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Chapter NR 720

SOIL CLEANUP STANDARDS

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Note: Corrections made under s. 13.93 (2m) (b) 7., Stats., Register, January, 2001, No. 541.

NR 720.01 Purpose. The purpose of this chapter is to establish soil cleanup standards, for the remediation of soil contamination, which result in restoration of the environment to the extent practicable, minimize harmful effects to the air, lands and waters of the state and are protective of public health, safety and welfare, and the environment as required by ss. 292.11, 292.15, and 292.31, Stats., and which are consistent with ch. 160, Stats., and ch. NR 140. This chapter is adopted pursuant to ss. 227.11 (2), 289.06 (1), (2), 292.11, 292.15, and 292.31, Stats.

History: Cr. Register, March, 1995, No. 471, eff. 4–1–95; am., Register, February, 1996, No. 482, eff. 3–1–96.

NR 720.02 Applicability. (1) Except as provided in sub. (1m), this chapter applies to all remedial actions taken by responsible parties to address soil contamination after an investigation has been conducted at a site, facility or portion of a site or facility that is subject to regulation under s. 292.11 or 292.31, Stats., regardless of whether there is direct involvement or oversight by the department. This chapter also applies to soil contamination at all of the following:

(a) Solid waste facilities, where remedial action is required by the department pursuant to s. NR 508.04 (4);

Note: Chapter NR 720 does not apply to landspreading regulated under ch. NR 518 or solid waste facilities where ongoing operations are occurring, unless remedial action is required pursuant to s. NR 508.04 (4).

(b) Hazardous waste facilities, where the owner or operator is required to close the facility pursuant to s. 291.29, Stats., or subchs. G and H of ch. NR 664, to institute corrective action pursuant to s. 291.37, Stats., or s. NR 664.0101, or to meet requirements imposed by the department under s. NR 600.07 where a discharge has occurred. However, if U.S. EPA requires that states employ soil cleanup standards for hazardous waste facilities that are more stringent than the standards in this chapter, the department is obligated under the state's hazardous waste management act, ch. 291, Stats., and its hazardous waste program RCRA authorization to apply the more stringent soil cleanup standards.

Note: Section NR 600.07 no longer exists.

(c) Wastewater lagoons, storage structures and treatment structures that are abandoned pursuant to s. NR 110.09, 213.07 or 214.08.

Note: Chapter NR 720 applies to abandonment of lagoons, storage structures and treatment structures for sewage treatment facilities projects; abandonment of lagoons, storage structures and treatment structures that receive wastewaters, associated sludges, by–product solids and any resulting leachates from industrial, commercial or agricultural sources, except as provided in s. NR 213.02 (2); and abandonment of land treatment systems for industrial liquid wastes, by–product solids and sludges, except as provided in s. NR 214.02 (3). Chapter NR 720 does not apply to activities regulated under s. 281.48, Stats., or permitted activities regulated under 40 CFR 503 or ch. NR 204, 206 or 214, including permitted land spreading of sludge or land disposal of wastewaters from municipal and domestic wastewater treatment works and permitted land treatment of industrial liquid wastes, by–product solids and sludges.

(d) Sites where remedial action is being taken by a person who is seeking the liability exemption under s. 292.15, Stats.

(1m) This chapter is not applicable to sites contaminated with petroleum products discharged from petroleum storage tanks that satisfy all of the risk screening criteria in s. NR 746.06 (2) and are eligible for closure under s. NR 746.07 or 746.08.

Note: If sites and facilities that are contaminated with petroleum products discharged from petroleum storage tanks do not satisfy the risk screening criteria in s. NR 746.06 (2) or the closure requirements of s. NR 746.07 or 746.08, the site or facility would be still be subject to this chapter.

(2) This chapter applies to interim actions taken by responsible parties or other persons under s. 292.15, Stats., when at the completion of both the site investigation and interim action taken to address contaminated soil, the responsible parties or persons taking action under s. 292.15, Stats., request that the site or facility be closed out in accordance with ch. NR 726, without taking a subsequent remedial action to address the contaminated soil.

(3) This chapter applies to remedial actions taken by the department where a department–funded response action is being taken under the authority of s. 292.11 or 292.31, Stats.

(4) Concentrations of legally applied pesticides are exempt from the requirements of this chapter when all of the following conditions are met:

(a) The application of the pesticide was done in compliance with:

1. The pesticide label currently registered with the U.S. EPA;
2. Sections 94.67 to 94.71, Stats.; and
3. Rules adopted under ss. 94.67 to 94.71, Stats.

(b) For pesticides that are intended to be applied to the soil, pesticide concentrations exceeding soil cleanup standards are only found in the surface soil layer, where the pesticide is expected to perform its intended+ purpose, and only at concentrations that would be expected from pesticide application, in compliance with the pesticide label requirements.

Note: The depth of the surface layer of soil will vary depending on the type of pesticide applied and the appropriate intended use of that pesticide.

