

POLLUTION CONTROL BOARD

NOTICE OF PROPOSED AMENDMENTS

1) Heading of the Part: Tiered Approach to Corrective Action Objectives

2) Code Citation: 35 Ill. Adm. Code 742

3) Section Numbers: Proposed Action:

742.105	Amend
742.110	Amend
742.115	Amend
742.200	Amend
742.210	Amend
742.220	Amend
742.222	New
742.225	Amend
742.227	New
742.305	Amend
742.310	Amend
742.312	New
742.405	Amend
742.500	Amend
742.505	Amend
742.510	Amend
742.515	New
742.600	Amend
742.605	Amend
742.610	Amend
742.700	Amend
742.705	Amend
742.710	Amend
742.712	New
742.715	Amend
742.717	New
742.805	Amend
742.810	Amend
742.812	New
742.900	Amend
742.920	Amend
742.925	Amend
742.935	New
742.1000	Amend
742.1010	Amend

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742.1015	Amend
742.1105	Amend
742.1200	New
742.1205	New
742.1210	New
742.APPENDIX A	
TABLE A	Amend
TABLE E	Amend
TABLE F	Amend
TABLE J	New
TABLE K	New
742.APPENDIX B	
TABLE G	New
TABLE H	New
TABLE I	New
742.APPENDIX C	
TABLE A	Amend
TABLE B	Amend
TABLE E	Amend
TABLE F	Amend
TABLE L	New
TABLE M	New
742.APPENDIX F	Amend

- 4) Statutory Authority: Authorized by Section 27 of the Environmental Protection Act [415 ILCS 5/27]
- 5) A Complete Description of the Subjects and Issues Involved: On April 19, 2012, the Illinois Pollution Control Board (Board) adopted an opinion and order proposing first-notice amendments to the Tiered Approach to Corrective Action Objectives (TACO) rules (35 Ill. Adm. Code 742). The rulemaking is docketed Tiered Approach to Corrective Action Objectives (TACO) (Indoor Inhalation): Amendments to 35 Ill. Adm. Code 742, R11-9. Since 1997, the TACO rules have provided procedures for developing remediation objectives based upon risks posed to human health by environmental conditions at a variety of sites. TACO is used at sites being remediated under any one of several regulatory programs: Leaking Underground Storage Tank (UST) Program; Site Remediation Program (SRP); and Resource Conservation and Recovery Act (RCRA) Part B Permits and Closure Plans.

The first-notice amendments include the addition of a new exposure route under TACO:

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the indoor inhalation exposure route. To protect building occupants, this exposure route addresses the potential for vapors to migrate into buildings from underlying volatile chemicals in soil or groundwater, a process commonly known as "vapor intrusion" or "VI." The Board also proposed adding 13 chemicals to the TACO tables based upon the Board's pending rulemaking on groundwater quality standards, Proposed Amendments to Groundwater Quality Standards (35 Ill. Adm. Code 620), R08-18. Further, the first-notice amendments to TACO update physical and chemical parameters and revise toxicity values in accordance with the new United States Environmental Protection Agency hierarchy for selecting human health toxicity values.

The R11-9 rulemaking was initiated when the Illinois Environmental Protection Agency (IEPA) filed a proposal with the Board on November 9, 2010, under Section 27 of the Environmental Protection Act [415 ILCS 5/27]. After conducting two public hearings and receiving public comments, the Board has adopted, for first notice, the amendments proposed or agreed to by IEPA, with minor clarifying changes. In addition, the Board proposed requiring that IEPA be notified if an indoor inhalation building control technology at a school is rendered inoperable. The Board also proposed that the entire set of amendments would become effective on a date certain 60 days after their final adoption. For further information, please refer to the Board's first-notice opinion and order of April 19, 2012, which is available through the Clerk's Office On-Line (COOL) on the Board's Web site at www.ipcb.state.il.us.

6) Published studies or reports and sources of underlying data used to compose this rulemaking:

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Fitzpatrick, N.A., Fitzgerald, J.J. 2002. "An Evaluation of Vapor Intrusion Into Buildings Through a Study of Field Data." Soil and Sediment Contamination 11(4):603-623.

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- 7) Will this rulemaking replace any emergency rulemaking currently in effect? No
- 8) Does this rulemaking contain an automatic repeal date? No
- 9) Does this rulemaking contain incorporations by reference? Yes
- 10) Are there any other proposed amendments pending on this Part? No
- 11) Statement of Statewide Policy Objectives: These proposed amendments do not create or

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enlarge a State mandate as defined in Section 3(b) of the State Mandates Act [30 ILCS 805/3(b)].

- 12) Time, Place, and Manner in which interested persons may comment on this proposed rulemaking: The Board will accept written public comments on this proposal for a period of 45 days after the date of publication in the Illinois Register. Public comments should refer to docket R11-9 and must be filed with the Clerk of the Board. Public comments may be filed at the following address:

Pollution Control Board
John Therriault, Assistant Clerk
JRTC
100 W. Randolph Street, Suite 11-500
Chicago, IL 60601

In addition, public comments may be filed electronically through COOL on the Board's Web site at www.ipcb.state.il.us. Persons interested in obtaining copies of Board opinions and orders in R11-9 may do so by contacting the Clerk's office at (312) 814-3620 or by download from COOL on the Board's Web site. For more information, please contact Hearing Officer Richard McGill by telephone at (312) 814-6983 or by e-mail at mcgillr@ipcb.state.il.us.

- 13) Initial Regulatory Flexibility Analysis:
- A) Types of small businesses, small municipalities, and not-for-profit corporations affected: This rulemaking could impact any small business, small municipality, and not-for-profit corporation in a regulatory program subject to TACO remediation objectives (e.g., Leaking UST Program or SRP). The amendments are proposed to become effective on a date certain 60 days after their final adoption by the Board. The delayed effective date would help to accommodate those entities with sites near closure who wish to submit remediation completion documentation to IEPA in order to receive a No Further Remediation (NFR) letter in accordance with the existing TACO regulations.
- B) Reporting, bookkeeping, or other procedures required for compliance: This rulemaking does not impose additional bookkeeping requirements beyond those already required by the existing rules. Under the proposed amendments, where a school receives an NFR letter based upon the use of an indoor inhalation building control technology, the site owner/operator must notify IEPA upon the building control technology being rendered inoperable.

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- C) Types of Professional skills necessary for compliance: In addition to the professional skills currently necessary to comply with the existing TACO regulations, compliance with the amendments may involve addressing the indoor inhalation exposure route through the sampling/analysis of soil gas and the design/installation of building control technologies, such as sub-slab depressurization (SSD) systems or vented raised floors.
- 14) Regulatory Agenda in which these amendments were summarized: January 2012

The full text of the Proposed Amendments begins on the next page:

TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE G: WASTE DISPOSAL
CHAPTER I: POLLUTION CONTROL BOARD
SUBCHAPTER f: RISK BASED CLEANUP OBJECTIVES

PART 742
TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES

SUBPART A: INTRODUCTION

Section
742.100 Intent and Purpose
742.105 Applicability
742.110 Overview of Tiered Approach
742.115 Key Elements
742.120 Site Characterization

SUBPART B: GENERAL

Section
742.200 Definitions
742.205 Severability
742.210 Incorporations by Reference
742.215 Determination of Soil Attenuation Capacity
742.220 Determination of Soil Saturation Limit
742.222 Determination of Soil Vapor Saturation Limit
742.225 Demonstration of Compliance with Soil and Groundwater Remediation Objectives
742.227 Demonstration of Compliance with Soil Gas Remediation Objectives for the Outdoor and Indoor Inhalation Exposure Routes
742.230 Agency Review and Approval

SUBPART C: EXPOSURE ROUTE EVALUATIONS

Section
742.300 Exclusion of Exposure Route
742.305 Contaminant Source and Free Product Determination
742.310 Outdoor Inhalation Exposure Route
742.312 Indoor Inhalation Exposure Route
742.315 Soil Ingestion Exposure Route
742.320 Groundwater Ingestion Exposure Route

SUBPART D: DETERMINING AREA BACKGROUND

Section
742.400 Area Background
742.405 Determination of Area Background for Soil
742.410 Determination of Area Background for Groundwater
742.415 Use of Area Background Concentrations

SUBPART E: TIER 1 EVALUATION

Section
742.500 Tier 1 Evaluation Overview
742.505 Tier 1 Soil, Soil Gas and Groundwater Remediation Objectives
742.510 Tier 1 Remediation Objectives Tables for the Ingestion, Outdoor Inhalation, and Soil Component of the Groundwater Ingestion Exposure Routes

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742.515 Tier 1 Remediation Objectives Tables for the Indoor Inhalation Exposure Route

SUBPART F: TIER 2 GENERAL EVALUATION

Section

742.600 Tier 2 Evaluation Overview
742.605 Land Use
742.610 Chemical and Site Properties

SUBPART G: TIER 2 SOIL AND SOIL GAS EVALUATION

Section

742.700 Tier 2 Soil Evaluation Overview
742.705 Parameters for Soil Remediation Objective Equations
742.710 SSL Soil Equations
742.712 SSL Soil Gas Equation for the Outdoor Inhalation Exposure Route
742.715 RBCA Soil Equations
742.717 J&E Soil Gas Equations for the Indoor Inhalation Exposure Route
742.720 Chemicals with Cumulative Noncarcinogenic Effects

SUBPART H: TIER 2 GROUNDWATER EVALUATION

Section

742.800 Tier 2 Groundwater Evaluation Overview
742.805 Tier 2 Groundwater Remediation Objectives
742.810 RBCA Calculations to Predict Impacts from Remaining Groundwater Contamination
742.812 J&E Groundwater Equations for the Indoor Inhalation Exposure Route

SUBPART I: TIER 3 EVALUATION

Section

742.900 Tier 3 Evaluation Overview
742.905 Modifications of Parameters
742.910 Alternative Models
742.915 Formal Risk Assessments
742.920 Impractical Remediation
742.925 Exposure Routes
742.930 Derivation of Toxicological Data
742.935 Indoor Inhalation Exposure Route

SUBPART J: INSTITUTIONAL CONTROLS

Section

742.1000 Institutional Controls
742.1005 No Further Remediation Letters
742.1010 Environmental Land Use Controls
742.1012 Federally Owned Property: Land Use Control Memoranda of Agreement
742.1015 Ordinances
742.1020 Highway Authority Agreements and Highway Authority Agreement Memoranda of Agreement

SUBPART K: ENGINEERED BARRIERS

Section

742.1100 Engineered Barriers
742.1105 Engineered Barrier Requirements

SUBPART L: BUILDING CONTROL TECHNOLOGIES

Section

742.1200 Building Control Technologies
742.1205 Building Control Technology Proposals
742.1210 Building Control Technology Requirements

742.APPENDIX A General

742.ILLUSTRATION A Developing Soil Remediation Objectives Under the Tiered Approach

742.ILLUSTRATION B Developing Groundwater Remediation Objectives Under the Tiered Approach

742.TABLE A Soil Saturation Limits (Csat) for Chemicals Whose Melting Point is Less than 30°C

742.TABLE B Tolerance Factor (K)

742.TABLE C Coefficients {AN-I+1} for W Test of Normality, for N=2(1)50

742.TABLE D Percentage Points of the W Test for n=3(1)50

742.TABLE E Similar-Acting Noncarcinogenic Chemicals

742.TABLE F Similar-Acting Carcinogenic Chemicals

742.TABLE G Concentrations of Inorganic Chemicals in Background Soils

742.TABLE H Concentrations of Polynuclear Aromatic Hydrocarbon Chemicals in Background Soils

742.TABLE I Chemicals Whose Tier 1 Class I Groundwater Remediation Objective Exceeds the 1 in 1,000,000 Cancer Risk Concentration

TABLE J List of TACO Volatile Chemicals for the Indoor Inhalation Exposure Route

TABLE K Soil Vapor Saturation Limits (Cvsat) for Volatile Chemicals

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AUTHORITY: Implementing Sections 22.4, 22.12, Title XVI, and Title XVII and authorized by Sections 27 and 58.5 of the Environmental Protection Act [415 ILCS 5/22.4, 22.12, 27, and 58.5 and Title XVI and Title XVII].

SOURCE: Adopted in R97-12(A) at 21 Ill. Reg. 7942, effective July 1, 1997; amended in R97-12(B) at 21 Ill. Reg. 16391, effective December 8, 1997; amended in R97-12(C) at 22 Ill. Reg. 10847, effective June 8, 1998; amended in R00-19(A) at 25 Ill. Reg. 651, effective January 6, 2001; amended in R00-19(B) at 25 Ill. Reg. 10374, effective August 15, 2001; amended in R00-19(C) at 26 Ill. Reg. 2683, effective February 5, 2002; amended in R06-10 at 31 Ill. Reg. 4063, effective February 23, 2007; amended in R06-10 at ~~3136~~ Ill. Reg. ~~4063-effective-March 9, 2007, amended in R11-09 at 36 Ill. Reg. _____~~, effective _____ ~~-NOTE: Italics indicates statutory language~~.

SUBPART A: INTRODUCTION

Section 742.105 Applicability

a) Any person, including a person required to perform an investigation pursuant to the Illinois Environmental Protection Act [415 ILCS 5] (Act), may elect to proceed under this Part to the extent allowed by State or federal law and regulations and the provisions of this Part and subject to the exceptions listed in subsection (h) below. A person proceeding under this Part may do so to the extent such actions are consistent with the requirements of the program under which site remediation is being addressed.

b) This Part is to be used in conjunction with the procedures and requirements applicable to the following programs:

- 1) Leaking Underground Storage Tanks (35 Ill. Adm. Code 731, 732, and 734);
- 2) Site Remediation Program (35 Ill. Adm. Code 740); and
- 3) RCRA Part B Permits and Closure Plans (35 Ill. Adm. Code 724 and 725).

c) The procedures in this Part may not be used if their use would delay response action to address imminent and substantial threats to human health and the environment. This Part may only be used after actions to address such threats have been completed.

d) This Part may be used to develop remediation objectives to protect surface waters, sediments or ecological concerns, when consistent with the regulations of other programs, and as approved by the Agency.

e) A no further remediation determination issued by the Agency prior to July 1, 1997 pursuant to Section 4(y) of the Act or one of the programs listed in subsection (b) of this Section that approves completion of remedial action relative to a release shall remain in effect in accordance with the terms of that determination.

f) Site specific groundwater remediation objectives determined under this Part for contaminants of concern may exceed the groundwater quality standards established pursuant to the rules promulgated under the Illinois Groundwater Protection Act [415 ILCS 55] as long as done in accordance with Sections 742.805 and 742.900(c)(9). (See 415 ILCS 5/58.5(d)(4))

g) Where contaminants of concern include polychlorinated byphenyls (PCBs), a person may need to evaluate the applicability of regulations adopted under the Toxic Substances Control Act (15 ~~U.S.C.~~ USC 2601).

h) This Part may not be used in lieu of the procedures and requirements applicable to landfills under 35 Ill. Adm. Code 807 or 811 through 814.

i) An evaluation of the indoor inhalation exposure route under this Part addresses the potential of contaminants present in soil gas or groundwater to reach human receptors within buildings. This Part does not address the remediation or mitigation of any contamination within a building from a source other than soil gas or groundwater, such as the building structure itself and products within the building.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.110 Overview of Tiered Approach

a) This Part presents an approach for developing remediation objectives (see Appendix A, Illustrations A and B) that include an option for exclusion of pathways from further consideration, use of area background concentrations as remediation objectives and three tiers for selecting applicable remediation objectives. An understanding of human exposure routes is necessary to properly conduct an evaluation under this approach. In some cases, applicable human exposure ~~route(s)~~ routes can be excluded from further consideration prior to any tier evaluation. Selecting which tier or combination of tiers to be used to develop remediation objectives is dependent on the site-specific conditions and remediation goals. Tier 1 evaluations and Tier 2 evaluations are not prerequisites to conducting Tier 3 evaluations.

b) A Tier 1 evaluation compares the concentration of contaminants detected at a site to the corresponding remediation objectives for residential and industrial/ commercial properties contained in Appendix B, Tables A, B, C, ~~D~~ E, G, H and I. To complete a Tier 1 evaluation, the extent and concentrations of the contaminants of concern, the groundwater class, the land use classification, human exposure routes at the site, and, if appropriate, soil pH,

must be known. If remediation objectives are developed based on industrial/commercial property use, then institutional controls under Subpart J are required.

c) A Tier 2 evaluation uses the risk based equations from the Soil Screening Level (~~SSL-Model~~) model and Risk Based Corrective Action (RBCA-~~Model~~) model and modified Johnson and Ettinger ~~Model~~ (~~J&E-Model~~) model) documents listed in Appendix C, Tables A, ~~and C~~, and L, respectively. In addition to the information that is required for a Tier 1 evaluation, site-specific information is used to calculate Tier 2 remediation objectives. As in Tier 1, Tier 2 evaluates residential and industrial/commercial properties only. If remediation objectives are developed based on industrial/commercial property use, then institutional controls under Subpart J are required.

d) A Tier 3 evaluation allows alternative parameters and factors, not available under a Tier 1 or Tier 2 evaluation, to be considered when developing remediation objectives. Remediation objectives developed for conservation and agricultural properties can only be developed under Tier 3.

e) Remediation objectives may be developed using area background concentrations or any of the three tiers if the evaluation is conducted in accordance with applicable requirements in Subparts D through I. When contaminant concentrations do not exceed remediation objectives developed under one of the tiers or area background procedures under Subpart D, further evaluation under any of the other tiers is not required.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.115 Key Elements

To develop remediation objectives under this Part, the following key elements shall be addressed.

a) Exposure Routes

1) This Part identifies the following as potential exposure routes to be addressed:

A) Outdoor ~~Inhalation;~~ inhalation;

B) Indoor ~~Inhalation;~~ inhalation;

~~C-B)~~ Soil ingestion;

~~D-C)~~ Groundwater ingestion; and

~~E-D)~~ Dermal contact with soil.

2) The evaluation of exposure routes under subsections (a)(1)(A), (a)(1)(B), ~~and~~ (a)(1)(C) and (a)(1)(D) of this Section is required for all sites when developing remediation objectives or excluding exposure pathways. Evaluation of the dermal contact exposure route is required for use of RBCA equations in Appendix C, Table C or use of formal risk assessment under Section 742.915.

3) The groundwater ingestion exposure route is comprised of two components:

A) Migration from soil to groundwater (soil component); and

- B) Direct ingestion of groundwater (groundwater component).
- 4) The outdoor inhalation route is comprised of two components:
 - A) Migration from soil through soil gas to outdoor air (soil component); and
 - B) Migration from soil gas to outdoor air (soil gas component).
- 5) The indoor inhalation exposure route is comprised of two components:
 - A) Migration from soil gas to indoor air (soil gas component); and
 - B) Migration from groundwater through soil gas to indoor air (groundwater component).
- b) Contaminants of Concern

The contaminants of concern to be remediated depend on the following:

- 1) The materials and wastes managed at the site;
 - 2) The extent of the no further remediation determination being requested from the Agency pursuant to a specific program; and
 - 3) The requirements applicable to the specific program, as listed at Section 742.105(b) under which the remediation is being performed.
- c) Land Use
- The present and post-remediation uses of the site where exposures may occur shall be evaluated. The land use of a site, or portion thereof, shall be classified as one of the following:
- 1) Residential property;
 - 2) Conservation property;
 - 3) Agricultural property; or
 - 4) Industrial/commercial property.

d) Environmental Media of Concern

This Part provides procedures for developing remediation objectives for the following environmental media:

- 1) Soil;
- 2) Soil gas;
- 3) Groundwater.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

SUBPART B: GENERAL

Section 742.200 Definitions

Except as stated in this Section, or unless a different meaning of a word or term is clear from the context, the definition of words or terms in this Part shall be the same as that applied to the same words or terms in the Act.

"Act" means the Illinois Environmental Protection Act [415 ILCS 5].

"ADL" means Acceptable Detection Limit, which is the detectable concentration of a substance that is equal to the lowest appropriate Practical Quantitation Limit (PQL) as defined in this Section.

"Agency" means the Illinois Environmental Protection Agency.

"Agricultural Property" means any real property for which its present or post-remediation use is for growing agricultural crops for food or feed either as harvested crops, cover crops or as pasture. This definition includes, but is not limited to, properties used for confinement or grazing of livestock or poultry and for silviculture operations. Excluded from this definition are farm residences, farm outbuildings and agrichemical facilities.

"Aquifer" means saturated (with groundwater) soils and geologic materials which are sufficiently permeable to readily yield economically useful quantities of water to wells, springs, or streams under ordinary hydraulic gradients. (Illinois Groundwater Protection Act [415 ILCS 55/3(a)])

"Area Background" means concentrations of regulated substances that are consistently present in the environment in the vicinity of a site that are the result of natural conditions or human activities, and not the result solely of releases at the site. [415 ILCS 5/58.2]

"ASTM" means the American Society for Testing and Materials.

"Board" means the Illinois Pollution Control Board.

"Building" means a man-made structure with an enclosing roof and enclosing walls, except for windows and doors, that is fit for any human occupancy for at least six consecutive months.

"Building Control Technology" means any technology or barrier that affects air flow or air pressure within a building for purposes of reducing contaminant migration to the indoor air.

"Cancer Risk" means a unitless probability of an individual developing cancer from a defined exposure rate and frequency.

"Cap" means a barrier designed to prevent the infiltration of precipitation or other surface water, or impede the ingestion or inhalation of contaminants.

"Capillary Fringe" means the zone above the water table in which water is held by surface tension. Water in the capillary fringe is under a pressure less than atmospheric.

"Carcinogen" means a contaminant that is classified as a category A1 or A2 carcinogen by the American Conference of Governmental Industrial Hygienists; a category 1 or 2A/2B carcinogen by the World Health Organization's International Agency for Research on Cancer; a "human carcinogen" or "anticipated human carcinogen" by the United States Department of Health and Human Service National

Toxicological Program; or a category A or B1/B2 carcinogen or as "carcinogenic to humans" or "likely to be carcinogenic to humans" by the United States Environmental Protection Agency in the integrated risk information system or a final rule issued in a Federal Register notice by the USEPA. [415 ILCS 5/58.2]

"Class I Groundwater" means groundwater that meets the Class I: Potable Resource Groundwater criteria set forth in 35 Ill. Adm. Code 620.

"Class II Groundwater" means groundwater that meets the Class II: General Resource Groundwater criteria set forth in 35 Ill. Adm. Code 620.

"Conservation Property" means any real property for which present or post-remediation use is primarily for wildlife habitat.

"Construction Worker" means a person engaged on a temporary basis to perform work involving invasive construction activities including, but not limited to, personnel performing demolition, earth-moving, building, and routine and emergency utility installation or repair activities.

"Contaminant of Concern" or "Regulated Substance of Concern" means any contaminant that is expected to be present at the site based upon past and current land uses and associated releases that are known to the person conducting a remediation based upon reasonable inquiry. [415 ILCS 5/58.2]

"County ~~highway~~Highway" means county highway as defined in the Illinois Highway Code, [605 ILCS 5].

"District ~~road~~Road" means district road as defined in the Illinois Highway Code, [605 ILCS 5].

"Engineered Barrier" means a barrier designed or verified using engineering practices that limits exposure to or controls migration of the contaminants of concern.

"Environmental Land Use Control" means an instrument that meets the requirements of this Part and is placed in the chain of title to real property that limits or places requirements upon the use of the property for the purpose of protecting human health or the environment, is binding upon the property owner, heirs, successors, assigns, and lessees, and runs in perpetuity or until the Agency approves, in writing, removal of the limitation or requirement from the chain of title.

"Exposure Route" means the transport mechanism by which a contaminant of concern reaches a receptor.

"Federally Owned Property" means real property owned in fee by the United States of America on which institutional controls are sought to be placed in accordance with this Subpart.

"Federal Landholding Entity" means that federal department, agency, or instrumentality with the authority to occupy and control the day-to-day use, operation and management of Federally Owned Property.

"Free Product" means a contaminant that is present as a non-aqueous phase liquid for chemicals whose melting point is less than 30~~2~~°C (e.g., liquid not dissolved in water).

"GIS" means Geographic Information System.

"GPS" means Global Positioning System.

"Groundwater" means underground water which occurs within the saturated zone and geologic materials where the fluid pressure in the pore space is equal to or greater than atmospheric pressure. [415 ILCS 5/3.64]

"Groundwater Quality Standards" means the standards for groundwater as set forth in 35 Ill. Adm. Code 620.

"Hazard Quotient" means the ratio of a single substance exposure level during a specified time period to a reference dose for that substance derived from a similar exposure period.

"Highway" means any public way for vehicular travel which has been laid out in pursuance of any law of this State, or of the Territory of Illinois, or which has been established by dedication, or used by the public as a highway for 15 years, or which has been or may be laid out and connect a subdivision or platted land with a public highway and which has been dedicated for the use of the owners of the land included in the subdivision or platted land where there has been an acceptance and use under such dedication by such owners, and which has not been vacated in pursuance of law. The term "highway" includes rights of way, bridges, drainage structures, signs, guard rails, protective structures and all other structures and appurtenances necessary or convenient for vehicular traffic. A highway in a rural area may be called a "road", while a highway in a municipal area may be called a "street". (Illinois Highway Code [605 ILCS 5/2-202])

"Highway Authority" means the Department of Transportation with respect to a State highway; the Illinois State Toll Highway with respect to a toll highway; the County Board with respect to a county highway or a county unit district road if a discretionary function is involved and the County Superintendent of Highways if a ministerial function is involved; the Highway Commissioner with respect to a township or district road not in a county unit road district; or the corporate authorities of a municipality with respect to a municipal street. (Illinois Highway Code [605 ILCS 5/2-213])

"Human Exposure Pathway" means a physical condition which may allow for a risk to human health based on the presence of all of the following: contaminants of concern; an exposure route; and a receptor activity at the point of exposure that could result in contaminant of concern intake.

"Industrial/Commercial Property" means any real property that does not meet the definition of residential property, conservation property or agricultural property.

"Infiltration" means the amount of water entering into the ground as a result of precipitation.

"Institutional Control" means a legal mechanism for imposing a restriction on land use, as described in Subpart J.

"Land Use Control Memoranda of Agreement" mean agreements entered into between one or more agencies of the United States and the Illinois Environmental Protection Agency that limit or place requirements upon the use of Federally Owned Property for the purpose of protecting human health or the environment.

"Man-Made Pathways" means constructed physical conditions that may allow for the transport of regulated substances including, but not limited to, sewers, utility lines, utility or elevator vaults, building foundations, basements, crawl spaces, drainage ditches, ~~or~~ previously excavated and filled areas, ~~or~~ or sumps. [415 ILCS 5/58.2]

"Natural Pathways" means natural physical conditions that may allow for the transport of regulated substances including, but not limited to, soil, groundwater, sand seams and lenses, and gravel seams and lenses. [415 ILCS 5/58.2]

"Person" means an individual, trust, firm, joint stock company, joint venture, consortium, commercial entity, corporation (including a government corporation), partnership, association, state, municipality, commission, political subdivision of a state, or any interstate body including the United States government and each department, agency, and instrumentality of the United States. [415 ILCS 5/58.2]

"Point of Human Exposure" means the points at which human exposure to a contaminant of concern may reasonably be expected to occur. The point of human exposure is at the source, unless an institutional control limiting human exposure for the applicable exposure route has been or will be in place, in which case the point of human exposure will be the boundary of the institutional control. Point of human exposure may be at a different location than the point of compliance.

"Populated Area" means:

an area within the boundaries of a municipality that has a population of 10,000 or greater based on the year 2000 or most recent census; or

an area less than three miles from the boundary of a municipality that has a population of 10,000 or greater based on the year 2000 or most recent census.

"Potable" means generally fit for human consumption in accordance with accepted water supply principles and practices. (Illinois Groundwater Protection Act [415 ILCS 55/3(h)])

"PQL" means practical quantitation limit or estimated quantitation limit, which is the lowest concentration that can be reliably measured within specified limits of precision and accuracy for a specific laboratory analytical method during routine laboratory operating conditions in accordance with "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods", EPA Publication No. SW-846, incorporated by reference in Section 742.210. When applied to filtered water samples, PQL includes the method detection limit or estimated detection limit in accordance with the applicable method revision in: "Methods for the Determination of Organic Compounds in Drinking Water", Supplement II", EPA Publication No. EPA/600/4-88/039; "Methods for the Determination of Organic Compounds in Drinking Water, Supplement III", EPA Publication No. EPA/600/R-95/131, all of which are incorporated by reference in Section 742.210.

"Qsoil" means the volumetric flow rate of soil gas from the subsurface into the enclosed building space.

"RBCA" means Risk Based Corrective Action as defined in ASTM E-1739-95, as incorporated by reference in Section 742.210.

"RCRA" means the Resource Conservation and Recovery Act of 1976 (42 ~~U.S.C.~~USC 6921).

"Reference Concentration" or "RfC" means an estimate of a daily exposure, in units of milligrams of chemical per cubic meter of air (mg/m³), to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects during a portion of a lifetime (up to approximately seven years, subchronic) or for a lifetime (chronic).

"Reference Dose" or "RfD" means an estimate of a daily exposure, in units of milligrams of chemical per kilogram of body weight per day (mg/kg/d), to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects during a portion of a lifetime (up to approximately seven years, subchronic) or for a lifetime (chronic).

"Regulated Substance" means any hazardous substance as defined under Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (P.L. 96-510) and petroleum products including crude oil or any fraction thereof, natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas). [415 ILCS 5/58.2]

"Residential Property" means any real property that is used for habitation by individuals, or where children have the opportunity for exposure to contaminants through ~~soil~~-ingestion or inhalation (indoor or outdoor) at educational facilities, health care facilities, child care facilities or ~~outdoor~~ recreational areas. [415 ILCS 5/58.2]

"Right of Way" means the land, or interest therein, acquired for or devoted to a highway. (Illinois Highway Code [605 ILCS 5/2-217])

"Saturated Zone" means a subsurface zone in which all the interstices or voids are filled with water under pressure greater than that of the atmosphere.

"Similar-Acting Chemicals" are chemical substances that have toxic or harmful effect on the same specific organ or organ system (see Appendix A.Tables E and F for a list of similar-acting chemicals with noncarcinogenic and carcinogenic effects).

"Site" means any single location, place, tract of land or parcel of property, or portion thereof, including contiguous property separated by a public right-of-way. [415 ILCS 5/58.2]

"Slurry Wall" means a man-made barrier made of geologic material which is constructed to prevent or impede the movement of contamination into a certain area.

"Soil Gas" means the air existing in void spaces in the soil between the groundwater table and the ground surface.

"Soil Saturation Limit" or "Csat" means the contaminant concentration at which ~~soil pore air and pore water are saturated with the chemical and the adsorptive limits of the soil particles have been reached. the contaminant concentration at which~~ the absorptive limits of the soil particles, the solubility limits of the available soil moisture, and saturation of soil pore air have been reached. Above the soil saturation concentration, the assumptions regarding vapor

transport to air and/or dissolved phase transport to groundwater (for chemicals ~~which~~that are liquid at ambient soil temperatures) do not apply, and alternative modeling approaches are required.

"Soil Vapor Saturation Limit" or "Cvsat" means the maximum vapor concentration that can exist in the soil pore air at a given temperature and pressure.

"Solubility" means a chemical specific maximum amount of solute that can dissolve in a specific amount of solvent (groundwater) at a specific temperature.

"SPLP" means Synthetic Precipitation Leaching Procedure (Method 1312) as published in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA Publication No. SW-846, as incorporated by reference in Section 742.210.

"SSL" means Soil Screening Levels as defined in USEPA's Soil Screening Guidance: User's Guide and Technical Background Document, as incorporated by reference in Section 742.210.

"State ~~highway~~Highway" means ~~state~~State highway as defined in the Illinois Highway Code [605 ILCS 5].

"Stratigraphic Unit" means a site-specific geologic unit of native deposited material and/or bedrock of varying thickness (e.g., sand, gravel, silt, clay, bedrock, etc.). A change in stratigraphic unit is recognized by a clearly distinct contrast in geologic material or a change in physical features within a zone of gradation. For the purposes of this Part, a change in stratigraphic unit is identified by one or a combination of differences in physical features such as texture, cementation, fabric, composition, density, and/or permeability of the native material and/or bedrock.

"Street" means street as defined in the Illinois Highway Code [605 ILCS 5].

"TCLP" means Toxicity Characteristic Leaching Procedure (Method 1311) as published in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA Publication No. SW-846, as incorporated by reference in Section 742.210.

"Toll ~~highway~~Highway" means toll highway as defined in the Illinois Highway Code [605 ILCS 5].

"Total Petroleum Hydrocarbon~~-(or "TPH")~~" means the additive total of all petroleum hydrocarbons found in an analytical sample.

"Township ~~road~~Road" means township road as defined in the Illinois Highway Code [605 ILCS 5].

"Unconfined Aquifer" means an aquifer whose upper surface is a water table free to fluctuate under atmospheric pressure.

"Volatile Chemicals" means chemicals with a Dimensionless Henry's Law Constant of greater than 1.9×10^{-2} or a vapor pressure greater than 0.1 Torr (mmHg) at 25°C. For purposes of the indoor inhalation exposure route, elemental mercury is included in this definition.

~~"Volatile Organic Compounds (VOCs)" means organic chemical analytes identified as volatiles as published in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA Publication No. SW-846 (incorporated by reference in Section 742.210), method numbers 8011, 8015B, 8021B, 8031, 8260B, 8315A, and 8316. For analytes not listed in any category in those methods, those analytes which have a boiling point less than 200° C and a vapor pressure greater than 0.1 Torr (mm Hg) at 20° C.~~

"Water Table" means the top water surface of an unconfined aquifer at atmospheric pressure.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.210 Incorporations by Reference

a) The Board incorporates the following material by reference:

Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs), U.S. Environmental Protection Agency, 1600 Clifton Road, Mailstop F32, Atlanta, Georgia 30333, (770) 488-3357 (November 2007).

~~ASTM. American Society for Testing and Materials International, _____ 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. 2959, (610) 832-9585.~~

ASTM D 2974-00, Standard Test Methods for Moisture, Ash and Organic Matter of Peat and Other Organic Soils, approved August 10, 2000.

ASTM D 2488-00, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), approved February 10, 2000.

ASTM D 1556-00, Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method, approved March 10, 2000.

ASTM D 2167-94, Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method, approved March 15, 1994.

ASTM D 2922-01, Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth), approved June 10, 2001.

ASTM D 2937-00e1, Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method, approved June 10, 2000.

ASTM D 854-02, Standard Test Methods for Specific Gravity of Soil Solids by Water Pycnometer, approved July 10, 2002.

ASTM D 2216-98, Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass, approved February 10, 1998.

ASTM D 4959-00, Standard Test Method for Determination of Water (Moisture) Content of Soil by Direct Heating, approved March 10, 2000.

ASTM D 4643-00, Standard Test Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method, approved February 10, 2000.

ASTM D 5084-03, Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter, approved November 1, 2003.

ASTM D 422-63 (2002), Standard Test Method for Particle-Size Analysis of Soils, approved November 10, 2002.

ASTM D 1140-00, Standard Test Methods for Amount of Material in Soils Finer than the No. 200 (75 ~~mm~~µm) Sieve, approved June 10, 2000.

ASTM D 3017-01, Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth), approved June 10, 2001.

ASTM D 4525-90 (2001), Standard Test Method for Permeability of Rocks by Flowing Air, approved May 25, 1990.

ASTM D 2487-00, Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System), approved March 10, 2000.

ASTM D 1945-03, Standard Test Method for Analysis of Natural Gas by Gas Chromatography, approved May 10, 2003.

ASTM D 1946-90, Standard Practice for Analysis of Reformed Gas by Gas Chromatography, approved June 1, 2006.

ASTM E 1527-00, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, approved May 10, 2000. Vol. 11.04.

ASTM E 1739-95 (2002), Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites, approved September 10, 1995.

ASTM E 2121-09, Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings, approved November 1, 2009.

ASTM E 2600-08, Standard Practice for Assessment for Vapor Intrusion into Structures on Property Involved in Real Estate Transactions, approved March 1, 2008.

API. American Petroleum Institute, 1220 L Street, NW, Washington, DC 20005-4070 (202) 682-8000.

^uBIOVAPOR-A 1-D Vapor Intrusion Model with Oxygen-Limited Aerobic Biodegradation, Version 2.0 (January 2010)^u.

Barnes, Donald G. and Dourson, Michael. (1988). Reference Dose (RfD): Description and Use in Health Risk Assessments. Regulatory Toxicology and Pharmacology. 8, 471-486.

EPRI. Electric Power Research Institute. 3420 Hillview Avenue, Palo Alto, California 94304. (650) 855-2121.

Polycyclic Aromatic Hydrocarbons (PAHs) in Surface Soil in Illinois: Background PAHs, EPRI, Palo Alto, CA, We Energies, Milwaukee, WI, and IEPA, Springfield, IL: 2004. 1011376.

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40 CFR 761 (1998).

c) This Section incorporates no later editions or amendments.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.220 Determination of Soil Saturation Limit

a) For any organic contaminant that has a melting point below 30°C, the remediation objective for the outdoor inhalation exposure route developed under Tier 2 shall not exceed the soil saturation limit, as determined under subsection (c) of this Section.

b) For any organic contaminant that has a melting point below 30°C, the remediation objective under Tier 2 for the soil component of the groundwater ingestion exposure route shall not exceed the soil saturation limit, as determined under subsection (c) of this Section.

c) The soil saturation limit shall be:

- 1) The value listed in Appendix A, Table A for that specific contaminant;
- 2) A value derived from Equation S29 in Appendix C, Table A; or
- 3) A value derived from another method approved by the Agency.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.222 Determination of Soil Vapor Saturation Limit

a) For any volatile chemical, the soil gas remediation objective for the indoor and outdoor inhalation exposure routes developed under Tier 2 shall not exceed the soil vapor saturation limit, as determined under subsection (b) ~~of this Section.~~

b) The soil vapor saturation limit shall be:

- 1) The value listed in Appendix A, Table K for that specific contaminant;
- 2) A value derived from Equation J&E5 in Appendix C, Table L; or
- 3) A value derived from another method approved by the Agency.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 742.225 Demonstration of Compliance with Soil and Groundwater Remediation Objectives

Compliance with soil and groundwater remediation objectives is achieved if each sample result does not exceed that respective remediation objective unless a person elects to proceed under subsections (c), (d) and (e) of this Section.

a) Compliance with groundwater remediation objectives developed under Subparts D through F and H through I shall be demonstrated by comparing the contaminant concentrations of discrete samples at each sample point to the applicable groundwater remediation objective. Sample points shall be determined by the program under which remediation is performed.

b) Unless the person elects to composite samples or average sampling results as provided in subsections (c) and (d) of this Section, compliance with soil remediation objectives developed under Subparts D through G and I shall be demonstrated by comparing the contaminant concentrations of discrete samples to the applicable soil remediation objective.

1) Except as provided in subsections (c) and (d) of this Section, compositing of samples is not allowed.

2) Except as provided in subsections (c) and (d) of this Section, averaging of sample results is not allowed.

3) Notwithstanding subsections (c) and (d) of this Section, compositing of samples and averaging of sample results is not allowed for the construction worker population.

4) The number of sampling points required to demonstrate compliance is determined by the requirements applicable to the program under which remediation is performed.

c) If a person chooses to composite soil samples or average soil sample results to demonstrate compliance relative to the soil component of the groundwater ingestion exposure route, the following requirements apply:

1) A minimum of two sampling locations for every 0.5 acre of contaminated area is required, with discrete samples at each sample location obtained at every two feet of depth, beginning at six inches below the ground surface for surface contamination and at the upper limit of contamination for subsurface contamination and continuing through the zone of contamination. Alternatively, a sampling method may be approved by the Agency based on an appropriately designed site-specific evaluation. Samples obtained at or below the water table shall not be used in compositing or averaging.

2) For contaminants of concern other than volatile ~~organic contaminants~~ chemicals:

A) Discrete samples from the same boring may be composited; or

B) Discrete sample results from the same boring may be averaged.

3) For volatile ~~organic contaminants~~ chemicals:

A) Compositing of samples is not allowed.

B) Discrete sample results from the same boring may be averaged.

4) Composite samples may not be averaged. An arithmetic average may be calculated for discrete samples collected at every two feet of depth through the zone of contamination as specified ~~above in Section 742.225~~ subsection (c) (1) of this Section.

d) If a person chooses to composite soil samples or average soil sample results to demonstrate compliance relative to the outdoor inhalation exposure route or ingestion exposure ~~routes~~route, the following requirements apply:

1) A person shall submit a sampling plan for Agency approval, based upon a site-specific evaluation;

2) For volatile ~~organic compounds~~-chemicals, compositing of samples is not allowed; ~~and~~

3) All samples shall be collected within the contaminated area-i.

4) Composite samples may not be averaged. Procedures specified in "Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites", USEPA Office of Emergency and Remedial Response, OSWER 9285.6-10 (December 2002), as incorporated by reference in Section 742.210, or an alternative procedure approved by the Agency, shall be used to determine sample averages.

e) When averaging under this Section, if no more than 15% of sample results are reported as "non-detect", "no contamination", "below detection limits", or similar terms, such results shall be included in the averaging calculations as one-half the reported analytical detection limit for the contaminant. However, when performing a test for normal or lognormal distribution for the purpose of calculating a 95% Upper Confidence Limit of the mean for a contaminant, a person may substitute for each non-detect value a randomly generated value between, but not including, zero and the reported analytical detection limit. If more than 15% of sample results are "non-detect", procedures specified in "Guidance for Data Quality Assessment, Practical Methods for Data Analysis, EPA QA/G-9, QA00 Update", EPA/600/R-96/084 (July 2000), as incorporated by reference in Section 742.210, or an alternative procedure approved by the Agency shall be used to address the non-detect values, or another statistically valid procedure approved by the Agency may be used to determine an average.

f) All soil samples collected after August 15, ~~2001~~2001 shall be reported on a dry weight basis for the purpose of demonstrating compliance, with the exception of the TCLP and SPLP and the property pH.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.227 Demonstration of Compliance with Soil Gas Remediation Objectives for the Outdoor and Indoor Inhalation Exposure Routes

Compliance shall be demonstrated by comparing the contaminant concentrations of discrete samples at each sample point to the applicable soil gas remediation objective. As specified in Section 742.510(c), the soil gas remediation objectives for the outdoor inhalation exposure route are contained in Appendix B, Table G. As specified in Section 742.515, the soil gas remediation objectives for the indoor inhalation exposure route are contained in Appendix B, Tables H and I. ~~This Section 742.227~~ applies to exterior soil gas samples or near-slab samples collected outside a building. Proposals to use sub-slab soil gas data for the indoor inhalation exposure route shall follow Section 742.935(c).

a) Sample points shall be determined by the program under which remediation is performed.

b) When collecting soil gas samples:

- 1) Use rigid-wall tubing made of nylon or Teflon(r) or other material approved by the Agency;
 - 2) Use gas-tight, inert containers to hold the sample. For light sensitive or halogenated volatile chemicals, these containers shall be opaque or dark-colored;
 - 3) Purge three volumes before obtaining each discrete soil gas sample;
 - 4) Use a helium tracer or other leak apparatus detection system approved by the Agency; and
 - 5) Limit the flow rate to 200 ml/min.
- c) Soil gas samples shall be analyzed using a National Environmental Laboratory Accreditation Program (NELAP) certified laboratory.
- d) Soil gas remediation objectives shall be compared to concentrations of soil gas collected at a depth at least 3 feet below ground surface and above the saturated zone.

