned as described in s. NR 550.24 (2).

(d) *Incompatibility.* Incompatibility values are assigned as described in s. NR 550.24 (2).

(e) *Waste quantity.* Waste quantity values are assigned as described in s. NR 550.22 (4) (f).

(4) POTENTIAL IMPACTS. (a) *Distance to nearest population.* Distance to nearest population is the distance from the hazardous substance to the nearest building or area in which one or more persons are likely to be located either for residential, educational, business, occupational, or rec-

reational purposes. It is an indicator of the potential for harm to humans from fire and explosion. The building or area need not be off-site. Distance values are shown in Table 37.

TABLE 37

DISTANCE TO NEAREST POPULATION

Distance	Assigned Value
>2 miles	0
1 mile - 2 miles	1
½ mile - 1 mile	2
200 feet - ½ mile	3
51 feet - 200 feet	4
<50 feet	5

(b) *Distance to nearest building.* Distance to nearest building is an indicator of the potential for property damage as a result of fire or explosion. Values for distance to nearest building are shown in Table 38.

TABLE 38

DISTANCE TO NEAREST BUILDING

Distance	Assigned Value
>½ mile	0
200 feet - ½ mile	1
51 feet - 200 feet	2
<50 feet	3

(c) *Sensitive environments.* Distance to nearest sensitive environment is measured from the substance of concern, not from the site or facility boundary. It is an indicator of potential harm to a sensitive environment from fire or explosion at the site or facility. Select the highest value using the information provided in Table 39, except assign a value of 3 where fire could be expected to spread to a sensitive environment even though that environment is more than 100 feet from the substance.

TABLE 39

VALUES FOR SENSITIVE ENVIRONMENTS — FIRE AND EXPLOSION

Assigned Value =	0	1	2	3
Distance to Wetlands	>100 feet	-	-	<100 feet
Distance to Critical Habitat	>½ mile	1,000 feet to ½ mile	100 to 1,000 feet	<100 feet

(d) *Land use.* Assign land use value as in s. NR 550.24 (3) (c).

(e) *Population at risk.* Population within a 2-mile radius of the substance of concern, not from the site or facility boundary, is a rough indicator of the population at risk in the event of fire or explosion at a facility. The population to be counted includes those residing within the 2-mile radius as well as people regularly in the vicinity such as workers in factories, offices, or students. It does not include travelers passing through the area. If aerial photography is used in making the count, assume 2.8 individuals per dwelling. This population factor is given a value from Table 40.

(f) *Buildings at risk.* The number of buildings within a 2-mile radius from the substance of concern, not from the site or facility boundary, is a rough indicator of the property damage that could result from fire and explosion at a facility. Building values are shown in Table 41.

TABLE 40 — POPULATION AT RISK
FIRE AND EXPLOSION

Population	Assigned Value
0	0
1 to 100	1
101 to 700	2
701 to 1,500	3
1,501 to 5,000	4
>5,000	5

TABLE 41 — BUILDINGS AT RISK
FIRE AND EXPLOSION

Number of Buildings	Assigned Value
0	0
1 to 26	1
27 to 260	2
261 to 790	3
791 to 2,600	4
>2,600	5

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.27 Direct contact. (1) *Potential injury.* The direct contact hazard mode refers to the potential for injury by direct contact with substances at the site or facility.

(2) OBSERVED INCIDENT. If there is a confirmed instance in which contact with substances at the site or facility has caused injury, illness, or death to humans, or domestic or wild animals, enter a value of 45 on line 1 of the worksheet shown in Figure 9 and proceed to line 4. Document the incident giving the date, location and pertinent details. If no such instance is known, enter "0" on line 1 and proceed to line 2.

(3) ACCESSIBILITY. Accessibility to substances of concern refers to the measures taken to limit access by humans or animals to substances. Accessibility values are shown in Table 42.