(5) The department may exercise enforcement discretion on a case–by–case basis and choose to regulate a site, facility or a portion of a site or facility under only one of a number of potentially applicable statutory authorities. However, where overlapping restrictions or requirements apply, the more restrictive control. The department shall, after receipt of a request from a responsible party, provide a letter that indicates which regulatory program or programs the department considers to be applicable.

Note: Sites, facilities or portions of a site or facility that are subject to regulation under s. 292.11 or 292.31, Stats., may also be subject to regulation under other statutes, including solid waste statutes, ch. 289, Stats., or the hazardous waste management act, ch. 291, Stats., and the administrative rules adopted pursuant to those statutes. One portion of a site or facility may be regulated under a different statutory authority than other portions of that site or facility. When necessary, the department will, to the best of its ability, facilitate coordination between the regulatory programs involved.

(6) The department may take any action within the context of regulatory programs established in statutes or rules outside this chapter, if those actions are necessary to protect public health, welfare or safety or prevent a damaging effect on the environment for present and future uses, whether or not a soil cleanup standard has been adopted under this chapter.

(7) Nothing in this chapter authorizes an impact on soil quality that would cause a violation of a groundwater quality standard contained in ch. NR 140, an impact on soil quality or groundwater quality that would cause a violation of a surface water quality standard

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contained in chs. NR 102 to 106 or an impact on soil quality that would cause a violation of an air quality standard contained in chs. NR 400 to 499.

History: Cr. Register, March, 1995, No. 471, eff. 4–1–95; cr. (1) (d), am. (2); Register, February, 1996, No. 482, eff. 3–1–96; emerg. am. (1) (intro.), cr. (1m), eff. 5–18–00; am. (1) (intro.), cr. (1m), Register, January, 2001, No. 541, eff. 2–1–01; **corrections in (1) (b) made under s. 13.93 (2m) (b) 7., Stats., Register September 2007 No. 621.**

NR 720.03 Definitions. In this chapter:

(1) "Aquifer" means a saturated subsurface geological formation of rock or soil.

(2) "Contaminant of concern" means a hazardous substance that is present at a site or facility in such concentrations that the contaminant poses an actual or potential threat to human health, safety or welfare or the environment based upon:

(a) The toxicological characteristics of the hazardous substance that influence its ability to adversely affect human health or the environment relative to the concentration of the hazardous substance at the site or facility;

(b) The chemical and physical characteristics of the hazardous substance which govern its tendency to persist in the environment and the chemical, physical and biological characteristics at the site or facility which govern the tendency for the hazardous substance to persist at the site or facility;

(c) The chemical and physical characteristics of the hazardous substance which govern its tendency to move into and through environmental media;

(d) The naturally occurring background concentrations of the hazardous substance;

(e) The thoroughness of the testing for the hazardous substance at the site or facility;

(f) The frequency that the hazardous substance has been detected at the site or facility; and

(g) Degradation by–products of the hazardous substance.

(3) "Cumulative excess cancer risk" means the upper bound on the estimated excess cancer risk associated with exposure to multiple hazardous substances or multiple exposure pathways.

(4) "Direct contact" means human exposure to substances in soil through inhalation of particulate matter or incidental ingestion of soil.

Note: The definition of direct contact will be expanded in future revisions to include human exposures by inhalation of vapors and dermal absorption.

(5) "Hazard index" means the sum of 2 or more hazard quotients for multiple hazardous substances or multiple exposure pathways.

(6) "Hazard quotient" means the ratio of the exposure of a single hazardous substance over a specified time period to a reference dose, or reference concentration where appropriate, for that hazardous substance derived for a similar exposure period.

Note: Hazard quotients and the hazard index are measures of noncarcinogenic risk.

(7) "Incidental ingestion of soil" means ingestion of soil by humans as a result of normal hand–to–mouth behaviors.

(8) "Inhalation of particulate matter" means inhalation by humans of air with contaminated soil particles less than 10 microns in diameter.

(9) "Limit of detection" means the lowest concentration level that can be determined to be statistically different from a blank.

Note: This definition of "limit of detection" is consistent with s. NR 140.05 (12). However, the definition of "limit of detection", has been changed in s. NR 149.03 (41) to mean "the lowest concentration or amount of analyte that can be identified, measured, and reported with confidence that the concentration is not a false positive value."

(10) "Limit of quantitation" means the lowest concentration for an analytical test method and sample matrix at which the quantity of a particular substance can be measured with a stated degree of confidence.

(11) "Pathway" means the route a substance takes in traveling to a receptor or potential receptor or the specific portal of entry, such as lungs, skin or digestive tract, the substance takes to potentially express its toxic effect, or both.

Note: The food chain pathway for cadmium, for example, refers to cadmium being taken up in plant tissue and the plant tissue being ingested by an organism.