(Source: Added at 36 Ill. Reg. _____, effective _____)

SUBPART C: EXPOSURE ROUTE EVALUATIONS

Section 742.305 Contaminant Source and Free Product Determination

No exposure route shall be excluded from consideration relative to a contaminant of concern unless the following requirements are met:

- a) The sum of the concentrations of all organic contaminants of concern shall not exceed the attenuation capacity of the soil as determined under Section 742.215;
- b) The concentrations of any organic contaminants of concern remaining in the soil shall not exceed the soil saturation limit as determined under Section 742.220;
- c) Any soil which contains contaminants of concern shall not exhibit any of the characteristics of reactivity for hazardous waste as determined under 35 Ill. Adm. Code 721.123;
- d) Any soil which contains contaminants of concern shall not exhibit a pH less than or equal to 2.0 or greater than or equal to 12.5, as determined by SW-846 Method 9040B: pH Electrometric for soils with 20% or greater aqueous (moisture) content or by SW-846 Method 9045C: Soil pH for soils with less than 20% aqueous (moisture) content as incorporated by reference in Section 742.210;
- e) Any soil which contains contaminants of concern in the following list of inorganic chemicals or their salts shall not exhibit any of the characteristics of toxicity for hazardous waste as determined by 35 Ill. Adm. Code 721.124: arsenic, barium, cadmium, chromium, lead, mercury, selenium or silver; ~~and~~

f) If contaminants of concern include polychlorinated biphenyls (PCBs), the concentration of any PCBs in the soil shall not exceed 50 parts per million as determined by SW-846 Methods; and

g) The concentration of any contaminant of concern in soil gas shall not exceed 10% of its Lower Explosive Limit (LEL) as measured by a hand held combustible gas indicator that has been calibrated to manufacturer specifications.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.310 Outdoor Inhalation Exposure Route

The outdoor inhalation exposure route may be excluded from consideration if:

a) The ~~following~~ requirements in ~~subsections~~ subsection (a)(1) or (a)(2) are met:

1) An approved engineered barrier is in place that meets the requirements of Subpart K; or

2) The only contaminants of concern are benzene, toluene, ethylbenzene, and total xylenes, and a demonstration of active biodegradation has been made for benzene, toluene, ethylbenzene, and total xylenes such that no outdoor inhalation exposure will occur. This demonstration shall be submitted to the Agency for review and approval;

~~ba~~b) The requirements of Sections 742.300 and 742.305 are met;

~~b) An approved engineered barrier is in place that meets the requirements of Subpart K;~~

c) Safety ~~worker~~ precautions for the construction worker are taken if the Tier 1 construction worker remediation objectives are exceeded; and

d) An institutional control, in accordance with Subpart J, will be placed on the property.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.312 Indoor Inhalation Exposure Route

The indoor inhalation exposure route may be excluded from consideration if:

a) None of the contaminants of concern are listed on Appendix A, Table J and none of the contaminants of concern are volatile chemicals, as defined in Section 742.200; or

b) The ~~following~~ requirements in subsections (b)(1)(A) ~~or~~ (B) or (C) and (b)(2) and (b)(3) are met:

1) Exclusion options when the contaminants of concern are volatile chemicals:

A) No building or man-made pathway exists or will be placed above the contaminated soil gas or groundwater; or

B) An approved building control technology is in place or will be placed that meets the requirements of Subpart L; or

C) If the contaminants of ~~concerns~~ concern are benzene, toluene, ethylbenzene, and total xylenes only, a demonstration of active biodegradation has been made for benzene, toluene, ethylbenzene, and total xylenes such that no indoor inhalation exposure will occur. This demonstration shall be submitted to the Agency for review and approval;

2) The requirements of Sections 742.300 and 742.305 are met; and

3) An institutional control, in accordance with Subpart J, will be placed on the property.

(Source: Added at 36 Ill. Reg. _____, effective _____)

SUBPART D: DETERMINING AREA BACKGROUND

Section 742.405 Determination of Area Background for Soil

a) Soil sampling results shall be obtained for purposes of determining area background levels in accordance with the following procedures:

1) For volatile ~~organic-contaminants~~-chemicals, sample results shall be based on discrete samples;

2) Unless an alternative method is approved by the Agency, for contaminants other than volatile ~~organic-contaminants~~-chemicals, sample results shall be based on discrete samples or composite samples. If a person elects to use composite samples, each 0.5 acre of the area to be sampled shall be divided into quadrants and 5 aliquots of equal volume per quadrant shall be composited into 1 sample;

3) Samples shall be collected from similar depths and soil types, which shall be consistent with the depths and soil types in which maximum levels of contaminants are found in the areas of known or suspected releases; and

4) Samples shall be collected from areas of the site or adjacent to the site that are unaffected by known or suspected releases at or from the site. If the sample results show an impact from releases at or from the site, then the sample results shall not be included in determining area background levels under this Part.

b) Area background shall be determined according to one of the following approaches:

1) Statewide Area Background Approach:

A) The concentrations of inorganic chemicals in background soils listed in Appendix A, Table G may be used as the upper limit of the area background concentration for the site. The first column to the right of the chemical name presents inorganic chemicals in background soils for counties within Metropolitan Statistical Areas. Counties within Metropolitan Statistical Areas are identified in Appendix A, Table G, Footnote a. Sites located in counties outside Metropolitan Statistical Areas shall use the concentrations of inorganic chemicals in background soils shown in the second column to the right of the chemical name.

B) Soil area background concentrations determined according to this statewide area background approach shall be used as provided in Section 742.415(b) of this Part. For each parameter whose sampling results demonstrate concentrations above those in Appendix A, Table G, the person shall develop appropriate soil remediation objectives in accordance with this Part, or may determine area background in accordance with subsection (b)(2) of this Section.

2) A statistically valid approach for determining area background concentrations appropriate for the characteristics of the data set, and approved by the Agency.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

SUBPART E: TIER 1 EVALUATION

Section 742.500 Tier 1 Evaluation Overview

a) A Tier 1 evaluation compares the concentration of each contaminant of concern detected at a site to the baseline remediation objectives provided in Appendix B, Tables A, B, C, D, ~~and~~ E, G, H and I. Use of Tier 1 remediation objectives requires only limited site-specific information: concentrations of contaminants of concern, groundwater classification, land use classification, and, if appropriate, soil pH. (See Appendix B, Illustration A.)

b) Although Tier 1 allows for differentiation between residential and industrial/commercial property use of a site, an institutional control under Subpart J is required where remediation objectives are based on an industrial/commercial property use.

c) Any given exposure route is not a concern if the concentration of each contaminant of concern detected at the site is below the Tier 1 value of that given route. In such a case, no further evaluation of that route is necessary.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.505 Tier 1 Soil, Soil Gas and Groundwater Remediation Objectives

a) Soil

1) Outdoor Inhalation Exposure Route

A) The Tier 1 soil remediation objectives for this exposure route based upon residential property use are listed in Appendix B, Table A.

B) The Tier 1 soil remediation objectives for this exposure route based upon industrial/commercial property use are listed in Appendix B, Table B. Soil remediation objective determinations relying on this table require use of institutional controls in accordance with Subpart J.

C) For this exposure route, it is acceptable to determine compliance by meeting either the soil or soil gas remediation objectives.

2) Ingestion Exposure Route

A) The Tier 1 soil remediation objectives for this exposure route based upon residential property use are listed in Appendix B, Table A.

B) The Tier 1 soil remediation objectives for this exposure route based upon industrial/commercial property use are listed in Appendix B, Table B. Soil remediation objective determinations relying on this table require use of institutional controls in accordance with Subpart J.

3) Soil Component of the Groundwater Ingestion Route

A) The Tier 1 soil remediation objectives for this exposure route based upon residential property use are listed in Appendix B, Table A.

B) The Tier 1 soil remediation objectives for this exposure route based upon industrial/commercial property use are listed in Appendix B, Table B.

C) The pH-dependent Tier 1 soil remediation objectives for identified ionizable organics or inorganics for the soil component of the groundwater ingestion exposure route (based on the total amount of contaminants present in the soil sample results and groundwater classification) are provided in Appendix B, Tables C and D.

D) Values used to calculate the Tier 1 soil remediation objectives for this exposure route are listed in Appendix B, Table F.

4) Evaluation of the dermal contact with soil exposure route is not required under Tier 1.

b) Soil Gas

1) Outdoor Inhalation Exposure Route

A) The Tier 1 soil gas remediation objectives for this exposure route based upon residential property use are listed in Appendix B, Table G.

B) The Tier 1 soil gas remediation objectives for this exposure route based upon industrial/commercial property use, including the construction worker population, are listed in Appendix B, Table G. Soil gas remediation objective determinations relying on an industrial/commercial scenario require use of institutional controls in accordance with Subpart J.

C) For this exposure route, it is acceptable to determine compliance by meeting either the soil or soil gas remediation objectives.

2) Indoor Inhalation Exposure Route

A) The Tier 1 soil gas remediation objectives for this exposure route are listed in Appendix B, Tables H and I.

B) The Tier 1 soil gas remediation objectives for this exposure route are based on a default water-filled soil porosity value of 0.15 cm³/cm³.

C) Appendix B, Table H shall be used when soil or groundwater contamination is within 5 feet, vertically or horizontally, of an existing or potential building or man-made pathway. In this scenario, the mode of contaminant transport is both diffusion and advection, which sets the Q_{soil} value at 83.33 cm³/sec.

D) Appendix B, Table I shall be used when soil and groundwater contamination are more than 5 feet, vertically and horizontally, from an existing or potential building or man-made pathway. In this scenario, the mode of contaminant transport is diffusion only, which sets the Q_{soil} value at 0.0 cm³/sec. Soil gas remediation objective determinations relying on this table require use of institutional controls in accordance with Subpart J.

E) To determine whether the Q_{soil} value can be set at 0.0 cm³/sec, the site evaluator shall demonstrate that soil and groundwater within 5 feet, vertically and horizontally, of an existing or potential building or man-made pathway meet the Tier 1 remediation objectives for residential property listed in Appendix B, Table A, and the Tier 1 remediation objectives for Class I groundwater listed in Appendix B, Table E, respectively.

~~b~~-c) Groundwater

1) The Tier 1 groundwater remediation objectives for the groundwater component of the groundwater ingestion route are listed in Appendix B, Table E.

2) The Tier 1 groundwater remediation objectives for this exposure route are given for Class I and Class II groundwaters, respectively.

3) The evaluation of 35 Ill. Adm. Code 620.615 regarding mixtures of similar-acting chemicals shall be considered satisfied for Class I groundwater at the point of human exposure if:

A) No more than one similar-acting noncarcinogenic chemical as listed in Appendix A, Table E is detected in the groundwater at the site; and

B) No carcinogenic contaminant of concern as listed in Appendix A, Table I is detected in any groundwater sample associated with the site, using analytical procedures capable of achieving either the 1 in 1,000,000 cancer risk concentration or the ADL, whichever is greater.

4) If the conditions of subsection (c)(3)~~(b)(3)~~ of this Section are not met, the Class I groundwater remediation objectives set forth in Appendix B, Table E shall be corrected for the cumulative effect of mixtures of similar-acting chemicals using the following methodologies:

A) For noncarcinogenic chemicals, the methodologies set forth at Section 742.805(c) or Section 742.915(h) shall be used; and

B) For carcinogenic chemicals, the methodologies set forth at Section 742.805(d) or Section 742.915(h) shall be used.

5) For the groundwater component of the indoor inhalation exposure route, the Tier 1 groundwater remediation objectives are listed in Appendix B, Tables H and I.

A) The Tier 1 groundwater remediation objectives for this exposure route are based on a default water-filled soil porosity value of 0.15 cm³/cm³.

B) Appendix B, Table H shall be used when soil or groundwater contamination is within 5 feet, vertically and horizontally, of an existing or potential building or man-made pathway. In this scenario, the mode of contaminant

transport is both diffusion and advection, which sets the Q_{soil} value at 83.33 cm³/sec.

C) Appendix B, Table I shall be used when soil and groundwater contamination are more than 5 feet, vertically and horizontally, from an existing or potential building or man-made pathway. In this scenario, the mode of contaminant transport is diffusion only, which sets the Q_{soil} value at 0.0 cm³/sec. Groundwater remediation objective determinations relying on this table require use of institutional controls in accordance with Subpart J.

D) To determine whether the Q_{soil} value can be set at 0.0 cm³/sec, the site evaluator shall demonstrate that soil and groundwater within 5 feet, vertically and horizontally, of an existing or potential building or man-made pathway meet the Tier 1 remediation objectives for residential property listed in Appendix B, Table A, and the Tier 1 remediation objectives for Class I groundwater listed in Appendix B, Table E, respectively.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.510 Tier 1 Remediation Objectives Tables for the Ingestion, Outdoor Inhalation and Soil Component of the Groundwater Ingestion Exposure Routes

a) Soil remediation objectives are listed in Appendix B, Tables A, B, C and D.

1) Appendix B, Table A is based upon residential property use.

A) The first column to the right of the chemical name lists soil remediation objectives for the soil ingestion exposure route.

B) The second column lists the soil remediation objectives for the outdoor inhalation exposure route.

C) The third and fourth columns list soil remediation objectives for the soil component of the groundwater ingestion exposure route for the respective classes of groundwater:

i) Class I groundwater; and

ii) Class II groundwater.

D) The final column lists the Acceptable Detection Limit (ADL), only ~~where~~when applicable.

2) Appendix B, Table B is based upon industrial/commercial property use.

A) The first and third columns to the right of the chemical name list the soil remediation objectives for the soil ingestion exposure route based on two receptor populations:

i) Industrial/commercial; and

ii) Construction worker.

B) The second and fourth columns to the right of the chemical name list the soil remediation objectives for the ~~outdoor~~-inhalation exposure route based on two receptor populations:

- i) Industrial/commercial; and
- ii) Construction worker.

C) The fifth and sixth columns to the right of the chemical name list the soil remediation objectives for the soil component of the groundwater ingestion exposure route for two classes of groundwater:

- i) Class I groundwater; and
- ii) Class II groundwater.

D) The final column lists the acceptable detection limit (ADL), only ~~where~~when applicable.

3) Appendix B, Tables C and D set forth pH specific soil remediation objectives for inorganic and ionizing organic chemicals for the soil component of the groundwater ingestion route.

A) Table C sets forth remediation objectives based on Class I groundwater and Table D sets forth remediation objectives based on Class II groundwater.

B) The first column in Tables C and D lists the chemical names.

C) The second through ninth columns to the right of the chemical names list the pH based soil remediation objectives.

4) For the inorganic chemicals listed in Appendix B, Tables A and B, the soil component of the groundwater ingestion exposure route shall be evaluated using TCLP (SW-846 Method 1311) or SPLP (SW-846 Method 1312), incorporated by reference at Section 742.210 unless a person chooses to evaluate the soil component on the basis of the total amount of contaminant in a soil sample result in accordance with subsection (a)(5) of this Section.

5) For those inorganic and ionizing organic chemicals listed in Appendix B, Tables C and D, if a person elects to evaluate the soil component of the groundwater ingestion exposure route based on the total amount of contaminant in a soil sample result (rather than TCLP or SPLP analysis), the person shall determine the soil pH at the site and then select the appropriate soil remediation objectives based on Class I and Class II groundwaters from Tables C and D, respectively. If the soil pH is less than 4.5 or greater than 9.0, then Tables C and D cannot be used.

6) Unless one or more exposure routes are excluded from consideration under Subpart C, the most stringent soil remediation objective of the exposure routes (i.e., soil ingestion exposure route, outdoor inhalation exposure route, and soil component of the groundwater ingestion exposure route) shall be compared to the concentrations of soil contaminants of concern measured at the site. When using Appendix B, Table B to select soil remediation objectives for the ingestion exposure route and outdoor inhalation exposure routes, the remediation objective shall be the more stringent soil remediation objective of the industrial/commercial populations and construction worker populations.

7) Confirmation sample results may be averaged or soil samples may be composited in accordance with Section 742.225.

8) If a soil remediation objective for a chemical is less than the ADL, the ADL shall serve as the soil remediation objective.

b) Groundwater remediation objectives for the groundwater component of the groundwater ingestion exposure route are listed in Appendix B, Table E. However, Appendix B, Table E must be corrected for cumulative effect of mixtures of similar-acting noncarcinogenic chemicals as set forth in Section ~~Sections-~~ 742.505(c)(3) and (c)(4).

1) The first column to the right of the chemical name lists groundwater remediation objectives for Class I groundwater, and the second column lists the groundwater remediation objectives for Class II groundwater.

2) To use Appendix B, Table E of this Part, the 35 Ill. Adm. Code 620 classification for groundwater at the site shall be determined. The concentrations of groundwater contaminants of concern at the site are compared to the applicable Tier 1 groundwater remediation objectives for the groundwater component of the groundwater ingestion exposure route in Appendix B, Table E.

c) Soil gas remediation objectives for the outdoor inhalation exposure route are listed in Appendix B, Table G.

1) The first column to the right of the chemical name lists the soil gas remediation objectives for residential populations.

2) The second and third columns to the right of the chemical names list the soil gas remediation objectives for the outdoor inhalation exposure route based on two receptor populations:

A) Industrial/commercial; and

B) Construction worker.

~~ed~~) For contaminants of concern not listed in Appendix B, Tables A, ~~B-and~~, E, and G, a person may request site-specific remediation objectives from the Agency or propose site-specific remediation objectives in accordance with 35 Ill. Adm. Code 620, Subpart I of this Part, or both.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.515 Tier 1 Remediation Objectives Tables for the Indoor Inhalation Exposure Route

a) When the mode of contaminant transport is both diffusion and advection as described in Section 742.505 (i.e., soil or groundwater contamination is within 5 feet of an existing or potential building or man-made pathway), the remediation objectives for soil gas and groundwater listed in Appendix B, Table H shall be used.

1) The first column to the right of the chemical name lists the soil gas remediation objectives for residential receptors.

2) The second column lists the soil gas remediation objectives for industrial/commercial receptors.

3) The third column lists the groundwater remediation objectives for residential receptors.

4) The fourth column lists the groundwater remediation objectives for industrial/commercial receptors.

b) When the mode of contaminant transport is diffusion only as described in Section 742.505 (i.e., soil and groundwater contamination are more than 5 feet from an existing or potential building or man-made pathway), the remediation objectives for soil gas and groundwater listed in Appendix B, Table I shall be used. Remediation objectives relying on this table require use of institutional controls in accordance with Subpart J.

1) The first column to the right of the chemical name lists the soil gas remediation objectives for residential receptors.

2) The second column lists the soil gas remediation objectives for industrial/commercial receptors.

3) The third column lists the groundwater remediation objectives for residential receptors.

4) The fourth column lists the groundwater remediation objectives for industrial/commercial receptors.

c) If using Appendix B, Table H, compliance is determined by meeting either the soil gas remediation objectives or the groundwater remediation objectives.

d) If using Appendix B, Table I, compliance is determined by meeting both the soil gas remediation objectives and the groundwater remediation objectives.

e) For volatile chemicals not listed in Appendix B, Table H or I, a person may request site-specific remediation objectives from the Agency or propose site-specific remediation objectives in accordance with Subpart I ~~of this Part~~, or both.

(Source: Added at 36 Ill. Reg. _____, effective _____)

SUBPART F: TIER 2 GENERAL EVALUATION

Section 742.600 Tier 2 Evaluation Overview

a) Tier 2 remediation objectives are developed through the use of equations which allow site-specific data to be used. (See Appendix C, Illustrations A and B.) The equations identified in Appendix C, Tables A, ~~and~~-C, and L may be used to develop Tier 2 remediation objectives.

b) Tier 2 evaluation is only required for contaminants of concern and corresponding exposure routes (except where excluded from further consideration under Subpart C) exceeding the Tier 1 remediation objectives. When conducting Tier 2 evaluations, the values used in the calculations must have the appropriate units of measure as identified in Appendix C, Tables B, ~~and~~-D, and M.

c) Any development of remediation objectives using site-specific information or equations outside the Tier 2 framework shall be evaluated under Tier 3.

d) Any development of a remediation objective under Tier 2 shall not use a target hazard quotient greater than one at the point of human exposure or a target cancer risk greater than 1 in 1,000,000 at the point of human exposure.

e) In conducting a Tier 2 evaluation, the following conditions shall be met:

1) For each discrete sample, the total soil contaminant concentration of either a single contaminant or multiple contaminants of concern shall not exceed the attenuation capacity of the soil as provided in Section 742.215.

2) Remediation objectives for noncarcinogenic compounds which affect the same target organ, organ system or similar mode of action shall meet the requirements of Section 742.720.

3) The soil remediation objectives based on the outdoor inhalation exposure route and the soil component of the groundwater ingestion exposure routes shall not exceed the soil saturation limit as provided in Section 742.220.

4) The soil gas remediation objectives based on the indoor and outdoor inhalation exposure routes shall not exceed the soil vapor saturation limit ~~as~~ provided in Section 742.222.

f) Tier 2 remediation objectives for the indoor inhalation exposure route shall be calculated for either soil gas or groundwater if a Q_{soil} value of 83.33 cm^3/sec is used.

g) Tier 2 remediation objectives for the indoor inhalation exposure route shall be calculated for both soil gas and groundwater if a Q_{soil} value of 0.0 cm^3/sec is used.

~~f~~h) If the calculated Tier 2 soil remediation objective for an applicable exposure route is more stringent than the corresponding Tier 1 remediation objective, then the Tier 1 remediation objective applies.

~~g~~i) If the calculated Tier 2 soil remediation objective for an exposure route is more stringent than the Tier 1 soil remediation ~~objective(s)~~objectives for the other exposure routes, then the Tier 2 calculated soil remediation objective applies and Tier 2 soil remediation objectives for the other exposure routes are not required.

~~h~~j) If the calculated Tier 2 soil remediation objective is less stringent than one or more of the soil remediation objectives for the remaining exposure routes, then the Tier 2 values are calculated for the remaining exposure ~~route(s)~~routes and the most stringent Tier 2 calculated value applies.

k) If a contaminant has both carcinogenic and noncarcinogenic effects for any applicable exposure route or receptor, remediation objectives shall be calculated for each effect and the more stringent remediation objective shall apply. The toxicological-specific information is described in Section 742.705(d).

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.605 Land Use

a) Present and post-remediation land use is evaluated in a Tier 2 evaluation. Acceptable exposure factors for the Tier 2 evaluation for residential,

industrial/commercial, and construction worker populations are provided in the far right column of Appendix C, Tables B, ~~and-D~~, and M. Use of exposure factors different from those in Appendix C, Tables B, ~~and-D~~, and M must be approved by the Agency as part of a Tier 3 evaluation.

b) If a Tier 2 evaluation is based on an industrial/commercial property use, then:

1) Construction worker populations shall also be evaluated, except for the indoor inhalation exposure route; and

2) Institutional controls are required in accordance with Subpart J.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.610 Chemical and Site Properties

a) Physical and Chemical Properties of Contaminants

Tier 2 evaluations require information on the physical and chemical properties of the contaminants of concern. The physical and chemical properties used in a Tier 2 evaluation are contained in Appendix C, Table E. If the site has contaminants not included in this table, a person may request the Agency to provide the applicable physical and chemical input values or may propose input values under Subpart I. If a person proposes to apply values other than those in Appendix C, Table E, or those provided by the Agency, the evaluation shall be considered under Tier 3.

b) Soil and Groundwater Parameters

1) A Tier 2 evaluation requires examination of soil and groundwater parameters. The parameters that may be varied, and the conditions under which these parameters are determined as part of Tier 2, are summarized in Appendix C, Tables B, ~~and-D~~, and M. If a person proposes to vary site-specific parameters outside of the framework of these tables, the evaluation shall be considered under Tier 3.

2) To determine site-specific physical soil parameters, a minimum of one boring per 0.5 acre of contamination shall be collected. This boring must be deep enough to allow the collection of the required field measurements. The site-specific physical soil parameters must be determined from the portion of the boring representing the stratigraphic ~~unit(s)~~units being evaluated. For example, if evaluating the soil component of the groundwater ingestion exposure route, two samples from the boring will be required:

A) A sample of the predominant soil type for the vadose zone; and

B) A sample of the predominant soil type for the saturated zone.

3) A site-specific SSL dilution factor (used in developing soil remediation objectives based upon the protection of groundwater) may be determined by substituting site information in Equation S22 in Appendix C, Table A. To make this demonstration, a minimum of three monitoring wells shall be used to determine the hydraulic gradient. As an alternative, the default dilution factor value listed in Appendix C, Table B may be used. If monitoring wells are used to determine the hydraulic gradient, the soil taken from the borings shall be visually inspected to ensure there are no significant differences in the stratigraphy. If there are similar soil types in the field, one boring shall be

used to determine the site-specific physical soil parameters. If there are significant differences, all of the borings shall be evaluated before determining the site-specific physical soil parameters for the site.

4) Not all of the parameters identified in Appendix C, Tables B, ~~and-D~~, and M need to be determined on a site-specific basis. A person may choose to collect partial site-specific information and use default values as listed in Appendix C, Tables B, ~~and-D~~, and M for the rest of the parameters.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

SUBPART G: TIER 2 SOIL AND SOIL GAS EVALUATION

Section 742.700 Tier 2 Soil Evaluation Overview

a) Tier 2 remediation objectives are developed through the use of models which allow site-specific data to be considered. Appendix C, Tables A, ~~and-C~~, and L list equations that shall be used under a Tier 2 evaluation to calculate soil remediation objectives prescribed by SSL, ~~and~~ RBCA, and the modified J&E models, respectively. (See also Appendix C, Illustration A.)

b) Appendix C, Table A lists equations that are used under the SSL model. (See also Appendix C, Illustration A.) The SSL model has equations to evaluate the following human exposure routes:

1) Soil ingestion exposure route;

2) Outdoor Inhalation exposure route ~~for~~; and

~~A) Organic contaminants;~~

~~B) Fugitive dust; and~~

3) Soil component of the groundwater ingestion exposure route.

c) Evaluation of the dermal exposure route is not required under the SSL model.

d) Appendix C, Table C lists equations that are used under the RBCA model. (See also Appendix C, Illustration A.) The RBCA model has equations to evaluate human exposure based on the following:

1) The combined exposure routes of outdoor inhalation of vapors and particulates, soil ingestion and dermal contact with soil;

2) The ~~ambient vapor inhalation (outdoor)~~ outdoor inhalation exposure route from subsurface soils;

3) Soil component of the groundwater ingestion route; and

4) Groundwater ingestion exposure route.

e) Appendix C, Table L lists equations that are used under the modified J&E model. The modified J&E model has equations to evaluate human exposure by the indoor inhalation exposure route. The modified model allows for the development of soil gas remediation objectives.

f) ~~e)~~ The equations in either Appendix C, Table A, ~~or~~ C, or L may be used to calculate remediation objectives for each contaminant of concern under Tier 2, if the following requirements are met:

1) The Tier 2 soil or soil gas remediation objectives for the ingestion and outdoor inhalation exposure routes shall use the applicable equations from the same approach (i.e., SSL equations in Appendix C, Table C). For the indoor inhalation exposure route, only the J&E equations can be used.

2) The equations used to calculate soil remediation objectives for the soil component of the groundwater ingestion exposure route are not dependent on the approach utilized to calculate soil remediation objectives for the other exposure routes. For example, it is acceptable to use the SSL equations for calculating Tier 2 soil remediation objectives for the ingestion and outdoor inhalation exposure routes, and the RBCA equations for calculating Tier 2 soil remediation objectives for the soil component of the groundwater ingestion exposure route.

3) Combining equations from Appendix C, Tables A, ~~and~~ C, and L to form a new model is not allowed. In addition, Appendix C, Tables A, ~~and~~ C, and L must use their own applicable parameters identified in Appendix C, Tables B, ~~and~~ D, and M, respectively.

g) ~~f)~~ In calculating soil or ~~soil~~-gas remediation objectives for industrial/commercial property use, applicable calculations shall be performed twice: once using industrial/commercial population default values and once using construction worker population default values. The more stringent soil or ~~soil~~-gas remediation objectives derived from these calculations must be used for further Tier 2 evaluations. The indoor inhalation exposure route does not apply to the construction worker population.

h) ~~g)~~ Tier 2 data sheets provided by the Agency shall be used to present calculated Tier 2 remediation objectives, if required by the particular program for which remediation is being performed.

i) ~~h)~~ The RBCA equations which rely on the parameter Soil Water Sorption Coefficient (k_s) can only be used for ionizing organics and inorganics by substituting values for k_s from Appendix C, Tables I and J, respectively. This will also require the determination of a site-specific value for soil pH.

j) For the outdoor inhalation exposure route, it is acceptable to use either [Section 742.710](#) to develop a soil remediation objective or [Section 742.712](#) to develop a soil gas remediation objective to determine compliance with the pathway.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.705 Parameters for Soil Remediation Objective Equations

a) Appendix C, Tables B, ~~and~~ D, and M list the input parameters for the SSL, ~~and~~ RBCA, and J&E equations, respectively. The first column lists each symbol as it is presented in the equation. The next column defines the parameters. The third column shows the units for the parameters. The fourth column identifies where information on the parameters can be obtained (i.e., field measurement, applicable ~~equation(s)~~ equations, reference source, or default value). The last column identifies how the parameters can be generated.

b) Default Values

Default values are numerical values specified for use in the Tier 2 equations. The fourth column of Appendix C, Tables B, ~~and~~-D, and M denotes if the default values are from the SSL model, RBCA model, the modified J&E model or some other source. The last column of Appendix C, Tables B, ~~and~~-D, and M lists the numerical values for the default values used in the SSL, ~~and~~-RBCA, and J&E equations, respectively.

c) Site-specific Information

Site-specific information is a parameter measured, obtained, or determined from the site to calculate Tier 2 remediation objectives. The fourth column of Appendix C, Tables B, ~~and~~-D, and M identifies those site-specific parameters that may require direct field measurement. For some parameters, numerical default inputs have been provided in the last column of Appendix C, Tables B, ~~and~~-D, and M to substitute for site-specific information. In some cases, information on the receptor or soil type is required to select the applicable numerical default inputs. Site-specific information includes:

1) Physical soil parameters identified in Appendix C, Table F. The second column identifies the location where the sample is to be collected. Acceptable methods for measuring or calculating these soil parameters are identified in the last column of Appendix C, Table F;

2) Institutional controls or engineered barriers, pursuant to Subparts J and K, describe applicable institutional controls and engineered barriers under a Tier 2 evaluation; and

3) Land use classification

d) Toxicological-specific Information

1) Toxicological-specific information is used to calculate Tier 2 remediation objectives for the following parameters, if applicable:

A) Oral Chronic Reference Dose (RfDo, expressed in mg/kg-d);

B) Oral Subchronic Reference Dose (RfDs, expressed in mg/kg-d, shall be used for construction worker remediation objective calculations);

C) Oral Slope Factor (SFo, expressed in (mg/kg-d)⁻¹);

D) Inhalation Unit Risk Factor (URF expressed in (µg/m³)⁻¹);

E) Inhalation Chronic Reference Concentration (RfC, expressed in mg/m³);

F) Inhalation Subchronic Reference Concentration (RfCs, expressed in mg/m³, shall be used for construction worker remediation objective calculations);

G) Inhalation Chronic Reference Dose (RfDi, expressed in mg/kg-d);

H) Inhalation Subchronic Reference Dose (RfDis, expressed in mg/kg-d, shall be used for construction worker remediation objective calculations); and

I) Inhalation Slope Factor (SF_i, expressed in (mg/kg-d)⁻¹);

2) Toxicological information can be obtained ~~from IRIS~~ by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210, or the program under which the remediation is being performed.

e) Chemical-specific Information

Chemical-specific information used to calculate Tier 2 remediation objectives is listed in Appendix C, Table E.

f) Calculations

Calculating numerical values for some parameters requires the use of equations listed in Appendix C, ~~Table~~Tables A, ~~or~~ C, and L. The parameters that are calculated are listed in Appendix C, Tables B, ~~and~~ D, and M.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.710 SSL Soil Equations

a) This Section sets forth the equations and parameters used to develop Tier 2 soil remediation objectives for the three exposure routes using the SSL approach.

b) Soil Ingestion Exposure Route

1) Equations S1 through S3 form the basis for calculating Tier 2 remediation objectives for the soil ingestion exposure route using the SSL approach. Equation S1 is used to calculate soil remediation objectives for noncarcinogenic contaminants. Equations S2 and S3 are used to calculate soil remediation objectives for carcinogenic contaminants for residential populations and industrial/commercial and construction worker populations, respectively.

2) For Equations S1 through S3, the SSL default values cannot be modified with site-specific information.

c) Outdoor Inhalation Exposure Route

1) Equations S4 through S16, S26 and S27 are used to calculate Tier 2 soil remediation objectives for the outdoor inhalation exposure route using the SSL approach. To address this exposure route, organic contaminants and mercury must be evaluated separately from fugitive dust using their own equations set forth in subsections (c)(2) and (c)(3) of this Section, respectively.

2) Organic Contaminants

A) Equations S4 through S10 are used to calculate Tier 2 soil remediation objectives for organic contaminants and mercury based on the outdoor inhalation exposure route. Equation S4 is used to calculate soil remediation objectives for noncarcinogenic organic contaminants in soil for residential and industrial/commercial populations. Equation S5 is used to calculate soil remediation objectives for noncarcinogenic organic contaminants and mercury in soil for construction worker populations. Equation S6 is used to calculate soil remediation objectives for carcinogenic organic contaminants in soil for residential and industrial/commercial populations. Equation S7 is used to calculate soil remediation objectives for carcinogenic organic contaminants in soil for construction worker populations. Equations S8 through S10, S27 and S28 are used for calculating numerical values for some of the parameters in Equations S4 through S7.

B) For Equation S4, a numerical value for the Volatilization Factor (VF) can be calculated in accordance with subsection (c)(2)(F) of this Section. The remaining parameters in Equation S4 have either SSL default values listed in Appendix C, Table B or toxicological-specific information (i.e., RfC), which can be obtained ~~from IRIS~~ by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210 or requested from the program under which the remediation is being performed.

C) For Equation S5, a numerical value for the Volatilization Factor adjusted for Agitation (VF') can be calculated in accordance with subsection (c)(2)(G) of this Section. The remaining parameters in Equation S5 have either SSL default values listed in Appendix C, Table B or toxicological-specific information (i.e., RfC), which can be obtained ~~from IRIS~~ by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210 or requested from the program under which the remediation is being performed.

D) For Equation S6, a numerical value for VF can be calculated in accordance with subsection (c)(2)(F) of this Section. The remaining parameters in Equation S6 have either default values listed in Appendix C, Table B or toxicological-specific information (i.e., URF), which can be obtained ~~from IRIS~~ by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210 or requested from the program under which the remediation is being performed.

E) For Equation S7, a numerical value for VF' can be calculated in accordance with subsection (c)(2)(G) of this Section. The remaining parameters in Equation S7 have either default values listed in Appendix C, Table B or toxicological-specific information (i.e., URF), which can be obtained ~~from IRIS~~ by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210 or requested from the program under which the remediation is being performed.

F) The VF can be calculated for residential and industrial/commercial populations using one of the following equations based on the information known about the contaminant source and receptor population:

i) Equation S8, in conjunction with Equation S10, is used to calculate VF assuming an infinite source of contamination; or

ii) If the area and depth of the contaminant source are known or can be estimated reliably, mass limit considerations may be used to calculate VF using Equation S26.

G) The VF' can be calculated for the construction worker populations using one of the following equations based on the information known about the contaminant source:

i) Equation S9 is used to calculate VF' assuming an infinite source of contamination; or

ii) If the area and depth of the contaminant source are known or can be estimated reliably, mass limit considerations may be used to calculate VF' using Equation S27.

3) Fugitive Dust

A) Equations S11 through S16 are used to calculate Tier 2 soil remediation objectives using the SSL fugitive dust model for the outdoor inhalation exposure route. Equation S11 is used to calculate soil remediation objectives for noncarcinogenic contaminants in fugitive dust for residential and industrial/commercial populations. Equation S12 is used to calculate soil remediation objectives for noncarcinogenic contaminants in fugitive dust for construction worker populations. Equation S13 is used to calculate soil remediation objectives for carcinogenic contaminants in fugitive dust for residential and industrial/commercial populations. Equation S14 is used to calculate soil remediation objectives for carcinogenic contaminants in fugitive dust for construction worker populations. Equations S15 and S16 are used for calculating numerical quantities for some of the parameters in Equations S11 through S14.

B) For Equation S11, a numerical value can be calculated for the Particulate Emission Factor (PEF) using Equation S15. This equation relies on various input parameters from a variety of sources. The remaining parameters in Equation S11 have either SSL default values listed in Appendix C, Table B or toxicological-specific information (i.e., RfC), which can be obtained ~~from IRIS~~ by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210 or requested from the program under which the remediation is being performed.

C) For Equation S12, a numerical value for the Particulate Emission Factor for Construction Worker (PEF') can be calculated using Equation S16. The remaining parameters in Equation S12 have either SSL default values listed in Appendix C, Table B or toxicological-specific information (i.e., RfC), which can be obtained ~~from IRIS~~ by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210 or requested from the program under which the remediation is being performed.

D) For Equation S13, a numerical value for PEF can be calculated using Equation S15. The remaining parameters in Equation S13 have either default values listed in Appendix C, Table B or toxicological-specific information (i.e., URF), which can be obtained ~~from IRIS~~ by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210 or requested from the program under which the remediation is being performed.

E) For Equation S14, a numerical value for PEF' can be calculated using Equation S16. The remaining parameters in Equation S14 have either default values listed in Appendix C, Table B or toxicological-specific information (i.e., URF), which can be obtained ~~from IRIS~~ by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210 or requested from the program under which the remediation is being performed.

d) Soil Component of the Groundwater Ingestion Exposure Route

The Tier 2 remediation objective for the soil component of the groundwater ingestion exposure route can be calculated using one of the following equations based on the information known about the contaminant source and receptor population:

1) Equation S17 is used to calculate the remediation objective assuming an infinite source of contamination.

A) The numerical quantities for four parameters in Equation S17, the Target Soil Leachate Concentration (C_w), Soil-Water Partition Coefficient (K_d) for non-ionizing organics, Water-Filled Soil Porosity ~~Theta-w~~ Thetaw (θ_w) and Air-

Filled Soil Porosity ~~Theta~~Theta (θ), are calculated using Equations S18, S19, S20 and S21, respectively. Equations S22, S23, S24 and S25 are also needed to calculate numerical values for Equations S18 and S21. The pH-dependent Kd values for ionizing organics can be calculated using Equation S19 and the pH-dependent Koc values in Appendix C, Table I.

B) The remaining parameters in Equation S17 are Henry's Law Constant (H'), a chemical specific value listed in Appendix C, Table E and Dry Soil Bulk Density (~~rho~~rho), a site-specific based value listed in Appendix C, Table B.

C) The default value for GWobj is the Tier 1 groundwater objective. For chemicals for which there is no Tier 1 groundwater remediation objective, the value for GWobj shall be the concentration determined according to the procedures specified in 35 Ill. Adm. Code 620, Subpart F. As an alternative to using Tier 1 groundwater remediation objectives or concentrations determined according to the procedures specified in 35 Ill. Adm. Code 620, Subpart F, GWobj may be developed using Equations R25 and R26, if approved institutional controls are in place as required in Subpart J.

2) If the area and depth of the contaminant source are known or can be estimated reliably, mass limit considerations may be used to calculate the remediation objective for this exposure route using Equation S28. The parameters in Equation S28 have default values listed in Appendix C, Table B.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.712 SSL Soil Gas Equation for the Outdoor Inhalation Exposure Route

a) This ~~section~~Section sets forth the equation and parameters used to develop Tier 2 soil gas remediation objectives for the outdoor inhalation exposure route using the SSL approach.

b) Equation S30 is used to calculate Tier 2 soil gas remediation objectives for the outdoor inhalation exposure route for residential, industrial/commercial, and construction worker populations.

c) Equations S4 through S16, S26 and S27, which calculate Tier 2 soil remediation objectives as described in Section 742.710(c), form the basis for developing the Tier 2 soil gas remediation objectives for the outdoor inhalation exposure route using the SSL model.

d) The remaining parameters used to calculate Equation S30 are listed in Appendix C, Table B, except for Dimensionless Henry's Law Constant (H'), a chemical specific value listed in Appendix C, Table E.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 742.715 RBCA Soil Equations

a) This Section presents the RBCA model and describes the equations and parameters used to develop Tier 2 soil remediation objectives.

b) Ingestion, Outdoor Inhalation, and Dermal Contact

1) The two sets of equations in subsections (b)(2) and (b)(3) of this Section shall be used to generate Tier 2 soil remediation objectives for the combined ingestion, outdoor inhalation, and dermal contact with soil exposure routes.

2) Combined Exposure Routes of Soil Ingestion, Outdoor Inhalation of Vapors and Particulates, and Dermal Contact with Soil

A) Equations R1 and R2 form the basis for deriving Tier 2 remediation objectives for the set of equations that evaluates the combined exposure routes of soil ingestion, outdoor inhalation of vapors and particulates, and dermal contact with soil using the RBCA approach. Equation R1 is used to calculate soil remediation objectives for carcinogenic contaminants. Equation R2 is used to calculate soil remediation objectives for noncarcinogenic contaminants. Soil remediation objectives for the ~~ambient vapor inhalation (outdoor)~~ outdoor inhalation exposure route from subsurface soils must also be calculated in accordance with the procedures outlined in subsection (b)(3) of this Section and compared to the values generated from Equations R1 or R2. The smaller value (i.e., R1 and R2 compared to R7 and R8, respectively) from these calculations is the Tier 2 soil remediation objective for the combined exposure routes of soil ingestion, outdoor inhalation, and dermal contact with soil.