TABLE 42

ACCESSIBILITY TO WASTE

Barrier	Assigned Value
A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or facility personnel) which continuously monitors and controls entry onto the facility;	0
or	
An artificial or natural barrier (e.g., a fence combined with a cliff), which completely surrounds the facility; and a means to control entry, at all times, through the gates or other entrances to the facility (e.g., an attendant, television monitors, locked entrances, or controlled roadway access to the facility).	
Security guard, but no barrier	1
A barrier, but no separate means to control entry	2
Barriers do not completely surrond the facility	3

DIRECT CONTACT WORKSHEET					
Rating Factor	**Assigned Value (circle one)**	**Multiplier**	**Score**	**Max. Score**	**Ref. Section**
[1] Observed Incident	0 45	1		45	sub. (2)
If line [1] is 45, proceed to line [4]. If line [1] is 0, proceed to line [2].					
[2] Accessibility	0 1 2 3	1		3	sub. (3)
[3] Containment	0 15	1		15	sub. (4)
[4] Waste Toxicity	0 1 2 3	5		15	sub. (5)
[5] Potential Impacts					sub. (6)
Population Within a 1-Mile Radius	0 1 2 3 4 5	4		20	
Distance to a Critical Habitat	0 1 2 3	4		12	
	Total Potential Impacts Score			32	
[6] If line [1] is 45, multiply [1] × [4] × [5]					
If line [1] is 0, multiply [2] × [3] × [4] × [5]				21,600	
[7] Divide line [6] by 21,600 and multiply by 100			S_{DC} =		

Figure 9

DIRECT CONTACT WORKSHEET

(4) CONTAINMENT. Containment indicates whether the substances of concern are accessible to direct contact. For example, if a substance at the site or facility is in surface impoundments, containers (sealed or unsealed), piles, tanks, or landfills with a cover depth of less than 2 feet, or has been spilled on the ground or other surfaces easily contacted such as the bottom of shallow pond or creek, assign this rating factor a value of 15. Otherwise, assign a value of 0.

(5) WASTE TOXICITY. Assign a toxicity value as described in s. NR 550.22 (4).

(6) POTENTIAL IMPACTS. (a) *Population.* Population within one-mile radius is a rough indicator of the population that could be involved in direct contact incidents at an uncontrolled facility. Population values are shown in Table 43.

TABLE 43 — POPULATION AT RISK
DIRECT CONTACT

Population	Assigned Value
0	0
1 to 100	1
101 to 700	2
701 to 1,500	3
1,501 to 5,000	4
>5,000	5

(b) *Habitats.* Distance to a critical habitat of an endangered species is a rough measure of the probability of harm to members of an endangered species by direct contact with a substance of concern. Distance values are shown in Table 44.

TABLE 44

HABITATS

Distance	Assigned Value
>1 mile	0
½ to 1 mile	1
¼ to ½ mile	2
<¼ mile	3

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

Subchapter 3 — Environmental Response and Repair

NR 550.30 General requirements for response and repair. (1) APPROVALS. (a) *Planned response and repair actions.* 1. Response and repair actions may involve several department programs. Except in emergencies, the department or its contractor shall obtain all necessary department approvals before starting a repair action. Required approvals may include:

a. Approvals and operating permits for solid and hazardous waste facilities under ss. 144.43 to 144.79, Stats.;

b. Approvals and permits for wastewater facilities under s. 144.04 and ch. 147, Stats.;

c. Approvals and permits for air pollution control facilities under ss. 144.30 to 144.426, Stats.;

d. Approvals of water supply wells, water treatment systems, and water distribution systems under s. 144.04 and ch. 162, Stats.;

e. Approvals and permits for dredging or construction within the waters of the state under ch. 30, Stats.;

f. Other approvals or permits issued by the department; and

g. Compliance with the Wisconsin environmental policy act, s. 1.11, Stats.

2. Persons responsible for a site or facility which poses a substantial danger to the public health or welfare, or the environment may not start any planned repair action without obtaining all necessary department approvals prior to taking the repair action.

(b) *Emergency response and repair actions.* 1. The department, or its contractor, may take emergency response and repair action without first obtaining approvals or permits whenever an imminent risk threatens the public health or safety, or the environment, where appropriate waivers or exemptions have been obtained.