(12) "Responsible parties" means:

(a) Persons who are required to address soil contamination under s. 292.31, Stats., or who agree to address soil contamination in a contract entered into under s. 292.11, Stats.

(b) Owners and operators of solid waste facilities that are subject to regulation under ch. NR 508;

(c) Owners and operators of hazardous waste facilities that are subject to the closure requirements of s. 291.29, Stats., or subchs. G and H of ch. NR 664 or the corrective action requirements of s. 291.37, Stats., or s. NR 664.0101 or where the department has imposed special requirements where a discharge has occurred under s. NR 600.07; and

Note: Section NR 600.07 no longer exists.

(d) Owners and operators of wastewater lagoons, storage structures or treatment structures that are abandoned and are subject to regulation under s. NR 110.09, 213.07 or 214.08.

(13) "Restricted access areas" means land immediately adjacent to highways or railroad right–of–ways, where the presence of structural controls, such as fencing, has eliminated pedestrian ingress by the public.

(14) "Risk" means the probability that a hazardous substance, when released to the environment, will cause adverse effects in exposed humans or other biological receptors.

History: Cr. Register, March, 1995, No. 471, eff. 4–1–95; **corrections in (12) (c) made under s. 13.93 (2m) (b) 7., Stats., Register September 2007 No. 621.**

NR 720.05 General. (1) Responsible parties shall select and implement a remedial action to address soil contamination when, after any of the following investigations has been completed, information collected during the investigation indicates that a remedial action to address soil contamination is necessary to achieve compliance with the requirements of this chapter:

(a) Site investigation report developed in accordance with ch. NR 716 at sites or facilities subject to regulation under s. 292.11 or 292.31, Stats.

(b) Solid waste in–field conditions report prepared in accordance with the requirements of s. NR 508.04 (4).

(c) Investigation done under a hazardous waste closure plan or a RCRA facility investigation report, developed in accordance with the requirements of subchs. G and H of ch. NR 664 or s. NR 664.0101.

(d) Investigation done under a wastewater facility, structure or system abandonment plan developed in accordance with the requirements of s. NR 110.09 (2) (r), 213.07 or 214.08.

Note: Remedial actions at some types of sites or facilities, such as the abandonment of wastewater lagoons, may only have to comply with ch. NR 720 and not other requirements in the NR 700 series, such as the minimum site investigation requirements in ch. NR 716. In this case, the department or responsible parties may choose to use the other chapters of the NR 700 rule series as guidance for complying with ch. NR 720.

(2) Remedial actions conducted by responsible parties to address soil contamination shall be designed and implemented to restore the contaminated soil to levels that, at a minimum, meet the soil cleanup standards for the site or facility determined in accordance with this chapter.

(3) If all soil contaminant concentrations meet applicable soil cleanup standards after a remedial action is completed, the department may not require further remedial action for soils, unless the department determines that the residual soil contamination:

(a) Presents a threat to public health, safety or welfare or the environment at the site or facility;

(b) Will cause a violation of a groundwater quality standard contained in ch. NR 140;

(c) Will cause a violation of a surface water quality standard contained in chs. NR 102 to 106; or

(d) Will cause a violation of an air quality standard contained in chs. NR 400 to 499.

History: Cr. Register, March, 1995, No. 471, eff. 4–1–95; **corrections in (1) (c) made under s. 13.93 (2m) (b) 7., Stats., Register September 2007 No. 621.**

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NR 720.07 Procedures for establishing soil cleanup standards applicable to a site or facility. (1) GENERAL. (a) Responsible parties shall use information from the sources listed in s. NR 720.05 (1) to determine the residual contaminant levels or performance standards for each exposure or migration pathway of concern for each soil contaminant of concern at a site or facility in accordance with ss. NR 720.09 to 720.19.

(b) In addition to meeting the requirements of par. (c), responsible parties shall establish the soil cleanup standard for each soil contaminant of concern at the site or facility as:

1. The residual contaminant level which is the lowest concentration of those determined in accordance with the requirements of ss. NR 720.09 to 720.19 (3); or

Note: Numeric residual contaminant levels are determined separately for each exposure or migration pathway of concern at a site. These residual contaminant levels are not the soil cleanup standard for the site. The soil cleanup standard for the site is determined by selecting the lowest concentration from among the individual residual contaminant levels determined for each pathway.

2. A performance standard determined in accordance with s. NR 720.19 (2).

(c) In addition to meeting the requirements of par. (b), a soil cleanup standard developed under this chapter shall comply with the following requirements:

1. Residual soil contamination at the site or facility shall not adversely affect surface water;

2. Residual soil contamination at the site or facility shall not adversely affect a sensitive environment; and

3. Residual soil contamination at the site or facility shall not concentrate through plant uptake and adversely affect the food chain.