B) In Equation R1, numerical values are calculated for two parameters:

i) The volatilization factor for surficial soils (VFss) using Equations R3 and R4; and

ii) The volatilization factor for ~~subsurface~~ surficial soils regarding particulates (VFp) using Equation ~~R5-5~~ 5.

C) VFss uses Equations R3 and R4 to derive a numerical value. Equation R3 requires the use of Equation R6. Both equations must be used to calculate the VFss. The lowest calculated value from these equations must be substituted into Equation R1.

D) The remaining parameters in Equation R1 have either default values listed in Appendix C, Table D or toxicological-specific information (i.e., SFO, SFI), which can be obtained ~~from IRIS~~ by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210 or requested from the program under which the remediation is being performed.

E) For Equation R2, the parameters VFss and VFp are calculated. The remaining parameters in Equation R2 have either default values listed in Appendix C, Table D or toxicological-specific information (i.e., RfDo, RfDi), which can be obtained ~~from IRIS~~ by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210 or requested from the program under which the remediation is being performed.

F) For chemicals other than inorganics which do not have default values for the dermal absorption factor (RAF_d) in Appendix C, Table D, a dermal absorption factor of 0.5 shall be used for Equations R1 and R2. For inorganics, dermal absorption may be disregarded (i.e., RAF_d = 0).

3) ~~Ambient Vapor Inhalation (outdoor)~~ Outdoor Inhalation Exposure Route route from Subsurface Soils (soil below one meter)

A) Equations R7 and R8 form the basis for deriving Tier 2 remediation objectives for the ~~ambient vapor inhalation (outdoor)~~ outdoor inhalation

exposure ~~route~~ from subsurface soils using the RBCA approach. Equation R7 is used to calculate soil remediation objectives for carcinogenic contaminants. Equation R8 is used to calculate soil remediation objectives for noncarcinogenic contaminants.

B) For Equation R7, the carcinogenic risk-based screening level for air (RBSLair) and the volatilization factor for soils below one meter to ambient air (VFsamb) have numerical values that are calculated using Equations R9 and R11, respectively. Both equations rely on input parameters from a variety of sources.

C) The noncarcinogenic risk-based screening level for air (RBSLair) and the volatilization factor for soils below one meter to ambient air (VFsamb) in Equation R8 have numerical values that can be calculated using Equations R10 and R11, respectively.

c) Soil Component of the Groundwater Ingestion Exposure Route

1) Equation R12 forms the basis for deriving Tier 2 remediation objectives for the soil component of the groundwater ingestion exposure route using the RBCA approach. The parameters, groundwater at the source (GWsource) and Leaching Factor (LFsw), have numerical values that are calculated using Equations R13 and R14, respectively.

2) Equation R13 requires numerical values that are calculated using Equation R15.

3) Equation R14 requires numerical values that are calculated using Equations R21, R22, and R24. For non-ionizing organics, the Soil Water Sorption Coefficient (ks) shall be calculated using Equation R20. For ionizing organics and inorganics, the values for ~~(ks)~~ are listed in Appendix C, Tables I and J, respectively. The pH-dependent ks values for ionizing organics can be calculated using Equation R20 and the pH- dependent Koc values in Appendix C, Table I. The remaining parameters in Equation R14 are field measurements or default values listed in Appendix C, Table D.

d) The default value for GWcomp is the Tier 1 groundwater remediation objective. For chemicals for which there is no Tier 1 groundwater remediation objective, the value for GWcomp shall be the concentration determined according to the procedures specified in 35 Ill. Adm. Code 620, Subpart F. As an alternative to using the above concentrations, GWcomp may be developed using Equations R25 and R26, if approved institutional controls are in place as may be required in Subpart J.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.717 J&E Soil Gas Equations for the Indoor Inhalation Exposure Route

a) This Section sets forth the equations and parameters to be used to develop Tier 2 soil gas remediation objectives for the indoor inhalation exposure route using the modified J&E model.

b) Equations J&E1 and J&E2 calculate, for carcinogens and noncarcinogens, respectively, an acceptable concentration of the contaminant of concern in indoor air that adequately protects humans who inhale this air. Equation J&E3 converts indoor air concentrations from parts per million volume to milligrams per cubic meter.

c) Equation J&E4 calculates an acceptable concentration of the contaminant of concern in the soil gas at the source of contamination. This calculation is made using: ~~+~~

1) an attenuation factor developed in accordance with Equations J&E7 through 18; and ~~+~~

2) the acceptable concentration of the contaminant of concern in indoor air calculated in accordance with Equation J&E1 (for carcinogens) or J&E2 (for noncarcinogens).

d) The attenuation factor (Equation J&E7 or J&E8) accounts for the following processes:

1) Migration of contaminants from the source upwards through the vadose zone;

2) Migration of contaminants through the earthen filled cracks in the slab-on-grade or basement floor and walls; and

3) Mixing of the contaminants with air inside the building.

e) Equation J&E7 is used ~~where~~when the mode of contaminant transport is both diffusion and advection. In this scenario, the Q_{soil} value equals 83.33 cm³/sec as described in Section 742.505.

f) Equation J&E8 is used ~~where~~when the mode of contaminant transport is diffusion only. In this scenario, the Q_{soil} value equals 0.0 cm³/sec as described in Section 742.505.

g) Equations J&E9a through J&E18 calculate input parameters for either Equation J&E7 or J&E8 (the equations used to calculate an attenuation factor). These equations assume there are "n" different soil layers between the source of the contamination and the floor of the building. Equations J&E11, 16, 17 and 18 shall be used to calculate the needed parameters for each of the n layers (the general soil layer is referred to as soil layer "i" and $i = 1, 2, \dots, 1, 2, \dots, n$). Equations J&E16, 17, and 18 shall also be used to calculate needed parameters for the soil in the cracks of the floor of the building (it is through these cracks that contaminants flow from the subsurface ~~and~~ into the building).

h) The default representative subsurface temperature for Henry's Law Constant is 13°C. This value shall be used, as appropriate, in all calculations needed to represent the system by which contaminants migrate through the subsurface.

i) The calculated soil gas remediation objective shall be compared with the saturated vapor concentration (C_{vsat} , Equation J&E6b) for each volatile chemical. The calculated C_{vsat} shall use the default representative subsurface temperature specified in ~~742.717~~subsection (g). If the calculated soil gas remediation objective is greater than C_{vsat} , then C_{vsat} is used as the soil gas remediation objective.

j) The calculated soil gas remediation objective shall be compared to concentrations of soil gas collected at a depth at least 3 feet below ground surface and above the saturated zone. If a valid sample cannot be collected, a soil gas sampling plan shall be approved by the Agency under Tier 3.

(Source: Added at 36 Ill. Reg. _____, effective _____)

SUBPART H: TIER 2 GROUNDWATER EVALUATION

Section 742.805 Tier 2 Groundwater Remediation Objectives

a) To develop a groundwater remediation objective under this Section that exceeds the applicable Tier 1 groundwater remediation objective, or for which there is no Tier I groundwater remediation objective, a person may request approval from the Agency if the person has performed the following:

1) Identified the horizontal and vertical extent of groundwater for which the Tier 2 groundwater remediation objective is sought;

2) Taken corrective action, to the maximum extent practicable to remove any free product;

3) Using Equation R26 in accordance with Section 742.810, demonstrated that the concentration of any contaminant of concern in groundwater will meet:

A) The applicable Tier 1 groundwater remediation objective at the point of human exposure; or

B) For any contaminant of concern for which there is no Tier 1 groundwater remediation objective, the concentration determined according to the procedures specified in 35 Ill. Adm. Code 620 at the point of human exposure. A person may request the Agency to provide these concentrations or may propose these concentrations under Subpart I;

4) Using Equation R26 in accordance with Section 742.810, demonstrated that the concentration of any contaminant of concern in groundwater within the minimum or designated maximum setback zone of an existing potable water supply well will meet the applicable Tier 1 groundwater remediation objective or, if there is no Tier 1 groundwater remediation objective, the concentration determined according to the procedures specified in 35 Ill. Adm. Code 620. A person may request the Agency to provide these concentrations or may propose these concentrations under Subpart I;

5) Using Equation R26 in accordance with Section 742.810, demonstrated that the concentration of any contaminant of concern in groundwater discharging into a surface water will meet the applicable water quality standard under 35 Ill. Adm. Code 302;

6) Demonstrated that the source of the release is not located within the minimum or designated maximum setback zone or within a regulated recharge area of an existing potable water supply well; and

7) If the selected corrective action includes an engineered barrier as set forth in Subpart K to minimize migration of contaminants of concern from the soil to the groundwater, demonstrated that the engineered barrier will remain in place for post-remediation land use through an institutional control as set forth in Subpart J.

b) A groundwater remediation objective that exceeds the water solubility of that chemical (refer to Appendix C, Table E for solubility values) is not allowed.

c) The contaminants of concern for which a Tier 1 remediation objective has been developed shall be included in any mixture of similar-acting chemicals under consideration in Tier 2. The evaluation of 35 Ill. Adm. Code 620.615 regarding mixtures of similar-acting chemicals shall be considered satisfied for Class I groundwater at the point of human exposure if either of the following requirements are achieved:

1) Calculate the weighted average using the following equations:

$$\text{Wave} = x_1 + x_2 + x_3 + \dots + x_a$$

where:

Wave = Weighted ~~Average~~ Average x_1 through x_a = Concentration of each individual contaminant at the location of concern. Note that, depending on the target organ, the actual number of contaminants will range from 2 to 33. ~~CUO~~ x_a = A Tier 1 or Tier 2 remediation objective must be developed for each x_a .

A) If the value of the weighted average calculated in accordance with the equations above is less than or equal to 1.0, then the remediation objectives are met for those chemicals.

B) If the value of the weighted average calculated in accordance with the equations above is greater than 1.0, then additional remediation must be carried out until the level of contaminants remaining in the remediated area has a weighted average calculated in accordance with the equation above less than or equal to one; or

2) Divide each individual chemical's remediation objective by the number of chemicals in that specific target organ group that were detected at the site. Each of the contaminant concentrations at the site is then compared to the remediation objectives that have been adjusted to account for this potential additivity.

d) The evaluation of 35 Ill. Adm. Code 620.615 regarding mixtures of similar-acting chemicals are considered satisfied if the cumulative risk from any ~~contaminant(s)~~ contaminants of concern listed in Appendix A, Table I, plus any other ~~contaminant(s)~~ contaminants of concern detected in groundwater and listed in Appendix A, Table F as affecting the same target organ/organ system as the ~~contaminant(s)~~ contaminants of concern detected from Appendix A, Table I, does not exceed 1 in 10,000.

e) Groundwater remediation objectives for the indoor inhalation exposure route shall be developed in accordance with Section 742.812.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.810 RBCA Calculations to Predict Impacts from Remaining Groundwater Contamination

a) Equation R26 predicts the contaminant concentration along the centerline of a groundwater plume emanating from a vertical planar source in the aquifer (dimensions S_w wide and S_d deep). This model accounts for both three-dimensional dispersion (x is the direction of groundwater flow, y is the other horizontal direction, and z is the vertical direction) and biodegradation.

1) The parameters in this equation are: ~~x~~

X = distance from the planar source to the location of concern, along the centerline of the groundwater plume (i.e., $y = 0, z = 0$)
 C_x = the concentration of the contaminant at a distance X from the source, along the centerline of the plume
 C_{source} = the greatest potential concentration of the contaminant of concern in the groundwater at the source of the contamination, based on the concentrations of contaminants in groundwater due to the release and the projected concentration of the contaminant migrating from the soil to the groundwater. As indicated above, the model assumes a planar source discharging groundwater at a concentration equal to C_{source} .
 α_x = dispersivity in the x direction (i.e., Equation R16)
 α_y = dispersivity in the y direction (i.e., Equation R17)
 α_z = dispersivity in the z direction (i.e., Equation R18)
 U = specific discharge (i.e., actual groundwater flow velocity through a porous medium; takes into account the fact that the groundwater actually flows only through the pores of the subsurface materials) where the aquifer hydraulic conductivity (K), the hydraulic gradient (I) and the total soil porosity ϕ_{TT} must be known (i.e., Equation R19)
 λ = first order degradation constant obtained from Appendix C, Table E or from measured groundwater data
 Sw = width of planar groundwater source in the y direction
 Sd = depth of planar groundwater source in the z direction

2) The following parameters are determined through field measurements: $U, K, I, \phi_{TT}, Sw, Sd$.

A) The determination of values for U, K, I and ϕ_{TT} can be obtained through the appropriate laboratory and field techniques;

B) From the immediate down-gradient edge of the source of the groundwater contamination values for Sw and Sd shall be determined. Sw is defined as the width of groundwater at the source which exceeds the Tier 1 groundwater remediation objective. Sd is defined as the depth of groundwater at the source which exceeds the Tier 1 groundwater remediation objective; and

C) Total soil porosity can also be calculated using Equation R23.

b) Once values are obtained for all the input parameters identified in subsection (a) of this Section, the contaminant concentration C_x along the centerline of the plume at a distance X from the source shall be calculated so that X is the distance from the down-gradient edge of the source of the contamination at the site to the point where the contaminant concentration is equal to the Tier 1 groundwater remediation objective or concentration determined according to the procedures specified in 35 Ill. Adm. Code 620, Subpart F.

1) If there are any potable water supply wells located within the calculated distance X , then the Tier 1 groundwater remediation objective or concentration shall be met at the edge of the minimum or designated maximum setback zone of the nearest potable water supply down-gradient of the source. To demonstrate that a minimum or maximum setback zone of a potable water supply well will not be impacted above the applicable Tier 1 groundwater remediation objective or concentration determined according to the procedures specified in 35 Ill. Adm. Code 620, Subpart F, X shall be the distance from the C_{source} location to the edge of the setback zone.

2) To demonstrate that no surface water is adversely impacted, X shall be the distance from the down-gradient edge of the source of the contamination site to the nearest surface water body. This calculation must show that the contaminant

in the groundwater at this location (Cx) does not exceed the applicable water quality standard.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.812 J&E Groundwater Equations for the Indoor Inhalation Exposure Route

Groundwater remediation objectives for the indoor inhalation exposure route are calculated using the modified J&E model as described in Section 742.717, except as follows:

- a) In Equation J&E9a, the total number of layers of soil that contaminants migrate through from the source to the building shall include a capillary fringe layer.
- b) The thickness of the capillary fringe layer is 37.5 cm.
- c) The volumetric water content of the capillary fringe shall be 90 % of the total porosity of the soil that comprises the capillary fringe.
- d) Equations J&E7 and J&E8 calculate an acceptable groundwater remediation objective.

1) This calculation is made using: ~~(1~~

A) the soil gas remediation objective calculated in accordance with Equation J&E~~4,4~~ and ~~(2~~

B) the assumption that this gas is in equilibrium with any contamination in the groundwater.

~~12)~~ Equation J&E7 is used ~~where~~when the mode of contaminant transport is both diffusion and advection. In this scenario, the Qsoil value equals 83.33 cm³/sec as described in Section 742.505.

~~23)~~ Equation J&E8 is used ~~where~~when the mode of contaminant transport is diffusion only. In this scenario, the Qsoil value equals 0.0 cm³/sec as described in Section 742.505.

e) A groundwater remediation objective that exceeds the water solubility of that chemical (refer to Appendix C, Table E for solubility values) is not allowed.

(Source: Added at 36 Ill. Reg. _____, effective _____)

SUBPART I: TIER 3 EVALUATION

Section 742.900 Tier 3 Evaluation Overview

a) Tier 3 sets forth a flexible framework to develop remediation objectives outside of the requirements of Tiers 1 and 2. Although Tier 1 and Tier 2 evaluations are not prerequisites to conduct Tier 3 evaluations, data from Tier 1 and Tier 2 can assist in developing remediation objectives under a Tier 3 evaluation.

b) The level of detail required to adequately characterize a site depends on the particular use of Tier 3. Tier 3 can require additional investigative efforts beyond those described in Tier 2 to characterize the physical setting of the site. However, in situations where remedial efforts have simply reached a physical obstruction additional investigation may not be necessary for a Tier 3 submittal.

c) Situations that can be considered for a Tier 3 evaluation include, but are not limited to:

1) Modification of parameters not allowed under Tier 2;

2) Use of models different from those used in Tier 2;

3) Use of additional site data, such as results of indoor air sampling, to improve or confirm predictions of exposed receptors to contaminants of concern;

4) Analysis of site-specific risks using formal risk assessment, probabilistic data analysis, and sophisticated fate and transport models (e.g., requesting a target hazard quotient greater than 1 or a target cancer risk greater than 1 in 1,000,000);

5) Requests for site-specific remediation objectives because an assessment indicates further remediation is not practical;

6) Incomplete human exposure ~~pathway(s)~~parkways not excluded under Subpart C;

7) Use of toxicological-specific information not available from the sources listed in Tier 2;

8) Land uses which are substantially different from the assumed residential or industrial/commercial property uses of a site (e.g., a site will be used for recreation in the future and cannot be evaluated in Tier 1 or 2); ~~and~~

9) Requests for site-specific remediation objectives that exceed Tier 1 groundwater remediation objectives so long as the following is demonstrated:

A) To the extent practical, the exceedance of the groundwater quality standard has been minimized and beneficial use appropriate to the groundwater that was impacted has been returned; and

B) Any threat to human health or the environment has been minimized- [415 ILCS 5/58.5(d)(4)(A)]; and

10) Use of building control technologies, other than those described in Subpart L, to prevent completion of the indoor inhalation exposure route.

d) For requests of a target cancer risk ranging between 1 in 1,000,000 and 1 in 10,000 at the point of human exposure or a target hazard quotient greater than 1 at the point of human exposure, the requirements of Section 742.915 shall be followed. Requests for a target cancer risk exceeding 1 in 10,000 at the point of human exposure are not allowed.

e) Requests for approval of a Tier 3 evaluation must be submitted to the Agency for review under the specific program under which remediation is performed. When reviewing a submittal under Tier 3, the Agency shall consider whether the interpretations and conclusions reached are supported by the

information gathered [415 ILCS 58.7(e)(1)]. The Agency shall approve a Tier 3 evaluation if the person submits the information required under this Part and establishes through such information that public health is protected and that specified risks to human health and the environment have been minimized.

f) If contaminants of concern include polychlorinated biphenyls (PCBs), requests for approval of a Tier 3 evaluation must additionally address the applicability of 40 CFR 761.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.920 Impractical Remediation

Any request for site-specific remediation objectives due to impracticality of remediation shall be submitted to the Agency for review and approval. Any request for site-specific remediation objectives due to impracticality of remediation that involves the indoor inhalation exposure route shall follow Section 742.935 in lieu of this Section. A submittal under this Section shall include the following information:

- a) The ~~reason(s)~~ reasons why the remediation is impractical;
 - b) The extent of contamination;
 - c) Geology, including soil types;
 - d) The potential impact to groundwater;
 - e) Results and locations of sampling events;
 - f) Map of the area, including all utilities and structures; and
- g) Present and post-remediation uses of the area of contamination, including human receptors at risk.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.925 Exposure Routes

Technical information may demonstrate that there is no actual or potential impact of contaminants of concern to receptors from a particular exposure route. In these instances, a demonstration excluding an exposure route shall be submitted to the Agency for review and approval. A demonstration that involves the indoor inhalation exposure route shall follow Section 742.935 in lieu of this Section. A submittal under this Section shall include the following information:

- a) A description of the route evaluated;
- b) A description of the site and physical site characteristics;
- c) A discussion of the result and possibility of the route becoming active in the future; and
- d) Technical support that may include, but is not limited to, the following:
 - 1) a discussion of the natural or man-made barriers to that exposure route;

- 2) calculations and modeling;
- 3) physical and chemical properties of contaminants of concern; and
- 4) contaminant migration properties.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.935 Indoor Inhalation Exposure Route

a) Exclusion of Exposure Route

Site information may demonstrate that there is no actual or potential impact of contaminants of concern to receptors from the indoor inhalation exposure route. In ~~such~~the instances, a demonstration excluding the exposure route shall be submitted to the Agency for review and approval. A submittal under this Section shall include the following information:

- 1) A description of the site, physical site characteristics, existing and planned buildings, and existing and planned manmade pathways; and
- 2) A discussion of the possibility of the route becoming active in the future.

b) Exclusion of Exposure Route Using Building Control Technologies

Any proposals to use building control technologies as a means to prevent or mitigate human exposures under the indoor inhalation exposure route that differ from the requirements of Subpart L shall be submitted to the Agency for review and approval. A submittal under this Section shall include the following information:

- 1) A description of the site and physical site characteristics;
- 2) The current extent of contamination;
- 3) Geology, including soil parameters;
- 4) Results and locations of sampling events;
- 5) Scaled map of the area, including all buildings and man-made pathways;
- 6) A description of building characteristics and methods of construction, including a description of man-made pathways;
- 7) Present and post-remediation uses of the land above the area of contamination, including human receptors at risk;
- 8) A description of any building control technologies currently in place or proposed for installation that can reduce or eliminate the potential for completion of the exposure route, including design and construction specifications;
- 9) Information regarding the effectiveness of any building control technologies currently in place or proposed for installation and a schedule for performance testing to show the effectiveness of the control technology. For buildings not yet constructed, an approved building control technology shall be in place and operational prior to human occupancy;

10) Identification of documents reviewed and the criteria used in the documents for determining whether building control technologies are effective and how those criteria compare to existing or potential buildings or man-made pathways at the site; and

11) A description as to how the effectiveness of the building control technologies will be operated and maintained for the life of the buildings and man-made pathways, or until soil gas and groundwater contaminant concentrations have reached remediation objectives that are approved by the Agency. This includes provisions for potential extended system inoperability due to power failure or other disruption.

c) Calculations and Modeling Used to Establish Soil Gas Remediation Objectives

The calculations and modeling shall account for contaminant transport through the mechanisms of diffusion and advection. Proposals to use soil gas data, including ~~subslab~~sub-slab samples, to establish remediation objectives for the indoor inhalation exposure route that differ from the requirements of Section 742.227 shall be submitted to the Agency for review and approval. A submittal under this Section shall include the following information:

- 1) Scaled map of the area, showing all buildings and man-made pathways (current and planned);
- 2) The current extent of contamination;
- 3) Geology, including soil parameters;
- 4) Depth to groundwater (including seasonal variation) and flow direction;
- 5) Location of soil gas sampling points; and
- 6) A discussion of soil gas sampling procedures that, at a minimum, addresses the following:
 - A) sampling equipment;
 - B) soil gas collection protocol, including field tests and weather conditions; and
 - C) laboratory analytical methods.

d) Calculations and Modeling Used to Establish Soil Remediation Objectives

The calculations and modeling shall account for contaminant transport through the mechanisms of diffusion and advection. Any proposals to use soil data in lieu of soil gas data to establish remediation objectives for the indoor inhalation exposure route shall be submitted to the Agency for review and approval. A submittal under this Section shall include the following information:

- 1) Scaled map of the area, showing all buildings and man-made pathways (current and planned);
- 2) The current extent of contamination;

- 3) Geology, including soil parameters;
- 4) Location of soil sampling points; ~~and~~
- 5) A discussion of soil sampling procedures that, at a minimum, addresses the following:
 - A) sampling equipment;
 - B) soil collection protocol, including field tests and weather conditions; and
 - C) laboratory analytical methods ~~;~~
- 6) Mathematical and technical justification for the model proposed; and
- 7) Demonstration that the model was correctly applied.

e) Calculations and Modeling Used to Establish Groundwater Remediation Objectives

The calculations and modeling shall account for contaminant transport through the mechanisms of diffusion and advection. Proposals to use groundwater data to establish remediation objectives for the indoor inhalation exposure route that differ from the requirements of ~~Section~~Sections 742.805 and ~~Section~~742.812 shall be submitted to the Agency for review and approval. A submittal under this Section shall include the following information ~~;~~:

- 1) Scaled map of the area, showing all buildings and man-made pathways (current and planned);
- 2) The current extent of contamination;
- 3) Geology, including soil parameters and the thickness of the capillary fringe;
- 4) Depth to groundwater (including seasonal variation) and flow direction;
- 5) Results and locations of groundwater sampling events;
- 6) Mathematical and technical justification for the model proposed; and
- 7) Demonstration that the model was correctly applied.

(Source: Added at 36 Ill. Reg. _____, effective _____)

SUBPART J: INSTITUTIONAL CONTROLS

Section 742.1000 Institutional Controls

a) Institutional controls in accordance with this Subpart must be placed on the property when remediation objectives are based on any of the following assumptions:

- 1) Industrial/Commercial property use;
- 2) Target cancer risk greater than 1 in 1,000,000;

- 3) Target hazard quotient greater than 1;
- 4) Engineered barriers;
- 5) The point of human exposure is located at a place other than at the source;
- 6) Exclusion of exposure routes; ~~or~~
- 7) Use of remediation objectives based on a diffusion only mode of contaminant transport for the indoor inhalation exposure route;
- 8) Use of an indoor inhalation building control technology; or
- 9) ~~7)~~ Any combination of the above.

b) The Agency shall not approve any remediation objective under this Part that is based on the use of institutional controls unless the person has proposed institutional controls meeting the requirements of this Subpart and the requirements of the specific program under which the institutional control is proposed. A proposal for approval of institutional controls shall provide identification of the selected institutional controls from among the types recognized in this Subpart.

c) The following instruments may be institutional controls subject to the requirements of this Subpart J and the requirements of the specific program under which the institutional control is proposed:

- 1) No Further Remediation Letters;
- 2) Environmental Land Use Controls;
- 3) Land Use Control Memoranda of Agreement;
- 4) Ordinances adopted and administered by a unit of local government;
- 5) Agreements between a property owner (or, in the case of a petroleum leaking underground storage tank, the owner or operator of the tank) and a highway authority with respect to any contamination remaining under highways; and

6) Agreements between a highway authority, ~~which that~~ is also the property owner (or, in the case of a petroleum leaking underground storage tank, the owner or operator of the tank) and the Agency with respect to any contamination remaining under the highways.

d) No Further Remediation Letters and Environmental Land Use Controls that meet the requirements of this Subpart and the recording requirements of the program under which remediation is being performed are transferred with the property.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.1010 Environmental Land Use Controls

a) An Environmental Land Use Control (ELUC) is an institutional control that may be used under this Part to impose land use limitations or requirements

related to environmental contamination. ELUCs are only effective when approved by the Agency in accordance with this Part. Activities or uses that may be limited or required include, but are not limited to, prohibition of use of groundwater for potable purposes, restriction to industrial/commercial uses, operation or maintenance of engineered barriers, indoor inhalation building control technologies, or worker safety plans. ELUCs may be used in the following circumstances:

1) When No Further Remediation Letters are not available, including but not limited to when contamination has migrated off-site or outside the remediation site; or

2) When No Further Remediation Letters are not issued under the program for which a person is undergoing remediation.

b) Recording requirements:

1) An ELUC approved by the Agency pursuant to this Section must be recorded in the Office of the Recorder or Registrar of Titles for the county in which the property that is the subject of the ELUC is located. A copy of the ELUC demonstrating that it has been recorded must be submitted to the Agency before the Agency will issue a no further remediation determination.

2) An ELUC approved under this Section will not become effective until officially recorded in the chain of title for the property that is the subject of the ELUC in accordance with subsection (b)(1) of this Section.

3) Reference to the recorded ELUC must be made in the instrument memorializing the Agency's no further remediation determination. Recording of the no further remediation determination and confirmation of recording must be in accordance with the requirements of the program under which the determination was issued.

4) The requirements of this Section do not apply to Federally Owned Property for which the Federal Landholding Entity does not have the authority under federal law to record land use limitations on the chain of title.

5) The requirements of this Section apply only to those sites for which a request for a no further remediation determination has not yet been made to the Agency by January 6, 2001.

c) Duration:

1) Except as provided in this subsection (c), an ELUC shall remain in effect in perpetuity.

2) At no time shall any site for which an ELUC has been imposed as a result of remediation activities under this Part be used in a manner inconsistent with the land use limitation unless attainment of objectives appropriate for the new land use is achieved and a new no further remediation determination has been obtained and recorded in accordance with the program under which the ELUC was first imposed or the Site Remediation Program (35 Ill. Adm. Code 740) ~~---~~ [415 ILCS 58.8(c)]. In addition, the appropriate release or modification of the ELUC must be prepared by the Agency and filed on the chain of title for the property that is the subject of the ELUC.

A) For a Leaking Underground Storage Tank (LUST) site under 35 Ill. Adm. Code 731, ~~or~~ 732, or 734 or a Site Remediation Program site under 35 Ill. Adm. Code 740, an ELUC may be released or modified only if the NFR Letter is also modified under the Site Remediation Program to reflect the change;

B) For a RCRA site under 35 Ill. Adm. Code 721-730, an ELUC may be released or modified only if there is also an amended certification of closure or a permit modification.

3) In addition to any other remedies that may be available, a failure to comply with the limitations or requirements of an ELUC may result in avoidance of an Agency no further remediation determination in accordance with the program under which the determination was made. The failure to comply with the limitations or requirements of an ELUC may also be grounds for an enforcement action pursuant to Title VIII of the Act.

d) An ELUC submitted to the Agency must match the form and contain the same substance, except for variable elements (e.g., name of property owner), as the model in Appendix F and must contain the following elements:

1) Name of property owners and declaration of property ownership;

2) Identification of the property to which the ELUC applies by common address, legal description, and Real Estate Tax Index/Parcel Index Number;

3) A reference to the Bureau of Land LPC numbers or 10-digit identification numbers under which the remediation was conducted;

4) A statement of the reason for the land use limitation or requirement relative to protecting human health and the surrounding environment from soil, groundwater, and/or other environmental contamination;

5) The language instituting such land use limitations or requirements;

6) A statement that the limitations or requirements apply to the current owners, occupants, and all heirs, successors, assigns, and lessees;

7) A statement that the limitations or requirements apply in perpetuity or until:

A) The Agency determines that there is no longer a need for the ELUC;

B) The Agency, upon written request, issues to the site that received the no further remediation determination that relies on the ELUC a new no further remediation determination approving modification or removal of the limitations or requirements;

C) The new no further remediation determination is filed on the chain of title of the site subject to the no further remediation determination; and

D) A release or modification of the land use limitation is filed on the chain of title for the property that is the subject of the ELUC;

8) Scaled site maps showing:

A) The legal boundary of the property to which the ELUC applies;

B) The horizontal and vertical extent of contaminants of concern above applicable remediation objectives for soil, ~~and~~ groundwater, and soil gas to which the ELUC applies;

C) Any physical features to which an ELUC applies (e.g., engineered barriers, monitoring wells, caps, indoor inhalation building control technologies); and

D) The nature, location of the source, and direction of movement of the contaminants of concern;

9) A statement that any information regarding the remediation performed on the property for which the ELUC is necessary may be obtained from the Agency through a request under the Freedom of Information Act [5 ILCS 140] and rules promulgated thereunder; and

10) The dated, notarized signatures of the property owners or authorized agent.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.1015 Ordinances

a) An ordinance adopted by a unit of local government that effectively prohibits the installation of potable water supply wells (and the use of such wells) may be used as an institutional control to meet the requirements of Section 742.320(d) or 742.805(a)(3) if the requirements of this Section are met. A model ordinance is found in Appendix G. Ordinances prohibiting the installation of potable water supply wells (and the use of such wells) that do not expressly prohibit the installation of potable water supply wells (and the use of such wells) by units of local government may be acceptable as institutional controls if the requirements of this Section are met and a Memorandum of Understanding (MOU) is entered into under subsection (i) of this Section. For purposes of this Section, a unit of local government is considered to be expressly prohibited from installing and using potable water supply wells only if the unit of local government is included in the prohibition provision by name. The prohibition required by this Section shall satisfy the following requirements at a minimum:

1) The prohibition shall not allow exceptions for potable water well installation and use other than for the adopting unit of local government;

2) The prohibition shall apply at all depths and shall not be limited to particular aquifers or other geologic formations;

3) If the prohibition does not apply everywhere within the boundaries of the unit of local government, the limited area to which the prohibition applies shall be easily identifiable and clearly defined by the ordinance (e.g., narrative descriptions accompanied by maps with legends or labels showing prohibition boundaries, ~~or~~ narrative descriptions using fixed, common reference points such as street names). Boundaries of prohibitions limited by area shall be fixed by the terms of the ordinance and shall not be subject to change without amending the ordinance in which the prohibition has been adopted (e.g., no boundaries defined with reference to zoning districts or the availability of the public water supply); and

4) The prohibition shall not in any way restrict or limit the Agency's approval of the use of the ordinance as an institutional control pursuant to

this Part (e.g., no restrictions based on remediation program participation, or no restrictions on persons performing remediation within the prohibition area who may use the ordinance).

b) A request for approval of a local ordinance as an institutional control shall provide the following:

1) A copy of the ordinance restricting groundwater use certified by an official of the unit of local government in which the site is located that it is a true and accurate copy of the ordinance, unless the Agency and the unit of local government have entered an agreement under subsection (i) of this Section, in which case the request may alternatively reference the MOU. The ordinance must demonstrate that potable use of groundwater from potable water supply wells is prohibited;

2) A scaled ~~map(s)~~ or maps delineating the area and extent of groundwater contamination modeled above the applicable remediation objectives including any measured data showing concentrations of contaminants of concern in which the applicable remediation objectives are exceeded;

3) A scaled map delineating the boundaries of all properties under which groundwater is located ~~which~~ that exceeds the applicable groundwater remediation objectives;

4) Information identifying the current ~~owner(s)~~ owners of each property identified in subsection (b)(3) of this Section; and

5) A copy of the proposed written notification to the unit of local government that adopted the ordinance and to the current owners identified in subsection (b)(4) of this Section that includes the following information:

A) The name and address of the unit of local government that adopted the ordinance;

B) The ordinance's citation;

C) A description of the property being sent notice by adequate legal description, reference to a plat showing the boundaries of the property, or ~~by~~ accurate street address;

D) Identification of the party requesting to use the groundwater ordinance as an institutional control, and a statement that the party has requested approval from the Agency to use the ordinance as an institutional control;

E) A statement that use of the ordinance as an institutional control allows contamination above groundwater ingestion remediation objectives to remain in groundwater beneath the affected properties, and that the ordinance strictly prohibits human and domestic consumption of the groundwater;

F) A statement as to the nature of the release and response action with the site name, site address, and Agency site number or Illinois inventory identification number; and

G) A statement that more information about the remediation site may be obtained by contacting the party requesting the use of the groundwater ordinance as an institutional control or by submitting a FOIA request to the Agency.

c) Written notification proposed pursuant to subsection (b)(5) of this Section must be sent to the unit of local government that adopted the ordinance, as well as to all current property owners identified in subsection (b)(4). Written proof that the notification was sent to the unit of local government and the property owners shall be submitted to the Agency within 45 days from the date the Agency's no further remediation determination is recorded. Such proof may consist of the return card from certified mail, return receipt requested, a notarized certificate of service, or a notarized affidavit.

d) Unless the Agency and the unit of local government have entered into a MOU under subsection (i) of this Section, the current owner or successors in interest of a site who have received approval of use of an ordinance as an institutional control under this Section shall:

1) Monitor activities of the unit of local government relative to variance requests or changes in the ordinance relative to the use of potable groundwater at properties identified in subsection (b)(3) of this Section; and

2) Notify the Agency of any approved variance requests or ordinance changes within 30 days after the date such action has been approved.

e) The information required in subsections (b)(1) through (b)(5) of this Section and the Agency letter approving the groundwater remediation objective shall be submitted to the unit of local government. Proof that the information has been filed with the unit of local government shall be provided to the Agency.

f) Any ordinance or MOU used as an institutional control pursuant to this Section shall be recorded in the Office of the Recorder or Registrar of Titles of the county in which the site is located together with the instrument memorializing the Agency's no further remediation determination pursuant to the specific program within 45 days after receipt of the Agency's no further remediation determination.

g) An institutional control approved under this Section shall not become effective until officially recorded in accordance with subsection (f) of this Section. The person receiving the approval shall obtain and submit to the Agency within 30 days after recording a copy of the institutional control demonstrating that it has been recorded.

h) The following shall be grounds for voidance of the ordinance as an institutional control and the instrument memorializing the Agency's no further remediation determination:

1) Modification of the ordinance by the unit of local government to allow potable use of groundwater;

2) Approval of a site-specific request, such as a variance, to allow potable use of groundwater at a site identified in subsection (b)(3) of this Section;

3) Violation of the terms of an institutional control recorded under Section 742.1005 or Section 742.1010; or

4) Failure to provide notification and proof of such notification pursuant to subsection (c) of this Section.

i) The Agency and a unit of local government may enter into a MOU under this Section if the unit of local government has adopted an ordinance satisfying subsection (a) of this Section and if the requirements of this subsection are met. The MOU submitted to the Agency must match the form and contain the same substance as the model in Appendix H and shall include the following:

1) Identification of the authority of the unit of local government to enter the MOU;

2) Identification of the legal boundaries, or equivalent, under which the ordinance is applicable;

3) A certified copy of the ordinance;

4) A commitment by the unit of local government to notify the Agency of any variance requests or proposed ordinance changes at least 30 days prior to the date the local government is scheduled to take action on the request or proposed change;

5) A commitment by the unit of local government to maintain a registry of all sites within the unit of local government that have received no further remediation determinations pursuant to specific programs; and

6) If the ordinance does not expressly prohibit the installation of potable water supply wells (and the use of such wells) by units of local government, a commitment by the unit of local government:

A) To review the registry of sites established under subsection (i)(5) of this Section prior to siting potable water supply wells within the area covered by the ordinance;

B) To determine whether the potential source of potable water may be or has been affected by contamination left in place at those sites; and

C) To take whatever steps are necessary to ensure that the potential source of potable water is protected from the contamination or treated before it is used as a potable water supply.

j) A groundwater ordinance may not be used to exclude the indoor inhalation exposure route.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

SUBPART K: ENGINEERED BARRIERS

Section 742.1105 Engineered Barrier Requirements

a) Natural attenuation, access controls, and point of use treatment shall not be considered engineered barriers. Engineered barriers may not be used to prevent direct human exposure to groundwater without the use of institutional controls.

b) For purposes of determining remediation objectives under Tier 1, engineered barriers are not recognized.

c) The following engineered barriers are recognized for purposes of calculating remediation objectives that exceed residential remediation objectives:

1) For the soil component of the groundwater ingestion exposure route, the following engineered barriers are recognized if they prevent completion of the exposure pathway:

A) Caps or walls constructed of compacted clay, asphalt, concrete or other material approved by the Agency; and

B) Permanent structures such as buildings and highways.

2) For the soil ingestion exposure route, the following engineered barriers are recognized if they prevent completion of the exposure pathway:

A) Caps or walls constructed of compacted clay, asphalt, concrete, or other material approved by the Agency;

B) Permanent structures such as buildings and highways; and

C) Soil, sand, gravel, or other geologic materials that:

i) Cover the contaminated media;

ii) Meet the soil remediation objectives under Subpart E for residential property for contaminants of concern; and

iii) Are a minimum of three feet in depth.

3) For the outdoor inhalation exposure route, the following engineered barriers are recognized if they prevent completion of the exposure pathway:

A) Caps or walls constructed of compacted clay, asphalt, concrete, or other material approved by the Agency;

B) Permanent structures such as buildings and highways; and

C) Soil, sand, gravel, or other geologic materials that:

i) Cover the contaminated media;

ii) Meet the soil remediation objectives under Subpart E for residential property for contaminants of concern; and

iii) Are a minimum of ten feet in depth and not within ten feet of any manmade pathway.

4) For the ingestion of groundwater exposure route, the following engineered barriers are recognized if they prevent completion of the exposure pathway:

A) Slurry walls; and

B) Hydraulic control of groundwater.

d) Unless otherwise prohibited under Section 742.1100, any other type of engineered barrier may be proposed if it will be as effective as the options listed in subsection (c) of this Section.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

SUBPART L: BUILDING CONTROL TECHNOLOGIES

Section 742.1200 Building Control Technologies

a) Any person who develops remediation objectives under this Part based on building control technologies shall meet the requirements of this Subpart and the requirements of Subpart J relative to institutional controls.

b) The Agency shall not approve any remediation objective under this Part that is based on the use of building control technologies unless the person has proposed building control technologies meeting the requirements of this Subpart or Subpart I and Subpart J relative to institutional controls.

c) The use of building control technologies can be recognized in determining remediation objectives only if the building control technologies are intended for use as part of the final corrective action.

d) An approved building control technology shall be in place and operational prior to human occupancy.

e) Any no further remediation determination based upon the use of building control technologies shall require effective maintenance of the building control technology. The maintenance requirements shall be included in an institutional control under Subpart J. This institutional control shall address provisions for inoperability by requiring the following if the building control technology is rendered inoperable:

1) The site owner/operator shall notify building occupants and workers in advance of intrusive activities. ~~Such~~The notification shall enumerate the contaminant of concern known to be present;

2) The site owner/operator shall require building occupants and workers to implement protective measures consistent with good industrial hygiene practice; and

3) For a school, the site owner/operator shall notify the Agency upon any building control technology being rendered inoperable. For the purposes of this subsection (e)(3), the term "school" means any public educational facility in Illinois, including grounds and/or campus, consisting of students, comprising one or more grade groups or other identifiable groups, organized as one unit with one or more teachers to give instruction of a defined type. Public educational facility includes, but is not limited to, primary and secondary (kindergarten -12th grade), charter, vocational, alternative, and special education schools. Public educational facility does not include junior colleges, colleges, or universities.

f) Failure to install or maintain a building control technology in accordance with a no further remediation determination shall be grounds for voidance of the determination and the instrument memorializing the Agency's no further remediation determination.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 742.1205 Building Control Technology Proposals

A proposal to use a building control technology under this Subpart shall include the following information:

- a) A description of the site and physical site characteristics;
- b) The current extent and modeled migration of contamination;
- c) Geology, including soil types;
- d) Results and locations of sampling events;
- e) Scaled map of the area, including all buildings and man-made pathways;
- f) A description of building characteristics and methods of construction, including a description of man-made pathways; and
- g) Present and post-remediation uses of the land above the area of contamination, including human receptors at risk.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 742.1210 Building Control Technology Requirements

- a) Natural attenuation, access controls, and point of use treatment shall not be considered building control technologies.
- b) For purposes of determining compliance with remediation objectives under Tier 1, building control technologies are not recognized.
- c) The following building control technologies are recognized for purposes of pathway exclusion under Section 742.312.
 - 1) Sub-slab depressurization (SSD) systems meeting the following requirements:
 - A) A suction pit is installed that is at least two cubic feet and extends at least 6 inches below the slab (larger suction pits may be excavated as needed to achieve the performance criteria in ~~Section 742.1210~~ subsection (c) (1) (B));
 - B) A PVC pipe of at least 3 inches in diameter extends from the suction pit to the intake side of an in-line fan capable of achieving a static vacuum of at least 0.25 inches water column (wc) at the suction point and measureable vacuum at the ~~furthest~~ farthest edges of the area served by the suction pit under worst case conditions (all exhaust fans and heating systems running during cold weather) as determined by a differential pressure reading of at least -0.003 inches wc below the slab or visible downward flow of air at test holes using chemical or smoke sticks;
 - C) All visible cracks and joints in the slab (including the place where the pipe exits the slab) and foundation walls are sealed;

D) The pipe exhausts outside the building at least 10 feet above ground and at least 10 feet from any door or window; and

E) Additional suction pits meeting the requirements of ~~Section-742.1210~~ subsection (c)(1)(A) shall be installed as necessary to achieve measureable vacuum below the slab in all areas, including in any area where subsurface or foundation conditions (e.g., a sub-slab grade beam) prevent adequate suction field extension.