2. Persons responsible for a site or facility may take emergency response and repair actions at the site or facility without first obtaining department approvals or permits whenever an imminent risk threatens the public health or safety, or the environment, provided appropriate waivers and exemptions have been obtained from the department.

(2) AGREEMENTS AND CONTRACTS. (a) *Applicability.* 1. The department may enter into a response or repair contract or agreement with any person who is responsible for causing substantial danger to the public health or welfare, or the environment.

2. The department may enter into a contract with any person for response or repair actions.

(b) *Purpose.* Any contract or agreement which the department enters into for response or repair actions shall:

1. Define the individual roles and responsibilities of each person who signs the contract or agreement;

2. Define the existing and future liabilities of any person responsible for causing substantial danger to the public health or welfare, or the environment, at the site or facility where the response or repair action is to occur;

3. Allocate the response or repair costs;

4. Establish a schedule for completing the response or repair actions in a timely manner; and,

5. Specify appropriate response or repair actions.

(c) *Content.* Any contract or agreement shall, generally, contain the following provisions;

1. A listing of persons to the contract or agreement and their roles and responsibilities;

2. A description of the site or facility, and its location;

3. Findings of fact;

4. All provisions needed to fulfill the purposes of the contract or agreement listed in par. (b);

5. A schedule of damages for not completing the response and repair actions according to the contract or agreement;

6. The methods for resolving any conflicts which arise during the response and repair actions, or in interpretation of the contract or agreement provisions;

7. The methods for modifying the contract or agreement; and

8. Other provisions which may be necessary to insure a timely response and repair, and to insure protection of all persons entering the contract or agreement.

(3) ROLES AND RESPONSIBILITIES. (a) *Department of natural resources.* The department shall be responsible for administering response and repair activities taken under this chapter. The department shall:

1. Identify sites or facilities which cause or threaten to cause environmental pollution and maintain an inventory of these sites or facilities under s. NR 550.20(1);

2. Conduct an initial assessment of sites or facilities which cause or threaten to cause environment pollution under s. NR 550.20(5);

3. Determine a hazard score using the Wisconsin hazard ranking system for each site or facility which causes or threatens to cause environmental pollution using ss. NR 550.21 to 550.27;

4. Determine whether a site or facility listed on the inventory poses a substantial danger to the public health or welfare, or the environment under s. NR 550.21(1);

5. Maintain the hazard ranking list of sites or facilities under s. NR 550.21(2);

6. Identify sites or facilities which are an imminent risk to the public health or safety, or the environment, and take emergency response and repair actions under s. NR 550.32;

7. Develop scopes of work for response and repair actions under s. NR 550.33;

8. Evaluate proposals for response and repair actions under ss. NR 550.31 and 550.33;

9. Evaluate proposed repair alternatives and select appropriate repairs under s. NR 550.33;

10. Prepare the cost-benefit analysis under s. NR 550.33;

11. Determine when a repair action should start or stop under s. NR 550.33;

12. Prepare a written decision under s. NR 550.33; and

13. Develop contracts and agreements for response and repair actions under sub. (2).

(b) *Contractors.* Under contract with the department, contractors may:

1. Perform response and repair actions in accordance with contract terms and scope of work;

2. Develop, evaluate, and recommend appropriate repair alternatives;

3. Identify sites or facilities which may pose an imminent risk to the public health or safety, or the environment, and notify the department of the potential imminent risk;

4. Take emergency response and repair actions; and

5. Perform other related tasks as specified by the department.

(c) *Responsible persons.* Under contract or agreement with the department, persons responsible for sites or facilities which pose a substantial danger to the public health or welfare, or the environment may:

1. Perform response and repair actions;

2. Develop, evaluate, and recommend appropriate repair alternatives; and

3. Identify sites which may pose an imminent risk to the public health or welfare or the environment and notify the department of the potential imminent risk; and

4. Take emergency response and repair actions.

(d) *Environmental protection agency.* The EPA may:

1. Give technical assistance to the department for response and repair actions;

2. Grant funds to the department for performing site or facility assessments, investigating sites or facilities, developing and evaluating response and repair alternatives;

3. Give technical assistance to the department for developing contracts or agreements for response and repair actions; and

4. If requested by the department, perform immediate removals under section 106 of the superfund act at sites or facilities which pose an imminent risk to the public health or safety, or the environment.