Note: It is the department's intention to adopt in the future soil cleanup standards based on protection of human food chain exposures, protection of surface water quality and protection of terrestrial ecosystems after exposure assumptions and methods have been developed to allow the department to calculate soil cleanup standards for these pathways of exposure. Responsible parties are required by ss. NR 720.07 (2) and 720.19 (6) to consider human food chain exposures, the protection of surface water quality and the protection of terrestrial ecosystems, if these pathways are of concern, when determining a residual contaminant level at a site or facility.

(2) COMPLIANCE WITH SOIL CLEANUP STANDARDS. (a) Contaminant concentrations in soil samples shall be determined using a department–approved and appropriate analytical method and reported on a dry weight basis. An appropriate analytical method shall have limits of detection or limits of quantitation, or both, at or below soil cleanup standards where possible. Responsible parties shall report the limit of detection and the limit of quantitation with sample results. The department may require that supporting documentation for the reported limit of detection and limit of quantitation be submitted.

(b) If a soil contaminant concentration in a sample exceeds the soil cleanup standard at or above the limit of quantitation for that soil contaminant, the soil cleanup standard shall be considered to have been exceeded.

(c) If a soil cleanup standard for a soil contaminant is between the limit of detection and the limit of quantitation, the soil cleanup standard shall be considered to be exceeded if the soil contaminant concentration is reported at or above the limit of quantitation.

(d) The following applies when a soil cleanup standard for a soil contaminant is below the limit of detection:

1. If a soil contaminant is not detected in a sample, the soil cleanup standard shall not be considered to have been exceeded.

2. If a soil contaminant is reported above the limit of detection but below the limit of quantitation, the soil cleanup standard shall be considered to have been exceeded if the presence of that soil contaminant has been confirmed by the use of an appropriate analytical method.

History: Cr. Register, March, 1995, No. 471, eff. 4–1–95.

NR 720.09 Determination of residual contaminant levels based on protection of groundwater. (1) CRITERIA AND PROCESS USING GENERIC RESIDUAL CONTAMINANT LEVELS. If all of the following criteria are met, responsible parties may use one of the methods in sub. (3) and, where applicable, the standards in sub. (4) to determine residual contaminant levels based on groundwater protection for a site or facility:

(a) An investigation has been conducted and completed in accordance with applicable administrative rules, as specified in s. NR 720.05 (1);

(b) The contaminants of concern are listed in Table 1, except that at sites or facilities with petroleum contamination where gasoline range organics (GRO) or diesel range organics (DRO), or both, are the only contaminants of concern present other than contaminants listed in Table 1, the standards in sub. (4) (a) may be used for non–specific GRO or DRO contamination in addition to the methods in sub. (3) which are applicable to contaminants listed in Table 1;

(c) The horizontal and vertical degree and extent of contamination is defined;

(d) The vertical distance from the base of the contaminated soil to carbonate bedrock (limestone or dolostone) or fractured bedrock is one meter (3.28 feet) or greater;

(e) The vertical thickness of the residual soil contamination is 6 meters (19.69 feet) or less; and

(f) None of the residual contaminants or combinations of residual contaminants at the site or facility are known to contribute to facilitated transport or cosolvent effects.

Note: In some cases, a contaminant or combination of contaminants may contribute to an increased potential for migration of contaminants to groundwater by facilitated transport or by acting as a solvent for other contaminants, which would make the use of the values in Table 1 inappropriate. An example of facilitated transport might be polychlorinated biphenyls (PCBs) in the presence of an oily phase. An example of cosolvency might be polycyclic aromatic hydrocarbons (PAHs) in the presence of alcohols, where the alcohol acts to increase the solubility of the PAHs.

Note: If a site or facility meets the criteria in sub. (1), responsible parties are not required to use the methods for generic residual contaminant levels in sub. (3). The procedure in s. NR 720.19 may be used to determine site–specific soil cleanup standards even when the site or facility meets the criteria in sub. (1).

(2) SITE–SPECIFIC PROCESS. If any of the criteria in sub. (1) are not met, responsible parties shall use the procedure in s. NR 720.19 to determine soil cleanup standards specific to a site or facility based on groundwater protection.

(3) METHODS FOR DETERMINING GENERIC RESIDUAL CONTAMINANT LEVELS. Responsible parties may select one of the following methods to determine residual contaminant levels based on groundwater protection for sites or facilities that meet all of the criteria in sub. (1) in addition to meeting the requirements of sub. (4), if applicable:

(a) *Method 1.* Responsible parties may use the residual contaminant levels based on protection of groundwater listed for each substance in Table 1.

(b) *Method 2. 1.* Responsible parties may determine the residual contaminant levels based on protection of groundwater using the baseline concentration for each substance listed in Table 1 multiplied by a groundwater dilution factor specific to the site or facility determined using parameter values from the site or facility determined in accordance with subd. 2. and a groundwater mixing zone depth of 5 feet (152.4 cm) in the following equation:

$$DF = 1 + \frac{K \times 1 \times d}{R \times 1}$$

Where:

DF = groundwater dilution factor,

K = hydraulic conductivity (cm/day),

I = hydraulic gradient (cm/cm)

d = depth of groundwater mixing zone (cm)

R = average groundwater recharge rate (cm/day), and

l = horizontal extent of contaminated soil parallel to the hydraulic gradient (cm).