2) Sub-membrane depressurization (SMD) systems meeting the following requirements:

A) A non-woven geotextile is installed on the exposed earthen material;

B) A cross-laminated polyethylene membrane liner at least 0.10 mm (or 4 mil) thick is placed over the geotextile and sealed to foundation walls using a low volatile adhesive that is recommended by the liner manufacturer (e.g., acrylic latex adhesive);

C) A 3 inch diameter PVC pipe extends from a hole cut in the liner to the intake side of an in-line fan capable of achieving a static vacuum of at least 0.25 inches water column (wc) at the riser pipe and measureable vacuum at the ~~furthest~~ farthest edges of the liner under worst case conditions (all exhaust fans running during cold weather) as determined by a differential pressure reading of at least -0.003 inches wc below the liner or visible downward flow of air in test holes using chemical or smoke sticks;

D) The pipe is sealed to the liner;

E) The pipe exhausts outside the building at least 10 feet above ground and at least 10 feet from any door or window; and

F) No leaks based on smoke stick tests along the entire perimeter of the liner (i.e., at all sealed edges) with the fan running. Where leaks are identified, appropriate repairs are undertaken and smoke stick testing repeated until no leaks are detected.

3) Membrane barrier systems when placed below concrete slabs meeting the following requirements:

A) The membrane is impermeable to volatile chemicals and is not less than 1.5 mm (or 60 mil) thick;

B) The membrane is sealed to foundation walls and any penetrating pipes according to membrane manufacturer/installer recommendations;

C) The membrane is installed in accordance with the manufacturer's requirements and by an applicator trained and approved by the manufacturer;

D) A smoke test of the membrane system (where smoke is injected below the installed liner prior to slab installation), in accordance with the manufacturer's requirements, is performed to ensure no leaks exist. Where leaks are identified, appropriate repairs are undertaken and smoke testing repeated until no leaks are detected;

E) The membrane is puncture resistant to slab installation construction activities and protected by sand layers or geotextiles as recommended by the manufacturer; and

F) Construction activities following membrane installation do not damage, puncture or tear the membrane or otherwise compromise its ability to prevent the migration of volatile chemicals.

4) Vented raised floors meeting the following requirements:

A) An interconnected void system below the slab sufficient to allow free movement of air and communication of negative pressures to all points below the slab;

B) Sealing of all construction joints, open cracks, and penetrations through the slab (e.g., for utilities and riser pipes) with a low volatile caulk; and

C) At least one 3 inch diameter riser pipe venting to the atmosphere above the roof line (at least 10 feet from any doors or windows) for each 5000 square feet of membrane area, with the capability of converting passively vented floor systems to actively vented or SSD systems meeting the performance requirements of ~~Section 742.1210(e)(1)~~ subsection (c)(1).

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 742.APPENDIX A:— General

Section 742.TABLE A:— Soil Saturation Limits (Csat) for Chemicals Whose Melting Point is Less than 30° C

CAS No.	Chemical Name	Csat (mg/kg)
67-64-1	Acetone	100,000
71-43-2	Benzene	870111-44-4
31-300117-81-7	Bis(2-chloroethyl) ether	3,300
31-300075-27-4	Bis(2-ethylhexyl) phthalate	31,000
3-00075-25-2	Bromodichloromethane (Dichlorobromomethane)	3,000
1-90071-36-3	Bromoform	1,900
10,00085-68-7	Butanol	10,000
93075-15-0	Butyl benzyl phthalate	93075
72056-23-5	Carbon disulfide	72056
1,100108-90-7	Carbon tetrachloride	1,100
680124-48-1	Chlorobenzene (Monochlorobenzene)	680124
1,30067-66-3	Chlorodibromomethane (Dibromochloromethane)	1,300
2,90096-12-8	Chloroform	2,900
1,400106-93-4	1,2-Dibromo-3-chloropropane	1,400
2,80084-74-2	1,2-Dibromoethane (Ethylene dibromide)	2,800
2,30095-50-1	1,2-Dichlorobenzene (o-Dichlorobenzene)	2,300
1,700107-06-2	1,1-Dichloroethane (Ethylene dichloride)	1,700
1,80075-35-4	1,1-Dichloroethylene	1,800
1,500156-59-2	cis-1,2-Dichloroethylene	1,500
1,200156-60-5	trans-1,2-Dichloroethylene	1,200
3,10078-87-5	1,2-Dichloropropane	3,100
1,00542-75-6	1,3-Dichloropropene (1,3-Dichloropropylene, cis + trans)	1,400
2,000117-84-0	Diethyl phthalate	2,000
10,000100-41-4	Di-n-octyl phthalate	10,000
40077-47-4	Ethylbenzene	40077
2,20078-59-1	Hexachlorocyclopentadiene	2,200
4,60074-83-9	Isophorone	4,600
3,2001634-04-4	Methyl bromide (Bromomethane)	3,200
8,80075-09-2	Methyl tertiary butyl ether	8,800
2,40098-95-3	Methylene chloride (Dichloromethane)	2,400
1,000100-42-5	Nitrobenzene	1,000
1,500127-18-4	Styrene	1,500
240108-88-3	Tetrachloroethylene (Perchloroethylene)	240108
3,20071-55-6	1,1,2,4-Trichlorobenzene	3,200
1,20079-00-5	1,1,1-Trichloroethane	1,200
1,80079-01-6	1,1,2-Trichloroethane	1,800
1,300108-05-4	Trichloroethylene	1,300
2,70075-01-4	Vinyl acetate	2,700
1,200108-38-3	Vinyl chloride	1,200
42095-47-6	m-Xylene	42095
410106-42-3	p-Xylene	4601330
20-7	Xylenes (total)	320
95-57-8	Ionizable Organics	95
53,000	Chlorophenol	53,000

For NameFor the Outdoor Inhalation Exposure Route a Csat (mg/kg)
For the Soil Component of the Groundwater Ingestion Exposure Route b Csat (mg/kg)

CAS No.	Chemical Name	Csat (mg/kg)
67-64-1	Acetone	1.00E+05
71-43-2	Benzene	8.00E+02
31-300117-81-7	Bis(2-chloroethyl) ether	3.00E+03
31-300075-27-4	Bis(2-ethylhexyl) phthalate	3.90E+03

ethylhexyl)phthalate 2.00E+026.80E+0175-27-4Bromodichloromethane
(Dichlorobromomethane) 2.80E+032.00E+0375-25-2Bromoforn 2.00E+031.20E+0371-36-
3Butanol 1.00E+041.60E+0478-93-32-Butanone (MEK) 2.50E+044.50E+0485-68-7Butyl
benzyl phthalate 1.00E+033.40E+0275-15-0Carbon disulfide 8.50E+025.20E+0256-23-
5Carbon tetrachloride 1.20E+035.60E+02108-90-7Chlorobenzene
(Monochlorobenzene) 6.20E+022.90E+02124-48-1Chlorodibromomethane
(Dibromochloromethane) 1.40E+038.90E+0267-66-3Chloroform 3.40E+032.50E+0395-57-82-
~~Chlorophenol~~ Chlorophenolc (ionizable organic) 1.00E+047.10E+0375-99-
0Dalapon 1.20E+051.90E+0596-12-81,2-Dibromo-3-chloropropane 6.90E+024.30E+02106-
93-41,2-Dibromoethane (Ethylene dibromide) 1.60E+031.20E+0384-74-2Di-n-butyl
phthalate 2.60E+038.80E+0295-50-11,2-Dichlorobenzene (o-
Dichlorobenzene) 5.60E+022.10E+0275-71-8Dichlorodifluoromethane
8.70E+024.30E+0275-34-31,1-Dichloroethane 1.70E+031.40E+03107-06-21,2-
Dichloroethane (Ethylene dichloride) 1.90E+032.10E+0375-35-41,1-
Dichloroethylen 1.40E+039.10E+02156-59-2cis-1,2-
Dichloroethylen 1.30E+031.00E+03156-60-5trans-1,2-
Dichloroethylene 3.00E+032.10E+0378-87-51,2-Dichloropropane 1.20E+038.70E+02542-
75-61,3-Dichloropropene (1,3-Dichloropropylene, cis + trans) 1.00E+038.50E+0284-
66-2
Diethyl phthalate 2.20E+039.20E+02105-67-92,4-Dimethylphenol 1.00E+044.70E+03117-
84-0Di-n-octyl phthalate 1.60E+015.20E+00123-91-1p-Dioxane 1.00E+052.00E+05100-41-
4Ethylbenzene 3.50E+021.50E+0277-47-4Hexachlorocyclopentadiene 1.30E+024.40E+0178-
59-1Isophorone 3.00E+033.00E+0398-82-8Isopropylbenzene
(Cumene) 9.40E+024.00E+027439-97-6Mercury (elemental) 3.10E+00N/A74-83-9Methyl
bromide (Bromomethane) 3.10E+033.60E+031634-04-4Methyl tertiary-butyl
ether 8.40E+031.10E+0475-09-2Methylene chloride
(Dichloromethane) 2.50E+033.00E+0398-95-3Nitrobenzene 7.10E+025.90E+02621-64-7n-
Nitrosodi-n-propylamine 1.90E+032.30E+03100-42-5Styrene 6.30E+022.60E+02127-18-
4Tetrachloroethylene (Perchloroethylene) 8.00E+023.10E+02108-88-
3Toluene 5.80E+022.90E+02120-82-11,2,4-Trichlorobenzene 3.40E+021.20E+0271-55-
61,1,1-Trichloroethane 1.30E+036.70E+0279-00-51,1,2-
Trichloroethane 1.80E+031.30E+0379-01-6Trichloroethylene 1.20E+036.50E+0275-69-
4Trichlorofluoromethane 1.80E+038.90E+02108-05-4Vinyl acetate 2.60E+034.20E+0375-
01-4Vinyl chloride 2.60E+032.90E+03108-38-3m-Xylene 4.10E+021.60E+0295-47-6o-
Xylene 3.70E+021.50E+02106-42-3p-Xylene 3.30E+021.40E+021330-20-7Xylenes
(total) 2.80E+021.10E+02

a Soil Saturation Limits calculated using an foc of 0.006 g/g and a system temperature of 25°C.

b Soil Saturation Limits calculated using an foc of 0.002 g/g and a system temperature of 25°C.

c Csat for pH of 6.8. If soil pH is other than 6.8, a site-specific Csat should be calculated using equations S19 and S29 and the pH-specific Koc values in Appendix C, Table I.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.APPENDIX A General

Section 742.TABLE E Similar-Acting Noncarcinogenic Chemicals

~~Adrenal Gland~~Central Nervous SystemNitrobenzeneButanol (Ingestion only)1,2,4-
Trichlorobenzene (Ingestion only)Cyanide (amenable)2,4-
DimethylphenolKidneyEndrinAcetone (Ingestion only)ManganeseCadmium (Ingestion
only)2-MethylphenolChlorobenzeneMercury (Inhalation only)DalaponStyrene-
(Inhalation only)1,1-DichloroethaneToluene (Inhalation only)Di-n-octyl phthalate-

~~(Ingestion only) Xylenes (Ingestion only) Endosulfan Ethylbenzene Circulatory System Fluoranthene Antimony Methyl tertiary butyl ether (Inhalation only) Barium (Ingestion only) Nitrobenzene 2,4-D Pyrene cis-1,2-Dichloroethylene (Ingestion only) Toluene (Ingestion only) Nitrobenzene 2,4,5-Trichlorophenol trans-1,2-Dichloroethylene (Ingestion only) Vinyl acetate (Ingestion only) 2,4-Dimethylphenol Fluoranthene Liver Fluorene Acenaphthene Styrene (Ingestion only) Acetone (Ingestion only) Zinc Butylbenzyl phthalate (Ingestion only) Chlorobenzene (Ingestion only) Gastrointestinal System 1,1-Dichloroethylene (Ingestion only) Beryllium (Ingestion only) Di-n-octyl phthalate (Ingestion only) Endothal Endrin Hexachlorocyclopentadiene (Ingestion only) Ethylbenzene Methyl bromide (Ingestion only) Fluoranthene Methyl tertiary butyl ether (Ingestion only) Methyl tertiary butyl ether (Inhalation only) Nitrobenzene Picloram Styrene (Ingestion only) 2,4,5-TP (Silvex) Toluene (Ingestion only) 1,2,4-Trichlorobenzene (Inhalation only) 2,4,5-Trichlorophenol Immune System 2,4-Dichlorophenol p-Chloroaniline Mercury (Ingestion only) Reproductive System Barium (Inhalation only) Boron (Ingestion only) Carbon disulfide 2-Chlorophenol (Ingestion only) 1,2-Dibromo-3-Chloropropane (Inhalation only) Dinoseb Ethylbenzene (Inhalation only) Methoxychlor Phenol Respiratory System 1,2-Dichloropropane (Inhalation only) 1,3-Dichloropropylene (Inhalation only) Hexachlorocyclopentadiene (Inhalation only) Methyl bromide (Inhalation only) Naphthalene (Inhalation only) Toluene (Inhalation only) Vinyl acetate (Inhalation only)~~

Adrenal Gland
Isopropylbenzene

Cholinesterase Inhibition
Aldicarb
Carbofuran Decreased Body Weight Gains
and Circulatory System Effects
Carbofuran

Circulatory System
Alachlor
Antimony (ingestion only)
Benzene
Cobalt (ingestion only)
2,4-D
cis-1,2-Dichloroethylene (ingestion only)
2,4-Dimethylphenol
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Endosulfan
Fluoranthene
Fluorene
Methylene Chloride (inhalation only)

Nickel (Res. & I/C only) (inhalation only)
Nitrate as N
Nitrobenzene (ingestion only)
Selenium
Simazine
Styrene (ingestion only)
1,3,5-Trinitrobenzene
Zinc

Decreased Body Weight Gain

Atrazine
Bis(2-chloroethyl) ether
Cyanide
1,2-Dichlorobenzene (inhalation only)
Diethyl phthalate (ingestion only)
Enzosulfan
2-Methylphenol (o-cresol)
Naphthalene (ingestion only)
Nickel (ingestion only)
n-Nitrosodiphenylamine
Phenol (ingestion only)
Simazine
Tetrachloroethylene (ingestion only)

~~Adrenal Gland~~
~~Decreased Body Weight Gain (continued)~~
~~Isopropylbenzene~~
~~Enzosulfan~~
~~2-Methylphenol (o-cresol)~~
~~Cholinesterase Inhibition~~
~~Naphthalene (ingestion only)~~
~~Aldicarb~~
~~Nickel (ingestion only)~~
~~Carbofuran~~
~~n-Nitrosodiphenylamine~~
~~Phenol (ingestion only)~~
~~Circulatory System~~
~~Simazine~~
~~Alachlor~~
~~Tetrachloroethylene (ingestion only)~~
~~Antimony (ingestion only)~~
1,1,1-Trichloroethane (ingestion only)
~~Benzene~~
~~Vinyl~~
Vinyl acetate (ingestion only)
~~Cobalt (ingestion only)~~
Xylenes (Res. & I/C only) (ingestion only)
~~2,4-Diis~~
~~1,2-Dichloroethylene (ingestion only)~~

Endocrine System
~~2,4-Dimethylphenol~~
~~Cyanide~~
~~2,4-Dinitrotoluene~~

Cyanide

1,2-Dibromoethane (ingestion only)
~~2,6-Dinitrotoluene~~
~~Di-n-octyl phthalate (ingestion only)~~
~~Enzosulfan~~
~~Nitrobenzene~~
~~Fluoranthene~~
Nitrobenzene
1,2,4-Trichlorobenzene (ingestion only)
~~Fluorene~~
~~Methylene Chloride (inhalation only)~~
~~Eye~~
~~Nickel (Res. & I/C only) (inhalation only)~~
~~2,4-Dinitrophenol~~
~~Nitrate as N~~
~~n-Nitrosodiphenylamine~~
~~Nitrobenzene (ingestion only)~~

Eye

2,4-Dinitrophenol

n-Nitrosodiphenylamine

Polychlorinated biphenyls (PCBs)
~~Selenium~~
~~Trichloroethylene~~
~~Simazine~~
~~Styrene (ingestion only)~~
Trichloroethylene

Gastrointestinal System
~~1,3,5-Trinitrobenzene~~

Beryllium (ingestion only)
~~Zinc~~
~~Copper~~

Copper

1,3-Dichloropropene (cis + trans)

Endothall

Fluoride

Hexachlorocyclopentadiene (ingestion only) ~~Decreased Body Weight~~
~~Gain Endothall Atrazine Fluoride Bis(2-chloroethyl) ether Hexachlorocyclopentadiene~~
~~(ingestion only) Cyanide Iron 1,2-Dichlorobenzene (inhalation only)~~

Iron

Methyl bromide (ingestion only) ~~Diethyl phthalate (ingestion only)~~
Methyl tertiary-butyl ether (ingestion only) ~~Immune System Liver (continued) 4-~~
~~Chloroaniline Chlorobenzene (ingestion only) 2,4-~~
~~Dichlorophenol Chlorodibromomethane (ingestion only)~~

Immune System

4-Chloroaniline

2,4-Dichlorophenol

Mercury (ingestion only) ~~Chloroform Polychlorinated~~
Polychlorinated biphenyls (PCBs) ~~2,4-DDTKidney 1,2-Dibromoethane (ingestion~~
~~only)~~

Kidney

Acetone (ingestion only)

Aldrin (CW only)

Barium

Bromodichloromethane (ingestion only)

Cadmium

2,4-D

Dalapon

1,1-Dichloroethane

1,2-Dichloroethane (CW only) (ingestion only)

Ensolulfan

Ethylbenzene (ingestion only)

Fluoranthene

gamma-HCH (gamma-BHC)

Hexachloroethane (ingestion only)

Isopropylbenzene

Mecoprop (MCPP)

Methyl tertiary-butyl ether (inhalation only)

Pentachlorophenol

Pyrene

Toluene (ingestion only)

2,4,5-Trichlorophenol

Vinyl acetate (ingestion only)

Liver

Acenaphthene

Aldrin (Res. & I/C only)

Bis(2-ethylhexyl)phthalate (Res. & I/C only) (ingestion only)

Bromoform

Butyl Benzyl Phthalate (ingestion only)

Carbon Tetrachloride

Chlordane

Chlorobenzene (ingestion only)

Chlorodibromomethane (ingestion only)

Chloroform

2,4-D

DDT

1,2-Dibromoethane (ingestion only)

1,2-Dichlorobenzene (CW only) (ingestion only) ~~Aldrin (CW only) 1,4-~~
~~Dichlorobenzene Barium Dichlorodifluoromethane Bromodichloromethane (ingestion~~
~~only)~~

1,4-Dichlorobenzene

Dichlorodifluoromethane

1,2-Dichloroethane (inhalation only) ~~Cadmium~~

1,1-Dichloroethylene ~~2,4-Dtrans-1,2-Dichloroethylene Dalapon~~

trans-1,2-Dichloroethylene

1,2-Dichloropropane (ingestion only) ~~1,1-Dichloroethane Dieldrin (Res. & I/C only) 1,2-Dichloroethane (CW only) (ingestion only) 2,4-~~

~~Dinitrotoluene Ensosulfan 2,6-Dinitrotoluene Ethylbenzene (ingestion only)~~

Dieldrin (Res. & I/C only)

2,4-Dinitrotoluene

2,6-Dinitrotoluene

Di-n-octyl phthalate (ingestion only) ~~Fluoranthene p~~

~~p-Dioxane gamma-HCH (gamma-BHC) Endrin Hexachloroethane (ingestion only)~~

Endrin

Ethylbenzene (ingestion only) ~~Isopropylbenzene Fluoranthene Mecoprop-~~

~~(MCP) Heptachlor Methyl tertiary butyl ether (inhalation only) Heptachlor-~~

~~epoxide Pentachlorophenol Hexachlorobenzene Pyrene alpha-HCH (alpha-BHC) Toluene-~~

~~(ingestion only) gamma-HCH (gamma-BHC) 2,4,5-Trichlorophenol High Melting Explosive~~

Fluoranthene

Heptachlor

Heptachlor epoxide

Hexachlorobenzene

alpha-HCH (alpha-BHC)

gamma-HCH (gamma-BHC)

High Melting Explosive, Octogen (HMX) ~~Vinyl acetate (ingestion only)~~

Isophorone (inhalation only)

Methyl tertiary-butyl ~~ether~~ Liver Methylene ether

Methylene Chloride (ingestion only) ~~Acenaphthene Pentachlorophenol Aldrin (Res. &~~

~~I/C only) Phenol (inhalation only) Bis(2-ethylhexyl)phthalate (Res. & I/C only) -~~

~~(ingestion only) Picloram Bromoform Styrene (ingestion only) Butyl Benzyl Phthalate~~

~~(ingestion only)~~

Pentachlorophenol

Phenol (inhalation only)

Picloram

Styrene (ingestion only)

Tetrachloroethylene (ingestion only) ~~Carbon Tetrachloride Toxaphene~~

Toxaphene (CW only) ~~Chlordane~~

2,4,5-TP (Silvex) ~~Liver (continued) Reproductive System (continued)~~

1,2,4-Trichlorobenzene (inhalation only) ~~Carbofuran~~

1,1,1-Trichloroethane (inhalation only) ~~Carbon disulfide (ingestion only)~~

1,1,2-Trichloroethane (ingestion only) ~~2-Chlorophenol~~

2,4,5-Trichlorophenol ~~1,2-Dibromo-3-chloropropane~~

2,4,6-Trinitrotoluene (TNT) ~~1,2-Dibromoethane (ingestion only)~~

Vinyl Chloride ~~Dicamba Dinoseb Mortality Ethylbenzene (inhalation only)~~

Mortality

Di-n-butyl phthalate (ingestion only) ~~Isophorone (inhalation only)~~

Xylenes (Res. & I/C only) (ingestion only) ~~Reproductive System (continued)~~

Nervous ~~System~~ Methoxychlor Butanol System

Butanol (ingestion only)

Carbon disulfide (inhalation only)

Cyanide

Dieldrin

2,4-Dimethylphenol

2,4-Dinitrotoluene

2,6-Dinitrotoluene

Endrin
Hexachloroethane (inhalation only) (CW only)
Manganese
Mercury (inhalation only)
2-Methylphenol (o-cresol)
Phenol (inhalation only)
Selenium
Styrene (inhalation only)
Tetrachloroethylene (inhalation only)
Toluene (inhalation only)
Trichloroethylene
Xylenes (CW only) (ingestion only)
Xylenes (inhalation only)

Reproductive System
Arsenic (inhalation only)
Bis(2-ethylhexyl)phthalate (CW only) (ingestion only)
Boron
2-Butanone
Carbofuran
Carbon disulfide (ingestion only)
2-Chlorophenol
1,2-Dibromo-3-chloropropane
1,2-Dibromoethane (ingestion only)
Dicamba
Dinoseb
Ethylbenzene (inhalation only)
Isophorone (inhalation only)
Methoxychlor
Royal Demolition Explosive, Cyclonite (RDX)~~Carbon disulfide (inhalation only)~~~~2,4,6-Trichlorophenol~~~~Cyanide~~~~Dieldrin (CW only)~~
2,4,6-Trichlorophenol

Respiratory System~~2,4-Dimethylphenol~~~~Antimony~~
Antimony (inhalation only)~~2,4-Dinitrotoluene~~~~Benzoic~~
Benzoic Acid (inhalation only)~~2,6-Dinitrotoluene~~~~Beryllium~~
Beryllium (inhalation only)~~Endrin~~~~Cadmium~~
Cadmium (inhalation only)~~Hexachloroethane (inhalation only) (CW only)~~
Chromium (hex) (inhalation only)~~Manganese~~~~Cobalt~~
Cobalt (inhalation only)~~Mercury (inhalation only)~~
1,2-Dibromoethane (inhalation only)~~2-Methylphenol (o-cresol)~~
trans-1,2-Dichloroethylene (inhalation only)~~Phenol (inhalation only)~~
1,2-Dichloropropane (inhalation only)~~Selenium~~
1,3-Dichloropropene (cis + trans) (inhalation only)~~Styrene (inhalation only)~~
Hexachlorocyclopentadiene (inhalation only)~~Tetrachloroethylene (inhalation only)~~
Methyl bromide (inhalation only)~~Toluene (inhalation only)~~
Naphthalene (inhalation only)~~Trichloroethylene~~~~Nickel~~
Nickel (inhalation only)~~Xylenes (CW only) (ingestion only)~~~~Nitrobenzene (inhalation only)~~~~Xylenes (inhalation only)~~
Nitrobenzene (inhalation only)
Vinyl acetate (inhalation only)~~Reproductive System~~~~Skin~~~~Arsenic (inhalation only)~~

Skin
Arsenic (ingestion only)~~Bis(2-ethylhexyl)phthalate (CW only) (ingestion only)~~
Polychlorinated biphenyls (PCBs)~~Boron~~~~Selenium~~~~2-Butanone~~~~Silver~~~~Spleen~~
Selenium

Silver

Spleen

1,3-Dinitrobenzene

1,3,5-~~Trinitrobenzene~~NotesTrinitrobenzene

Notes:

Res. = Residential ~~receptor~~Ireceptor

I/C = Industrial Commercial ~~receptor~~CWreceptor

CW = Construction Worker receptor

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.APPENDIX A:— General

Section 742.TABLE F:— Similar-Acting Carcinogenic Chemicals

Bladder

1,3-Dichloropropene (cis + trans) (ingestion only)

n-Nitrosodiphenylamine

Circulatory System

Benzene

1,2-Dibromoethane

1,2-Dichloroethane

Pentachlorophenol

2,4,6-Trichlorophenol

Gall Bladder

p-Dioxane (inhalation only)

Gastrointestinal System

Benzo(a)anthracene (ingestion only)

Benzo(b)fluoranthene (ingestion only)

Benzo(k)fluoranthene (ingestion only)

Benzo(a)pyrene (ingestion only)

Bromoform

Chrysene (ingestion only)

Dibenzo(a,h)anthracene (ingestion only)

1,2-Dibromoethane (ingestion only)

Indeno(1,2,3-cd)pyrene (ingestion only)

Kidney

Bromodichloromethane (~~Ingestion~~ingestion only)

Chloroform (~~Ingestion~~ingestion only)

1,2-Dibromo-3-chloropropane (~~Ingestion~~ingestion only)

~~2,4-Dinitrotoluene~~

~~2,6-Dinitrotoluene~~

~~Hexachlorobenzene~~

Nitrobenzene

Liver

Aldrin

Bis(2-chloroethyl) ether

Bis(2-ethylhexyl) phthalate (~~Ingestion only~~)

Carbazole

Carbon ~~tetrachloride~~Tetrachloride

Chlordane
Chloroform ~~(Inhalation only)~~
DDD
DDE
DDT
1,2-Dibromo-3-chloropropane ~~(Ingestion only)~~
1,2-Dibromoethane ~~(Ingestion only)~~
3,3'-Dichlorobenzidine
1,2-Dichloroethane 1,2-Dichloropropane ~~(Ingestion only)~~
1,3-Dichloropropylene ~~(Ingestion only)~~
Dieldrin
2,4-Dinitrotoluene
2,6-Dinitrotoluene
p-Dioxane
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
alpha-HCH (alpha-BHC)
gamma-HCH (Lindane) ~~gamma-BHC~~
Methylene ~~chloride~~ Chloride
Nitrobenzene
Nn-Nitrosodiphenylamine (inhalation only)
Nn-Nitrosodi-n-propylamine
Pentachlorophenol
Polychlorinated biphenyls (PCBs)
Tetrachloroethylene
~~Trichloroethylene~~
~~2,4,6-Trichlorophenol~~
Toxaphene
Trichloroethylene
Vinyl ~~chloride~~ Chloride (I/C & CW)

~~Circulatory System~~

~~Benzene~~
~~2,4,6-Trichlorophenol~~

~~Gastrointestinal System~~

~~Benzo(a)anthracene~~
~~Benzo(b)fluoranthene~~
~~Benzo(k)fluoranthene~~
~~Benzo(a)pyrene~~
~~Chrysene~~
~~Dibenzo(a,h)anthracene~~
~~Indeno(1,2,3-c,d)pyrene~~
~~Bromodichloromethane (Ingestion only)~~
~~Bromoform~~
~~1,2-Dibromo-3-chloropropane (Ingestion only)~~
~~1,2-Dibromoethane (Ingestion only)~~
~~1,3-Dichloropropylene (Ingestion only)~~

~~Lung~~

~~Arsenic (Inhalation only)~~
~~Beryllium (Inhalation only)~~
~~Cadmium (Inhalation only)~~
~~Chromium, hexavalent (Inhalation only)~~
~~1,3-Dichloropropylene (Inhalation only)~~
~~Methylene chloride (Inhalation only)~~

~~N-Nitrosodi-n-propylamine
Nickel (Inhalation-only)
Vinyl chloride~~

~~Nasal Cavity~~

~~1,2-Dibromo-3-chloropropane (Inhalation-only)
1,2-Dibromoethane (Inhalation-only)
N-Nitrosodi-n-propylamine~~

~~Bladder~~

~~3,3'-Dichlorobenzidine
1,3-Dichloropropylene (Ingestion-only)
N-Nitrosodiphenylamine
Vinyl Chloride (Res.)~~

Mammary Gland

3,3'-Dichlorobenzidine

2,4-Dinitrotoluene

2,6-Dinitrotoluene

~~BladderLiver (continued)1,3-Dichloropropene (cis + trans) (ingestion-
only)Chlordanen-NitrosodiphenylamineChloroformDDDCirculatory-
SystemDDEBenzeneDDT1,2-Dibromoethane1,2-Dichloropropane1,2-
DichloroethaneDieldrinPentachlorophenol2,4-Dinitrotoluene2,4,6-
Trichlorophenol2,6-Dinitrotoluenep-DioxaneGall BladderHeptachlorp-Dioxane-
(inhalation-only)Heptachlor-epoxideHexachlorobenzeneGastrointestinal-
Systemalpha-HCH (alpha-BHC)Benzo(a)anthracene (ingestion-only)gamma-HCH (gamma-
BHC)Benzo(b)fluoranthene (ingestion-only)Methylene ChlorideBenzo(k)flouranthene-
(ingestion-only)NitrobenzeneBenzo(a)pyrene (ingestion-only)n-
Nitrosodiphenylamine (inhalation-only)Bromoformn-Nitrosodi-n-propylamineChrysene-
(ingestion-only)PentachlorophenolDibenzo(a,h)anthracene (ingestion-
only)Polychlorinated biphenyls (PCBs)1,2-Dibromoethane (ingestion-
only)TetrachloroethyleneIndeno(1,2,3-cd)pyrene (ingestion-
only)ToxapheneTrichloroethyleneKidneyVinyl Chloride (I/C &-
CW)Bromodichloromethane (ingestion-only)Vinyl Chloride (Res.)Chloroform-
(ingestion-only)1,2-Dibromo-3-chloropropane (ingestion-only)Mammary-
GlandNitrobenzene3,3'-Dichlorobenzidine2,4-DinitrotolueneLiver2,6-
DinitrotolueneAldrinBis(2-chloroethyl)etherRespiratory SystemBis(2-
ethylhexyl)phthalateArsenic (inhalation-only)CarbazoleBenzo(a)anthracene-
(inhalation-only)Carbon TetrachlorideBenzo(b)fluoranthene (inhalation-only)
Respiratory System (continued~~

Arsenic (inhalation only)

Benzo(a)anthracene (inhalation only)

Benzo(b)fluoranthene (inhalation only)

Benzo(k) ~~flouranthene~~ fluoranthene (inhalation only)

Benzo(a)pyrene (inhalation only) ~~BerylliumCadmiumChromium~~

Beryllium

Cadmium

Chromium (hexavalent ion)

Chrysene (inhalation only)

Cobalt

Dibenzo(a,h)anthracene (inhalation only)

1,2-Dibromo-3-chloropropane (inhalation only)

1,2-Dibromoethane (inhalation only)

1,3-Dichloropropene (cis + trans) (inhalation only)

p-Dioxane (inhalation only) ~~TrichloroethyleneNotes~~

Trichloroethylene

Notes:

Res. = Residential ~~receptor~~ Ireceptor

I/C = Industrial Commercial ~~receptor~~ CWreceptor

CW = Construction Worker receptor

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.APPENDIX A+ General

Section 742.~~Table~~TABLE J+ List of TACO Volatile Chemicals for the Indoor Inhalation Exposure Route

CAS No.Chemical67-64-1Acetone71-43-2Benzene111-44-4Bis(2-chloroethyl) ether75-27-4Bromodichloromethane75-25-2Bromoform71-36-3Butanol78-93-32-Butanone (MEK)75-15-0Carbon disulfide56-23-5Carbon tetrachloride108-90-7Chlorobenzene124-48-1Chlorodibromomethane67-66-3Chloroform95-57-82-Chlorophenol75-99-0Dalapon96-12-81,2-dibromo-3-chloropropane106-93-41,2-Dibromoethane95-50-11,2-Dichlorobenzene106-46-71,4-Dichlorobenzene75-71-8Dichlorodifluoromethane75-34-31,1-Dichloroethane107-06-21,2-Dichloroethane75-35-41,1-Dichloroethylene156-59-2cis-1,2-Dichloroethylene156-60-5Trans-1,2-Dichloroethylene78-87-51,2-Dichloropropane542-75-61,3-Dichloropropylene (cis + trans)123-91-1p-Dioxane100-41-4Ethylbenzene76-44-8Heptachlor118-74-1Hexachlorobenzene77-47-4Hexachlorocyclopentadiene67-72-1Hexachloroethane78-59-1Isophorone98-82-8Isopropylbenzene (Cumene)7439-97-6Mercury74-83-9Methyl bromide1634-04-4Methyl tertiary-butyl ether75-09-2Methylene chloride93-65-22-Methylnaphthalene95-48-72-Methylphenol (o-cresol)91-20-3Naphthalene98-95-3Nitrobenzene621-64-7n-Nitrosodi-n-propylamine108-95-2Phenol1336-36-3Polychlorinated biphenyls (PCBs) 100-42-5Styrene127-18-4Tetrachloroethylene108-88-3Toluene120-82-11,2,4-Trichlorobenzene71-55-61,1,1-Trichloroethane79-00-51,1,2-Trichloroethane79-01-6Trichloroethylene75-69-4Trichlorofluoromethane108-05-4Vinyl acetate75-01-4Vinyl chloride108-38-3m-Xylene95-47-6o-Xylene106-42-3p-Xylene1330-20-7Xylenes (total)

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 742.APPENDIX A+ ~~General~~

Section 742.~~TABLE~~TABLE K+ ~~Soil Vapor Saturation Limits (Cvsat) for Volatile Chemicals~~

CAS No.Chemical NameCvsat (mg/m3)67-64-1Acetone7.50E+0571-43-2Benzene4.20E+05111-44-4Bis(2-chloroethyl) ether1.20E+0475-27-4Bromodichloromethane4.50E+0575-25-2Bromoform7.80E+0471-36-3Butanol2.90E+0478-93-32-Butanone (MEK)3.80E+0575-15-0Carbon disulfide1.50E+0656-23-5Carbon tetrachloride1.00E+06108-90-7Chlorobenzene7.40E+04124-48-1Chlorodibromomethane5.70E+0467-66-3Chloroform1.30E+0695-57-82-Chlorophenol (ionizable organic)1.70E+0475-99-0Dalapon1.50E+0396-12-81,2-Dibromo-3-chloropropane7.80E+03106-93-41,2-Dibromoethane1.40E+0595-50-11,2-Dichlorobenzene1.10E+04106-46-71,4-Dichlorobenzene8.40E+0375-71-8Dichlorodifluoromethane3.30E+0775-34-31,1-Dichloroethane1.30E+06107-06-21,2-Dichloroethane4.40E+0575-35-41,1-Dichloroethylene3.30E+06156-59-2cis-1,2-Dichloroethylene1.10E+06156-60-5trans-1,2-Dichloroethylene1.80E+0678-87-51,2-Dichloropropane3.20E+05542-75-61,3-Dichloropropylene (cis + trans)2.10E+05123-91-1p-Dioxane1.90E+05100-41-4Ethylbenzene5.90E+0476-44-8Heptachlor8.30E+00118-74-1Hexachlorobenzene2.80E-0177-47-4Hexachlorocyclopentadiene9.10E+0267-72-

1Hexachloroethane2.80E+0378-59-1Isophorone3.40E+0398-82-8Isopropylbenzene
 (Cumene)3.00E+047439-97-6Mercury (elemental)2.20E+0174-83-9Methyl
 bromide8.60E+061634-04-4Methyl tertiary-butyl ether1.20E+0675-09-2Methylene
 chloride2.00E+0693-65-22-Methylnaphthalene5.30E+021634-04-42-Methylphenol (o-
 cresol)1.80E+0391-20-3Naphthalene6.20E+0298-95-3Nitrobenzene1.70E+03621-64-7n-
 Nitrosodi-n-propylamine9.50E+02108-95-2Phenol1.50E+031336-36-3Polychlorinated
 biphenyls (PCBs)9.00E+00100-42-5Styrene3.40E+04127-18-
 4Tetrachloroethylene1.80E+05108-88-3Toluene1.40E+05120-82-11,2,4-
 Trichlorobenzene4.30E+0371-55-61,1,1-Trichloroethane8.70E+0579-00-51,1,2-
 Trichloroethane1.70E+0579-01-6Trichloroethylene5.30E+0575-69-
 4Trichlorofluoromethane6.30E+06108-05-4Vinyl acetate4.30E+0575-01-4Vinyl
 chloride 1.10E+07108-38-3m-Xylene5.20E+0495-47-6o-Xylene4.10E+04106-42-3p-
 Xylene5.50E+041330-20-7Xylenes (total)4.90E+04

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 742.APPENDIX B: Tier 1 Illustrations and Tables

Section 742.TABLE G: Tier 1 Soil Gas Remediation Objectives for theOutdoor
 Inhalation
 Exposure Routea

CAS No.	Chemical Name	Residential (mg/m3)	Industrial/Commercial (mg/m3)	Construction Worker (mg/m3)
67-64-1	Acetone	750,000	750,000	750,000
71-43-2	Benzene	100	111-44-4	Bis(2-chloroethyl) ether
1.3c2.4c3.4c75-27-4	Bromodichloromethane	450,000	450,000	450,000
75-25-2	Bromoform	1,800	3,500	4,900
71-36-3	Butanol	29,000	29,000	29,000
78-93-32	Butanone (MEK)	380,000	380,000	15,000
75-15-0	Carbon disulfide	1,500,000	1,500,000	48,000
56-23-5	Carbon tetrachloride	290	550	770
108-90-7	Chlorobenzene	36,000	57,000	3,700
124-48-1	Chlorodibromomethane	57,000	57,000	150
67-66-3	Chloroform	110	200	290
95-57-82	Chlorophenol	17,000	17,000	17,000
99-0	Dalapon	1,500	1,500	1,500
96-12-81,2	Dibromo-3-chloropropane	0.14	0.27	0.38
106-93-41,2	Dibromoethane	2.9c5.6c7.9c95-50-11,2	Dichlorobenzene	11,000
11,000e6,700b106-46-71,4-	Dichlorobenzene	8,400	8,400	6,400
75-71-8	Dichlorodifluoromethane	890,000	1,400,000	892,000
75-34-31,1-	Dichloroethane	870,000	1,300,000	90,000
107-06-21,2	Dichloroethane	67c130c180c75-35-41,1-	Dichloroethylene	520,000
820,000b5,300b156-59-2	cis-1,2-Dichloroethylene	1,100,000	1,100,000	1,100,000
156-60-5	trans-1,2-Dichloroethylene	120,000	190,000	12,000
78-87-51,2-	Dichloropropane	240c470c110c542-75-61,3-	Dichloropropylene (cis + trans)	1,900
3,700c1,400c123-91-1p-	Dioxane	16c30c42c100-41-4	Ethylbenzene	59,000
59,000e8,500b76-44-8	Heptachlor	0.40c0.76c1.1c118-74-1	Hexachlorobenzene	0.26c0.28e0.28e77-47-4
77-47-4	Hexachlorocyclopentadiene	85b140b440b67-72-1	Hexachloroethane	2,800
2,800e2,800e2,800e78-59-1	Isophorone	3,400	3,400	1,500
98-82-8	Isopropylbenzene (Cumene)	30,000	30,000	30,000
7439-97-6	Mercury	f22e22e0.62b74-83-9	Methyl bromide	12,000
19,000b2,400b1634-04-4	Methyl tertiary-butyl ether	1,200,000	1,200,000	23,000
75-09-2	Methylene chloride	6,100	12,000	5,100
57-62	Methylnaphthalene	530e530e530e95-48-72	Methylphenol (o-cresol)	1,800
1,800e1,800e410b91-20-3	Naphthalene	560b620e5.8b98-95-3	Nitrobenzene	6.5c12c10b621-64-7
n-Nitrosodi-n-propylamine	0.056	0.11c0.15c108-95-2	Phenol	1,500
1,500e1,500e79b1336-36-3	Polychlorinated biphenyls (PCBs)	---d---d---d	100-42-5	Styrene
34,000e34,000e16,000b127-18-4	Tetrachloroethylene	360c690c970c108-88-3	Toluene	140,000
140,000e140,000e50,000b120-82-11,2,4-	Trichlorobenzene	1,000	1,600	110
71-55-61,1,1-	Trichloroethane	870,000	870,000	89,000
79-00-51,1,2-	Trichloroethane	170,000	170,000	170,000
79-01-6	Trichloroethylene	1,700	3,300	1,500
75-69-4	Trichlorofluoromethane	2,100,000	3,400,000	220,000
108-05-4	Vinyl			

acetate160,000b250,000b1,600b75-01-4Vinyl chloride780c3,000c3,000b108-38-3m-Xylene52,000e52,000e3,100b95-47-6o-Xylene41,000e41,000e2,600b106-42-3p-Xylene55,000e55,000e3,300b1330-20-7Xylenes (total)49,000e49,000e2,900b
Chemical Name and Remediation Objective Notations

a For the outdoor inhalation exposure route, it is acceptable to determine compliance by meeting either the soil or soil gas remediation objectives. The soil remediation objectives for the outdoor inhalation route are located in Appendix B, Tables A and B.