(e) *Department of justice.* The department of justice may recover costs from responsible persons for causing a substantial danger at a site or facility and shall represent the department in cases where judicial review of the department's repair decisions is sought.

(f) *Department of administration.* The department of administration is responsible under ch. 16, Stats., for awarding and administering state

contracts for professional services and construction. For the purpose of contracts for actions taken by the department under this chapter, the department of administration shall:

1. Assist the department to evaluate proposals and procure professional services for response and repair actions;

2. Finalize contracts for professional services for response and repair actions, and contracts for repair actions;

3. Advertise for construction bids for repair actions;

4. Assist the department to evaluate construction bids for repair actions; and

5. Award and administer, with the assistance of the department, contracts for professional services for response and repair actions, and construction of repairs.

(g) *Division of emergency government.* The division of emergency government shall:

1. Provide a 24-hour toll-free or collect telephone number at which notices under ch. NR 158 may be received;

2. Promptly notify the department of any environmental threat which may cause an imminent risk to the public health or safety, or the environment; and

3. Assist the department, when necessary, with coordinating emergency response and repair actions taken under this chapter.

(h) *Local units of government.* Local units of government may:

1. Assist the department by securing access to sites or facilities for the department and its contractors or by limiting access to the public to sites or facilities which pose an imminent risk;

2. Provide facilities for the purpose of public meetings or hearings; and

3. Act as responsible persons.

(i) *Other state or federal agencies.* Other state or federal agencies may:

1. Act as technical advisors to the department for response and repair actions;

2. Provide the department with legal assistance in cases where response and repair actions involves a site or facility regulated by the other agencies;

3. Contract with the department for response and repair actions; and

4. Act as a responsible person.

(j) *Universities, colleges, and university extensions.* Universities, colleges and their agents may:

1. Provide technical assistance to the department for response and repair actions;

2. Provide research assistance to the department for response and repair actions;

3. Contract with the department for response and repair actions; and

4. Act as responsible persons.

(k) *Other commissions or groups.* Local and regional planning agencies, interstate and international commissions, environmental groups, other advocacy groups, or special interest groups may:

1. Provide technical comment and assistance to the department for response and repair actions;

2. Provide assistance for dissemination of information about response and repair actions; and

3. Contract with the department for response and repair actions.

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.31 Contractor selection. (1) PROFESSIONAL SERVICES. (a) *Regulatory requirements.* Professional services shall be procured in accordance with ch. ADM 20.

(b) *Procurement procedures.* The department and the department of administration shall develop and maintain inter-agency procedures for awarding professional service contracts for response and repair actions.

(c) *Use of professional services.* It shall be the normal practice of the department to procure professional services for:

1. Preparation of in-field conditions studies under s. NR 550.34;

2. Preparation of repair option plans under s. NR 550.35;

3. Preparation of plans and specifications for the repair, if appropriate; and

4. Construction supervision and inspection.

(d) *Other uses of professional services.* The department may procure professional services for:

1. The initial site assessment and risk potential evaluation under s. NR 550.20 (5); or

2. Special research or demonstration projects.

(e) *Contractor selection.* 1. For most response and repair contracts, the department shall procure professional services from experienced consulting firms, or affiliations of experienced consulting firms, which have interdisciplinary qualifications. At a minimum, each consulting firm or affiliation of firms used by the department for response and repair shall have 3 years of consulting experience and shall have one professional engineer and one hydrogeologist, who meets the requirements of subd. 2., on staff. Consulting firms shall provide the department with a statement of qualifications on forms provided by the department. The department shall retain these statements on file for reference. Each consulting firm or affiliation of firms may, from time to time, submit updated qualifications to the department to insure that accurate information on the firm's qualifications is available to the department.