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2. Parameter values specific to the site or facility shall be determined as follows:

a. Hydraulic conductivity shall be determined as the geometric mean of values determined from appropriate aquifer tests. Appropriate aquifer tests may include slug tests and pumping tests, and shall be properly performed using accepted practices.

b. Hydraulic gradient shall be determined using water level measurements from a minimum of 3 groundwater monitoring wells whose screens intersect the same hydrogeologic unit using the procedures specified in s. NR 716.13 (8). In cases where the magnitude of the hydraulic gradient is known to vary, an average value shall be used.

Note: Section NR 716.13 (8) requires that water levels be measured and recorded to the nearest 0.01 foot prior to obtaining a groundwater sample from the well.

c. Horizontal extent of contaminated soil parallel to the hydraulic gradient shall be determined as the maximum lateral extent from the information listed in s. NR 720.05 (1) and direction of the hydraulic gradient determined in subd. 2. b. In cases where the direction of the hydraulic gradient is known to vary, the longest appropriate dimension shall be used.

d. Average groundwater recharge rate shall be determined using an appropriate method or a default value of 0.07 cm/day.

Note: The default value of 0.07 cm/day is equivalent to an average annual recharge rate of 10 inches/year (25.4 cm/year).

Note: Average groundwater recharge rate can be approximated from the infiltration rate less the evapotranspiration rate. Appropriate methods may include the review of literature sources applicable to the site or facility or the use of field measurements, analytical solutions for estimating infiltration rate combined with analytical or empirical equations for estimating of evapotranspiration, or water balance approaches, among others. It is preferable to overestimate the average groundwater recharge rate rather than underestimate it.

Note: In some cases, use of Method 2 will yield residual contaminant levels lower than those for Method 1. In such cases, the residual contaminant level for Method 1 can be used.

(4) PETROLEUM CONTAMINATION. (a) *Generic residual contaminant levels.* 1. For sites or facilities with petroleum contamination where subd. 2. is not applicable, the soil cleanup standard for gasoline range organics (GRO) or diesel range organics (DRO) is a concentration in soil that may not exceed 100 milligrams per kilogram for either GRO or DRO.

2. For sites or facilities with petroleum contamination where contaminated soils and soils below the contaminated soil for a depth of 3 meters have a hydraulic conductivity of $1x10^{-6}$ cm/s or less, the soil cleanup standard for gasoline range organics (GRO) or diesel range organics (DRO) is a concentration in soil that may not exceed 250 milligrams per kilogram for either GRO or DRO.

Note: Milligrams per kilogram (mg/kg) is equivalent to parts per million (ppm) in soil.

(b) *Site−specific determination.* For sites or facilities with petroleum contamination where the concentration of gasoline range organics or diesel range organics, or both, is greater than the concentration specified in par. (a), Table 1 may be used to determine the residual contaminant levels for the compounds listed in Table 1 and soil cleanup standards for gasoline range organics and diesel range organics may be determined using the procedure in s. NR 720.19.

Table 1
Baseline Concentrations, Dilution Attenuation Factors and Residual Contaminant Levels Based on Protection of Groundwater

Substance	Baseline Concentration µg/kg	Dilution Attenuation Factor	Residual Contaminant Level µg/kg
Benzene	0.093	59	5.5
1,2Dichloro-ethane	0.041	120	4.9
Ethylbenzene	42	70	2900
Toluene	18	81	1500
Xylenes (total)	47	87	4100

Note: Micrograms per kilogram (µg/kg) is equivalent to parts per billion (ppb) in soil. Soil concentrations are on a dry weight basis.

Note: The residual contaminant levels for Method 1 listed in Table 1 represent concentrations of contaminants that can remain in soil at a site and not cause a violation of a ch. NR 140 preventive action limit in groundwater. These residual contaminant levels are based on the baseline concentration for a substance multiplied by the dilution attenuation factor for that substance listed in Table 1.

Note: The residual contaminant levels in Table 1 are based on protection of groundwater. These concentrations of hazardous substances in soil may not be protective of other pathways of concern.

History: Cr. Register, March, 1995, No. 471, eff. 4−1−95.

NR 720.11 Determining residual contaminant levels based on protection of human health from direct contact with contaminated soil. (1) LAND USE CLASSIFICATION. (a) Responsible parties shall determine an appropriate land use classification for the site or facility in compliance with pars. (b) to (d), unless otherwise directed by the department.