b Calculated values correspond to a target hazard quotient of 1.

c Calculated values correspond to a cancer risk level of 1 in 1,000,000.

d PCBs are a mixture of different congeners. The appropriate values to use for the physical/chemical and toxicity parameters depend on the congeners present at the site. Persons remediating sites should consult with BOL if calculation of Tier 2 or 3 remediation objectives is desired.

e The value shown is the Cvsat value of the chemical in soil gas. The Cvsat of the chemical becomes the remediation objective if the calculated value exceeds the Cvsat value or if there are no toxicity criteria available for the inhalation route of exposure.

f Value for the inhalation exposure route is based on Reference Concentration for elemental Mercury (CAS No. 7439-97-6). Inhalation remediation objectives only apply at sites where elemental Mercury is a contaminant of concern.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 742.APPENDIX B: Tier 1 Illustrations and Tables

Section 742.TABLE H: Tier 1 Soil Gas and Groundwater Remediation Objectives for the Indoor Inhalation Exposure Route - Diffusion and Advection

Qsoil equals 83.33 cm³/seca

Soil GasGroundwaterCAS No.Chemical NameResidential

(mg/m³)Industrial/

Commercial

(mg/m³)Residential

(mg/L)Industrial/

Commercial (mg/L)67-64-1Acetone750,000f750,000f1,000,000g1,000,000g71-43-

2Benzene0.37c2.8c0.11c0.41c111-44-4Bis(2-chloroethyl)ether0.014c0.087c0.083c0.43c75-27-

4Bromodichloromethane450,000f450,000f6,700g6,700g75-25-

2Bromoform11c52c3.1c12c71-36-3Butanol29,000f29,000f74,000g74,000g78-93-32-

Butanone (MEK)6,400b40,000b10,000b48,000b75-15-0Carbon

disulfide780b5,300b67b210b56-23-5Carbon tetrachloride0.21c1.5c0.020c0.076c108-

90-7Chlorobenzene69b420b26b82b124-48-

1Chlorodibromomethane57,000f57,000f2,600g2,600g67-66-

3Chloroform0.11c0.92c0.07i0.15c95-57-82-

Chlorophenol17,000f17,000f22,000g22,000g75-99-

0Dalapone1,500f1,500f900,000g900,000g96-12-81,2-Dibromo-3-

chloropropane0.0012c0.0062c0.00065c0.0027c106-93-41,2-

Dibromoethane0.0078c0.048c0.0035c0.014c95-50-11,2-

Dichlorobenzene290b1,700b140b160g106-46-71,4-

Dichlorobenzene1,200b6,800b79g79g75-71-
 8Dichlorodifluoromethane270b1,700b3.0b9.2b75-34-31,1-
 Dichloroethane690b4,200b180b580b107-06-21,2-
 Dichloroethane0.099c0.81c0.054c0.22c75-35-41,1-
 Dichloroethylene240b1,600b24b74b156-59-2cis-1,2-
 Dichloroethylenel,100,000f1,100,000f3,500g3,500g156-60-5trans-1,2-
 Dichloroethylene85b510b16b51b78-87-51,2-Dichloropropane0.31c2.3c0.12c0.48c542-
 75-61,3-Dichloropropylene (cis + trans)0.90c6.2c0.14c0.52c123-91-1p-
 Dioxane0.22c2.3c2.9c25c100-41-4Ethylbenzene1,3c9.3c0.37c1.4c76-44-
 8Heptachlor0.0063c0.032c0.0025c0.0096c118-74-
 1Hexachlorobenzene0.0087c0.057c0.0059c0.0062g77-47-
 4Hexachlorocyclopentadiene0.58b2.6b0.084b0.26b67-72-
 1Hexachloroethane2,800f2,800f50g50g78-59-
 1Isophorone2,900b3,400f12,000g12,000g98-82-8Isopropylbenzene
 (Cumene)600b3,500b2.7b8.4b7439-97-6Mercuryh0.42b2.5b0.053b0.060g74-83-9Methyl
 bromide6.9b42b1.5b4.8b1634-04-4Methyl tertiary-butyl
 ether3,700b24,000b1,900b6,800b75-09-2Methylene chloride5.6c45c2.1c8.2c91-57-62-
 Methylnaphthalene530f530f25g25g95-48-72-Methylphenol (o-
 cresol)600b1,800f26,000g26,000g91-20-3Naphthalene0.11c0.75c0.075c0.32c98-95-
 3Nitrobenzene0.077c0.57c0.34c2.0c621-64-7n-Nitrosodi-n-
 propylamine0.0016c0.012c0.044c0.27c108-95-2Phenol140b1,300b28,000b83,000g1336-
 36-3Polychlorinated biphenyls (PCBs)---d---d---d---d100-42-
 5Styrenel,400b8,500b310g310g127-18-4Tetrachloroethylene0.55c4.0c0.091c0.34c108-
 88-3Toluene6,200b40,000b530g530g120-82-11,2,4-Trichlorobenzene5.4b25b1.85.9b71-
 55-61,1,1-Trichloroethane6,600b41,000b1,000b1,300g79-00-51,1,2-
 Trichloroethane170,000f170,000f4,400g4,400g79-01-
 6Trichloroethylenel.5c12c0.34c1.3c75-69-
 4Trichlorofluoromethane860b5,600b26b82b108-05-4Vinyl
 acetate250b1,600b160b550b75-01-4Vinyl chloride0.29c4.8c0.028c0.21c108-38-3m-
 Xylenel40b850b43b130b95-47-6o-Xylene120b790b40b130b106-42-3p-
 Xylene130b820b38b120b1330-20-7Xylenes (total)e140b840b30b93b
 Chemical Name and Remediation Objective Notations

a Compliance is determined by meeting either the soil gas remediation objectives or the groundwater remediation objectives. See Sections 742.505 and 742.515.

b Calculated values correspond to a target hazard quotient of 1.

c Calculated values correspond to a cancer risk level of 1 in 1,000,000.

d PCBs are a mixture of different congeners. The appropriate values to use for the physical/chemical and toxicity parameters depend on the congeners present at the site. Persons remediating sites should consult with BOL if calculation of Tier 2 or 3 remediation objectives is desired.

e Groundwater remediation objective calculated at 25°C. For Dalapon and 1,2-Dibromo-3-chloropropane, the critical temperature (Tc) and enthalpy of vaporization at the normal boiling point (Hv,b) are not available. For Xylenes (total), the enthalpy of vaporization at the normal boiling point (Hv,b) is not available.

f The value shown is the Cvsat value of the chemical in soil gas. The Cvsat of the chemical becomes the remediation objective if the calculated value exceeds the Cvsat value or if there are no toxicity criteria available for the inhalation route of exposure.

g The value shown is the solubility of the chemical in water. The solubility of the chemical becomes the remediation objective if the calculated value exceeds the solubility or if there are no toxicity criteria available for the ingestion route of exposure.

h Value for the inhalation exposure route is based on Reference Concentration for elemental Mercury (CAS No. 7439-97-6). Inhalation remediation objectives only apply at sites where elemental Mercury is a contaminant of concern.

i The value shown is the Groundwater Remediation Objective listed in Appendix B, Table E.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 742.APPENDIX B: Tier 1 Illustrations and Tables

Section 742.TABLE I: Tier 1 Soil Gas and Groundwater Remediation Objectives for the Indoor Inhalation Exposure Route - Diffusion Only

Qsoil equals 0.0 cm³/seca,b
Soil GasGroundwaterCAS No.Chemical NameResidential
(mg/m³)Industrial/
Commercial
(mg/m³)Residential
(mg/L)Industrial/
Commercial
(mg/L)67-64-1Acetone750,000g750,000g1,000,000h1,000,000h71-43-
2Benzene41d300d0.41d2.6d111-44-4Bis(2-chloroethyl)ether1.9d14d6.6d48d75-27-
4Bromodichloromethane450,000g450,000g6,700h6,700h75-25-
2Bromoform1,800d13,000d170d1,300d71-36-3Butanol29,000g29,000g74,000h74,000h78-
93-32-Butanone (MEK)380,000g380,000g220,000h220,000h75-15-0Carbon
disulfide81,000c500,000c170c820c56-23-5Carbon
tetrachloride24d180d0.052d0.31d108-90-7Chlorobenzene8,300c51,000c130c470h124-48-
1Chlorodibromomethane57,000g57,000g2,600h2,600h67-66-
3Chloroform12d87d0.17d1.1d95-57-82-Chlorophenol17,000g17,000g22,000h22,000h75-
99-0Dalaponf1,500g1,500g900,000h900,000h96-12-81,2-Dibromo-3-
chloropropanef0.17d1.3d0.029d0.21d106-93-41,2-
Dibromoethane1.1d7.9d0.073d0.52d95-50-11,2-
Dichlorobenzene11,000g11,000g160h160h106-46-71,4-
Dichlorobenzene8,400g8,400g79h79h75-71-
8Dichlorodifluoromethane32,000c200,000c6.8c33c75-34-31,1-
Dichloroethane81,000c500,000c750c4,100c107-06-21,2-
Dichloroethane10d76d0.50d3.5d75-35-41,1-
Dichloroethylene27,000c160,000c61c300c156-59-2cis-1,2-
Dichloroethylene1,100,000g1,100,000g3,500h3,500h156-60-5trans-1,2-
Dichloroethylene10,000c63,000c58c310c78-87-51,2-
Dichloropropane36d260d0.67d4.5d542-75-61,3-Dichloropropylene (cis +
trans)110d830d0.42d2.6d123-91-1p-Dioxane15d110d140d1,000d100-41-
4Ethylbenzene150d1,100d1.3d8.1d76-44-8Heptachlor0.97d7.1d0.058d0.18h118-74-
1Hexachlorobenzene0.28g0.28g0.0062h0.0062h77-47-
4Hexachlorocyclopentadiene86c530c0.29c1.5c67-72-
1Hexachloroethane2,800g2,800g50h50h78-59-
1Isophorone3,400g3,400g12,000h12,000h98-82-8Isopropylbenzene
(Cumene)30,000g30,000g6.2c30c7439-97-6Mercuryi22g22g0.060h0.060h74-83-9Methyl
bromide830c5,100c6.1c33c1634-04-4Methyl tertiary-butyl
ether420,000c1,200,000g30,000c51,000h75-09-2Methylene

chloride590d4,400d12d84d91-57-62-Methylnaphthalene530g530g25h25h95-48-72-
Methylphenol (o-cresol)1,800g1,800g26,000h26,000h91-20-
3Naphthalene14d100d1.8d13d98-95-3Nitrobenzene9.0d66d23d170d621-64-7n-Nitrosodi-
n-propylamine0.18d1.3d3.3d24d108-95-2Phenol1,500g1,500g83,000h83,000h1336-36-
3Polychlorinated biphenyls (PCBs)---e---e---e---e100-42-
5Styrene34,000g34,000g310h310h127-18-4Tetrachloroethylene66d490d0.26d1.6d108-88-
3Toluene140,000g140,000g530h530h120-82-11,2,4-
Trichlorobenzene800c4,300g35h35h71-55-61,1,1-
Trichloroethane770,000c870,000g1,300h1,300h79-00-51,1,2-
Trichloroethane170,000g170,000g4,400h4,400h79-01-
6Trichloroethylene180d1,300d1.1d6.7d75-69-
4Trichlorofluoromethane97,000c600,000c62c300c108-05-4Vinyl
acetate28,000c170,000c2,500c15,000c75-01-4Vinyl chloride30d440d0.065d0.75d108-
38-3m-Xylene17,000d52,000c160c160h95-47-6o-Xylene14,000d41,000c170c180h106-42-
3p-Xylene16,000d55,000c140c160h1330-20-7Xylenes (total)f17,000d49,000c96c110h
Chemical Name and Remediation Objective Notations

a Compliance is determined by meeting both the soil gas remediation objectives and the groundwater remediation objectives. See Sections 742.505 and 742.515.

b Remediation objectives relying on this table require use of institutional controls in accordance with Subpart J.

c Calculated values correspond to a target hazard quotient of 1.

d Calculated values correspond to a cancer risk level of 1 in 1,000,000.

e PCBs are a mixture of different congeners. The appropriate values to use for the physical/chemical and toxicity parameters depend on the congeners present at the site. Persons remediating sites should consult with BOL if calculation of Tier 2 or 3 remediation objectives is desired

f Groundwater remediation objective calculated at 25°C. For Dalapon and 1,2-Dibromo-3-chloropropane, the critical temperature (Tc) and enthalpy of vaporization at the normal boiling point (Hv,b) are not available. For Xylenes (total), the enthalpy of vaporization at the normal boiling point (Hv,b) is not available.

g The value shown is the Cvsat value of the chemical in soil gas. The Cvsat of the chemical becomes the remediation objective if the calculated value exceeds the Cvsat value or if there are no toxicity criteria available for the inhalation route of exposure.

h The value shown is the solubility of the chemical in water. The solubility of the chemical becomes the remediation objective if the calculated value exceeds the solubility or if there are no toxicity criteria available for the inhalation route of exposure.

i Value for the inhalation exposure route is based on Reference Concentration for elemental Mercury (CAS No. 7439-97-6). Inhalation remediation objectives only apply at sites where elemental Mercury is a contaminant of concern.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 742.APPENDIX C: Tier 2 Illustrations and Tables

Section 742. ~~Table~~ TABLE A:— SSL Equations

Equations for Soil Ingestion Exposure Route Remediation Objectives for Noncarcinogenic Contaminants

~~(mg/kg)~~ (mg/kg) S1 Remediation Objectives for Carcinogenic Contaminants - Residential (mg/kg) S2 Remediation Objectives for Carcinogenic Contaminants - Industrial/ Commercial, Construction Worker (mg/kg) S3

Equations for Inhalation Exposure Route (Organic Contaminants and ~~Mercury~~) Mercury Remediation Objectives for Noncarcinogenic Contaminants - Residential, Industrial/ Commercial (mg/kg) S4 Remediation Objectives for Noncarcinogenic Contaminants - Construction Worker (mg/kg) S5 Remediation Objectives for Carcinogenic Contaminants - Residential, Industrial/ Commercial (mg/kg) S6 Remediation Objectives for Carcinogenic Contaminants - Construction Worker (mg/kg) S7 Equation for Derivation of the Volatilization Factor - Residential, Industrial/ Commercial, VF (m³/kg) S8 Equation for Derivation of the Volatilization Factor - Construction Worker, $VF' = \frac{VF}{1 - VF}$ (m³/kg) $VF' = \frac{VF}{1 - VF}$ S9 Equation for Derivation of Apparent Diffusivity, DA (cm²/s) S10

Equations for Inhalation Exposure Route (Fugitive Dusts) Remediation Objectives for Noncarcinogenic Contaminants - Residential, Industrial/ Commercial (mg/kg) S11 Remediation Objectives for Noncarcinogenic Contaminants - Construction Worker (mg/kg) S12 Remediation Objectives for Carcinogenic Contaminants - Residential, Industrial/ Commercial (mg/kg) S13 Remediation Objectives for Carcinogenic Contaminants - Construction Worker (mg/kg) S14 Equation for Derivation of Particulate Emission Factor, PEF (m³/kg) S15 Equation for Derivation of Particulate Emission Factor, $PEF' = \frac{PEF}{1 - PEF}$ - Construction Worker (m³/kg)

NOTE: PEF must be the industrial/commercial ~~value~~ value S16

Equations for the Soil Component of the Groundwater Ingestion Exposure ~~Route~~ Route Remediation Objective

~~(mg/kg)~~
(mg/kg)

NOTE: This equation can only be used to model contaminant migration not in the water bearing unit. S17 Target Soil Leachate Concentration, C_w (mg/L) $C_w = DF \cdot \frac{GWobj}{L_{soil}}$ S18 Soil-Water Partition Coefficient, K_d (cm³/g) $K_d = K_{oc} \cdot f_{oc}$ S19 Water-Filled Soil Porosity,

$\frac{V_w}{V_w + V_a}$ (L_{water}/L_{soil}) S20 Air-Filled Soil Porosity, $\frac{V_a}{V_w + V_a}$ (L_{air}/L_{soil}) $S_{21} = \frac{1}{1 + \frac{K_d \cdot C_w}{C_{soil}}}$ S21 Dilution Factor, DF (unitless) S22 Groundwater Remediation ~~Objective~~ Objective for Carcinogenic Contaminants, GWobj (mg/L) S23 Total Soil Porosity, $\frac{V_w + V_a}{V_w + V_a + V_s}$ S24 Equation for Estimation of Mixing Zone Depth, d (m) S25

Mass-Limit Equations for Inhalation Exposure Route and Soil Component of the Groundwater Ingestion Exposure Route Mass-Limit Volatilization Factor for the Inhalation Exposure Route - Residential, Industrial/ Commercial, VF (m³/kg)

NOTE: This equation may be used when vertical thickness of contamination is known or can be estimated reliably. S26 Mass-Limit Volatilization Factor for the Inhalation Exposure Route - Construction Worker, $VF' = \frac{VF}{1 - VF}$ - (m³/kg) S27 Mass-Limit Remediation Objective for Soil Component of the Groundwater Ingestion Exposure Route (mg/kg)

NOTE: This equation may be used when vertical thickness is known or can be estimated reliably. S28 Equation for Derivation of the Soil Saturation Limit, ~~Csat~~ Csat S29 Equation for the soil gas component of the Outdoor Inhalation Exposure Route
S30

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742. APPENDIX C ~~+~~ Tier 2 Illustrations and Tables

Section 742. ~~Table~~ TABLE B ~~+~~ SSL Parameters

Symbol Parameter Units Source Parameter Value(s) AT Averaging Time for Noncarcinogens in Ingestion Equation yr Residential = 6

Industrial/Commercial = 25

Construction Worker = 0.115 AT Averaging Time for Noncarcinogens in Inhalation

~~Equation yr Residential = 30~~ Equation yr Residential = 30

Industrial/Commercial = 25

Construction Worker = 0.115 AT Averaging Time for ~~Carcinogens yr SSL~~ Carcinogens yr SSL 70 BW Body Weight kg Residential Weight kg Residential = 15, noncarcinogens

70, carcinogens

Industrial/Commercial = 70

Construction Worker = 70 Csat Soil Saturation Concentration mg/kg Appendix A, Table A or Equation S29 in Appendix C, Table A Chemical-Specific or Calculated

Value Cw Target Soil Leachate Concentration mg/L Equation S18 in Appendix C, Table ~~A~~ A ~~Groundwater~~ Groundwater Standard, Health Advisory concentration, or Calculated

Value d Mixing Zone Depth m SSL or Equation S25 in Appendix C, Table A2 m or Calculated Value da Aquifer Thickness m Field Measurement Site-Specific dcs Depth of

Source

(Vertical thickness of contamination) m Field Measurement or Estimation Site-Specific ~~DA~~ DA ~~Apparent~~ Apparent ~~Specific~~ Specific

Symbol Parameter Units Source Parameter Value(s) DA Apparent Diffusivity cm²/s Equation S10 in Appendix C, Table A Calculated Value Di Diffusivity in Air cm²/s Appendix C,

Table E Chemical-Specific Dw Diffusivity in Water cm²/s Appendix C, Table E Chemical-Specific DFD Dilution Factor unitless Equation S22 in Appendix C, Table A20 or

Calculated Value E Exposure Duration for Ingestion of

Carcinogens yr Industrial/Commercial = 25

Construction Worker = 1 E Exposure Duration for Inhalation of

Carcinogens yr Residential = 30

Industrial/Commercial = 25

Construction Worker = 1 E Exposure Duration for Ingestion of

Noncarcinogens yr Residential = 6

Industrial/Commercial = 25

Construction Worker = 1 E Exposure Duration for Inhalation of

Noncarcinogens yr Residential = 30

Industrial/Commercial = 25

Construction Worker = 1 E Exposure Duration for the Direct Ingestion of

Groundwater yr Residential = 30

Industrial/Commercial = 25

Construction Worker = 1 E DM-L Exposure Duration for Migration to Groundwater Mass-Limit Equation S28 yr SSL 70 E F Exposure Frequency d/yr Residential = 350

Industrial/Commercial = 250

Construction Worker = 30 F(x) Function dependent on Um/ ~~Ut~~ Ut ~~unitless~~ unitless SSL 0.194 foc Organic Carbon Content of Soil g/g SSL or Field Measurement (See

Appendix C, Table F) Surface Soil = 0.006

Subsurface soil = 0.002, or Site-Specific GW obj Groundwater Remediation

Remediation Objectives mg/L Appendix B, Table E, 35 IAC 620. Subpart F, or Equation

S23 in Appendix C, Table A Chemical-Specific or Calculated Henry's Law Constant unitless Appendix C, Table E Chemical-Specific Hydraulic Gradient m/m Field Measurement (See Appendix C, Table F) Site-Specific Infiltration Rate m/yr SSL 0.3 IM-L Infiltration Rate for Migration to Groundwater Mass-Limit Equation S28 m/yr SSL 0.18 IF soil-adj (residential) Age Adjusted Soil Ingestion Factor for Carcinogens (mg-yr) / (kg-d) SSL 114 IR soil Soil Ingestion Rate mg/d Residential = 200 Industrial/Commercial = 50

Construction Worker = 480 IRW Daily Water Ingestion Rate L/d Residential = 2 Industrial/Commercial = 1 KAquifer Hydraulic Conductivity m/yr Field Measurement (See Appendix C, Table F) Site-Specific Kd (Non-ionizing organics) Soil-Water Partition Coefficient cm³/g or L/kg Equation S19 in Appendix C, Table A Calculated Value Kd (Ionizing organics) Soil-Water Partition Coefficient cm³/g or L/kg Equation S19 in Appendix C, Table A Chemical and pH-Specific (see Appendix C, Table I) Kd (~~Inorganics~~In-organics) Soil-Water Partition Coefficient cm³/g or L/kg Appendix C, Table J Chemical and pH-Specific Koc Organic Carbon Partition Coefficient cm³/g or L/kg Appendix C, Table E or Appendix C, Table I Chemical-Specific Ks Saturated Hydraulic Conductivity m/yr Appendix C, Table K

Appendix C, Illustration C Site-Specific L Source Length Parallel to Groundwater Flow Field Measurement Site-Specific PEF Particulate Emission Factor m³/kg SSL or Equation S15 in Appendix C, Table A Residential = 1.32 * 109 or Site-Specific Industrial/Commercial = 1.24 * 109 or Site-Specific PEF Particulate Emission Factor adjusted for Agitation (construction worker) m³/kg Equation S16 in Appendix C, Table A using PEF (industrial/commercial) 1.24 * 108 or Site-Specific Q/C (used in VF equations) Inverse of the mean concentration at the center of a square source (g/m²-s) / (kg/m³) Appendix C, Table H Residential = 68.81 Industrial/Commercial = 85.81

Construction Worker = 85.81 Q/C (used in PEF equations) Inverse of the mean concentration at the center of a square source (g/m²-s) / (kg/m³) SSL or Appendix C, Table H Residential = 90.80 Industrial/Commercial = 85.81

Construction Worker = 85.81 RfC Inhalation Reference Concentration mg/m³ ~~IEPA-(IRIS/HEASTa)~~ Illinois EPA: <http://www.epa.state.il.us/land/taco/toxicity-values.xls> Toxicological-Specific (Note: for Construction Workers use subchronic reference concentrations) Rf Do Oral Reference Dose mg / (kg-d) ~~IEPA-(IRIS/HEASTa)~~ Illinois EPA: <http://www.epa.state.il.us/land/taco/toxicity-values.xls> Toxicological-Specific (Note: for Construction ~~Worker~~Workers use subchronic reference doses) ~~RO soil Soil remediation objective mg/kg Equation S30 in Appendix C, Table A Calculated value RO soil gas Soil gas remediation objective mg/m³ Equation S30 in Appendix C, Table A Calculated value SS solubility SSolubility~~ in Water mg/L Appendix C, Table E Chemical-Specific S Fo Oral Slope Factor (mg/kg-d) -1 ~~IEPA-(IRIS/HEASTa)~~ Illinois EPA: <http://www.epa.state.il.us/land/taco/toxicity-values.xls> Toxicological-Specific T Exposure Intervals Residential = 9.5 * 108 Industrial/Commercial = 7.9 * 108

Construction Worker = 3.6 * 106 ~~TM-L Exposure~~L Exposure Interval for Mass-Limit Volatilization Factor Equation S26 yr SSL 30 THQ Target Hazard Quotient unitless SSL 1 TR Target Cancer Risk unitless Residential = 10⁻⁶ at the point of human exposure Industrial/Commercial = 10⁻⁶ at the point of human exposure

Construction Worker = 10⁻⁶ at the point of human exposure Um Mean Annual Windspeed m/s SSL 4.69 UR Finhalation Unit Risk Factor (~~ug~~ug/m³) -1 ~~IEPA-(IRIS/HEASTa)~~ Illinois EPA: <http://www.epa.state.il.us/land/taco/toxicity-values.xls> Toxicological-Specific Ut Equivalent Threshold Value of Windspeed at 7 mm/s SSL 11.32 VF Fraction of Vegetative Cover unitless SSL or Field Measurement 0.5 ~~ex of~~ Site-Specific VF Volatilization Factor m³/kg Equation S8 in Appendix C, Table A Calculated Value VF Volatilization Factor adjusted for Agitation m³/kg Equation S9 in Appendix C, Table A Calculated Value VFM-L Mass-Limit Volatilization

Factorm³/kgEquation S26 in Appendix C, Table ACalculated ValueV_F M-LMass-Limit
Volatilization Factor adjusted for Agitationm³/kgEquation S27 in Appendix C,
Table ACalculated Valueh-Value?Total Soil PorosityLpore/LsoilSSL or Equation S24
in Appendix C, Table A0.43, or

Gravel = 0.25
Sand = 0.32
Silt = 0.40
Clay = 0.36, or

Calculated ValueqaAirValue?aAir-Filled Soil PorosityLair/LsoilSSL or Equation
S21 in Appendix C, Table ASurface Soil (top 1 meter) = 0.28 Subsurface Soil
(below 1 meter) = 0.13, or

Gravel = 0.05
Sand = 0.14
Silt = 0.24
Clay = 0.19, or

Calculated ValueqwWaterValue?wWater-Filled Soil PorosityLwater/LsoilSSL or
Equation S20 in Appendix C, Table ASurface Soil (top 1 meter) = 0.15
Subsurface Soil (below 1 meter) = 0.30, or

Gravel = 0.20
Sand = 0.18
Silt = 0.16
Clay = 0.17, or

Calculated ValuerbDryValue?bDry Soil Bulk Densitykg/L or g/cm³SSL or Field
Measurement (See Appendix C, Table F)1.5, or

Gravel = 2.0
Sand = 1.8
Silt = 1.6
Clay = 1.7, or

Site-SpecifiersSoilSpecific?sSoil Particle Densityg/cm³SSL or Field Measurement
(See Appendix C, Table F)2.65, or

Site-SpecifierwWaterSpecific?wWater Densityg/cm³SSL1/(2b+3)Exponential in
Equation S20unitlessAppendix C, Table K
Appendix C, Illustration CSite-Specific

~~a— HEAST = Health Effects Assessment Summary Tables. USEPA, Office of Solid
Waste and Emergency Response. EPA/SQO/R-95/036. Updated Quarterly.~~

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.APPENDIX C: Tier 2 Illustrations and Tables

Section 742.TableTABLE E: Default Physical and Chemical
ParametersParameters

CAS No.

~~Chemical Solubility~~ Chemical Solubility in Water (S) (mg/L) Diffusivity in Air (Di) (cm²/s) Diffusivity in Water (Dw) (cm²/s) Dimensionless Henry's Law Constant (H') (25°C) Organic Carbon Partition Coefficient (Koc) (L/kg) First Order Degradation Constant (1)

~~(d 1) Neutral Organics 83 32 9 Acenaphthene 4.24 0.04217.69E-6 0.00636 7,080 0.003467 64 1 Acetone 1,000,000.124 1.14E-50.00159 0.575 0.049515972 60 8 Alachlor 242 0.01985.69E-60.00000132 394 No Data 116 06 3 Aldicarb 6,000 0.03057.19E-60.0000000574120.00109309 00 2 Aldrin 0.18 0.0132 4.86E-60.006972,450,0000.00059120 12 7 Anthracene 0.0434 0.0324 7.74E-60.00267 29,500 0.000751912 24 9 Atrazine 700.02586.69E-60.00000005 451 No Data 71 43 2 Benzene 1,750 0.088 9.80E-6 0.228 58.9 0.0009~~

CAS No.

Chemical Solubility in Water (S) (mg/L) Diffusivity in Air (Di) (cm²/s) Diffusivity in Water (Dw) (cm²/s) Dimensionless Henry's Law Constant (H') (25°C) Organic Carbon Partition Coefficient (Koc) (L/kg) First Order Degradation Constant (1)

~~(d 1) 56 55 3 Benzo(a)anthracene 0.00940.0510 9.00E-60.000137 398,000 0.00051205 99 2 Benzo(b)fluoranthene 0.00150.0226 5.56E-60.004551,230,000 0.00057207 08 9 Benzo(k)fluoranthene 0.00080.0226 5.56E-60.0000341,230,000 0.0001665 85 0 Benzoic Acid 3,500 0.0536 7.97E-60.0000631 0.600 No Data 50 32 8 Benzo(a)pyrene 0.00162 0.0439.00E-60.0000463 1,020,000 0.00065111 44 4 Bis(2-chloroethyl) ether 17,2000.0692 7.53E-60.000738 15.5 0.0019117 81 7 Bis(2-ethylhexyl)phthalate 0.340.03513.66E-60.00000418 15,100,000 0.001875 27 4 Bromodichloromethane 6,740 0.0298 1.06E-50.065655.0 No Data 75 25 2 Bromoform 3,1000.0149 1.03E-50.021987.1 0.001971 36 3 Butanol 174,0000.0800 9.30E-60.0003616.920.0128385 68 7 Butyl Benzyl Phthalate 2.69 0.0174 4.83E-60.000051757,5000.0038586 74 8 Carbazole 7.48 0.0390 7.03E-60.0000006263,390 No Data~~

CAS No.

Chemical Solubility in Water (S) (mg/L) Diffusivity in Air (Di) (cm²/s)

~~Diffusivity in Water (Dw)
(cm²/s) Dimensionless
Henry's Law Constant (H')
(25°C) Organic Carbon Partition Coefficient (Koc)
(L/kg) First
Order
Degradation Constant
(1)
(d-1) 1563-66-2 Carbofuran 3200.02496.63E-6.0037737 No Data 75-15-0 Carbon
Disulfide 1,190-0.104-1.00E-51.2445.7 No Data 56-23-5 Carbon Tetrachloride 793-
0.0780-8.80E-61.25174-0.001957-74-9 Chlordane 0.0560.0118-4.37E-
60.00199120,0000.00025106-47-8 p-Chloroaniline 5,3000.0483-1.01E-50.000013666.1 No
Data 108-90-7 Chlorobenzene 472-0.0730-8.70E-60.152219-0.0023124-48-
1 Chlorodibromomethane 2,6000.0196-1.05E-50.032163.1-0.0038567-66-
3 Chloroform 7,920-0.104-1.00E-50.1539.8-0.0003995-57-82 Chlorophenol 22,000-
0.0501-9.46E-60.016388 No Data 218-01-9 Chrysene 0.0016-0.02486.21E-
60.00388398,0000.0003594-75-72,4-D6800.02317.31E-60.000000414510.0038572-54-
84,4'-DDD 0.090.0169-4.76E-60.0001641,000,0000.000062~~

~~CAS No.~~

~~Chemical~~

~~Solubility in Water (S)~~

~~(mg/L)~~

~~Diffusivity in Air (Di)~~

~~(cm²/s)~~

~~Diffusivity in Water (Dw)~~

~~(cm²/s) Dimensionless~~

~~Henry's Law Constant (H')~~

~~(25°C) Organic Carbon Partition Coefficient (Koc)~~

~~(L/kg) First~~

~~Order~~

~~Degradation Constant~~

~~(1)~~

~~(d-1) 72-55-94,4'-DDE 0.120.0144-5.87E-60.0008614,470,0000.000062-50-29-34,4'-
DDT 0.0250.0137-4.95E-60.0003322,630,0000.000062-75-99-0 Dalapon 900,0000.0414-
9.46E-6-0.000002645.8-0.00577553-70-3 Dibenzo(a,h)anthracene 0.00249-
0.0202-5.18E-60.0000006033,800,0000.0003796-12-81,2-Dibromo-3-
chloropropane 1,2000.0212-7.02E-60.00615182-0.001925106-93-41,2-
Dibromoethane 4,200-0.02878.06E-60.030393-0.00577584-74-2 Di-n-butyl-
Phthalate 11.2-0.0438-7.86E-60.000000038533,9000.0301395-50-11,2-
Dichlorobenzene 1560.0690-7.90E-60.0779617-0.0019106-46-71,4-Dichlorobenzene 73.8-
0.0690-7.90E-60.0996617-0.001991-94-13,3-Dichlorobenzidine 3.110.0194-6.74E-
60.0000001647240.0019~~

~~CAS No.~~

~~Chemical~~

~~Solubility in Water (S)~~

~~(mg/L)~~
~~Diffusivity in Air (Di)~~
~~(cm²/s)~~
~~Diffusivity in Water (Dw)~~
~~(cm²/s)Dimensionless~~
~~Henry's Law Constant (H')~~
~~(25°C)Organic Carbon Partition Coefficient (Koc)~~
~~(L/kg)First~~
~~Order~~
~~Degradation Constant~~
~~(l)~~
~~(d-1)75-34-31,1-Dichloroethane5,060-0.0742-1.05E-50.2331.6-0.0019107-06-21,2-~~
~~Dichloroethane8,520-0.104-9.90E-60.040117.4-0.001975-35-41,1-~~
~~Dichloroethylene2,250-0.0900-1.04E-51.0758.9-0.0053156-59-2Cis-1,2-~~
~~Dichloroethylene3,5000.0736-1.13E-50.16735.5-0.00024156-60-5Trans-1,2-~~
~~Dichloroethylene6,3000.0707-1.19E-50.38552.5-0.00024120-83-22,4-~~
~~Dichlorophenol4,5000.0346-8.77E-60.00013147-0.0002778-87-51,2-~~
~~Dichloropropane2,8000.0782-8.73E-60.11543.7-0.00027542-75-61,3-Dichloropropylene~~
~~(cis + trans)2,8000.0626-1.00E-50.72645.7-0.06160-57-1Dieldrin0.1950.0125-4.74E-~~
~~60.00061921,4000.0003284-66-2Diethyl Phthalate1,0800.0256-6.35E-~~
~~60.00001852880.00619105-67-92,4-Dimethylphenol7,8700.0584-8.69E-60.000082209-~~
~~0.049551-28-52,4-Dinitrophenol2,7900.0273-9.06E-60.00001820.010.00132~~

~~CAS-No.-~~

~~Chemical~~
~~Solubility in Water (S)~~
~~(mg/L)~~
~~Diffusivity in Air (Di)~~
~~(cm²/s)~~
~~Diffusivity in Water (Dw)~~
~~(cm²/s)Dimensionless~~
~~Henry's Law Constant (H')~~
~~(25°C)Organic Carbon Partition Coefficient (Koc)~~
~~(L/kg)First~~
~~Order~~
~~Degradation Constant~~
~~(l)~~
~~(d-1)121-14-22,4-Dinitrotoluene2700.2037.06E-60.000003895.50.00192606-20-22,6-~~
~~Dinitrotoluene1820.0327-7.26E-60.000030669.20.0019288-85-7Dinoseb520.02156.62E-~~
~~60.00001891,120-0.002817117-84-0Di-n-octyl Phthalate0.020.0151-3.58E-~~
~~60.0027483,200,0000.0019115-29-7Endosulfan0.510.0115-4.55E-~~
~~60.0004592,1400.07629145-73-3Endothal121,0000.02918.07E-60.00000001070.29No-~~
~~Data72-20-8Endrin0.250.0125-4.74E-60.00030812,3000.00032100-41-4Ethylbenzene169-~~
~~0.0750-7.80E-60.323363-0.003206-44-0Fluoranthene0.2060.03026.35E-~~
~~60.00066107,0000.0001986-73-7Fluorene1.980.0363-7.88E-60.0026113,8000.00069176-~~
~~44-8Heptachlor0.180.0112-5.69E-660.7-1,410,000-0.131024-57-3Heptachlor-~~
~~epoxide0.20.0132-4.23E-60.0003983,2000.00063~~

~~CAS-No.-~~

Chemical

~~Solubility in Water (S)~~

~~(mg/L)~~

~~Diffusivity in Air (Di)~~

~~(cm²/s)~~

~~Diffusivity in Water (Dw)~~

~~(cm²/s)Dimensionless~~

~~Henry's Law Constant (H')~~

~~(25°C)Organic Carbon Partition Coefficient (Koc)~~

~~(L/kg)First~~

~~Order~~

~~Degradation Constant~~

~~(1)~~

~~(d 1)118-74-1Hexachlorobenzene6.2-0.0542-5.91E-60.0541-55,000-0.00017319-84-6Alpha HCH (alpha BHC)2.00-0.0142-7.34E-60.0004351,2300.002558-89-9Gamma HCH (Lindane)6.80-0.0142-7.34E-60.0005741,0700.002977-47-4Hexachlorocyclo-Pentadiene1.80-0.0161-7.21E-61.11200,000-0.01267-72-1Hexachloroethane500.00256.80E-60.1591,780-0.00192193-39-5Indeno(1,2,3-e,d)pyrene0.0000220-0.0190-5.66E-60.00006563,470,0000.0004778-59-1Isophorone12,000-0.06236-76E-60.00027246.8-0.012387439-97-6Mercury-0.0307-6.30E-6-0.467-
-No Data72-43-5Methoxychlor0.0450-0.01564.46E-60.00064897,7000.001974-83-9Methyl Bromide15,200-0.07281-21E-50.25610.5-0.018241634-04-4Methyl tertiary-butyl ether51,0000-1021-10E-50.024111.5-
-No Data75-09-2Methylene Chloride13,0000-101-1.17E-50.089811.7-0.012~~

CAS No-

Chemical

~~Solubility in Water (S)~~

~~(mg/L)~~

~~Diffusivity in Air (Di)~~

~~(cm²/s)~~

~~Diffusivity in Water (Dw)~~

~~(cm²/s)Dimensionless~~

~~Henry's Law Constant (H')~~

~~(25°C)Organic Carbon Partition Coefficient (Koc)~~

~~(L/kg)First~~

~~Order~~

~~Degradation Constant~~

~~(1)~~

~~(d 1)95-48-72-Methylphenol (o-cresol)26,000-0.0740-8.30E-60.000049291.2-0.049591-20-3Naphthalene31.00-0.0590-7.50E-60.01982,000-0.002798-95-3Nitrobenzene2,0900-0.0760-8.60E-60.00098464.6-0.0017686-30-6N-Nitrosodiphenylamine35.10-0.03126-35E-60.0002051,2900.01621-64-7N-Nitrosodi-n-propylamine9,8900-0.0545-8.17E-60.000092324.0-0.001987-86-5Pentachlorophenol11,9500-0.05606-10E-60.000001592-0.00045108-95-2Phenol82,800-0.0820-9.10E-60.000016328.8-0.0991918-02-1Picloram4300-0.02555-28E-60.000000001661.98No Data1336-36-3Polychlorinated biphenyls (PCBs)0.7-a-a-a-a-a-309,000-
-No Data129-00-0Pyrene0.1350-0.0272-7.24E-60.000451105,0000.00018122-34-9Simazine50-0.0277-36E-60.0000000133133No Data100-42-5Styrene3100-0.0710-8.00E-60.113776-0.0033~~

~~CAS No.~~

~~Chemical~~

~~Solubility in Water (S)~~

~~(mg/L)~~

~~Diffusivity in Air (Di)~~

~~(cm²/s)~~

~~Diffusivity in Water (Dw)~~

~~(cm²/s) Dimensionless~~

~~Henry's Law Constant (H')~~

~~(25°C) Organic Carbon Partition Coefficient (Koc)~~

~~(L/kg) First~~

~~Order~~

~~Degradation Constant~~

~~(1)~~

~~(d 1) 93-72-12,4,5 TP (Silvex) 310.01945.83E-60.0000000325,440 No Data 127-18-4
Tetrachloroethylene 2000.0720 8.20E-60.754155 0.00096108 88-3 Toluene 526-0.0870-
8.60E-60.272182 0.0118001 35-2 Toxaphene 0.740.0116 4.34E-60.000246257,000 No-
Data 120-82-11,2,4 Trichlorobenzene 3000.0300 8.23E-60.05821,780 0.001971 55-
61,1,1 Trichloroethane 1,330 0.0780 8.80E-60.705110 0.001379 00 51,1,2-
Trichloroethane 4,420 0.0780 8.80E-60.037450.10.0009579 01-
6 Trichloroethylenel,100 0.0790 9.10E-60.422166 0.0004295 95-42,4,5-
Trichlorophenol 1,2000.0291 7.03E-60.0001781,6000.0003888 06-22,4,6-
Trichlorophenol 8000.0318 6.25E-6 0.000319 381 0.00038108 05-4 Vinyl-
Acetate 20,0000.0850 9.20E-60.0215.25 No Data 57-01 4 Vinyl Chloride 2,760 0.106-
1.23E 61.1118.6 0.00024108 38 3m Xylene 161 0.0707.80E-60.301407 0.0019~~

~~CAS No.~~

~~Chemical~~

~~Solubility in Water (S)~~

~~(mg/L)~~

~~Diffusivity in Air (Di)~~

~~(cm²/s)~~

~~Diffusivity in Water (Dw)~~

~~(cm²/s) Dimensionless~~

~~Henry's Law Constant (H')~~

~~(25°C) Organic Carbon Partition Coefficient (Koc)~~

~~(L/kg) First~~

~~Order~~

~~Degradation Constant~~

~~(1)~~

~~(d 1) 95-47-6o Xylene 178 0.0871.00E-50.213363 0.0019106 42-3p Xylene 185-
0.07698.44E-60.314389 0.00191330 20-7 Xylenes (total) 186 0.0720 9.34E-60.25260-
0.0019~~