2. To qualify as a hydrogeologist for the purposes of response and repair actions, a hydrogeologist shall be a graduate of an accredited insti-

tution of higher education, shall have successfully completed 30 semester hours or 45 quarter hours of course work in geology, at least 6 semester hours or 9 quarter hours of which was in hydrogeology, geohydrology, or groundwater geology, and shall have acquired through education and actual field experience the ability to direct the drilling of borings and the installation and development of wells, to describe and classify geologic samples, and to evaluate and interpret geologic and hydrogeologic data.

(2) CONSTRUCTION SERVICES. (a) *Regulatory requirements.* Construction contracts shall be procured in accordance with ch. Adm 20.

(b) *Procurement procedures.* The department and the department of administration shall develop and maintain inter-agency procedures for evaluating and awarding construction contracts for repair actions.

(3) OTHER SERVICES. The department may contract for services other than those considered as professional services or construction. Procurement of service contracts shall be done in accordance with established department procedures.

Note: Examples of service contracts are contracts for the removal of a waste, or laboratory services.

(4) EMERGENCY RESPONSE AND REPAIR. (a) *Determination.* The department shall determine the need for an emergency response and repair using the procedures listed in s. NR 550.32.

(b) *Professional services and other services.* The department may procure professional services or other services for emergency response and repair actions using the governor's bid waiver procedures under s. 16.75 (6) (d), Stats.

(c) *Construction services.* The department may procure construction contracts for emergency repair without competitive bidding under s. 16.855 (16), Stats.

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.32 Emergency response and repair. (1) GENERAL. (a) *Applicability.* The department may take emergency response and repair action in cases where an environmental threat from a site or facility causes an imminent risk to the public health or safety, or the environment. If time permits, the department shall request the EPA Region V emergency response section to evaluate the site or facility for an immediate removal under the authority of section 106 of the superfund act.

(b) *Purpose.* The purpose of any emergency response shall be to avert, prevent, or minimize the imminent risk.

(c) *Limitations.* Emergency responses shall be stopped when the environmental threat to the public health or safety, or the environment is no longer an imminent risk. Emergency response and repair actions shall be limited to the control of the imminent risk, not to the control of all risks which may be present at a site or facility.

(d) *Actions.* Possible emergency response and repair actions the department may take include:

1. Securing the site or facility;

2. Limiting access to the site or facility;

3. Containing or removing the waste or substance of concern;

4. Evacuating the area which is threatened;

5. Furnishing alternate water supplies;

6. Providing information about the imminent risk and how individuals may protect themselves from the threat; or

7. Other actions consistent with this chapter.

(e) *Cost analysis of emergency reponse actions.* If time permits, the department shall perform a cost analysis of possible emergency response and repair alternatives. The emergency response and repair action which has the lowest total present worth of costs while providing adequate safeguards against the imminent risk shall be implemented.

(2) EVALUATING THE NEED FOR EMERGENCY RESPONSE. (a) *Conditions.* An emergency response and repair action shall be taken only after the department has determined that both of the following conditions are present:

1. There is an immediate threat or immediate harm to the public health or safety, or the environment because of the release or potential release of a hazardous substance, or other substance of concern; and

2. The threat or harm could have severe or irreversible consequences.

(b) *Limitations.* The department may not take emergency action when:

1. The threat or risk of harm is remote in time;

2. The threat or risk of harm is speculative or without basis; or

3. The threat or risk of harm is small.

(c) *Evaluative criteria.* The department shall consider the following criteria to evaluate the need for taking an emergency response:

1. The threat or risk of harm could cause death or debilitating disease;

2. The threat or risk of harm could cause severe or debilitating injury;

3. The threat or risk of harm could severely restrict the continued use of a natural resource;

4. The threat or risk of harm could cause the immediate destruction or disruption of a natural resource; or

5. Other factors which lead the department to conclude an emergency response is necessary to protect the public health or safety, or the environment from an imminent risk.

(d) *Hazard ranking score.* Sites or facilities which have been scored by the federal or state hazard ranking systems, and which have received a score of 25.0 or more for either the fire and explosion or direct contact hazards shall be evaluated to determine whether an emergency response is necessary.