(b) Responsible parties shall classify the land use of a site or facility as non−industrial unless all of the following criteria are met:

1. The site or facility is currently zoned for, or otherwise officially designated for, industrial use.

Note: A site or facility may be officially designated for industrial use by the issuance of a conditional use or special exception permit that allows an industrial use of that site or facility in a non− industrial zoning district or by the designation of an area as industrial in a county development plan or a municipal master plan, among other means.

2. The site or facility is expected to be used for industrial purposes due to zoning, statutory or regulatory restrictions, comprehensive plans, adjacent land use or other relevant factors.

3. More stringent residual contaminant levels for soil are not necessary to protect public health on or off the site or facility.

Note: Situations where s. NR 720.11 (1) (b) 3. would apply include site or facilities which could otherwise be classified as industrial, but where proximity to a nonindustrial land use, such as residential housing located across the street, makes a nonindustrial classification more appropriate.

(c) The land use of a site or facility may be classified as industrial if all of the criteria in par. (b) are met and if a deed restriction which meets the requirements of s. NR 726.05 (8) is recorded within 30 days after remedial action is initiated at the site or facility.

(d) The industrial column in Table 2 may be applied to restricted access areas unless more stringent residual contaminant levels are necessary to protect public health on or off the site.

Note: A deed restriction must be recorded if soil cleanup levels based on industrial exposure are used.

(2) CRITERIA AND PROCESS FOR USING GENERIC RESIDUAL CONTAMINANT LEVELS. If all of the following criteria are met for a site or facility, responsible parties may use the residual contaminant levels based on protection from direct contact listed for each substance in Table 2 which are appropriate for the site or facility in accordance with the land use classification determined in sub. (1), unless sub. (3) or (5), or both, applies:

(a) An investigation has been conducted in accordance with applicable administrative rules, as specified in s. NR 720.05 (1);

(b) The contaminants of concern present at the site or facility are listed in Table 2; and

Note: For example, at a site where soils are contaminated with diesel fuel, polynuclear aromatic hydrocarbon (PAH) compounds are present and may be considered contaminants of concern. With the exception of naphthalene, PAH compounds are generally only of concern for direct contact due to their relatively low migration potential.

(c) The horizontal and vertical degree and extent of contamination is defined.

Note: If a site or facility meets the criteria in s. NR 720.11 (2) responsible parties are not required to use the procedure for generic residual contaminant levels in sub. (2). The procedure in s. NR 720.19 may be used to determine site−specific soil cleanup standards even when the site or facility meets the criteria in sub. (2).

(3) CUMULATIVE RISK. (a) The cumulative excess cancer risk may not exceed $1x10^{-5}$ and the hazard index for non−carcinogens may not exceed one for the contaminants of concern at a site or facility.

(b) Risks for carcinogens and for non−carcinogens are presumed to be additive within each category. The residual contaminant levels

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in Table 2 shall be prorated downward to keep the cumulative risk below the levels specified in par. (a).

Note: The residual contaminant levels for non–industrial land use in Table 2 are based on an excess cancer risk of $1x10^{-7}$ for carcinogens or a hazard quotient of 0.2 for noncarcinogens. These levels are intended to be analogous with the preventive action limits in ch. NR 140.

(4) SITE–SPECIFIC PROCESS. Except as provided in sub. (5), if one or more of the criteria in sub. (2) are not met, responsible parties shall use the procedure in s. NR 720.19 to determine soil cleanup standards specific to a site or facility based on protection from direct contact.

(5) EXCEPTIONS. (a) For sites contaminated with petroleum products discharged from petroleum storage tanks:

1. If residual concentrations of benzene and 1,2 – dichlorethane are below the soil contaminant concentrations in Table 2 in s. NR 746.06 (2) and residual concentrations of ethylbenzene, toluene, xylene, 1,2,4 – trimethylbenzene, 1,3,5 – trimethylbenzene and naphthalene are below the soil screening levels in Table 1 in s. NR 746.06 (2), responsible parties are not required to satisfy the requirements in s. NR 720.19 and are not required to determine a site–specific direct contact residual contaminant level or site–specific soil cleanup standard for these substances for the purpose of complying with the provisions in s. NR 720.07 (1) (a) and (b).

2. If the site does not meet the requirements of subd. 1. but meets the risk screening criteria in s. NR 746.06 (2) (b) and (c), the responsible party shall obtain prior approval from the agency with administrative authority for the site before taking any action to address a direct contact threat other than the use of a performance standard under s. NR 720.19 (2).

(b) If the background concentration for a substance in soil at a site or facility is higher than the residual contaminant level for that substance listed in Table 2 or determined using the procedure in s. NR 720.19 (3), the background concentration in soil may be used as the residual contaminant level for that substance. The background concentration for a substance in soil shall be determined using a department–approved and appropriate method.

Note: Naturally occurring background concentrations of arsenic in soil, for example, may be higher than the residual contaminant level for arsenic listed in Table 2. In such instances, the naturally occurring background concentration should be used as the soil cleanup level.