~~Chemical Abstracts Service (CAS) registry number. This number in the format xxx-
xx-x, is unique for each chemical and allows efficient searching on computerized
data bases.~~

~~a Soil Remediation objectives are determined pursuant to 40 CFR 761, as incorporated by reference at Section 732.104 (the USEPA "PCB Spill Cleanup Policy"), for most sites; persons remediating sites should consult with BOL if calculation of Tier 2 soil remediation objectives is desired.~~

~~CAS No.~~

~~Chemical~~

~~Solubility in Water (S)
(mg/L)~~

~~Diffusivity in Air (Di)
(cm²/s)~~

~~Diffusivity in Water (Dw)
(cm²/s) Dimensionless~~

~~Henry's Law Constant (H')~~

~~(25°C) Dimensionless (25°C) Dimensionless Henry's Law Constant (H') (13eC) °C~~

For the indoor inhalation exposure route Organic Carbon Partition Coefficient (Koc) (L/kg) First Order Degradation Constant (l) (d-1) Vapor Pressure (mm/Hg) Neutral Organics

83-32-9 Acenaphthene	3.60E+004	7.6E-027	6.9E-066	6.0E-03	-----																																																							
-b6	3.0E+033	4.0E-032	5.0E-036	7-64-1 Acetone	1.00E+061	2.4E-011	1.4E-051	6.0E-039	7.3E-047	8.0E-014	9.5E-022	3.0E+021	5972-60-8 Alachlor	2.40E+022	1.3E-025	2.8E-063	4.0E-06	----																																										
---	b3	2.0E+03	No Data	2.20E-05	116-06-3 Aldicarb	6.03E+033	1.8E-027	2.4E-065	9.0E-08	-----																																																		
--	b1	2.9E+011	1.09E-033	4.7E-05	309-00-2 Aldrin	1.70E-021	9.6E-024	8.6E-067	0.0E-03	-----																																																		
b2	5.0E+055	9.0E-046	0.0E-06	120-12-7 Anthracene	4.30E-023	8.5E-027	7.4E-062	7.0E-03	-----																																																			
--	b2	5.0E+047	5.0E-042	7.0E-06	1912-24-9 Atrazine	7.00E+012	5.9E-026	6.7E-069	6.8E-08	----																																																		
---	b3	6.3E+02	No Data	2.70E-07	71-43-2 Benzene	1.80E+038	8.0E-021	0.2E-052	3.0E-011	3.4E-015	0.0E+019	0.0E-049	5.0E+01																																															
56-55-3 Benzo(a)anthracene	9.40E-035	1.0E-029	0.0E-06	1.39E-04	-----	b4	0.0E+055	1.0E-041	1.0E-07	205-99-2 Benzo(b)fluoranthene	1.50E-032	2.3E-025	5.6E-064	5.5E-03	-----																																													
b1	0.5E+065	7.0E-045	0.0E-07	207-08-9 Benzo(k)fluoranthene	8.00E-042	2.3E-025	5.6E-063	4.0E-05	-----	b1	0.0E+061	6.0E-042	0.0E-09	65-85-0 Benzoic Acid	3.40E+037	0.2E-027	9.7E-061	1.5E-06	-----																																									
---	b1	2.1E+00	d No Data	7.00E-04	50-32-8 Benzo(a)pyrene	1.60E-034	3.0E-029	4.9E-064	5.0E-05	-----	b7	9.0E+056	5.0E-045	5.0E-09	111-44-4 Bis(2-chloroethyl) ether	1.72E+044	1.3E-027	5.3E-067	4.0E-042	9.4E-041	2.6E+011	9.0E-031	5.5E+00	117-81-7 Bis(2-ethylhexyl)phthalate	3.40E-013	5.1E-023	6.6E-064	1.0E-06	----																															
---	b1	0.0E+05	1.80E-036	8.0E-08	75-27-4 Bromodichloromethane	6.70E+035	6.1E-021	0.6E-056	6.0E-023	7.1E-025	0.0E+01	No Data	5.00E+01	75-25-2 Bromoform	3.10E+031	4.9E-021	0.3E-052	1.9E-021	0.6E-029	1.2E+011	9.0E-035	5.1E+00	71-36-3 Butanol	7.40E+048	0.0E-029	3.0E-063	6.1E-041	5.5E-046	0.0E+00	1.28E-027	0.0E+00	78-93-32 Butanone (MEK)	2.20E+058	0.8E-029	8E-062	3.0E-031	3.2E-032	0.0E+00	4.95E-029	5.0E+01	85-68-7 Butyl Benzyl Phthalate	2.70E+00	1.99E-024	8.9E-065	3.0E-05	-----	b6	3.0E+043	8.5E-038	3.0E-068	6-74-8 Carbazole	1.20E+00	4.17E-027	4.5E-063	6.0E-06	-----	b4	0.0E+03	No Data	7.00E-04
1563-66-2 Carbofuran	3.20E+022	3.7E-025	9.5E-06	1.27E-07	-----	b1	9.1E+02	No Data	4.85E-06	75-15-0 Carbon Disulfide	1.20E+031	0.4E-011	0.0E-05	1.23E+00	8.06E-016	3.0E+01	No Data	3.60E+02	256-23-5 Carbon Tetrachloride	7.90E+027	8.0E-028	8.0E-06	1.23E+00	7.48E-012	0.0E+02	1.90E-03	1.20E+02	57-74-9 Chlordane	5.60E-02	1.79E-02	4.37E-06	2.00E-03	-----																											
-b2	5.0E+05	2.50E-04	9.80E-06	106-47-8 p-Chloroaniline	5.30E+036	9.9E-02	1.01E-05	4.76E-																																																				

05-----b6.31E+01No Data1.23E-02108-90-7Chlorobenzene4.70E+027.30E-028.70E-061.50E-017.93E-022.00E+022.30E-031.20E+01124-48-1Chlorodibromomethane2.60E+033.66E-021.05E-053.20E-022.07E-026.92E+013.85E-034.90E+0067-66-3Chloroform 7.90E+031.04E-011.00E-051.50E-019.18E-025.00E+013.90E-042.00E+0295-57-82-Chlorophenol 2.20E+046.61E-029.46E-061.60E-027.28E-035.93E+01dNo Data2.34E+00218-01-9Chrysene 6.30E-032.44E-026.21E-063.90E-03-----b4.00E+053.50E-046.20E-0994-75-72,4-D 6.77E+025.88E-026.49E-064.18E-07-----b5.75E+023.85E-036.00E-0772-54-84,4'-DDD 9.00E-022.27E-025.79E-061.60E-04-----b7.90E+056.20E-056.70E-07
72-55-94,4'-DDE 1.20E-012.38E-025.87E-068.60E-04-----b4.00E+056.20E-056.00E-0650-29-34,4'-DDT 2.50E-021.99E-024.95E-063.30E-04-----b2.00E+066.20E-051.60E-0775-99-0Dalapon 9.00E+056.08E-029.45E-062.64E-06NA4.80E+005.78E-031.90E-0153-70-3Dibenzo(a,h)anthracene 2.50E-032.11E-025.24E-066.10E-07-----
b2.50E+063.70E-041.00E-1096-12-81,2-Dibromo-3-chloropropane 1.20E+032.68E-027.02E-066.20E-03cNA7.90E+011.93E-035.80E-01106-93-41,2-Dibromoethane 4.00E+034.37E-028.44E-063.00E-021.54E-025.00E+015.78E-031.30E+0184-74-2Di-n-butyl Phthalate 1.10E+014.38E-027.86E-067.40E-05-----a4.00E+043.01E-027.30E-051918-00-9Dicamba 4.50E+032.37E-025.95E-062.18E-09-----a2.95E+00No Data3.38E-0595-50-11,2-Dichlorobenzene 1.56E+026.90E-027.90E-067.79E-023.56E-025.75E+021.90E-031.36E+00106-46-71,4-Dichlorobenzene 7.90E+016.90E-027.90E-069.80E-024.69E-027.90E+021.90E-031.00E+0091-94-13,3-Dichlorobenzidine 3.10E+002.59E-026.74E-061.60E-07-----a2.82E+031.90E-033.71E-0875-71-8Dichlorodifluoromethane 2.80E+027.60E-021.08E-051.41E+018.14E+006.17E+011.92E-034.85E+03
75-34-31,1-Dichloroethane 5.10E+037.42E-021.05E-052.30E-011.42E-013.20E+011.90E-032.30E+02107-06-21,2-Dichloroethane 8.50E+031.04E-029.90E-064.00E-022.29E-022.00E+011.90E-037.90E+0175-35-41,1-Dichloroethylene 2.30E+039.00E-021.04E-051.10E+007.10E-015.00E+015.30E-036.00E+02156-59-2Cis-1,2-Dichloroethylene 3.50E+038.86E-021.13E-051.70E-011.00E-014.00E+012.40E-042.00E+02156-60-5Trans-1,2-Dichloroethylene 6.30E+037.03E-021.19E-053.90E-012.43E-015.00E+012.40E-043.30E+02120-83-22,4-Dichlorophenol 4.50E+034.89E-028.77E-061.30E-04-----
a7.32E+02d2.70E-046.70E-0278-87-51,2-Dichloropropane 2.80E+037.82E-028.73E-061.10E-016.52E-025.00E+012.70E-045.20E+01542-75-61,3-Dichloropropylene (cis + trans) 2.80E+036.26E-021.00E-057.40E-013.98E-012.00E+016.10E-023.40E+0160-57-1Dieldrin 2.00E-011.92E-024.74E-066.2E-04-----a2.50E+043.20E-045.9E-0684-66-2Diethyl Phthalate 1.10E+032.49E-026.35E-061.80E-05-----a3.20E+026.19E-031.60E-03105-67-92,4-Dimethylphenol 7.90E+036.43E-028.69E-068.20E-05-----
a2.00E+024.95E-029.80E-0275-71-81,3-Dinitrobenzene 8.60E+024.55E-028.46E-062.30E-07-----a3.20E+011.92E-039.00E-0451-28-52,4-Dinitrophenol 2.79E+032.73E-029.06E-061.82E-05-----a3.24E+011.32E-035.10E-03
121-14-22,4-Dinitrotoluene 2.70E+022.03E-017.06E-063.80E-06-----
a8.90E+011.92E-031.47E-04606-20-22,6-Dinitrotoluene 1.82E+023.70E-027.76E-063.06E-05-----a4.90E+011.92E-035.67E-0488-85-7Dinoseb 5.20E+012.45E-026.25E-061.87E-05-----a9.17E+01d2.82E-037.50E-05117-84-0Di-n-octyl Phthalate 2.00E-021.73E-024.17E-062.74E-03-----a1.30E+051.90E-032.60E-06123-91-lp-Dioxane 1.00E+062.29E-011.02E-051.97E-041.07E-047.20E-011.92E-033.81E+01115-29-7Endosulfan 5.10E-011.85E-024.55E-064.51E-04-----a5.00E+037.63E-021.00E-05145-73-3Endothall 2.10E+042.91E-028.07E-061.58E-14-----a7.59E+01No Data1.57E-1072-20-8Endrin 2.50E-011.92E-024.74E-63.08E-04-----a3.20E+043.20E-043.00E-06100-41-4Ethylbenzene 1.70E+027.50E-027.80E-063.24E-011.64E-013.20E+023.00E-039.60E+00206-44-0Fluoranthene 2.06E-012.51E-026.35E-066.60E-04-----
a7.40E+041.90E-041.23E-0886-73-7Fluorene 2.00E+004.40E-027.88E-062.62E-03-----
a1.30E+046.91E-046.30E-0476-44-8Heptachlor 1.80E-012.23E-025.69E-066.07E-021.73E-023.00E+031.30E-014.00E-041024-57-3Heptachlor epoxide 2.00E-012.19E-025.57E-063.90E-04-----a2.00E+056.30E-041.90E-05
118-74-1Hexachlorobenzene 6.20E-035.42E-025.91E-065.33E-021.35E-022.00E+041.70E-041.80E-05319-84-6Alpha-HCH (alpha-BHC) 2.00E+002.04E-025.04E-064.51E-04-----

a5.00E+032.50E-034.50E-0558-89-9Gamma-HCH (Lindane) 7.30E+002.75E-027.34E-065.74E-04-----a3.00E+032.90E-034.10E-042691-41-0High Melting Explosive, Octogen (HMX) 5.00E+002.69E-027.15E-068.67E-103.55E-081.40E+00No Data3.30E-1477-47-4Hexachlorocyclo-
Pentadienepentadiene 1.80E+002.79E-027.21E-061.11E+004.22E-011.20E+041.20E-025.96E-0267-72-1Hexachloroethane 5.00E+012.50E-036.80E-061.59E-017.26E-021.50E+031.92E-032.10E-01193-39-5Indeno(1,2,3-c,d)pyrene 2.20E-052.25E-025.66E-066.56E-05-----a3.10E+064.70E-041.00E-1078-59-1Isophorone 1.20E+046.23E-026.76E-062.72E-041.12E-042.50E+011.24E-024.38E-0198-82-8Isopropylbenzene (Cumene) 6.10E+016.50E-027.10E-064.92E+012.10E+011.02E+034.33E-024.50E+0093-65-2Mecoprop (MCP) 8.95E+022.40E-026.05E-067.70E-09-----a1.84E+01d3.85E-032.44E-057439-97-6Mercury 6.00E-027.14E-023.01E-054.51E-011.59E-018.70E+03No Data2.00E-0372-43-5Methoxychlor 4.50E-021.84E-024.46E-066.56E-04-----a5.00E+041.90E-036.00E-0774-83-9Methyl Bromide 1.50E+047.28E-021.21E-052.56E-011.79E-011.00E+011.82E-021.62E+031634-04-4Methyl tertiary-butyl ether 5.10E+048.59E-021.10E-052.42E-021.50E-021.00E+01No Data2.50E+0275-09-2Methylene Chloride 1.30E+041.01E-011.17E-059.02E-025.70E-021.30E+011.20E-024.30E+02
93-65-22-Methylnaphthalene 2.50E+015.22E-027.75E-062.10E-026.95E-031.60E+03No Data6.80E-0295-48-72-Methylphenol (o-cresol) 2.60E+047.40E-028.30E-064.92E-052.00E-054.20E+014.95E-022.99E-0191-20-3Naphthalene 3.10E+015.90E-027.50E-061.97E-028.29E-035.00E+022.70E-038.50E-0298-95-3Nitrobenzene 2.09E+037.60E-028.60E-069.84E-043.99E-044.00E+011.76E-032.40E-0186-30-6N-Nitrosodiphenylamine 3.50E+012.83E-027.19E-062.10E-04-----a1.00E+031.00E-026.70E-04621-64-7N-Nitrosodi-n-propylamine 9.89E+035.87E-028.17E-069.20E-055.48E-051.45E+011.90E-031.30E-0187-86-5Pentachlorophenol 2.00E+035.60E-026.10E-069.84E-07-----a2.77E+03d4.50E-043.20E-05108-95-2Phenol 8.30E+048.20E-029.10E-061.64E-056.67E-062.00E+019.90E-022.80E-011918-02-1Picloram 4.30E+022.26E-025.64E-062.19E-12-----a2.00E+00No Data7.21E-111336-36-3Polychlorinated biphenyls (PCBs) -----a-----a-----a-----a-----a-----a-----a129-00-0Pyrene 1.40E+002.77E-027.24E-064.51E-04-----a6.31E+041.80E-044.60E-06121-82-4Royal Demolition Explosive, Cyclonite (RDX) 5.97E+013.11E-028.49E-062.01E-11-----a7.20E+00No Data4.10E-09122-34-9Simazine 6.20E+002.48E-026.28E-063.80E-08-----a1.32E+02No Data2.21E-08100-42-5Styrene 3.10E+027.10E-028.00E-061.11E-015.48E-033.16E+023.30E-036.10E+0093-72-12,4,5-TP (Silvex) 7.10E+012.30E-025.83E-063.71E-07-----a5.50E+03No Data9.97E-06
127-18-4Tetrachloroethylene 2.00E+027.20E-028.20E-067.38E-014.00E-016.31E+029.60E-041.90E+01108-88-3Toluene 5.30E+028.70E-028.60E-062.71E-011.49E-011.58E+021.10E-022.80E+018001-35-2Toxaphene7.40E-012.16E-025.51E-062.46E-04-----a5.01E+04No Data9.80E-07120-82-11,2,4-Trichlorobenzene3.50E+013.00E-028.23E-065.74E-022.38E-021.58E+031.90E-034.30E-0171-55-61,1,1-Trichloroethane1.30E+037.80E-028.80E-066.97E-014.21E-011.26E+021.30E-031.20E+0279-00-51,1,2-Trichloroethane4.40E+037.80E-028.80E-063.73E-021.98E-025.01E+019.50E-042.30E+0179-01-6Trichloroethylene1.50E+037.90E-029.10E-064.10E-012.41E-011.00E+024.20E-047.30E+0175-69-4Trichlorofluoromethane1.10E+038.70E-029.70E-063.98E+002.69E+001.30E+029.63E-048.00E+0295-95-42,4,5-Trichlorophenol1.20E+032.91E-027.03E-061.78E-04-----a2.68E+03d3.80E-042.40E-0288-06-22,4,6-Trichlorophenol8.00E+022.61E-026.36E-063.53E-04-----a8.78E+02d3.80E-042.00E-02108-05-4Vinyl Acetate2.00E+048.50E-029.20E-062.09E-021.18E-024.57E+00No Data9.00E+0199-35-41,3,5-Trinitrobenzene2.80E+022.41E-026.08E-063.30E-10-----a1.60E+01No Data6.40E-06118-96-72,4,6-Trinitrotoluene (TNT) 1.24E+022.94E-027.90E-064.87E-09-----a3.72E+011.92E-032.02E-0657-01-4Vinyl Chloride8.80E+031.06E-011.23E-061.11E+008.14E-011.58E+012.40E-043.00E+03108-38-3m-Xylenel.60E+027.00E-027.80E-062.99E-011.52E-013.98E+021.90E-038.50E+00
95-47-6o-Xylenel.80E+028.70E-021.00E-052.13E-011.07E-013.16E+021.90E-036.60E+00106-42-3p-Xylenel.60E+027.69E-028.44E-063.16E-011.59E-013.16E+021.90E-

038.90E+001330-20-7Xylenes (total)1.10E+027.35E-029.23E-062.71E-01NA3.98E+021.90E-038.00E+00

Chemical Abstracts Service (CAS) registry number. This number in the format xxx-xx-x, is unique for each chemical and allows efficient searching on computerized ~~data bases-~~databases.

a Soil remediation objectives are determined pursuant to 40 CFR 761, as incorporated by reference at Section 742.210(b) (the USEPA "PCB Spill Cleanup Policy"), for most sites; persons remediating sites should consult with BOL if calculation of Tier 2 or 3 remediation objectives is desired. PCBs are a mixture of different congeners. The appropriate values to use for the physical/chemical parameters depend on congeners present at the site.

b Dimensionless Henry's Law Constant at 13°C is not calculated because the chemical is not volatile and does not require evaluation under the indoor inhalation exposure route.

c Dimensionless Henry's Law Constant = 20°C

d These chemicals are ionizing and its Koc value will change with pH. The Koc values listed in this table is the effective Koc at pH of 6.8. If the site-specific pH is ~~values a value~~ other than 6.8, the Koc value listed ~~in Section 742,~~ Appendix C, Table I should be used.

e The values in this table were taken from the following sources (in order of preference): SCDMS online database (<http://www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm>); CHEMFATE online database (<http://www.srcinc.com/what-we-do/databaseforms.aspx?id=381>); PhysProp online database (<http://www.srcinc.com/what-we-do/databaseforms.aspx?id=386>); Water⁹ (<http://www.epa.gov/ttn/chief/software/water/>) for diffusivity values; and Handbook of Environmental Degradation Rates by P.H. Howard (1991) for first order degradation constant values.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.APPENDIX C:— Tier 2 Illustrations and Tables

Section 742.~~Table~~TABLE F:— Methods for Determining Physical Soil Parameters

Methods for Determining Physical Soil Parameters ParameterSampling
LocationaMethod?b (soil bulk density)SurfaceASTM - D 1556-90
Sand Cone MethodbASTM - D 2167-94
Rubber Balloon MethodbASTM - D 2922-91
Nuclear MethodbSubsurfaceASTM - D 2937-94
Drive Cylinder Methodb?s (soil particle density)Surface or SubsurfaceASTM - D 854-92
Specific Gravity of ~~Soilbw~~Soilbw (moisture content)Surface or SubsurfaceASTM - D 4959-89 (Reapproved 1994)
StandardbASTM -D D 4643-93
Microwave OvenbASTM -D D2216-92
Laboratory DeterminationbASTM -D D3017-88 (Reapproved 1993)
Nuclear MethodbEquivalent USEPA Method (e.g., sample preparation procedures described in methods 3541 or 3550)foc (fraction organic carbon content)Surface or SubsurfaceASTM - D 2974-00

Moisture, Ash, and Organic ~~Matter~~Matter appropriately adjusted to estimate the fraction of organic carbon as stated in Nelson and Sommers (1982) b ? or ~~?TTT~~ (total soil porosity) Surface or Subsurface (calculated) Equation S24 in Appendix C, Table A for SSL Model, or Equation R23 in Appendix C, Table C for RBCA Model, or Equation J&E 16 in Appendix C, Table L for J&E ~~Model~~?ModelTa or ~~?as~~Tas (air-filled soil porosity) Surface or Subsurface (calculated) Equation S21 in Appendix C, Table A for SSL Model, or Equation R21 in Appendix C, Table C for RBCA Model, or Equation J&E 18 in Appendix C, Table L for J&E ~~Model~~?ModelTw or ~~?ws~~Tws (water-filled soil porosity) Surface or Subsurface (calculated) Equation S20 in Appendix C, Table A for SSL Model, or Equation R22 in Appendix C, Table C for RBCA Model, or Equation J&E 17 in Appendix C, Table L for J&E ~~Model~~

~~ASTM—D 5084-90~~Flexible Wall Permeameter~~b~~ModelK (hydraulic conductivity) Surface or ~~Subsurface~~PumpSubsurfaceASTM-D 5084-90 Flexible Wall Permeameter~~b~~Pump Test Slug Testi (hydraulic gradient) Surface or Subsurface Field Measurement

- a This is the location where the sample is collected
- b As incorporated by reference in Section 742.120.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.APPENDIX C:— Tier 2 Tables

Section 742.~~Table~~TABLE L:— J&E Equations

Indoor air remediation objectives (mg/m³)

For carcinogenic contaminants

J&E1 For noncarcinogenic contaminants

J&E2 To convert mg/m³ from parts per million volume

Note: 24.45 equals the molar volume of air in liters at normal temperature (25°C) and pressure (760 ~~mm-Hg~~mmHg). J&E3 Soil gas remediation objective (mg/m³)

J&E4 Soil Vapor Saturation Limit

(mg/m³-air) J&E5 Groundwater remediation objectives

J&E6 Attenuation factor

Attenuation factor when the mode of contaminant transport is both diffusion and advection

Q_{soil} = 83.33 cm³/sec

J&E7 Attenuation factor when the mode of contaminant transport is diffusion only

Q_{soil} = 0 cm³/sec

J&E8 Total overall effective diffusion coefficient for vapor transport in porous media for multiple soil layers (cm²/s) J&E9 ~~a~~InIn Equation J&E9a, the following condition must be satisfied: J&E9b

Source to building separation (cm) J&E10 Effective diffusion coefficient for each soil layer (cm²/s) J&E11

Surface area of enclosed space at or below grade (cm²)

For a slab-on-grade ~~building~~JbuildingJ&E12a Surface ~~are~~area of enclosed space at or below grade (cm²) For a building with a basement J&E12b Building ventilation rate (cm³/s)

J&E13

Area of total cracks (cm²)

J&E14 Effective diffusion coefficient through the cracks (cm²/s)

J&E15 Total porosity ~~Jporosity~~ J&E16 Water-filled soil porosity ~~Jporosity~~ J&E17 Air-filled soil porosity ~~Jporosity~~ J&E18

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 742. APPENDIX C:— Tier 2 Tables

Section 742. ~~Table~~ TABLE M:— J&E Parameters

Symbol ~~Parameter~~ Units ~~Parameter~~ Units Source Tier 1 or
Calculated Value ~~ABS~~ Surface area of enclosed space at or below grade ~~cm²~~ Equation
J&E 12a or 12b, Appendix C, Table ~~LResidential~~ LResidential = 1 x 10⁶
Industrial/Commercial = 4.0 x 10⁶ ~~A~~ crack Area of total cracks ~~cm²~~ Equation J&E 14,
Appendix C, Table ~~LCalculated~~ LCalculated Value ~~ATc~~ Averaging time for
~~carcinogens~~ year ~~SSL~~ carcinogens year SSL, May 1996 ~~70~~ 199670 ~~ATnc~~ Averaging time for
~~noncarcinogens~~ year ~~noncarcinogens~~ year ATnc = ED Residential = 30
ATnc = ED

~~Residential~~ = 30

Industrial/Commercial = 25

~~Cvsat~~ ~~Soil~~ Cvsat Soil vapor saturation limit ~~mg/m³-air~~ Equation J&E 5, Appendix C,
Table ~~L~~ Chemical-Specific or Calculated Value ~~Dcrack~~ eff Effective diffusion
coefficient through the cracks ~~cm²-/s~~ Equation s Equation J&E 15, Appendix C, Table
~~L~~ Calculated L Calculated Value ~~Di~~ Diffusivity in air ~~cm²-/s~~ Appendix s Appendix C,
Table E

~~Chemical-Specific~~ Di eff Effective E Chemical-Specific Di eff Effective diffusion
coefficient for each soil layer ~~cm²-/s~~ Equation layer cm²/s Equation J&E 11,
Appendix C, Table L

~~Calculated Value~~

~~Dsource~~ Distance L Calculated Value Dsource Distance from ground surface to top of
~~contamination~~ cm Field Measurement Soil contamination cm Field Measurement Soil
Contamination = 152.4 Groundwater Contamination = 304.8 ~~Site-Specific~~
~~D~~ Teff Total Specific D Teff Total overall effective diffusion
~~coefficient~~ cm coefficient cm² /s Equation J&E 9a, Appendix C, Table L Calculated
Value Dw Diffusivity in water ~~cm²-/s~~ Appendix s Appendix C, Table E Chemical E Chemical-
Specific E Exposure duration year Residential duration year Residential: SSL, May
1996

Industrial/Commercial: SSL 2002 Residential = 30 Industrial/Commercial =
25 ~~E~~ Exposure E Exposure frequency

day/year Residential year Residential: SSL, May 1996

Industrial/Commercial: SSL 2002 Residential = 350 Industrial/ Commercial =
250 E Air exchange rate exchanges per hour

~~Illinois-EPAResidential~~ hour Illinois-EPAResidential = 0.53 Industrial/
Commercial = 0.93 foc Fraction organic carbon ~~content~~ g/g SSL content g/g SSL, May
1996, or Field Measurement

Appendix C, Table F0.002 or ~~Site-Specific~~

~~HB~~ Height of building cm

~~Illinois-EPASlab-on-Grade~~ Specific HB Height of building cm Illinois-EPASlab-on-Grade
Residential = 244 Industrial/ Commercial = 305 or Site-Specific in Tier 3

Basement Residential = 427 Industrial/ Commercial = 488 or Site-Specific in Tier
3 H' T Dimensionless T Dimensionless Henry's law constant at the system (soil)

temperature

13°C unitless Appendix C, Table E

~~Chemical-Specific~~ L B

~~Length of building~~ cm

~~Illinois EPA Residential = 1000~~ 13°C unitless Appendix C, Table E Chemical-Specific Length of building cm Illinois EPA Residential = 1000
Industrial/Commercial = 2000 or Site-Specific in Tier 3 ~~crack Slab thickness cm US-EPA thickness cm USEPA~~, Users Guide ~~2004~~

~~10~~

L Distance, 2004 10 L Distance from ground surface to bottom of slab
~~cm US-EPA slab cm USEPA~~, Users Guide ~~2004 10, 2004 10~~ (slab on grade) 200
(basement) Li Thickness Li Thickness of soil layer ~~i cm Field cm Field~~ Measurement ~~For capillary fringe for Capillary Fringe~~, USEPA, 2004 Site-Specific
For ~~capillary fringe~~ Capillary Fringe, 37.5 cm LT Distance from bottom of slab to top of ~~contamination cm Field contamination cm Field~~ Measurement or Equation J&E 10, Appendix C, Table L 142.4 or Site-Specific
~~MW Molecular Specific MW Molecular~~ weight g/mole
~~Illinois EPA~~

~~Chemical Specific n Total mole Illinois EPA Chemical-Specific n Total~~ number of layers of different types of soil vapors migrate through from source to building (if source is groundwater, include a capillary fringe layer of 37.5 cm as one of the layers) ~~unitless Field measurement Site unitless Field Measurement Site-Specific P Vapor Pressure atm Appendix C, Table E Chemical-Specific Q bldg Building Specific Q bldg Building~~ ventilation rate ~~cm³/s Equations Equation~~ J&E 13, Appendix C, Table ~~L Slab L Slab-on~~ Grade Residential = 3.59 x 10⁴
Industrial/ Commercial = 3.15 x 10⁵
or Site-Specific in Tier 3

Basement

Residential = 6.28 x 10⁴

Industrial/Commercial = 5.04 x 10⁵

or Site-Specific in Tier 3 ~~Q soil Volumetric Q soil Volumetric~~ flow rate of soil gas into the enclosed space

~~cm³/s US-EPA space cm³/s USEPA~~, Users Guide for Evaluating Subsurface Vapor Intrusion into Buildings, 2004 If LT is less than 5 feet (152 cm), Q_{soil} equals ~~83.33~~ 83.33.

If LT is 5 feet (152 cm) or greater, Q_{soil} equals zero .

An input value of zero requires an institutional control. See Section 742.505(b) and (c). R Ideal gas constant atm-L/mol KUS-EPA K USEPA, Users Guide, 2004 0.08206
~~Rf Reference Rf Reference~~ concentration ug/ug/m³ Illinois EPA:
<http://www.epa.state.il.us/land/taco/toxicity-values.xls>

~~Toxicological Specific ROgw Groundwater xls Toxicological-Specific ROgw Groundwater~~ remediation objective mg/L Appendix L Appendix B, Table E, or Equation J&E 6, Appendix C, Table ~~L Chemical L Chemical-Specific~~ or Calculated Value

~~RO indoor air Indoor Value RO indoor air Indoor~~ air remediation objective mg/m³ Equations J&E 1 and 2, Appendix C, Table L
Calculated Value

~~RO soil gas Soil L Calculated Value RO soil gas Soil~~ gas remediation objective mg/m³ Equation J&E 4, Appendix C, Table L Calculated L Calculated
Value SS Solubility in water mg/L Appendix L Appendix C, Table ~~E Chemical E Chemical-Specific~~ Temperature KUS-EPA K USEPA, Users Guide, 2004 286 (converted from 13°C) THQ Target hazard quotient for a chemical unitless
SSL, May 1996

~~1 TR Target chemical unitless SSL, May 1996 1 TR Target~~ risk or the increased chance of developing cancer over a lifetime due to exposure to a

~~chemicalunitlessSSL~~chemicalunitlessSSL, May 1996 Residential = 10⁻⁶ at the point of human exposure
Industrial/Commercial = 10⁻⁶ at the point of human ~~exposure~~

~~URFUnit~~exposureURFUnit risk factor (ugug/m³) -1 Illinois EPA:
<http://www.epa.state.il.us/land/taco/toxicity-values.xls> ~~Toxicological~~
~~Specifiew Floor~~xlsToxicological- SpecificwFloor-wall seam ~~gap-cmUS-~~
~~EPAgapcmUSEPA~~, Users Guide, 20040.1 Wmoisture contentg of water/g of soilField
Measurement, Appendix C, Table FSite-~~Specifie~~SpecificWBWidth of
buildingcmIllinois EPAResidential = 1000
~~WB~~
~~Width of buildingem~~
~~Illinois EPA~~

~~Residential = 1000~~
Industrial/ Commercial = 2000
or Site-Specific in Tier 3aAttenuation ~~factor-~~
~~unitlessEquations~~factorunitlessEquations J&E 7 or 8, Appendix C, Table ~~L~~Site-
~~SpecifieqaAir~~LSite-SpecificTaAir-filled soil porositycm³/cm³SSL, May 1996 or
Equation J&E 18, Appendix C, Table L0.28 or Calculated ~~Valueqa~~ValueTa, crackAir-
filled porosity for soil in crackscm³/cm³SSL, May 1996 or
Equation J&E 18, Appendix C, Table L0.13~~qa?i~~a, iAir-filled porosity of soil layer
icm³/cm³SSL, May 1996 or
Equation J&E 18, Appendix C, Table L0.13 or Calculated Value
For capillary fringe, ~~qaTa~~, i = 0.1 ~~qTT~~, i~~qTT~~qTT, crackTotal porosity for soil in
crackscm³/cm³SSL, May 1996 or
Equation J&E 16, Appendix C, Table L0.43~~qTT~~qTT, iTotal porosity of soil layer
icm³/cm³SSL, May 1996 or
Equation J&E 16, Appendix C, Table L0.43 or Calculated Value~~qwWater?w~~Water-
filled soil porositycm³/cm³SSL, May 1996 or
Equation J&E 17, Appendix C, Table L0.15 or Calculated Value~~qw?w~~crackWater-
filled porosity for soil in crackscm³/cm³SSL, May 1996 or
Equation J&E 17, Appendix C, Table L0.15~~qw?w~~iWater-filled porosity of soil
layer icm³/cm³SSL, May 1996 or
Equation J&E 17, Appendix C, Table L
For capillary fringe, US EPA, Users Guide ~~20040.15~~20040.15 or Calculated Value
For capillary fringe = 0.375 or 0.9 qT, i~~qbDry?b~~Dry soil bulk densityg/cm³SSL,
May 1996 or
Field Measurement, Appendix C, Table F1.5 or Calculated ~~Valueqs~~Value?s, iSoil
particle densityg/cm³SSL, May 1996 or
Field Measurement, Appendix C, Table F2.65 or Calculated
~~ValueqwDensity~~Value?wDensity of waterg/cm³Illinois EPA1
(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 742.APPENDIX F:— Environmental Land Use Control

PREPARED BY:

Name: _____

Address: _____

RETURN TO:

Name: _____

Address: _____

THE ABOVE SPACE FOR RECORDER'S OFFICE

Model Environmental Land Use Control

THIS ENVIRONMENTAL LAND USE CONTROL ("ELUC"), is made ~~this-~~
~~_____ day of _____, 20__~~, by ~~_____~~ this day of,
20by, ("Property Owner") of the ~~real property~~realproperty located at the common
address _____ ("Property").

WHEREAS, 415 ILCS 5/58.17 and 35 Ill. Adm. Code 742 provide for the use of an ELUC as an institutional control in order to impose land use limitations or requirements related to environmental contamination so that persons conducting remediation can obtain a No Further Remediation determination from the Illinois Environmental Protection Agency ("IEPA"). The reason for an ELUC is to ensure protection of human health and the environment. The limitations and requirements contained herein are necessary in order to protect against exposure to contaminated soil, ~~or~~ groundwater, or soil gas ~~both,~~ that may be present on the property as a result of [VARIABLE] activities. Under 35 Ill. Adm. Code 742, the use of risk-based, site-specific remediation objectives may require the use of an ELUC on real property, and the ELUC may apply to certain physical features (e.g., engineered barriers, indoor inhalation building control technologies, monitoring wells, caps, etc.).

WHEREAS, _____ [the party performing remediation] intends ~~to request~~to request risk-based, site specific soil, ~~and~~ groundwater, or soil gas remediation objectives from IEPA under 35 Ill. Adm. Code 742 to obtain risk-based closure of the site, identified by Bureau of Land [10-digit LPC or Identification number] _____, utilizing an ELUC.

NOW, THEREFORE, the recitals set forth above are incorporated by reference as if fully set forth herein, and the Property Owner agrees as follows:

Date:-

By: _____

By: Director

Section One. Property Owner does hereby establish an ELUC on the real estate, ~~situated in~~situated in the County of _____, State of Illinois and further described in Exhibit ~~A attached~~Attached hereto and incorporated herein by reference (the "Property").

Attached as Exhibit B are site maps that show the legal boundary of the Property, any physical features to which the ELUC applies, the horizontal and vertical extent of the contaminants of concern above the applicable remediation objectives for soil, ~~or~~ groundwater, or soil gas ~~both,~~ and the nature, location of the source, and direction of movement of the contaminants of concern, as required under 35 Ill. Adm. Code 742.

Section Two. Property Owner represents and warrants he/she is the current owner of ~~the Property~~the Property and has the authority to record this ELUC on the chain of title for the Property with ~~the Office~~the Office of the Recorder or Registrar of Titles ~~in _____ County~~in County, Illinois.

Section Three. The Property Owner hereby agrees, for himself/herself, and his/her heirs, grantees, successors, assigns, transferees and any other owner, occupant, lessee, possessor or user of the Property or the holder of any portion thereof or interest therein, that [INSERT RESTRICTION (e.g., the groundwater under the Property shall not be used as a potable supply of water, and any contaminated groundwater or soil that is removed, excavated, or disturbed from the Property described in Exhibit A herein must be handled in accordance with all applicable laws and regulations)].

Section Four. This ELUC is binding on the Property Owner, his/her heirs, grantees, successors, assigns, transferees and any other owner, occupant, lessee, possessor or user of the Property or the holder of any portion thereof or interest therein. This ELUC shall apply in perpetuity against the Property and shall not be released until the IEPA determines there is no longer a need for this ELUC as an institutional control; until the IEPA, upon written request, issues to the site that received the no further remediation determination a new no further remediation determination approving modification or removal of the limitation(s) or requirement(s); the new no further remediation determination is filed on the chain of title of the site subject to the no further remediation determination; and until a release or modification of the land use limitation or requirement is filed on the chain of title for the Property.

Section Five. Information regarding the remediation performed on the Property may be obtained from the IEPA through a request under the Freedom of Information Act ~~+[5 ILCS 140+] and rules promulgated thereunder by providing the IEPA with the [10-digit LPC or identification number] listed above.~~

Section Six. The effective date of this ELUC shall be the date that it is officially recorded in the chain of title for the Property to which the ELUC applies.

WITNESS the following signatures:

Property Owner(s)

By: _____ Its: -
_____ Date: -

STATE OF ILLINOIS)) SS:COUNTY OF)
~~I, _____ I, the undersigned, a Notary Public for said
County and County and State, DO HEREBY CERTIFY, that _____ and
_____, that and personally known to me to be the Property Owner(s)
of _____, and personally, and personally known to me to be
the same persons whose names are subscribed to the foregoing instrument,
appeared before me this day in person and severally acknowledged that in said
capacities they signed and delivered the said instrument as their free and
voluntary act for the uses and purposes therein set forth.~~

Given under my hand and official seal, ~~this _____ day of -
_____, 20__.~~

this day of, 20 Notary Public

STATE OF _____)
~~) S.S. ILLINOIS)) SS:COUNTY OF _____)~~
I, _____, a notary public, do hereby certify that before me this day in
person appeared _____, personally known to me to be ~~the~~
~~Property the Property~~ Owner(s), of _____, each severally
acknowledged that they signed and delivered the foregoing instrument as the

Property Owner(s) herein set forth, and as their own free and voluntary act, for the uses and purposes herein set forth.

Given under my hand and official seal ~~this~~ _____ day of _____, 20__.

this day of 20, Notary Public

PIN NO. XX-XX-XXX-XXX-XXXX

(Parcel Index Number)

Exhibit A

The subject property is located in the City of _____, _____ County, State ~~of Illinois~~ of Illinois, commonly known as _____, ~~Illinois and~~ Illinois and more particularly described as: LIST THE COMMON ADDRESS; LEGAL DESCRIPTION; AND REAL ESTATE TAX INDEX OR PARCEL # (PURSUANT TO SECTION ~~742.1010~~ 742.1010 (D) (2))

PIN NO. XX-XX-XXX-XXX-XXXX

Exhibit B

IN ACCORDANCE WITH SECTION 742.1010(d) ~~(D)~~ (8) (A) - (D), PROVIDE ALL THE FOLLOWING ELEMENTS. ATTACH SEPARATE SHEETS, LABELED AS EXHIBIT B, WHERE NECESSARY.

(A) A scaled map showing the legal boundary of the property to which the ELUC applies.

(B) Scaled maps showing the horizontal and vertical extent of contaminants of concern above the applicable remediation objectives for soil, ~~and~~ groundwater, and soil gas to which the ELUC applies.

(C) Scaled maps showing the physical features to which an ELUC applies (e.g., engineered barriers, indoor inhalation building control technologies, monitoring wells, caps, etc.).

(D) Scaled maps showing the nature, location of the source, and direction of movement of the contaminants of concern.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

~~ILLINOIS REGISTER~~

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

JCAR350742-1207340r01



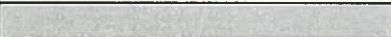
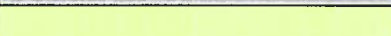

~~ILLINOIS REGISTER~~

~~POLLUTION CONTROL BOARD~~

~~NOTICE OF PROPOSED AMENDMENTS~~

Document comparison done by DeltaView on Friday, May 11, 2012 11:55:05 AM

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Document 1	file:///I:/Input/Agency Rulemakings - Files Received/2012/35-742-Agency(issue20).doc
Document 2	file:///I:/Input/Agency Rulemakings - Files Received/2012/35-742-JCAR(R01)(issue20).doc
Rendering set	Standard

Legend:	
<u>Insertion</u>	
Deletion	
Moved from	
<u>Moved to</u>	
Style change	
Format change	
Moved deletion	
Inserted cell	
Deleted cell	
Moved cell	
Split/Merged cell	
Padding cell	

Statistics:	
	Count
Insertions	691
Deletions	905
Moved from	3
Moved to	3
Style change	0
Format changed	0
Total changes	1602

JCAR350742-1207340r01

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2 SUBTITLE G: WASTE DISPOSAL
3 CHAPTER I: POLLUTION CONTROL BOARD
4 SUBCHAPTER f: RISK BASED CLEANUP OBJECTIVES

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16 742.120 Site Characterization

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STATE OF ILLINOIS
Pollution Control Board

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23 742.210 Incorporations by Reference
24 742.215 Determination of Soil Attenuation Capacity
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200	Sections 27 and 58.5 of the Environmental Protection Act [415 ILCS 5/22.4, 22.12, 27, and 58.5	
201	and Title XVI and Title XVII].	
202		
203	SOURCE: Adopted in R97-12(A) at 21 Ill. Reg. 7942, effective July 1, 1997; amended in R97-	
204	12(B) at 21 Ill. Reg. 16391, effective December 8, 1997; amended in R97-12(C) at 22 Ill. Reg.	
205	10847, effective June 8, 1998; amended in R00-19(A) at 25 Ill. Reg. 651, effective January 6,	
206	2001; amended in R00-19(B) at 25 Ill. Reg. 10374, effective August 15, 2001; amended in R00-	
207	19(C) at 26 Ill. Reg. 2683, effective February 5, 2002; amended in R06-10 at 31 Ill. Reg. 4063,	
208	effective February 23, 2007; amended in R06-10 at 36 Ill. Reg. _____, effective _____.	
209		

SUBPART A: INTRODUCTION

Section 742.105 Applicability

- a) Any person, including a person required to perform an investigation pursuant to the Illinois Environmental Protection Act [415 ILCS 5] (Act), may elect to

216 proceed under this Part to the extent allowed by State or federal law and
217 regulations and the provisions of this Part and subject to the exceptions listed in
218 subsection (h) below. A person proceeding under this Part may do so to the
219 extent such actions are consistent with the requirements of the program under
220 which site remediation is being addressed.