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.33 Planned response and repair. (1) PROGRAM GOALS AND OBJECTIVES. (a) *Goals.* 1. The department may take response and repair actions at a site or facility to reduce or eliminate the substantial dangers to the public health or welfare, or the environment by taking any or all of those actions listed in subds. 2. and 3., or other actions consistent with department authority under s. 144.442 (6), Stats.

2. On-site actions to reduce or eliminate substantial dangers may include:

a. Stopping the release of substances from the site or facility;

b. Isolating wastes at the site or facility;

c. Treating wastes or substances to reduce or eliminate inherent hazards;

d. Providing long-term care of the site or facility; or

e. Monitoring substances being released, or potentially released, from the site or facility.

3. Off-site actions to reduce or eliminate substantial dangers may include:

a. Reducing or eliminating human exposures to wastes or hazardous substances;

b. Removing hazardous substances from the environment;

c. Monitoring the potential human health effects resulting from the substantial danger; or

d. Restoring the environment to the extent practicable.

(b) *Objectives.* The department shall establish repair objectives consistent with the goals and management practices listed in sub. (1) for each repair action. Repair objectives shall be specific to the substantial danger present at the site or facility and shall be established considering:

1. The drinking water standards contained in ch. NR 109;

2. The surface water quality standards contained in chs. NR 102, 103, and 104;

3. The groundwater standards contained in ch. NR 140;

4. The ambient air quality standards contained in chs. NR 400-499;

5. Federal or state health standards or exposure advisories;

6. Preservation of wetlands, natural and scenic scientific areas, and other dedicated or protected resources; and

7. Preservation of threatened or endangered plant or animal species, or both.

(2) PLANNING ACTIVITIES. (a) *In-field conditions study.* An in-field conditions study shall be performed whenever the department determines that additional information is necessary before repair actions can be taken. The purpose of the in-field conditions study is to identify the pollutants at the site or facility, the extent of the pollution, the migration routes of the pollutants, the dangers posed by the pollutants and the

geological and hydrogeological features of the site or facility and surrounding area. In-field conditions studies shall be performed in accordance with s. NR 550.34.

(b) *Repair options plan.* A repair options plan shall be prepared to evaluate repair alternatives and to analyze the benefits of the repairs being considered. The repair options plan shall be prepared in accordance with s. NR 550.35.

(3) REPAIR ACTIONS. (a) *Selection.* Repair actions shall be selected to achieve the program goals and repair objectives. Whenever possible, the department shall avoid actions which remove and relocate hazardous substances. The department shall give preference to repair actions which:

1. Eliminate or reduce human exposure to hazardous substances;

2. Destroy hazardous substances;

3. Treat hazardous substances to render them innocuous;

4. Isolate the hazardous substances;

5. Contain substances and prevent future migration; and

6. Prevent the additional release of substances into the environment.

(b) *Evaluation of repair alternatives.* Repair actions shall be evaluated in the repair options plan prepared according to s. NR 550.35.

(c) *Selection of specific repair option.* The department shall, in general, select the repair option which has the lowest total present worth of project costs. However, in making the selection, the department shall also consider:

1. The capital and annual cost of the options being evaluated;

2. The degree to which each alternative meets the program goals and repair objectives for the site or facility;

3. The benefits and negative effects of each option;

4. The length of time needed to design and construct each option being evaluated; and

5. Other factors which the department requires in the scope of work.

(d) *Implementing repair actions.* When setting priorities for implementing repair actions at different sites or facilities, the department shall evaluate the criteria listed, in descending order of importance, in subds. 1. to 10.

1. The population using a drinking water supply which is contaminated by a hazardous substance released from each site or facility;

2. The population directly exposed to a hazardous substance released from each site or facility;

3. Known disruption of a sensitive environment caused by the release of a substance from each site or facility;

4. The hazard ranking system score for each site or facility obtained using the procedures in ss. NR 550.21 to 550.27;

5. The cost-benefit analysis for each repair prepared in accordance with sub. (4);

6. Money available from existing allocations to ERF, future allocations to ERF, superfund cost-sharing, well compensation program, and the willingness of responsible persons, or others, to help pay for a selected repair, the potential cost recovery from the responsible person, or, other sources of money;