Table 2

Residual Contaminant Levels Based On Human Health Risk From Direct Contact Related To Land Use

(milligrams per kilogram)

Substance	Non–Industrial	Industrial	Basis
Arsenic	0.039	1.6	cancer
Cadmium	8	510	noncancer
Chromium, hexavalent	14	200	cancer
Chromium, trivalent	16,000	NA	noncancer
Lead	50	500	noncancer

NA= Not applicable

Note: Milligrams per kilogram (mg/kg) is equivalent to parts per million (ppm) in soil. Soil concentrations are on a dry weight basis.

Note: The residual contaminant levels in Table 2 are based on protection of human health from direct contact through ingestion of soil or inhalation of particulate matter. These concentrations of hazardous substances in soil may not be protective of other pathways of concern. The definition of direct contact will be expanded in future revisions to include human exposures by inhalation of vapors and dermal absorption. In addition, these levels may be higher than those which would be characteristic of hazardous waste when tested using the toxicity characteristic leaching procedure (TCLP), U.S. EPA Method 1311.

History: Cr. Register, March, 1995, No. 471, eff. 4–1–95; am. (4) and (5), Register, January, 2001, No. 541, eff. 2–1–01.

NR 720.19 Procedure for determining soil cleanup standards specific to a site or facility. (1) GENERAL. (a) Responsible parties shall propose a soil cleanup standard specific to a site or facility in accordance with the requirements of this section when required in ss. NR 720.09 to 720.11 or if it is determined that it is not practicable to achieve the residual contaminant level for a soil contaminant specified in ss. NR 720.09 to 720.11 using on–site remedial action or, if the responsible party chooses to utilize off–site remedial actions, using off–site remedial action or a combination of on–site and off–site remedial actions at a site or facility.

(b) Responsible parties shall establish a soil cleanup standard for a specific soil contaminant or physical location at a site or facility using one of the methods in sub. (2) or (3).

(2) PERFORMANCE STANDARD. If selected, a performance standard shall be established for a remedial action so that the remedial action is operated and maintained, in compliance with chs. NR 722 and 724 when those chapters are applicable to the site or facility, until the lowest concentration that is practicable is achieved or a permanent engineering control is maintained, or both, so that the residual contaminants left in the soil do not pose a threat to public health, safety and welfare or the environment.

Note: Examples of performance standards include the allowable rate of infiltration by soil contaminants into the groundwater after a membrane liner has been installed, or the rate or percentage of removal efficiency offered by an in–situ treatment system at a specific site or facility. At a site or facility where an engineering control is being considered for selection, in accordance with the requirements of ch. NR 722, an engineering control may be selected even though the soil contaminants exceed a residual contaminant level.

(3) RESIDUAL CONTAMINANT LEVELS SPECIFIC TO A SITE OR FACILITY. If selected, residual contaminant levels specific to a site or facility shall be established that are protective of public health, safety and welfare and the environment and restore the environment to the lowest concentration practicable, in accordance with the requirements of sub. (4) to (6). Even in cases where the procedure in sub. (3) is selected by the responsible party, the procedure in sub. (2) may be used when the residual contaminant levels established under sub. (3) are not practicable to achieve.

(4) PROTECTION OF GROUNDWATER. (a) Residual contaminant levels for soil based on protection of groundwater shall be developed using the preventive action limits (PALs) established in ch. NR 140 or using procedures consistent with the methodology in ss. 160.13 and 160.15, Stats., and the criteria in s. NR 722.09 (2) (b) 2. when there is no preventive action limit as the target concentrations in groundwater.

Note: In developing a residual contaminant level, any relevant information shall be considered, including public welfare concerns for groundwater, such as taste and odor.

(b) Responsible parties shall use one or more of the methods listed in this paragraph based on scientifically valid procedures that are subject to department review and approval and site–specific geological, physical and chemical conditions to establish residual contaminant levels.

1. A contaminant transport and fate model.

2. Leaching tests appropriate for the site or facility in both application and extent.

3. Any other appropriate method approved by the department for that specific site or facility, or other appropriate method suggested in department guidance.

(5) PROTECTION OF HUMAN HEALTH FROM DIRECT CONTACT. (a) *General.* Residual contaminant levels for soil based on protection of human health from direct contact shall be developed:

1. For individual compounds using the excess cancer risk of $1x10^{-6}$ and the hazard quotient for non–carcinogens of one; and

2. So that the cumulative excess cancer risk will not exceed $1x10^{-5}$ and the hazard index for non–carcinogens will not exceed one for the site or facility.

3. Risks for carcinogens and for non–carcinogens are presumed to be additive within each category, unless there is specific information that demonstrates that an alternative approach is more appropriate.

4. If toxicological indices for both carcinogenic and non–carcinogenic end points exist for a substance, both shall be evaluated and

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the value that generates the lowest residual contaminant level shall be used for the site or facility.