- 221
- 222 b) This Part is to be used in conjunction with the procedures and requirements
223 applicable to the following programs:
- 224
- 225 1) Leaking Underground Storage Tanks (35 Ill. Adm. Code 731, 732, and
226 734);
 - 227
 - 228 2) Site Remediation Program (35 Ill. Adm. Code 740); and
 - 229
 - 230 3) RCRA Part B Permits and Closure Plans (35 Ill. Adm. Code 724 and 725).
 - 231
- 232 c) The procedures in this Part may not be used if their use would delay response
233 action to address imminent and substantial threats to human health and the
234 environment. This Part may only be used after actions to address such threats
235 have been completed.
- 236
- 237 d) This Part may be used to develop remediation objectives to protect surface waters,
238 sediments or ecological concerns, when consistent with the regulations of other
239 programs, and as approved by the Agency.
- 240
- 241 e) A no further remediation determination issued by the Agency prior to July 1, 1997
242 pursuant to Section 4(y) of the Act or one of the programs listed in subsection (b)
243 of this Section that approves completion of remedial action relative to a release
244 shall remain in effect in accordance with the terms of that determination.
- 245
- 246 f) Site specific groundwater remediation objectives determined under this Part for
247 contaminants of concern may exceed the groundwater quality standards
248 established pursuant to the rules promulgated under the Illinois Groundwater
249 Protection Act [415 ILCS 55] as long as done in accordance with Sections
250 742.805 and 742.900(c)(9). (See 415 ILCS 5/58.5(d)(4)
- 251
- 252 g) Where contaminants of concern include polychlorinated byphenyls (PCBs), a
253 person may need to evaluate the applicability of regulations adopted under the
254 Toxic Substances Control Act (15 USCU.S.C. 2601).
- 255
- 256 h) This Part may not be used in lieu of the procedures and requirements applicable to
257 landfills under 35 Ill. Adm. Code 807 or 811 through 814.
- 258

259 i) An evaluation of the indoor inhalation exposure route under this Part addresses
 260 the potential of contaminants present in soil gas or groundwater to reach human
 261 receptors within buildings. This Part does not address the remediation or
 262 mitigation of any contamination within a building from a source other than soil
 263 gas or groundwater, such as the building structure itself and products within the
 264 building.

265
 266 (Source: Amended at 36 Ill. Reg. _____, effective _____)
 267

268 **Section 742.110 Overview of Tiered Approach**
 269

270 a) This Part presents an approach for developing remediation objectives (see
 271 Appendix A, Illustrations A and B) that include an option for exclusion of
 272 pathways from further consideration, use of area background concentrations as
 273 remediation objectives and three tiers for selecting applicable remediation
 274 objectives. An understanding of human exposure routes is necessary to properly
 275 conduct an evaluation under this approach. In some cases, applicable human
 276 exposure ~~routes~~route(s) can be excluded from further consideration prior to any
 277 tier evaluation. Selecting which tier or combination of tiers to be used to develop
 278 remediation objectives is dependent on the site-specific conditions and
 279 remediation goals. Tier 1 evaluations and Tier 2 evaluations are not prerequisites
 280 to conducting Tier 3 evaluations.

281
 282 b) A Tier 1 evaluation compares the concentration of contaminants detected at a site
 283 to the corresponding remediation objectives for residential and industrial/
 284 commercial properties contained in Appendix B, Tables A, B, C, D ~~and~~ E, G, H
 285 and I. To complete a Tier 1 evaluation, the extent and concentrations of the
 286 contaminants of concern, the groundwater class, the land use classification,
 287 human exposure routes at the site, and, if appropriate, soil pH, must be known. If
 288 remediation objectives are developed based on industrial/commercial property
 289 use, then institutional controls under Subpart J are required.

290
 291 c) A Tier 2 evaluation uses the risk based equations from the Soil Screening Level
 292 (SSL) model and Risk Based Corrective Action (RBCA) model and modified
 293 Johnson and Ettinger (J&E) model) documents listed in Appendix C, Tables A,
 294 and C and L, respectively. In addition to the information that is required for a
 295 Tier 1 evaluation, site-specific information is used to calculate Tier 2 remediation
 296 objectives. As in Tier 1, Tier 2 evaluates residential and industrial/commercial
 297 properties only. If remediation objectives are developed based on
 298 industrial/commercial property use, then institutional controls under Subpart J are
 299 required.

300
 301 d) A Tier 3 evaluation allows alternative parameters and factors, not available under

302 a Tier 1 or Tier 2 evaluation, to be considered when developing remediation
303 objectives. Remediation objectives developed for conservation and agricultural
304 properties can only be developed under Tier 3.
305

- 306 e) Remediation objectives may be developed using area background concentrations
307 or any of the three tiers if the evaluation is conducted in accordance with
308 applicable requirements in Subparts D through I. When contaminant
309 concentrations do not exceed remediation objectives developed under one of the
310 tiers or area background procedures under Subpart D, further evaluation under
311 any of the other tiers is not required.
312

313 (Source: Amended at 36 Ill. Reg. _____, effective _____)
314

315 **Section 742.115 Key Elements**
316

317 To develop remediation objectives under this Part, the following key elements shall be
318 addressed.
319

- 320 a) Exposure Routes
321

- 322 1) This Part identifies the following as potential exposure routes to be
323 addressed:
324

325 A) ~~Outdoor inhalation~~Inhalation;

326 B) Indoor inhalation;

327 C) ~~B)~~ Soil ingestion;

328 D) ~~C)~~ Groundwater ingestion; and

329 E) ~~D)~~ Dermal contact with soil.
330

- 331 2) The evaluation of exposure routes under subsections (a)(1)(A), (a)(1)(B),
332 ~~and (a)(1)(C) and (a)(1)(D)~~ of this Section is required for all sites when
333 developing remediation objectives or excluding exposure pathways.
334 Evaluation of the dermal contact exposure route is required for use of
335 RBCA equations in Appendix C, Table C or use of formal risk assessment
336 under Section 742.915.
337

- 338 3) The groundwater ingestion exposure route is comprised of two
339 components:
340
341
342
343
344

- 345 A) Migration from soil to groundwater (soil component); and
- 346
- 347 B) Direct ingestion of groundwater (groundwater component).
- 348
- 349 4) The outdoor inhalation route is comprised of two components:
- 350
- 351 A) Migration from soil through soil gas to outdoor air (soil
- 352 component); and
- 353
- 354 B) Migration from soil gas to outdoor air (soil gas component).
- 355
- 356 5) The indoor inhalation exposure route is comprised of two components:
- 357
- 358 A) Migration from soil gas to indoor air (soil gas component); and
- 359
- 360 B) Migration from groundwater through soil gas to indoor air
- 361 (groundwater component).
- 362

363 b) Contaminants of Concern

364 The contaminants of concern to be remediated depend on the following:

- 365 1) The materials and wastes managed at the site;
- 366
- 367 2) The extent of the no further remediation determination being requested
- 368 from the Agency pursuant to a specific program; and
- 369
- 370 3) The requirements applicable to the specific program, as listed at Section
- 371 742.105(b) under which the remediation is being performed.
- 372
- 373
- 374

375 c) Land Use

376 The present and post-remediation uses of the site where exposures may occur

377 shall be evaluated. The land use of a site, or portion thereof, shall be classified as

378 one of the following:

- 379 1) Residential property;
- 380
- 381 2) Conservation property;
- 382
- 383 3) Agricultural property; or
- 384
- 385 4) Industrial/commercial property.
- 386
- 387

388 d) Environmental Media of Concern
389 This Part provides procedures for developing remediation objectives for the
390 following environmental media:

- 391 1) Soil;
392
393 2) Soil gas;
394
395 3) Groundwater.
396

397
398 (Source: Amended at 36 Ill. Reg. _____, effective _____)
399

400 SUBPART B: GENERAL
401

402 **Section 742.200 Definitions**
403

404 Except as stated in this Section, or unless a different meaning of a word or term is clear from the
405 context, the definition of words or terms in this Part shall be the same as that applied to the same
406 words or terms in the Act.
407

408 "Act" means the Illinois Environmental Protection Act [415 ILCS 5].
409

410 "ADL" means Acceptable Detection Limit, which is the detectable concentration
411 of a substance that is equal to the lowest appropriate Practical Quantitation Limit
412 (PQL) as defined in this Section.
413

414 "Agency" means the Illinois Environmental Protection Agency.
415

416 "Agricultural Property" means any real property for which its present or post-
417 remediation use is for growing agricultural crops for food or feed either as
418 harvested crops, cover crops or as pasture. This definition includes, but is not
419 limited to, properties used for confinement or grazing of livestock or poultry and
420 for silviculture operations. Excluded from this definition are farm residences,
421 farm outbuildings and agrichemical facilities.
422

423 "Aquifer" means *saturated (with groundwater) soils and geologic materials which*
424 *are sufficiently permeable to readily yield economically useful quantities of water*
425 *to wells, springs, or streams under ordinary hydraulic gradients.* (Illinois
426 Groundwater Protection Act [415 ILCS 55/3(a)])
427

428 "Area Background" means *concentrations of regulated substances that are*
429 *consistently present in the environment in the vicinity of a site that are the result*
430 *of natural conditions or human activities, and not the result solely of releases at*

431 the site. [415 ILCS 5/58.2]

432

433 "ASTM" means the American Society for Testing and Materials.

434

435 "Board" means the Illinois Pollution Control Board.

436

437 "Building" means a man-made structure with an enclosing roof and enclosing
438 walls, except for windows and doors, that is fit for any human occupancy for at
439 least six consecutive months.

440

441 "Building Control Technology" means any technology or barrier that affects air
442 flow or air pressure within a building for purposes of reducing contaminant
443 migration to the indoor air.

444

445 "Cancer Risk" means a unitless probability of an individual developing cancer
446 from a defined exposure rate and frequency.

447

448 "Cap" means a barrier designed to prevent the infiltration of precipitation or other
449 surface water, or impede the ingestion or inhalation of contaminants.

450

451 "Capillary Fringe" means the zone above the water table in which water is held by
452 surface tension. Water in the capillary fringe is under a pressure less than
453 atmospheric.

454

455 "Carcinogen" means *a contaminant that is classified as a category A1 or A2*
456 *carcinogen by the American Conference of Governmental Industrial Hygienists; a*
457 *category 1 or 2A/2B carcinogen by the World Health Organization's International*
458 *Agency for Research on Cancer; a "human carcinogen" or "anticipated human*
459 *carcinogen" by the United States Department of Health and Human Service*
460 *National Toxicological Program; or a category A or B1/B2 carcinogen or as*
461 *"carcinogenic to humans" or "likely to be carcinogenic to humans" by the United*
462 *States Environmental Protection Agency in the integrated risk information system*
463 *or a final rule issued in a Federal Register notice by the USEPA. [415 ILCS*
464 *5/58.2]*

465

466 "Class I Groundwater" means groundwater that meets the Class I: Potable
467 Resource Groundwater criteria set forth in 35 Ill. Adm. Code 620.

468

469 "Class II Groundwater" means groundwater that meets the Class II: General
470 Resource Groundwater criteria set forth in 35 Ill. Adm. Code 620.

471

472 "Conservation Property" means any real property for which present or post-
473 remediation use is primarily for wildlife habitat.

474
475 "Construction Worker" means a person engaged on a temporary basis to perform
476 work involving invasive construction activities including, but not limited to,
477 personnel performing demolition, earth-moving, building, and routine and
478 emergency utility installation or repair activities.
479
480 "Contaminant of Concern" or "Regulated Substance of Concern" means *any*
481 *contaminant that is expected to be present at the site based upon past and current*
482 *land uses and associated releases that are known to the person conducting a*
483 *remediation based upon reasonable inquiry.* [415 ILCS 5/58.2]
484
485 "County Highway" means county highway as defined in the Illinois Highway
486 Code [605 ILCS 5].
487
488 "District Road" means district road as defined in the Illinois Highway Code [605
489 ILCS 5].
490
491 "Engineered Barrier" means a barrier designed or verified using engineering
492 practices that limits exposure to or controls migration of the contaminants of
493 concern.
494
495 "Environmental Land Use Control" means an instrument that meets the
496 requirements of this Part and is placed in the chain of title to real property that
497 limits or places requirements upon the use of the property for the purpose of
498 protecting human health or the environment, is binding upon the property owner,
499 heirs, successors, assigns, and lessees, and runs in perpetuity or until the Agency
500 approves, in writing, removal of the limitation or requirement from the chain of
501 title.
502
503 "Exposure Route" means the transport mechanism by which a contaminant of
504 concern reaches a receptor.
505
506 "Federally Owned Property" means real property owned in fee by the United
507 States of America on which institutional controls are sought to be placed in
508 accordance with this Subpart.
509
510 "Federal Landholding Entity" means that federal department, agency, or
511 instrumentality with the authority to occupy and control the day-to-day use,
512 operation and management of Federally Owned Property.
513
514 "Free Product" means a contaminant that is present as a non-aqueous phase liquid
515 for chemicals whose melting point is less than 30°C (e.g., liquid not dissolved in
516 water).

517
518 "GIS" means Geographic Information System.
519
520 "GPS" means Global Positioning System.
521
522 "*Groundwater*" means *underground water which occurs within the saturated zone*
523 *and geologic materials where the fluid pressure in the pore space is equal to or*
524 *greater than atmospheric pressure. [415 ILCS 5/3.64]*
525
526 "Groundwater Quality Standards" means the standards for groundwater as set
527 forth in 35 Ill. Adm. Code 620.
528
529 "Hazard Quotient" means the ratio of a single substance exposure level during a
530 specified time period to a reference dose for that substance derived from a similar
531 exposure period.
532
533 "Highway" means *any public way for vehicular travel which has been laid out in*
534 *pursuance of any law of this State, or of the Territory of Illinois, or which has*
535 *been established by dedication, or used by the public as a highway for 15 years,*
536 *or which has been or may be laid out and connect a subdivision or platted land*
537 *with a public highway and which has been dedicated for the use of the owners of*
538 *the land included in the subdivision or platted land where there has been an*
539 *acceptance and use under such dedication by such owners, and which has not*
540 *been vacated in pursuance of law. The term "highway" includes rights of way,*
541 *bridges, drainage structures, signs, guard rails, protective structures and all*
542 *other structures and appurtenances necessary or convenient for vehicular traffic.*
543 *A highway in a rural area may be called a "road", while a highway in a*
544 *municipal area may be called a "street". (Illinois Highway Code [605 ILCS 5/2-*
545 *202])*
546
547 "Highway Authority" means *the Department of Transportation with respect to a*
548 *State highway; the Illinois State Toll Highway with respect to a toll highway; the*
549 *County Board with respect to a county highway or a county unit district road if a*
550 *discretionary function is involved and the County Superintendent of Highways if a*
551 *ministerial function is involved; the Highway Commissioner with respect to a*
552 *township or district road not in a county unit road district; or the corporate*
553 *authorities of a municipality with respect to a municipal street. (Illinois Highway*
554 *Code [605 ILCS 5/2-213])*
555
556 "Human Exposure Pathway" means a physical condition which may allow for a
557 risk to human health based on the presence of all of the following: contaminants
558 of concern; an exposure route; and a receptor activity at the point of exposure that
559 could result in contaminant of concern intake.

560
561 "Industrial/Commercial Property" means any real property that does not meet the
562 definition of residential property, conservation property or agricultural property.
563
564 "Infiltration" means the amount of water entering into the ground as a result of
565 precipitation.
566
567 "Institutional Control" means a legal mechanism for imposing a restriction on
568 land use, as described in Subpart J.
569
570 "Land Use Control Memoranda of Agreement" mean agreements entered into
571 between one or more agencies of the United States and the Illinois Environmental
572 Protection Agency that limit or place requirements upon the use of Federally
573 Owned Property for the purpose of protecting human health or the environment.
574
575 "Man-Made Pathways" means *constructed* physical conditions *that may allow for*
576 *the transport of regulated substances including, but not limited to, sewers, utility*
577 *lines, utility or elevator vaults, building foundations, basements, crawl spaces,*
578 *drainage ditches, ~~or~~ previously excavated and filled areas or sumps.* [415 ILCS
579 5/58.2]
580
581 "Natural Pathways" means *natural* physical conditions that may allow for *the*
582 *transport of regulated substances including, but not limited to, soil, groundwater,*
583 *sand seams and lenses, and gravel seams and lenses.* [415 ILCS 5/58.2]
584
585 "Person" means an *individual, trust, firm, joint stock company, joint venture,*
586 *consortium, commercial entity, corporation (including a government*
587 *corporation), partnership, association, state, municipality, commission, political*
588 *subdivision of a state, or any interstate body including the United States*
589 *government and each department, agency, and instrumentality of the United*
590 *States.* [415 ILCS 5/58.2]
591
592 "Point of Human Exposure" means the points at which human exposure to a
593 contaminant of concern may reasonably be expected to occur. The point of
594 human exposure is at the source, unless an institutional control limiting human
595 exposure for the applicable exposure route has been or will be in place, in which
596 case the point of human exposure will be the boundary of the institutional control.
597 Point of human exposure may be at a different location than the point of
598 compliance.
599
600 "Populated Area" means:
601
602 an area within the boundaries of a municipality that has a population of

603 10,000 or greater based on the year 2000 or most recent census; or
604
605 an area less than three miles from the boundary of a municipality that has
606 a population of 10,000 or greater based on the year 2000 or most recent
607 census.
608

609 "Potable" means *generally fit for human consumption in accordance with*
610 *accepted water supply principles and practices.* (Illinois Groundwater Protection
611 Act [415 ILCS 55/3(h)])
612

613 "PQL" means practical quantitation limit or estimated quantitation limit, which is
614 the lowest concentration that can be reliably measured within specified limits of
615 precision and accuracy for a specific laboratory analytical method during routine
616 laboratory operating conditions in accordance with "Test Methods for Evaluating
617 Solid Wastes, Physical/Chemical Methods", EPA Publication No. SW-846,
618 incorporated by reference in Section 742.210. When applied to filtered water
619 samples, PQL includes the method detection limit or estimated detection limit in
620 accordance with the applicable method revision in: "Methods for the
621 Determination of Organic Compounds in Drinking Water", Supplement II", EPA
622 Publication No. EPA/600/4-88/039; "Methods for the Determination of Organic
623 Compounds in Drinking Water, Supplement III", EPA Publication No.
624 EPA/600/R-95/131, all of which are incorporated by reference in Section
625 742.210.
626

627 "Q_{soil}" means the volumetric flow rate of soil gas from the subsurface into the
628 enclosed building space.
629

630 "RBCA" means Risk Based Corrective Action as defined in ASTM E-1739-95, as
631 incorporated by reference in Section 742.210.
632

633 "RCRA" means the Resource Conservation and Recovery Act of 1976 (42 USC
634 6921).
635

636 "Reference Concentration" or "RfC" means an estimate of a daily exposure, in
637 units of milligrams of chemical per cubic meter of air (mg/m³), to the human
638 population (including sensitive subgroups) that is likely to be without appreciable
639 risk of deleterious effects during a portion of a lifetime (up to approximately
640 seven years, subchronic) or for a lifetime (chronic).
641

642 "Reference Dose" or "RfD" means an estimate of a daily exposure, in units of
643 milligrams of chemical per kilogram of body weight per day (mg/kg/d), to the
644 human population (including sensitive subgroups) that is likely to be without
645 appreciable risk of deleterious effects during a portion of a lifetime (up to

646 approximately seven years, subchronic) or for a lifetime (chronic).

647
648 "Regulated Substance" means *any hazardous substance as defined under Section*
649 *101(14) of the Comprehensive Environmental Response, Compensation, and*
650 *Liability Act of 1980 (P.L. 96-510) and petroleum products including crude oil or*
651 *any fraction thereof, natural gas, natural gas liquids, liquefied natural gas, or*
652 *synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).*
653 [415 ILCS 5/58.2]

654
655 "Residential Property" means *any real property that is used for habitation by*
656 *individuals, or where children have the opportunity for exposure to contaminants*
657 *through soil-ingestion or inhalation (indoor or outdoor) at educational facilities,*
658 *health care facilities, child care facilities or ~~outdoor~~ recreational areas.* [415 ILCS
659 5/58.2]

660
661 "Right of Way" means *the land, or interest therein, acquired for or devoted to a*
662 *highway.* (Illinois Highway Code [605 ILCS 5/2-217])

663
664 "Saturated Zone" means a subsurface zone in which all the interstices or voids are
665 filled with water under pressure greater than that of the atmosphere.

666
667 "Similar-Acting Chemicals" are chemical substances that have toxic or harmful
668 effect on the same specific organ or organ system (see Appendix A. Tables E and
669 F for a list of similar-acting chemicals with noncarcinogenic and carcinogenic
670 effects).

671
672 "Site" means *any single location, place, tract of land or parcel of property, or*
673 *portion thereof, including contiguous property separated by a public right-of-*
674 *way.* [415 ILCS 5/58.2]

675
676 "Slurry Wall" means a man-made barrier made of geologic material which is
677 constructed to prevent or impede the movement of contamination into a certain
678 area.

679
680 "Soil Gas" means the air existing in void spaces in the soil between the
681 groundwater table and the ground surface.

682
683 "Soil Saturation Limit" or "C_{sat}" means the contaminant concentration at which
684 the absorptive limits of the soil particles, the solubility limits of the available soil
685 moisture, and saturation of soil pore air have been reached. Above the soil
686 saturation concentration, the assumptions regarding vapor transport to air and/or
687 dissolved phase transport to groundwater (for chemicals that are liquid at ambient
688 soil temperatures) do not apply, and alternative modeling approaches are required

689 ~~the contaminant concentration at which soil pore air and pore water are saturated~~
690 ~~with the chemical and the adsorptive limits of the soil particles have been reached.~~

691
692 "Soil Vapor Saturation Limit" or " C_v^{sat} " means the maximum vapor concentration
693 that can exist in the soil pore air at a given temperature and pressure.

694
695 "Solubility" means a chemical specific maximum amount of solute that can
696 dissolve in a specific amount of solvent (groundwater) at a specific temperature.

697
698 "SPLP" means Synthetic Precipitation Leaching Procedure (Method 1312) as
699 published in "Test Methods for Evaluating Solid Waste, Physical/Chemical
700 Methods", USEPA Publication No. SW-846, as incorporated by reference in
701 Section 742.210.

702
703 "SSL" means Soil Screening Levels as defined in USEPA's Soil Screening
704 Guidance: User's Guide and Technical Background Document, as incorporated by
705 reference in Section 742.210.

706
707 "State ~~Highway~~highway" means State highway as defined in the Illinois Highway
708 Code [605 ILCS 5].

709
710 "Stratigraphic Unit" means a site-specific geologic unit of native deposited
711 material and/or bedrock of varying thickness (e.g., sand, gravel, silt, clay,
712 bedrock, etc.). A change in stratigraphic unit is recognized by a clearly distinct
713 contrast in geologic material or a change in physical features within a zone of
714 gradation. For the purposes of this Part, a change in stratigraphic unit is identified
715 by one or a combination of differences in physical features such as texture,
716 cementation, fabric, composition, density, and/or permeability of the native
717 material and/or bedrock.

718
719 "Street" means street as defined in the Illinois Highway Code [605 ILCS 5].

720
721 "TCLP" means Toxicity Characteristic Leaching Procedure (Method 1311) as
722 published in "Test Methods for Evaluating Solid Waste, Physical/Chemical
723 Methods", USEPA Publication No. SW-846, as incorporated by reference in
724 Section 742.210.

725
726 "Toll ~~Highway~~highway" means toll highway as defined in the Illinois Highway
727 Code [605 ILCS 5].

728
729 "Total Petroleum Hydrocarbon" or "TPH" means the additive total of all
730 petroleum hydrocarbons found in an analytical sample.

731

732 "Township Roadroad" means township road as defined in the Illinois Highway
733 Code [605 ILCS 5].
734

735 "Unconfined Aquifer" means an aquifer whose upper surface is a water table free
736 to fluctuate under atmospheric pressure.
737

738 "Volatile Chemicals" means chemicals with a Dimensionless Henry's Law
739 Constant of greater than 1.9×10^{-2} or a vapor pressure greater than 0.1 Torr
740 (mmHg) at 25°C. For purposes of the indoor inhalation exposure route, elemental
741 mercury is included in this definition.
742

743 "Volatile Organic Compounds" or "VOCs" means organic chemical analytes
744 identified as volatiles as published in "Test Methods for Evaluating Solid Waste,
745 Physical/Chemical Methods", USEPA Publication No. SW-846 (incorporated by
746 reference in Section 742.210), method numbers 8011, 8015B, 8021B, 8031,
747 8260B, 8315A, and 8316. For analytes not listed in any category in those
748 methods, those analytes which have a boiling point less than 200°C and a vapor
749 pressure greater than 0.1 Torr (mm Hg) at 20°C.
750

751 "Water Table" means the top water surface of an unconfined aquifer at
752 atmospheric pressure.
753

754 (Source: Amended at 36 Ill. Reg. _____, effective _____)
755

756 **Section 742.210 Incorporations by Reference**
757

758 a) The Board incorporates the following material by reference:
759

760 Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk
761 Levels (MRLs), U.S. Environmental Protection Agency, 1600 Clifton Road,
762 Mailstop F32, Atlanta, Georgia 30333, (770)488-3357 (November 2007).
763

764 ASTM International. American Society for Testing and Materials, 100 Barr
765 Harbor Drive, West Conshohocken, PA 19428-2959, (610)832-9585.
766

767 ASTM D 2974-00, Standard Test Methods for Moisture, Ash and Organic
768 Matter of Peat and Other Organic Soils, approved August 10, 2000.
769

770 ASTM D 2488-00, Standard Practice for Description and Identification of
771 Soils (Visual-Manual Procedure), approved February 10, 2000.
772

773 ASTM D 1556-00, Standard Test Method for Density and Unit Weight of
774 Soil in Place by the Sand-Cone Method, approved March 10, 2000.

775
776 ASTM D 2167-94, Standard Test Method for Density and Unit Weight of
777 Soil in Place by the Rubber Balloon Method, approved March 15, 1994.
778
779 ASTM D 2922-01, Standard Test Methods for Density of Soil and Soil-
780 Aggregate in Place by Nuclear Methods (Shallow Depth), approved June
781 10, 2001.
782
783 ASTM D 2937-00e1, Standard Test Method for Density of Soil in Place
784 by the Drive-Cylinder Method, approved June 10, 2000.
785
786 ASTM D 854-02, Standard Test Methods for Specific Gravity of Soil
787 Solids by Water Pycnometer, approved July 10, 2002.
788
789 ASTM D 2216-98, Standard Test Method for Laboratory Determination of
790 Water (Moisture) Content of Soil and Rock by Mass, approved February
791 10, 1998.
792
793 ASTM D 4959-00, Standard Test Method for Determination of Water
794 (Moisture) Content of Soil by Direct Heating, approved March 10, 2000.
795
796 ASTM D 4643-00, Standard Test Method for Determination of Water
797 (Moisture) Content of Soil by the Microwave Oven Method, approved
798 February 10, 2000.
799
800 ASTM D 5084-03, Standard Test Methods for Measurement of Hydraulic
801 Conductivity of Saturated Porous Materials Using a Flexible Wall
802 Permeameter, approved November 1, 2003.
803
804 ASTM D 422-63 (2002), Standard Test Method for Particle-Size Analysis
805 of Soils, approved November 10, 2002.
806
807 ASTM D 1140-00, Standard Test Methods for Amount of Material in
808 Soils Finer than the No. 200 (75 μm) Sieve, approved June 10, 2000.
809
810 ASTM D 3017-01, Standard Test Method for Water Content of Soil and
811 Rock in Place by Nuclear Methods (Shallow Depth), approved June 10,
812 2001.
813
814 ASTM D 4525-90 (2001), Standard Test Method for Permeability of
815 Rocks by Flowing Air, approved May 25, 1990.
816
817 ASTM D 2487-00, Standard Classification of Soils for Engineering

818 Purposes (Unified Soil Classification System), approved March 10, 2000.
819
820 ASTM D 1945-03, Standard Test Method for Analysis of Natural Gas by
821 Gas Chromatography, approved May 10, 2003.
822
823 ASTM D 1946-90, Standard Practice for Analysis of Reformed Gas by
824 Gas Chromatography, approved June 1, 2006.
825
826 ASTM E 1527-00, Standard Practice for Environmental Site Assessments:
827 Phase I Environmental Site Assessment Process, approved May 10, 2000.
828 Vol. 11.04.
829
830 ASTM E 1739-95 (2002), Standard Guide for Risk-Based Corrective
831 Action Applied at Petroleum Release Sites, approved September 10, 1995.
832
833 ASTM E 2121-09, Standard Practice for Installing Radon Mitigation
834 Systems in Existing Low-Rise Residential Buildings, approved November
835 1, 2009.
836
837 ASTM E 2600-08, Standard Practice for Assessment for Vapor Intrusion
838 into Structures on Property Involved in Real Estate Transactions, approved
839 March 1, 2008.
840
841 API. American Petroleum Institute, 1220 L Street, NW, Washington DC 20005-
842 4070 (202)682-8000.
843
844 BIOVAPOR-A 1-D Vapor Intrusion Model with Oxygen-Limited Aerobic
845 Biodegradation, Version 2.0 (January 2010).
846
847 Barnes, Donald G. and Dourson, Michael. (1988). Reference Dose (RfD):
848 Description and Use in Health Risk Assessments. Regulatory Toxicology and
849 Pharmacology. 8, 471-486.
850
851 EPRI. Electric Power Research Institute. 3420 Hillview Avenue, Palo Alto,
852 California 94304. (650)855-2121.
853
854 Polycyclic Aromatic Hydrocarbons (PAHs) in Surface Soil in Illinois:
855 Background PAHs, EPRI, Palo Alto CA, We Energies, Milwaukee WI and
856 IEPA, Springfield IL: 2004. 1011376.
857
858 Reference Handbook for Site-Specific Assessment of Subsurface Vapor Intrusion
859 to Indoor Air, Electric Power Research Institute (EPRI), Inc., Program No.
860 1008492 (March 2005).

861
862 GPO. Superintendent of Documents, U.S. Government Printing Office,
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1043
 1044 c) This Section incorporates no later editions or amendments.

1045
 1046 (Source: Amended at 36 Ill. Reg. _____, effective _____)

1047
 1048 **Section 742.220 Determination of Soil Saturation Limit**

1049
 1050 a) For any organic contaminant that has a melting point below 30°C, the remediation
 1051 objective for the outdoor inhalation exposure route developed under Tier 2 shall
 1052 not exceed the soil saturation limit, as determined under subsection (c) of this
 1053 Section.

1054
 1055 b) For any organic contaminant that has a melting point below 30°C, the remediation
 1056 objective under Tier 2 for the soil component of the groundwater ingestion
 1057 exposure route shall not exceed the soil saturation limit, as determined under
 1058 subsection (c) of this Section.

1059
 1060 c) The soil saturation limit shall be:

1061
 1062 1) The value listed in Appendix A, Table A for that specific contaminant;

1063
 1064 2) A value derived from Equation S29 in Appendix C, Table A; or

1065
 1066 3) A value derived from another method approved by the Agency.

1067
 1068 (Source: Amended at 36 Ill. Reg. _____, effective _____)

1069
 1070 **Section 742.222 Determination of Soil Vapor Saturation Limit**

1071
 1072 a) For any volatile chemical, the soil gas remediation objective for the indoor and
 1073 outdoor inhalation exposure routes developed under Tier 2 shall not exceed the
 1074 soil vapor saturation limit, as determined under subsection (b).

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- b) The soil vapor saturation limit shall be:
 - 1) The value listed in Appendix A, Table K for that specific contaminant;
 - 2) A value derived from Equation J&E5 in Appendix C, Table L; or
 - 3) A value derived from another method approved by the Agency.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 742.225 Demonstration of Compliance with Soil and Groundwater Remediation Objectives

Compliance with soil and groundwater remediation objectives is achieved if each sample result does not exceed that respective remediation objective unless a person elects to proceed under subsections (c), (d) and (e) of this Section.

- a) Compliance with groundwater remediation objectives developed under Subparts D through F and H through I shall be demonstrated by comparing the contaminant concentrations of discrete samples at each sample point to the applicable groundwater remediation objective. Sample points shall be determined by the program under which remediation is performed.
- b) Unless the person elects to composite samples or average sampling results as provided in subsections (c) and (d) of this Section, compliance with soil remediation objectives developed under Subparts D through G and I shall be demonstrated by comparing the contaminant concentrations of discrete samples to the applicable soil remediation objective.
 - 1) Except as provided in subsections (c) and (d) of this Section, compositing of samples is not allowed.
 - 2) Except as provided in subsections (c) and (d) of this Section, averaging of sample results is not allowed.
 - 3) Notwithstanding subsections (c) and (d) of this Section, compositing of samples and averaging of sample results is not allowed for the construction worker population.
 - 4) The number of sampling points required to demonstrate compliance is determined by the requirements applicable to the program under which remediation is performed.

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- c) If a person chooses to composite soil samples or average soil sample results to demonstrate compliance relative to the soil component of the groundwater ingestion exposure route, the following requirements apply:
 - 1) A minimum of two sampling locations for every 0.5 acre of contaminated area is required, with discrete samples at each sample location obtained at every two feet of depth, beginning at six inches below the ground surface for surface contamination and at the upper limit of contamination for subsurface contamination and continuing through the zone of contamination. Alternatively, a sampling method may be approved by the Agency based on an appropriately designed site-specific evaluation. Samples obtained at or below the water table shall not be used in compositing or averaging.
 - 2) For contaminants of concern other than volatile ~~chemicals~~organic ~~contaminants~~:
 - A) Discrete samples from the same boring may be composited; or
 - B) Discrete sample results from the same boring may be averaged.
 - 3) For volatile ~~chemicals~~organic ~~contaminants~~:
 - A) Compositing of samples is not allowed.
 - B) Discrete sample results from the same boring may be averaged.
 - 4) Composite samples may not be averaged. An arithmetic average may be calculated for discrete samples collected at every two feet of depth through the zone of contamination as specified in subsection (c)(1) of this Section.
- d) If a person chooses to composite soil samples or average soil sample results to demonstrate compliance relative to the ~~outdoor inhalation~~inhalation exposure route or ingestion exposure route, the following requirements apply:
 - 1) A person shall submit a sampling plan for Agency approval, based upon a site-specific evaluation;
 - 2) For volatile ~~chemicals~~organic ~~compounds~~, compositing of samples is not allowed;

- 1161 3) All samples shall be collected within the contaminated area;-
 1162
 1163 4) Composite samples may not be averaged. Procedures specified in
 1164 "Calculating Upper Confidence Limits for Exposure Point Concentrations
 1165 at Hazardous Waste Sites", USEPA Office of Emergency and Remedial
 1166 Response, OSWER 9285.6-10 (December 2002), as incorporated by
 1167 reference in Section 742.210, or an alternative procedure approved by the
 1168 Agency, shall be used to determine sample averages.
 1169
 1170 e) When averaging under this Section, if no more than 15% of sample results are
 1171 reported as "non-detect", "no contamination", "below detection limits", or similar
 1172 terms, such results shall be included in the averaging calculations as one-half the
 1173 reported analytical detection limit for the contaminant. However, when
 1174 performing a test for normal or lognormal distribution for the purpose of
 1175 calculating a 95% Upper Confidence Limit of the mean for a contaminant, a
 1176 person may substitute for each non-detect value a randomly generated value
 1177 between, but not including, zero and the reported analytical detection limit. If
 1178 more than 15% of sample results are "non-detect", procedures specified in
 1179 "Guidance for Data Quality Assessment, Practical Methods for Data Analysis,
 1180 EPA QA/G-9, QA00 Update", EPA/600/R-96/084 (July 2000), as incorporated by
 1181 reference in Section 742.210, or an alternative procedure approved by the Agency
 1182 shall be used to address the non-detect values, or another statistically valid
 1183 procedure approved by the Agency may be used to determine an average.
 1184
 1185 f) All soil samples collected after August 15, 2001; shall be reported on a dry weight
 1186 basis for the purpose of demonstrating compliance, with the exception of the
 1187 TCLP and SPLP and the property pH.

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 1189 (Source: Amended at 36 Ill. Reg. _____, effective _____)
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1191 **Section 742.227 Demonstration of Compliance with Soil Gas Remediation Objectives for**
 1192 **the Outdoor and Indoor Inhalation Exposure Routes**

1193
 1194 Compliance shall be demonstrated by comparing the contaminant concentrations of discrete
 1195 samples at each sample point to the applicable soil gas remediation objective. As specified in
 1196 Section 742.510(c), the soil gas remediation objectives for the outdoor inhalation exposure route
 1197 are contained in Appendix B, Table G. As specified in Section 742.515, the soil gas remediation
 1198 objectives for the indoor inhalation exposure route are contained in Appendix B, Tables H and I.
 1199 This Section applies to exterior soil gas samples or near-slab samples collected outside a
 1200 building. Proposals to use sub-slab soil gas data for the indoor inhalation exposure route shall
 1201 follow Section 742.935(c).
 1202

- 1203 a) Sample points shall be determined by the program under which remediation is
- 1204 performed.
- 1205
- 1206 b) When collecting soil gas samples:
- 1207
- 1208 1) Use rigid-wall tubing made of nylon or Teflon[®] or other material approved
- 1209 by the Agency;
- 1210
- 1211 2) Use gas-tight, inert containers to hold the sample. For light sensitive or
- 1212 halogenated volatile chemicals, these containers shall be opaque or dark-
- 1213 colored;
- 1214
- 1215 3) Purge three volumes before obtaining each discrete soil gas sample;
- 1216
- 1217 4) Use a helium tracer or other leak apparatus detection system approved by
- 1218 the Agency; and
- 1219
- 1220 5) Limit the flow rate to 200 ml/min.
- 1221
- 1222 c) Soil gas samples shall be analyzed using a National Environmental Laboratory
- 1223 Accreditation Program (NELAP) certified laboratory.
- 1224
- 1225 d) Soil gas remediation objectives shall be compared to concentrations of soil gas
- 1226 collected at a depth at least 3 feet below ground surface and above the saturated
- 1227 zone.

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1229 (Source: Added at 36 Ill. Reg. _____, effective _____)

1230
1231 SUBPART C: EXPOSURE ROUTE EVALUATIONS

1232
1233 **Section 742.305 Contaminant Source and Free Product Determination**

1234
1235 No exposure route shall be excluded from consideration relative to a contaminant of concern

1236 unless the following requirements are met:

- 1237
- 1238 a) The sum of the concentrations of all organic contaminants of concern shall not
- 1239 exceed the attenuation capacity of the soil as determined under Section 742.215;
- 1240
- 1241 b) The concentrations of any organic contaminants of concern remaining in the soil
- 1242 shall not exceed the soil saturation limit as determined under Section 742.220;
- 1243
- 1244 c) Any soil which contains contaminants of concern shall not exhibit any of the
- 1245 characteristics of reactivity for hazardous waste as determined under 35 Ill. Adm.

- 1246 Code 721.123;
- 1247
- 1248 d) Any soil which contains contaminants of concern shall not exhibit a pH less than
- 1249 or equal to 2.0 or greater than or equal to 12.5, as determined by SW-846 Method
- 1250 9040B: pH Electrometric for soils with 20% or greater aqueous (moisture)
- 1251 content or by SW-846 Method 9045C: Soil pH for soils with less than 20%
- 1252 aqueous (moisture) content as incorporated by reference in Section 742.210;
- 1253
- 1254 e) Any soil which contains contaminants of concern in the following list of inorganic
- 1255 chemicals or their salts shall not exhibit any of the characteristics of toxicity for
- 1256 hazardous waste as determined by 35 Ill. Adm. Code 721.124: arsenic, barium,
- 1257 cadmium, chromium, lead, mercury, selenium or silver; and
- 1258
- 1259 f) If contaminants of concern include polychlorinated biphenyls (PCBs), the
- 1260 concentration of any PCBs in the soil shall not exceed 50 parts per million as
- 1261 determined by SW-846 Methods; and.
- 1262
- 1263 g) The concentration of any contaminant of concern in soil gas shall not exceed 10%
- 1264 of its Lower Explosive Limit (LEL) as measured by a hand held combustible gas
- 1265 indicator that has been calibrated to manufacturer specifications.
- 1266

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.310 Outdoor Inhalation Exposure Route

The outdoor inhalation exposure route may be excluded from consideration if:

- 1271
- 1272
- 1273 a) The requirements in subsection (a)(1) or (a)(2) are met:
- 1274
- 1275 1) An approved engineered barrier is in place that meets the requirements of
- 1276 Subpart K; or
- 1277
- 1278 2) The only contaminants of concern are benzene, toluene, ethylbenzene, and
- 1279 total xylenes, and a demonstration of active biodegradation has been made
- 1280 for benzene, toluene, ethylbenzene, and total xylenes such that no outdoor
- 1281 inhalation exposure will occur. This demonstration shall be submitted to
- 1282 the Agency for review and approval;
- 1283
- 1284 b)a) The requirements of Sections 742.300 and 742.305 are met;
- 1285
- 1286 b) ~~An approved engineered barrier is in place that meets the requirements of Subpart~~
- 1287 ~~K;~~
- 1288

- 1289 c) Safety precautions for the construction worker are taken if the Tier 1 construction
1290 worker remediation objectives are exceeded; and
- 1291
- 1292 d) An institutional control, in accordance with Subpart J, will be placed on the
1293 property.
- 1294

1295 (Source: Amended at 36 Ill. Reg. _____, effective _____)

1296

1297 Section 742.312 Indoor Inhalation Exposure Route

1298

1299 The indoor inhalation exposure route may be excluded from consideration if:

1300

- 1301 a) None of the contaminants of concern are listed on Appendix A, Table J and none
1302 of the contaminants of concern are volatile chemicals, as defined in Section
1303 742.200; or
- 1304
- 1305 b) The requirements in subsections (b)(1)(A), (B) or (C) and (b)(2) and (b)(3) are
1306 met:
 - 1307
 - 1308 1) Exclusion options when the contaminants of concern are volatile
1309 chemicals:
 - 1310
 - 1311 A) No building or man-made pathway exists or will be placed above
1312 the contaminated soil gas or groundwater; or
 - 1313
 - 1314 B) An approved building control technology is in place or will be
1315 placed that meets the requirements of Subpart L; or
 - 1316
 - 1317 C) If the contaminants of concern are benzene, toluene, ethylbenzene,
1318 and total xylenes only, a demonstration of active biodegradation
1319 has been made for benzene, toluene, ethylbenzene, and total
1320 xylenes such that no indoor inhalation exposure will occur. This
1321 demonstration shall be submitted to the Agency for review and
1322 approval;
 - 1323
 - 1324 2) The requirements of Sections 742.300 and 742.305 are met; and
 - 1325
 - 1326 3) An institutional control, in accordance with Subpart J, will be placed on
1327 the property.
 - 1328

1329 (Source: Added at 36 Ill. Reg. _____, effective _____)

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SUBPART D: DETERMINING AREA BACKGROUND

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Section 742.405 Determination of Area Background for Soil

- a) Soil sampling results shall be obtained for purposes of determining area background levels in accordance with the following procedures:
 - 1) For volatile ~~chemicals~~organic contaminants, sample results shall be based on discrete samples;
 - 2) Unless an alternative method is approved by the Agency, for contaminants other than volatile ~~chemicals~~organic contaminants, sample results shall be based on discrete samples or composite samples. If a person elects to use composite samples, each 0.5 acre of the area to be sampled shall be divided into quadrants and 5 aliquots of equal volume per quadrant shall be composited into 1 sample;
 - 3) Samples shall be collected from similar depths and soil types, which shall be consistent with the depths and soil types in which maximum levels of contaminants are found in the areas of known or suspected releases; and
 - 4) Samples shall be collected from areas of the site or adjacent to the site that are unaffected by known or suspected releases at or from the site. If the sample results show an impact from releases at or from the site, then the sample results shall not be included in determining area background levels under this Part.