7. The length of time needed to prepare engineering plans and specifications, obtain necessary regulatory approvals, and construct a selected repair;

8. The timing of a selected repair action;

9. Preclusion of, or conflict with, other repair actions being taken or considered under this chapter; and

10. Other appropriate factors.

(4) COST-BENEFIT ANALYSIS. (a) *Purpose.* The department shall prepare a cost-benefit analysis for each selected repair action. The purpose of the cost-benefit analysis is to ensure that the costs of the repair are reasonably appropriate, in the department's judgment, in comparison to the benefits being derived from the repair action. The cost-benefit analysis shall be used to help set priorities when comparing repair actions for implementation.

(b) *Qualitative analysis.* The cost-benefit analysis shall be a qualitative analysis of the effectiveness of the selected repair. The analysis shall explain how the selected repair action will meet program objectives and the repair goals; and why the department believes the costs of the repair are reasonable in comparison to the benefits derived.

(c) *Content.* The cost-benefit analysis shall contain:

1. A discussion of how the selected repair action will reduce or eliminate human exposure to hazardous substances at the site or facility, and what this reduction means in terms of human health or welfare;

2. A discussion of how the selected repair action will reduce existing migration and prevent future migration of substances from the site or facility;

3. A discussion of the immediate and long-term benefits derived from the selected repair;

4. A discussion of the adverse impacts associated with the selected repair action;

5. A statement of how the selected repair action meets the program goals and repair objectives;

6. A statement explaining why the department believes the costs of the repair are reasonable in comparison to the derived benefits; and

7. Other information which the department deems appropriate to demonstrate the effectiveness of the selected repair action.

(5) WRITTEN DECISION. (a) *General.* The department shall prepare a written decision for each selected repair action.

(b) *Findings of fact.* The written decision shall contain a finding of facts which includes:

1. A description of the site or facility;

2. A description of the substantial danger present at the site or facility;

3. A description of the repair alternatives considered for the site or facility;

4. A table of costs and total present worth for the repair alternatives considered in the repair options plan;

5. A listing of the benefits and negative impacts for each option considered;

6. The cost-benefit analysis prepared in accordance with sub. (4);

7. A statement of how the decision complies with the Wisconsin environmental policy act, and

8. Any other information which the department deems necessary to support its decision to implement a repair action.

(c) *Public notice.* The department shall issue a pbulic notice of its decision to take a repair action. This public notice shall be issued as a class I notice under ch. 985, Stats., as required by s. 144.442 (6) (f), Stats. The availability of the written decision for public review shall be included in the public notice.

(6) DECISION CRITERIA FOR STOPPING REPAIR ACTIONS. (a) *Decision criteria.* The department may stop a repair action at any time. When deciding to stop a repair action, the department shall consider:

1. The repair objectives established for the repair action and whether these objectives have been, or will be met;

2. The reduction of the substantial danger and the technical and economic feasibility of reducing the danger further; and

3. Other factors which the department deems appropriate.

(b) *Remaining dangers.* If a repair action is stopped prior to achieving the repair objectives, the department may evaluate ways to minimize human exposure to the remaining dangers.

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.34 In-field conditions study. (1) SCOPE OF WORK. The department shall prepare a scope of work based on what is already known about the site or facility for each in-field conditions study. Depending on the needs of the department, the in-field condition study may include any of the information in sub. (2).

(2) INFORMATION. (a) *Substance or waste characterization.* If necessary, the in-field conditions study shall determine the amount, physical state, and chemical character of substances or wastes existing at the site or facility.

(b) *Extent of pollution.* When appropriate, the in-field condition study shall determine:

1. The migration routes, the rates of migration of the substances or wastes, and the extent of the migration;

2. The number of people and natural resources potentially affected by the substances or wastes;

3. Any on-site pathways of exposure to the substances or wastes; and

4. Any other substantial danger posed by the site or facility.

(c) *Site or facility information.* Site or facility information which may be collected during the in-field conditions study include:

1. The site or facility setting and topography;

2. The local and regional geography, geology, climate, hydrology, and hydrogeology;

3. The surrounding natural environment and man-made features; and

4. The local land use and zoning practices in effect.

(3) IN-FIELD CONDITIONS REPORT. (a) *General.* The response contractor shall prepare an in-field conditions report describing the conditions found through the in-field conditions study. The report shall contain all of the information discussed in pars. (b) to (e) which is required by the department in the scope of work.