(b) *Methods and procedures.* Responsible parties shall determine a residual contaminant level to protect public health from direct contact with soil contamination using scientifically valid procedures and toxicological values approved by the department and the default exposure assumptions identified in par. (c) or alternative assumptions specifically approved by the department in writing.

Note: The department will generally consider toxicological values in the following order: recommendations of the department of health and social services; indices contained in U.S. EPA's Integrated Risk Information System (IRIS); indices contained in U.S. EPA's Health Effects Assessment Summary Tables (HEAST); recommendations of U. S. EPA's Environmental Criteria and Assessment Office; indices withdrawn from IRIS; indices withdrawn from HEAST; and other pertinent toxicological information.

(c) *Default exposure assumptions.* 1. Non−carcinogens. When the contaminant is not a carcinogen, the following default exposure assumptions shall be used:

a. When the land use of a site or facility is classified as non−industrial, in accordance with s. NR 720.11 (1), incidental ingestion of soil shall be assumed to occur at the rate of 200 mg of soil per day for a 15 kg child for 350 days each year and inhalation of particulate matter shall be assumed to occur at the inhalation rate of 20 m^3 of air per day with a concentration of 1.4 $\mu g/m^3$ of contaminated soil particles less than 10 μm in diameter for 350 days each year, for 6 years.

b. When the land use of a site or facility is classified as industrial, in accordance with s. NR 720.11 (1), incidental ingestion of soil shall be assumed to occur at the rate of 100 mg of soil per day for a 70 kg adult worker for 250 days each year and inhalation of particulate matter shall be assumed to occur at the inhalation rate of 24 m^3 of air per day with a concentration of 1.4 $\mu g/m^3$ of contaminated soil particles less than 10 m in diameter for 250 days each year, for 25 years.

2. Carcinogens. When the contaminant is a carcinogen, the following default exposure assumptions shall be used:

a. When the land use of a site or facility is classified as non−industrial, in accordance with s. NR 720.11 (1), incidental ingestion of soil shall be assumed to occur at the rate of 200 mg of soil per day for 350 days each year for 6 years for a 15 kg child and the rate of 100 mg per day for 350 days each year for 24 years for a 70 kg adult and inhalation of particulate matter shall be assumed to occur at the inhalation rate of 20 m^3 of air per day with a concentration of 1.4 $\mu g/m^3$ of contaminated soil particles less than 10 μm in diameter for 350 days each year for 30 years, during a 70 year lifetime.

b. When the land use of a site or facility is classified as industrial, in accordance with s. NR 720.11 (1), incidental ingestion of soil shall be assumed to occur at the rate of 100 mg of soil per day for 250 days each year for a 70 kg adult worker and inhalation of particulate matter shall be assumed to occur at the inhalation rate of 24 m^3 of air per day with a concentration of 1.4 $\mu g/m^3$ of contaminated soil particles less than 10 μm in diameter for 250 days each year, for 25 years during a 70 year lifetime.

Note: Department approval of alternative exposure assumptions for a site or facility will be based on consultation with the department of health and social services.

(6) OTHER PATHWAYS OF CONCERN. Responsible parties shall consider human food chain, surface water quality and terrestrial ecosystem pathways of exposure, when those pathways of exposure are of concern at a site or facility.

Note: In some cases, the potential for contaminant migration or exposure to contamination through other pathways may be of concern at a site or facility. These situations could include contaminated soil in close proximity to a surface water where the potential for runoff from the site or facility to cause an impact on surface water quality exists or contaminated soil where potential for bioaccumulation through the food chain resulting in adverse impacts to human health or terrestrial ecosystems exists. Section NR 720.19 (6) requires responsible parties to establish appropriate residual contaminant levels protective of these pathways when necessary.

(7) SUBMITTALS. (a) Unless otherwise directed by the department, submittals under this section shall be included in the site investigation report or the draft remedial action options report required under s. NR 700.11 (2) (b).

(b) Submittals to the department under this section shall include all of the following:

1. Complete background information and supporting documentation for the procedure to be used;

2. Documentation that the application of the procedure is valid for the site or facility under consideration;

3. Necessary data and documentation needed to fully evaluate the submittal; and

4. Legible copies of source documents or pertinent portions of source documents.

Note: The use of references to source documents alone in a submittal is generally not adequate for efficient department review. For example, background documentation for a given contaminant transport and fate model or articles in obscure publications may not be readily available or accessible to department staff. Considerable time can be spent in obtaining this documentation before a submittal can be reviewed. In order to facilitate department review of submittals, legible copies of entire source documents or the pertinent portions of source documents sufficient to evaluate the method or procedure used should be included with the submittal. The department will not purchase documents in order to review a particular submittal.

History: Cr. Register, March, 1995, No. 471, eff. 4−1−95; correction in (4) (a) made under s. 13.93 (2m) (b) 7., Stats., Register, February, 1997, No. 494.