(b) *Site or facility description.* The report shall describe the site or facility and discuss any of the gathered information listed in sub. (2) (c).

(c) *Sampling program.* The report shall describe the sampling program used to determine the information listed in sub. (2). The description shall contain, as appropriate:

1. The methods of sampling;

2. The number of samples taken;

3. Frequency of sampling;

4. The analytical methods used and the limitations of the analyses; and

5. The location of monitoring stations.

(d) *Nature of substantial danger.* The in-field conditions report shall describe any substantial dangers present at the site or facility. This description shall include:

1. A summary of the analytical results;

2. The statistical validity of the analytical results;

3. An interpretation of the data;

4. A discussion of the migration routes and rates of migration of substances or wastes; and

5. A discussion of how the pollution is causing a substantial danger to the public health or welfare, or the environment.

e. *Other information.* The in-field conditions study report may contain other information which the department may require in the scope of work.

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.

NR 550.35 Repair options plan. (1) SCOPE OF WORK. The department shall prepare a scope of work for each repair options plan. The scope of work shall be based on what is known about the site or facility, and shall be specific to determine the proper repair action for the site or facility. The repair options plan may contain any of the information listed in sub. (2). The scope of work shall contain the repair objectives established by the department for the site or facility.

(2) CONTENTS OF REPAIR OPTIONS PLAN. (a) *Description of site or facility.* A description of the site or facility shall be contained in the repair options plan. This description may be a summary of the information contained in the site description of the in-field conditions report.

(b) *Site or facility ownership.* The repair options plan shall identify the current site or facility owner, past owners, and the person or persons responsible for causing the substantial dangers at the site or facility if applicable.

(c) *Site dangers.* The repair options plan shall contain a summary of the environmental pollution and substantial danger at the site or facility which were identified in the in-field conditions study.

(d) *Repair objectives.* A statement of the repair objectives for the site or facility shall be included in the repair options plan.

(e) *Repair options.* The repair options plan shall contain a list of possible repairs for the site or facility. An initial screening of the possible repairs shall be performed to eliminate any option which is not appropriate for the site or facility. Factors to be considered when performing the initial screening include:

1. The engineering feasibility of each repair;

2. The effectiveness of each repair;

3. An estimate of cost of each repair;

4. The negative impacts of each repair option.

(f) *Total present worth analysis.* A total present worth analysis of the costs of the repair options shall be contained in the repair options plan. The repair options plan shall discuss the selection of the planning period and interest rate used to determine compound interest factors. The total present worth analysis shall be prepared in accordance with sub. (3).

(g) *Benefits.* The plan shall contain a discussion of the benefits of each option to the public health or welfare, or the environment.

(h) *Adverse effects.* The plan shall contain a discussion of the adverse effects of each repair option.

(i) *Regulatory approvals.* The repair options plan shall list the necessary regulatory approvals for each option considered.

(3) TOTAL PRESENT WORTH ANALYSIS. (a) *Total present worth.* The total present worth of the costs of each repair option shall be calculated. Total present worth shall be based on detailed estimation of:

1. Initial costs which include construction, easements, and engineering fees;

2. Future costs for additional construction or equipment replacement;

3. Annual operation and maintenance costs;

4. Salvage values; and

5. Any potential revenues.

(b) *Project planning period.* For the total present worth analysis, the response contractor, in conjunction with the department, shall select an appropriate project planning period for calculating the compound interest factors. The planning period shall be based on the repair option which takes the longest period of time to complete. However, in no instance may the planning period exceed 30 years.

(c) *Interest rate.* The interest rate to be used for calculating compound interest factors shall be the federal discounted interest rate which is in effect at the time the present worth analysis is performed.

History: Cr. Register, December, 1986, No. 372, eff. 1-1-87.