- b) Area background shall be determined according to one of the following approaches:
 - 1) Statewide Area Background Approach:
 - A) The concentrations of inorganic chemicals in background soils listed in Appendix A, Table G may be used as the upper limit of the area background concentration for the site. The first column to the right of the chemical name presents inorganic chemicals in background soils for counties within Metropolitan Statistical Areas. Counties within Metropolitan Statistical Areas are identified in Appendix A, Table G, Footnote a. Sites located in counties outside Metropolitan Statistical Areas shall use the concentrations of inorganic chemicals in background soils shown in the second column to the right of the chemical name.
 - B) Soil area background concentrations determined according to this

1375 statewide area background approach shall be used as provided in
1376 Section 742.415(b) of this Part. For each parameter whose
1377 sampling results demonstrate concentrations above those in
1378 Appendix A, Table G, the person shall develop appropriate soil
1379 remediation objectives in accordance with this Part, or may
1380 determine area background in accordance with subsection (b)(2) of
1381 this Section.
1382

- 1383 2) A statistically valid approach for determining area background
1384 concentrations appropriate for the characteristics of the data set, and
1385 approved by the Agency.
1386

1387 (Source: Amended at 36 Ill. Reg. _____, effective _____)
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1389 SUBPART E: TIER 1 EVALUATION
1390

1391 **Section 742.500 Tier 1 Evaluation Overview**
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- 1393 a) A Tier 1 evaluation compares the concentration of each contaminant of concern
1394 detected at a site to the baseline remediation objectives provided in Appendix B,
1395 Tables A, B, C, D, ~~and E~~, G, H and I. Use of Tier 1 remediation objectives
1396 requires only limited site-specific information: concentrations of contaminants of
1397 concern, groundwater classification, land use classification, and, if appropriate,
1398 soil pH. (See Appendix B, Illustration A.)
1399
- 1400 b) Although Tier 1 allows for differentiation between residential and
1401 industrial/commercial property use of a site, an institutional control under Subpart
1402 J is required where remediation objectives are based on an industrial/commercial
1403 property use.
1404
- 1405 c) Any given exposure route is not a concern if the concentration of each
1406 contaminant of concern detected at the site is below the Tier 1 value of that given
1407 route. In such a case, no further evaluation of that route is necessary.
1408

1409 (Source: Amended at 36 Ill. Reg. _____, effective _____)
1410

1411 **Section 742.505 Tier 1 Soil, Soil Gas and Groundwater Remediation Objectives**
1412

- 1413 a) Soil
1414
- 1415 1) Outdoor Inhalation Exposure Route
1416
- 1417 A) The Tier 1 soil remediation objectives for this exposure route

- 1418 based upon residential property use are listed in Appendix B, Table
1419 A.
1420
1421 B) The Tier 1 soil remediation objectives for this exposure route
1422 based upon industrial/commercial property use are listed in
1423 Appendix B, Table B. Soil remediation objective determinations
1424 relying on this table require use of institutional controls in
1425 accordance with Subpart J.
1426
1427 C) For this exposure route, it is acceptable to determine compliance
1428 by meeting either the soil or soil gas remediation objectives.
1429
1430 2) Ingestion Exposure Route
1431
1432 A) The Tier 1 soil remediation objectives for this exposure route
1433 based upon residential property use are listed in Appendix B, Table
1434 A.
1435
1436 B) The Tier 1 soil remediation objectives for this exposure route
1437 based upon industrial/commercial property use are listed in
1438 Appendix B, Table B. Soil remediation objective determinations
1439 relying on this table require use of institutional controls in
1440 accordance with Subpart J.
1441
1442 3) Soil Component of the Groundwater Ingestion Route
1443
1444 A) The Tier 1 soil remediation objectives for this exposure route
1445 based upon residential property use are listed in Appendix B, Table
1446 A.
1447
1448 B) The Tier 1 soil remediation objectives for this exposure route
1449 based upon industrial/commercial property use are listed in
1450 Appendix B, Table B.
1451
1452 C) The pH-dependent Tier 1 soil remediation objectives for identified
1453 ionizable organics or inorganics for the soil component of the
1454 groundwater ingestion exposure route (based on the total amount
1455 of contaminants present in the soil sample results and groundwater
1456 classification) are provided in Appendix B, Tables C and D.
1457
1458 D) Values used to calculate the Tier 1 soil remediation objectives for
1459 this exposure route are listed in Appendix B, Table F.
1460

- 1461 4) Evaluation of the dermal contact with soil exposure route is not required
 1462 under Tier 1.
 1463
- 1464 b) Soil Gas
 1465
- 1466 1) Outdoor Inhalation Exposure Route
 1467
- 1468 A) The Tier 1 soil gas remediation objectives for this exposure route
 1469 based upon residential property use are listed in Appendix B, Table
 1470 G.
 1471
- 1472 B) The Tier 1 soil gas remediation objectives for this exposure route
 1473 based upon industrial/commercial property use, including the
 1474 construction worker population, are listed in Appendix B, Table G.
 1475 Soil gas remediation objective determinations relying on an
 1476 industrial/commercial scenario require use of institutional controls
 1477 in accordance with Subpart J.
 1478
- 1479 C) For this exposure route, it is acceptable to determine compliance
 1480 by meeting either the soil or soil gas remediation objectives.
 1481
- 1482 2) Indoor Inhalation Exposure Route
 1483
- 1484 A) The Tier 1 soil gas remediation objectives for this exposure route
 1485 are listed in Appendix B, Tables H and I.
 1486
- 1487 B) The Tier 1 soil gas remediation objectives for this exposure route
 1488 are based on a default water-filled soil porosity value of 0.15
 1489 cm³/cm³.
 1490
- 1491 C) Appendix B, Table H shall be used when soil or groundwater
 1492 contamination is within 5 feet, vertically or horizontally, of an
 1493 existing or potential building or man-made pathway. In this
 1494 scenario, the mode of contaminant transport is both diffusion and
 1495 advection, which sets the Q_{soil} value at 83.33 cm³/sec.
 1496
- 1497 D) Appendix B, Table I shall be used when soil and groundwater
 1498 contamination are more than 5 feet, vertically and horizontally,
 1499 from an existing or potential building or man-made pathway. In
 1500 this scenario, the mode of contaminant transport is diffusion only,
 1501 which sets the Q_{soil} value at 0.0 cm³/sec. Soil gas remediation
 1502 objective determinations relying on this table require use of
 1503 institutional controls in accordance with Subpart J.

1504
1505 E) To determine whether the Q_{soil} value can be set at $0.0 \text{ cm}^3/\text{sec}$, the
1506 site evaluator shall demonstrate that soil and groundwater within 5
1507 feet, vertically and horizontally, of an existing or potential building
1508 or man-made pathway meet the Tier 1 remediation objectives for
1509 residential property listed in Appendix B, Table A, and the Tier 1
1510 remediation objectives for Class I groundwater listed in Appendix
1511 B, Table E, respectively.
1512

1513 c)b) Groundwater

- 1514
1515 1) The Tier 1 groundwater remediation objectives for the groundwater
1516 component of the groundwater ingestion route are listed in Appendix B,
1517 Table E.
1518
1519 2) The Tier 1 groundwater remediation objectives for this exposure route are
1520 given for Class I and Class II groundwaters, respectively.
1521
1522 3) The evaluation of 35 Ill. Adm. Code 620.615 regarding mixtures of
1523 similar-acting chemicals shall be considered satisfied for Class I
1524 groundwater at the point of human exposure if:
1525
1526 A) No more than one similar-acting noncarcinogenic chemical as
1527 listed in Appendix A, Table E is detected in the groundwater at the
1528 site; and
1529
1530 B) No carcinogenic contaminant of concern as listed in Appendix A,
1531 Table I is detected in any groundwater sample associated with the
1532 site, using analytical procedures capable of achieving either the 1
1533 in 1,000,000 cancer risk concentration or the ADL, whichever is
1534 greater.
1535
1536 4) If the conditions of subsection ~~(c)(3)(b)(3)~~ of this Section are not met, the
1537 Class I groundwater remediation objectives set forth in Appendix B, Table
1538 E shall be corrected for the cumulative effect of mixtures of similar-acting
1539 chemicals using the following methodologies:
1540
1541 A) For noncarcinogenic chemicals, the methodologies set forth at
1542 Section 742.805(c) or Section 742.915(h) shall be used; and
1543
1544 B) For carcinogenic chemicals, the methodologies set forth at Section
1545 742.805(d) or Section 742.915(h) shall be used.
1546

- 1547 5) For the groundwater component of the indoor inhalation exposure route,
- 1548 the Tier 1 groundwater remediation objectives are listed in Appendix B,
- 1549 Tables H and I.
- 1550
- 1551 A) The Tier 1 groundwater remediation objectives for this exposure
- 1552 route are based on a default water-filled soil porosity value of 0.15
- 1553 cm³/cm³.
- 1554
- 1555 B) Appendix B, Table H shall be used when soil or groundwater
- 1556 contamination is within 5 feet, vertically and horizontally, of an
- 1557 existing or potential building or man-made pathway. In this
- 1558 scenario, the mode of contaminant transport is both diffusion and
- 1559 advection, which sets the Q_{soil} value at 83.33 cm³/sec.
- 1560
- 1561 C) Appendix B, Table I shall be used when soil and groundwater
- 1562 contamination are more than 5 feet, vertically and horizontally,
- 1563 from an existing or potential building or man-made pathway. In
- 1564 this scenario, the mode of contaminant transport is diffusion only,
- 1565 which sets the Q_{soil} value at 0.0 cm³/sec. Groundwater remediation
- 1566 objective determinations relying on this table require use of
- 1567 institutional controls in accordance with Subpart J.
- 1568
- 1569 D) To determine whether the Q_{soil} value can be set at 0.0 cm³/sec, the
- 1570 site evaluator shall demonstrate that soil and groundwater within 5
- 1571 feet, vertically and horizontally, of an existing or potential building
- 1572 or man-made pathway meet the Tier 1 remediation objectives for
- 1573 residential property listed in Appendix B, Table A, and the Tier 1
- 1574 remediation objectives for Class I groundwater listed in Appendix
- 1575 B, Table E, respectively.
- 1576

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.510 Tier 1 Remediation Objectives Tables for the Ingestion, Outdoor Inhalation and Soil Component of the Groundwater Ingestion Exposure Routes

- 1579
- 1580
- 1581
- 1582 a) Soil remediation objectives are listed in Appendix B, Tables A, B, C and D.
- 1583
- 1584 1) Appendix B, Table A is based upon residential property use.
- 1585
- 1586 A) The first column to the right of the chemical name lists soil
- 1587 remediation objectives for the soil ingestion exposure route.
- 1588
- 1589 B) The second column lists the soil remediation objectives for the

1590 outdoor inhalation exposure route.

1591
1592 C) The third and fourth columns list soil remediation objectives for
1593 the soil component of the groundwater ingestion exposure route for
1594 the respective classes of groundwater:

1595
1596 i) Class I groundwater; and

1597
1598 ii) Class II groundwater.

1599
1600 D) The final column lists the Acceptable Detection Limit (ADL), only
1601 whenwhere applicable.

1602
1603 2) Appendix B, Table B is based upon industrial/commercial property use.

1604
1605 A) The first and third columns to the right of the chemical name list
1606 the soil remediation objectives for the soil ingestion exposure route
1607 based on two receptor populations:

1608
1609 i) Industrial/commercial; and

1610
1611 ii) Construction worker.

1612
1613 B) The second and fourth columns to the right of the chemical name
1614 list the soil remediation objectives for the inhalation exposure
1615 route based on two receptor populations:

1616
1617 i) Industrial/commercial; and

1618
1619 ii) Construction worker.

1620
1621 C) The fifth and sixth columns to the right of the chemical name list
1622 the soil remediation objectives for the soil component of the
1623 groundwater ingestion exposure route for two classes of
1624 groundwater:

1625
1626 i) Class I groundwater; and

1627
1628 ii) Class II groundwater.

1629
1630 D) The final column lists the acceptable detection limit (ADL), only
1631 when applicable.

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- 3) Appendix B, Tables C and D set forth pH specific soil remediation objectives for inorganic and ionizing organic chemicals for the soil component of the groundwater ingestion route.
 - A) Table C sets forth remediation objectives based on Class I groundwater and Table D sets forth remediation objectives based on Class II groundwater.
 - B) The first column in Tables C and D lists the chemical names.
 - C) The second through ninth columns to the right of the chemical names list the pH based soil remediation objectives.
 - 4) For the inorganic chemicals listed in Appendix B, Tables A and B, the soil component of the groundwater ingestion exposure route shall be evaluated using TCLP (SW-846 Method 1311) or SPLP (SW-846 Method 1312), incorporated by reference at Section 742.210 unless a person chooses to evaluate the soil component on the basis of the total amount of contaminant in a soil sample result in accordance with subsection (a)(5) of this Section.
 - 5) For those inorganic and ionizing organic chemicals listed in Appendix B, Tables C and D, if a person elects to evaluate the soil component of the groundwater ingestion exposure route based on the total amount of contaminant in a soil sample result (rather than TCLP or SPLP analysis), the person shall determine the soil pH at the site and then select the appropriate soil remediation objectives based on Class I and Class II groundwaters from Tables C and D, respectively. If the soil pH is less than 4.5 or greater than 9.0, then Tables C and D cannot be used.
 - 6) Unless one or more exposure routes are excluded from consideration under Subpart C, the most stringent soil remediation objective of the exposure routes (i.e., soil ingestion exposure route, outdoor inhalation exposure route, and soil component of the groundwater ingestion exposure route) shall be compared to the concentrations of soil contaminants of concern measured at the site. When using Appendix B, Table B to select soil remediation objectives for the ingestion exposure route and outdoor inhalation exposure ~~routes~~ route, the remediation objective shall be the more stringent soil remediation objective of the industrial/commercial populations and construction worker populations.
 - 7) Confirmation sample results may be averaged or soil samples may be composited in accordance with Section 742.225.

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8) If a soil remediation objective for a chemical is less than the ADL, the ADL shall serve as the soil remediation objective.

b) Groundwater remediation objectives for the groundwater component of the groundwater ingestion exposure route are listed in Appendix B, Table E. However, Appendix B, Table E must be corrected for cumulative effect of mixtures of similar-acting noncarcinogenic chemicals as set forth in Section 742.505(c)(3) and (c)(4).

1) The first column to the right of the chemical name lists groundwater remediation objectives for Class I groundwater, and the second column lists the groundwater remediation objectives for Class II groundwater.

2) To use Appendix B, Table E of this Part, the 35 Ill. Adm. Code 620 classification for groundwater at the site shall be determined. The concentrations of groundwater contaminants of concern at the site are compared to the applicable Tier 1 groundwater remediation objectives for the groundwater component of the groundwater ingestion exposure route in Appendix B, Table E.

c) Soil gas remediation objectives for the outdoor inhalation exposure route are listed in Appendix B, Table G.

1) The first column to the right of the chemical name lists the soil gas remediation objectives for residential populations.

2) The second and third columns to the right of the chemical names list the soil gas remediation objectives for the outdoor inhalation exposure route based on two receptor populations:

A) Industrial/commercial; and

B) Construction worker.

d)e) For contaminants of concern not listed in Appendix B, Tables A, B, and E, and G, a person may request site-specific remediation objectives from the Agency or propose site-specific remediation objectives in accordance with 35 Ill. Adm. Code 620, Subpart I of this Part, or both.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.515 Tier 1 Remediation Objectives Tables for the Indoor Inhalation Exposure Route

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- a) When the mode of contaminant transport is both diffusion and advection as described in Section 742.505 (i.e., soil or groundwater contamination is within 5 feet of an existing or potential building or man-made pathway), the remediation objectives for soil gas and groundwater listed in Appendix B, Table H shall be used.
 - 1) The first column to the right of the chemical name lists the soil gas remediation objectives for residential receptors.
 - 2) The second column lists the soil gas remediation objectives for industrial/commercial receptors.
 - 3) The third column lists the groundwater remediation objectives for residential receptors.
 - 4) The fourth column lists the groundwater remediation objectives for industrial/commercial receptors.

- b) When the mode of contaminant transport is diffusion only as described in Section 742.505 (i.e., soil and groundwater contamination are more than 5 feet from an existing or potential building or man-made pathway), the remediation objectives for soil gas and groundwater listed in Appendix B, Table I shall be used. Remediation objectives relying on this table require use of institutional controls in accordance with Subpart J.
 - 1) The first column to the right of the chemical name lists the soil gas remediation objectives for residential receptors.
 - 2) The second column lists the soil gas remediation objectives for industrial/commercial receptors.
 - 3) The third column lists the groundwater remediation objectives for residential receptors.
 - 4) The fourth column lists the groundwater remediation objectives for industrial/commercial receptors.

- c) If using Appendix B, Table H, compliance is determined by meeting either the soil gas remediation objectives or the groundwater remediation objectives.

- 1761 d) If using Appendix B, Table I, compliance is determined by meeting both the soil
- 1762 gas remediation objectives and the groundwater remediation objectives.
- 1763
- 1764 e) For volatile chemicals not listed in Appendix B, Table H or I, a person may
- 1765 request site-specific remediation objectives from the Agency or propose site-
- 1766 specific remediation objectives in accordance with Subpart I, or both.
- 1767

1768 (Source: Added at 36 Ill. Reg. _____, effective _____)

1769

1770 SUBPART F: TIER 2 GENERAL EVALUATION

1771 Section 742.600 Tier 2 Evaluation Overview

- 1772
- 1773
- 1774 a) Tier 2 remediation objectives are developed through the use of equations which
- 1775 allow site-specific data to be used. (See Appendix C, Illustrations A and B.) The
- 1776 equations identified in Appendix C, Tables A, ~~and C,~~ and L may be used to
- 1777 develop Tier 2 remediation objectives.
- 1778
- 1779 b) Tier 2 evaluation is only required for contaminants of concern and corresponding
- 1780 exposure routes (except where excluded from further consideration under Subpart
- 1781 C) exceeding the Tier 1 remediation objectives. When conducting Tier 2
- 1782 evaluations, the values used in the calculations must have the appropriate units of
- 1783 measure as identified in Appendix C, Tables B, ~~and D,~~ and M.
- 1784
- 1785 c) Any development of remediation objectives using site-specific information or
- 1786 equations outside the Tier 2 framework shall be evaluated under Tier 3.
- 1787
- 1788 d) Any development of a remediation objective under Tier 2 shall not use a target
- 1789 hazard quotient greater than one at the point of human exposure or a target cancer
- 1790 risk greater than 1 in 1,000,000 at the point of human exposure.
- 1791
- 1792 e) In conducting a Tier 2 evaluation, the following conditions shall be met:
- 1793
- 1794 1) For each discrete sample, the total soil contaminant concentration of either
- 1795 a single contaminant or multiple contaminants of concern shall not exceed
- 1796 the attenuation capacity of the soil as provided in Section 742.215.
- 1797
- 1798 2) Remediation objectives for noncarcinogenic compounds which affect the
- 1799 same target organ, organ system or similar mode of action shall meet the
- 1800 requirements of Section 742.720.
- 1801
- 1802 3) The soil remediation objectives based on the outdoor inhalation exposure
- 1803 route ~~inhalation~~ and the soil component of the groundwater ingestion

1804 exposure routes shall not exceed the soil saturation limit as provided in
1805 Section 742.220.

1806
1807 4) The soil gas remediation objectives based on the indoor and outdoor
1808 inhalation exposure routes shall not exceed the soil vapor saturation limit
1809 provided in Section 742.222.

1810
1811 f) Tier 2 remediation objectives for the indoor inhalation exposure route shall be
1812 calculated for either soil gas or groundwater if a Q_{soil} value of $83.33 \text{ cm}^3/\text{sec}$ is
1813 used.

1814
1815 g) Tier 2 remediation objectives for the indoor inhalation exposure route shall be
1816 calculated for both soil gas and groundwater if a Q_{soil} value of $0.0 \text{ cm}^3/\text{sec}$ is used.

1817
1818 h)f) If the calculated Tier 2 soil remediation objective for an applicable exposure route
1819 is more stringent than the corresponding Tier 1 remediation objective, then the
1820 Tier 1 remediation objective applies.

1821
1822 i)g) If the calculated Tier 2 soil remediation objective for an exposure route is more
1823 stringent than the Tier 1 soil remediation ~~objectives~~ objective(s) for the other
1824 exposure routes, then the Tier 2 calculated soil remediation objective applies and
1825 Tier 2 soil remediation objectives for the other exposure routes are not required.

1826
1827 j)h) If the calculated Tier 2 soil remediation objective is less stringent than one or
1828 more of the soil remediation objectives for the remaining exposure routes, then
1829 the Tier 2 values are calculated for the remaining exposure ~~routes~~ route(s) and the
1830 most stringent Tier 2 calculated value applies.

1831
1832 k) If a contaminant has both carcinogenic and noncarcinogenic effects for any
1833 applicable exposure route or receptor, remediation objectives shall be calculated
1834 for each effect and the more stringent remediation objective shall apply. The
1835 toxicological-specific information is described in Section 742.705(d).

1836
1837 (Source: Amended at 36 Ill. Reg. _____, effective _____)

1838
1839 **Section 742.605 Land Use**

1840
1841 a) Present and post-remediation land use is evaluated in a Tier 2 evaluation.
1842 Acceptable exposure factors for the Tier 2 evaluation for residential,
1843 industrial/commercial, and construction worker populations are provided in the
1844 far right column of Appendix C, Tables B, ~~and D,~~ and M. Use of exposure factors
1845 different from those in Appendix C, Tables B, ~~and D,~~ and M must be approved by
1846 the Agency as part of a Tier 3 evaluation.

- 1847
1848 b) If a Tier 2 evaluation is based on an industrial/commercial property use, then:
1849
1850 1) Construction worker populations shall also be evaluated, except for the
1851 indoor inhalation exposure route; and
1852
1853 2) Institutional controls are required in accordance with Subpart J.
1854

1855 (Source: Amended at 36 Ill. Reg. _____, effective _____)
1856

1857 **Section 742.610 Chemical and Site Properties**
1858

- 1859 a) Physical and Chemical Properties of Contaminants
1860 Tier 2 evaluations require information on the physical and chemical properties of
1861 the contaminants of concern. The physical and chemical properties used in a Tier
1862 2 evaluation are contained in Appendix C, Table E. If the site has contaminants
1863 not included in this table, a person may request the Agency to provide the
1864 applicable physical and chemical input values or may propose input values under
1865 Subpart I. If a person proposes to apply values other than those in Appendix C,
1866 Table E, or those provided by the Agency, the evaluation shall be considered
1867 under Tier 3.
1868
1869 b) Soil and Groundwater Parameters
1870
1871 1) A Tier 2 evaluation requires examination of soil and groundwater
1872 parameters. The parameters that may be varied, and the conditions under
1873 which these parameters are determined as part of Tier 2, are summarized
1874 in Appendix C, Tables B, ~~and D~~, and M. If a person proposes to vary site-
1875 specific parameters outside of the framework of these tables, the
1876 evaluation shall be considered under Tier 3.
1877
1878 2) To determine site-specific physical soil parameters, a minimum of one
1879 boring per 0.5 acre of contamination shall be collected. This boring must
1880 be deep enough to allow the collection of the required field measurements.
1881 The site-specific physical soil parameters must be determined from the
1882 portion of the boring representing the stratigraphic ~~unit~~unit(s) being
1883 evaluated. For example, if evaluating the soil component of the
1884 groundwater ingestion exposure route, two samples from the boring will
1885 be required:
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1887 A) A sample of the predominant soil type for the vadose zone; and
1888
1889 B) A sample of the predominant soil type for the saturated zone.

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- 3) A site-specific SSL dilution factor (used in developing soil remediation objectives based upon the protection of groundwater) may be determined by substituting site information in Equation S22 in Appendix C, Table A. To make this demonstration, a minimum of three monitoring wells shall be used to determine the hydraulic gradient. As an alternative, the default dilution factor value listed in Appendix C, Table B may be used. If monitoring wells are used to determine the hydraulic gradient, the soil taken from the borings shall be visually inspected to ensure there are no significant differences in the stratigraphy. If there are similar soil types in the field, one boring shall be used to determine the site-specific physical soil parameters. If there are significant differences, all of the borings shall be evaluated before determining the site-specific physical soil parameters for the site.
 - 4) Not all of the parameters identified in Appendix C, Tables B, D, and M need to be determined on a site-specific basis. A person may choose to collect partial site-specific information and use default values as listed in Appendix C, Tables B, D, and M for the rest of the parameters.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

SUBPART G: TIER 2 SOIL AND SOIL GAS EVALUATION

Section 742.700 Tier 2 Soil Evaluation Overview

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- a) Tier 2 remediation objectives are developed through the use of models which allow site-specific data to be considered. Appendix C, Tables A, C, and L list equations that shall be used under a Tier 2 evaluation to calculate soil remediation objectives prescribed by SSL, RBCA, and the modified J&E models, respectively. (See also Appendix C, Illustration A.)
 - b) Appendix C, Table A lists equations that are used under the SSL model. (See also Appendix C, Illustration A.) The SSL model has equations to evaluate the following human exposure routes:
 - 1) Soil ingestion exposure route;
 - 2) Outdoor Inhalation exposure route; ~~and for:~~
 - A) ~~Organic~~ contaminants;
 - B) ~~Fugitive dust~~; and

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- 3) Soil component of the groundwater ingestion exposure route.
 - c) Evaluation of the dermal exposure route is not required under the SSL model.
 - d) Appendix C, Table C lists equations that are used under the RBCA model. (See also Appendix C, Illustration A.) The RBCA model has equations to evaluate human exposure based on the following:
 - 1) The combined exposure routes of outdoor inhalation of vapors and particulates, soil ingestion and dermal contact with soil;
 - 2) The outdoor inhalation exposure~~ambient vapor inhalation (outdoor)~~ route from subsurface soils;
 - 3) Soil component of the groundwater ingestion route; and
 - 4) Groundwater ingestion exposure route.
 - e) Appendix C, Table L lists equations that are used under the modified J&E model. The modified J&E model has equations to evaluate human exposure by the indoor inhalation exposure route. The modified model allows for the development of soil gas remediation objectives.
 - f)e) The equations in either Appendix C, Table ~~A₂~~ ~~or~~ C₂ ~~or~~ L may be used to calculate remediation objectives for each contaminant of concern under Tier 2, if the following requirements are met:
 - 1) The Tier 2 soil or soil gas remediation objectives for the ingestion and outdoor inhalation exposure routes shall use the applicable equations from the same approach (i.e., SSL equations in Appendix C, Table C). For the indoor inhalation exposure route, only the J&E equations can be used.
 - 2) The equations used to calculate soil remediation objectives for the soil component of the groundwater ingestion exposure route are not dependent on the approach utilized to calculate soil remediation objectives for the other exposure routes. For example, it is acceptable to use the SSL equations for calculating Tier 2 soil remediation objectives for the ingestion and outdoor inhalation exposure routes, and the RBCA equations for calculating Tier 2 soil remediation objectives for the soil component of the groundwater ingestion exposure route.
 - 3) Combining equations from Appendix C, Tables ~~A₂~~ ~~and~~ C₂ ~~and~~ L to form a

1976 new model is not allowed. In addition, Appendix C, Tables A, ~~C~~, and
1977 L must use their own applicable parameters identified in Appendix C,
1978 Tables B, ~~D~~, and M, respectively.
1979

1980 g) In calculating soil or gas remediation objectives for industrial/commercial
1981 property use, applicable calculations shall be performed twice: once using
1982 industrial/commercial population default values and once using construction
1983 worker population default values. The more stringent soil or gas remediation
1984 objectives derived from these calculations must be used for further Tier 2
1985 evaluations. The indoor inhalation exposure route does not apply to the
1986 construction worker population.
1987

1988 h) Tier 2 data sheets provided by the Agency shall be used to present calculated Tier
1989 2 remediation objectives, if required by the particular program for which
1990 remediation is being performed.
1991

1992 i) The RBCA equations which rely on the parameter Soil Water Sorption
1993 Coefficient (k_s) can only be used for ionizing organics and inorganics by
1994 substituting values for k_s from Appendix C, Tables I and J, respectively. This will
1995 also require the determination of a site-specific value for soil pH.
1996

1997 j) For the outdoor inhalation exposure route, it is acceptable to use either Section
1998 742.710 to develop a soil remediation objective or Section 742.712 to develop a
1999 soil gas remediation objective to determine compliance with the pathway.
2000

2001 (Source: Amended at 36 Ill. Reg. _____, effective _____)
2002

2003 **Section 742.705 Parameters for Soil Remediation Objective Equations**
2004

2005 a) Appendix C, Tables B, ~~D~~, and M list the input parameters for the SSL, ~~and~~
2006 RBCA, and J&E equations, respectively. The first column lists each symbol as it
2007 is presented in the equation. The next column defines the parameters. The third
2008 column shows the units for the parameters. The fourth column identifies where
2009 information on the parameters can be obtained (i.e., field measurement,
2010 applicable ~~equation~~equation(s), reference source, or default value). The last
2011 column identifies how the parameters can be generated.
2012

2013 b) Default Values
2014 Default values are numerical values specified for use in the Tier 2 equations. The
2015 fourth column of Appendix C, Tables B, ~~and D~~, and M denotes if the default
2016 values are from the SSL model, RBCA model, the modified J&E model or some
2017 other source. The last column of Appendix C, Tables B, ~~and D~~, and M lists the
2018 numerical values for the default values used in the SSL, ~~and~~ RBCA, and J&E

2019 equations, respectively.

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c) Site-specific Information

Site-specific information is a parameter measured, obtained, or determined from the site to calculate Tier 2 remediation objectives. The fourth column of Appendix C, Tables B, and D, and M identifies those site-specific parameters that may require direct field measurement. For some parameters, numerical default inputs have been provided in the last column of Appendix C, Tables B, and D, and M to substitute for site-specific information. In some cases, information on the receptor or soil type is required to select the applicable numerical default inputs. Site-specific information includes:

- 1) Physical soil parameters identified in Appendix C, Table F. The second column identifies the location where the sample is to be collected. Acceptable methods for measuring or calculating these soil parameters are identified in the last column of Appendix C, Table F;
- 2) Institutional controls or engineered barriers, pursuant to Subparts J and K, describe applicable institutional controls and engineered barriers under a Tier 2 evaluation; and
- 3) Land use classification

d) Toxicological-specific Information

- 1) Toxicological-specific information is used to calculate Tier 2 remediation objectives for the following parameters, if applicable:
 - A) Oral Chronic Reference Dose (RfD_o, expressed in mg/kg-d);
 - B) Oral Subchronic Reference Dose (RfD_s, expressed in mg/kg-d, shall be used for construction worker remediation objective calculations);
 - C) Oral Slope Factor (SF_o, expressed in (mg/kg-d)⁻¹);
 - D) Inhalation Unit Risk Factor (URF expressed in (µg/m³)⁻¹);
 - E) Inhalation Chronic Reference Concentration (RfC, expressed in mg/m³);
 - F) Inhalation Subchronic Reference Concentration (RfC_s, expressed in mg/m³, shall be used for construction worker remediation

- 2062 objective calculations);
- 2063
- 2064 G) Inhalation Chronic Reference Dose (RfD_i, expressed in mg/kg-d);
- 2065
- 2066 H) Inhalation Subchronic Reference Dose (RfD_{is}, expressed in mg/kg-
- 2067 d, shall be used for construction worker remediation objective
- 2068 calculations); and
- 2069
- 2070 I) Inhalation Slope Factor (SF_i, expressed in (mg/kg-d)⁻¹);
- 2071
- 2072 2) Toxicological information can be obtained by following the guidelines in
- 2073 OSWER Directive 9285.7-53 ~~from IRIS~~, as incorporated by reference in
- 2074 Section 742.210, or the program under which the remediation is being
- 2075 performed.
- 2076

2077 e) Chemical-specific Information
 2078 Chemical-specific information used to calculate Tier 2 remediation objectives is
 2079 listed in Appendix C, Table E.

2081 f) Calculations
 2082 Calculating numerical values for some parameters requires the use of equations
 2083 listed in Appendix C, ~~Tables~~ Table A, C, and L. The parameters that are
 2084 calculated are listed in Appendix C, ~~Tables B, and D,~~ and M.

2085
 2086 (Source: Amended at 36 Ill. Reg. _____, effective _____)

2087
 2088 **Section 742.710 SSL Soil Equations**

2089
 2090 a) This Section sets forth the equations and parameters used to develop Tier 2 soil
 2091 remediation objectives for the three exposure routes using the SSL approach.

2092
 2093 b) Soil Ingestion Exposure Route

2094
 2095 1) Equations S1 through S3 form the basis for calculating Tier 2 remediation
 2096 objectives for the soil ingestion exposure route using the SSL approach.
 2097 Equation S1 is used to calculate soil remediation objectives for
 2098 noncarcinogenic contaminants. Equations S2 and S3 are used to calculate
 2099 soil remediation objectives for carcinogenic contaminants for residential
 2100 populations and industrial/commercial and construction worker
 2101 populations, respectively.

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 2103 2) For Equations S1 through S3, the SSL default values cannot be modified
 2104 with site-specific information.

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c) Outdoor Inhalation Exposure Route

- 1) Equations S4 through S16, S26 and S27 are used to calculate Tier 2 soil remediation objectives for the outdoor inhalation exposure route using the SSL approach. To address this exposure route, organic contaminants and mercury must be evaluated separately from fugitive dust using their own equations set forth in subsections (c)(2) and (c)(3) of this Section, respectively.

- 2) Organic Contaminants
 - A) Equations S4 through S10 are used to calculate Tier 2 soil remediation objectives for organic contaminants and mercury based on the outdoor inhalation exposure route. Equation S4 is used to calculate soil remediation objectives for noncarcinogenic organic contaminants in soil for residential and industrial/commercial populations. Equation S5 is used to calculate soil remediation objectives for noncarcinogenic organic contaminants and mercury in soil for construction worker populations. Equation S6 is used to calculate soil remediation objectives for carcinogenic organic contaminants in soil for residential and industrial/commercial populations. Equation S7 is used to calculate soil remediation objectives for carcinogenic organic contaminants in soil for construction worker populations. Equations S8 through S10, S27 and S28 are used for calculating numerical values for some of the parameters in Equations S4 through S7.

 - B) For Equation S4, a numerical value for the Volatilization Factor (VF) can be calculated in accordance with subsection (c)(2)(F) of this Section. The remaining parameters in Equation S4 have either SSL default values listed in Appendix C, Table B or toxicological-specific information (i.e., RfC), which can be obtained by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210~~from IRIS~~ or requested from the program under which the remediation is being performed.

 - C) For Equation S5, a numerical value for the Volatilization Factor adjusted for Agitation (VF') can be calculated in accordance with subsection (c)(2)(G) of this Section. The remaining parameters in Equation S5 have either SSL default values listed in Appendix C,

- 2148 Table B or toxicological-specific information (i.e., RfC), which
 2149 can be obtained by following the guidelines in OSWER Directive
 2150 9285.7-53, as incorporated by reference in Section 742.210 from
 2151 IRIS or requested from the program under which the remediation is
 2152 being performed.
- 2153
- 2154 D) For Equation S6, a numerical value for VF can be calculated in
 2155 accordance with subsection (c)(2)(F) of this Section. The
 2156 remaining parameters in Equation S6 have either default values
 2157 listed in Appendix C, Table B or toxicological-specific information
 2158 (i.e., URF), which can be obtained by following the guidelines in
 2159 OSWER Directive 9285.7-53, as incorporated by reference in
 2160 Section 742.210 from IRIS or requested from the program under
 2161 which the remediation is being performed.
- 2162
- 2163 E) For Equation S7, a numerical value for VF' can be calculated in
 2164 accordance with subsection (c)(2)(G) of this Section. The
 2165 remaining parameters in Equation S7 have either default values
 2166 listed in Appendix C, Table B or toxicological-specific information
 2167 (i.e., URF), which can be obtained by following the guidelines in
 2168 OSWER Directive 9285.7-53, as incorporated by reference in
 2169 Section 742.210 from IRIS or requested from the program under
 2170 which the remediation is being performed.
- 2171
- 2172 F) The VF can be calculated for residential and industrial/commercial
 2173 populations using one of the following equations based on the
 2174 information known about the contaminant source and receptor
 2175 population:
- 2176
- 2177 i) Equation S8, in conjunction with Equation S10, is used to
 2178 calculate VF assuming an infinite source of contamination;
 2179 or
- 2180
- 2181 ii) If the area and depth of the contaminant source are known
 2182 or can be estimated reliably, mass limit considerations may
 2183 be used to calculate VF using Equation S26.
- 2184
- 2185 G) The VF' can be calculated for the construction worker populations
 2186 using one of the following equations based on the information
 2187 known about the contaminant source:
- 2188
- 2189 i) Equation S9 is used to calculate VF' assuming an infinite
 2190 source of contamination; or

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ii) If the area and depth of the contaminant source are known or can be estimated reliably, mass limit considerations may be used to calculate VF' using Equation S27.

3) Fugitive Dust

- A) Equations S11 through S16 are used to calculate Tier 2 soil remediation objectives using the SSL fugitive dust model for the outdoor inhalation exposure route. Equation S11 is used to calculate soil remediation objectives for noncarcinogenic contaminants in fugitive dust for residential and industrial/commercial populations. Equation S12 is used to calculate soil remediation objectives for noncarcinogenic contaminants in fugitive dust for construction worker populations. Equation S13 is used to calculate soil remediation objectives for carcinogenic contaminants in fugitive dust for residential and industrial/commercial populations. Equation S14 is used to calculate soil remediation objectives for carcinogenic contaminants in fugitive dust for construction worker populations. Equations S15 and S16 are used for calculating numerical quantities for some of the parameters in Equations S11 through S14.
- B) For Equation S11, a numerical value can be calculated for the Particulate Emission Factor (PEF) using Equation S15. This equation relies on various input parameters from a variety of sources. The remaining parameters in Equation S11 have either SSL default values listed in Appendix C, Table B or toxicological-specific information (i.e., RfC), which can be obtained by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210~~from IRIS~~ or requested from the program under which the remediation is being performed.
- C) For Equation S12, a numerical value for the Particulate Emission Factor for Construction Worker (PEF') can be calculated using Equation S16. The remaining parameters in Equation S12 have either SSL default values listed in Appendix C, Table B or toxicological-specific information (i.e., RfC), which can be obtained by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210~~from IRIS~~ or requested from the program under which the remediation is being performed.

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- D) For Equation S13, a numerical value for PEF can be calculated using Equation S15. The remaining parameters in Equation S13 have either default values listed in Appendix C, Table B or toxicological-specific information (i.e., URF), which can be obtained by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210 from IRIS or requested from the program under which the remediation is being performed.
 - E) For Equation S14, a numerical value for PEF' can be calculated using Equation S16. The remaining parameters in Equation S14 have either default values listed in Appendix C, Table B or toxicological-specific information (i.e., URF), which can be obtained by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210 from IRIS or requested from the program under which the remediation is being performed.
- d) Soil Component of the Groundwater Ingestion Exposure Route
 The Tier 2 remediation objective for the soil component of the groundwater ingestion exposure route can be calculated using one of the following equations based on the information known about the contaminant source and receptor population:
- 1) Equation S17 is used to calculate the remediation objective assuming an infinite source of contamination.
 - A) The numerical quantities for four parameters in Equation S17, the Target Soil Leachate Concentration (C_w), Soil-Water Partition Coefficient (K_d) for non-ionizing organics, Water-Filled Soil Porosity Θ_w (Θ_w) and Air-Filled Soil Porosity Θ_a (Θ_a), are calculated using Equations S18, S19, S20 and S21, respectively. Equations S22, S23, S24 and S25 are also needed to calculate numerical values for Equations S18 and S21. The pH-dependent K_d values for ionizing organics can be calculated using Equation S19 and the pH-dependent K_{oc} values in Appendix C, Table I.
 - B) The remaining parameters in Equation S17 are Henry's Law Constant (H'), a chemical specific value listed in Appendix C, Table E and Dry Soil Bulk Density (ρ_b), a site-specific based value listed in Appendix C, Table B.

- 2277
2278 C) The default value for GW_{obj} is the Tier 1 groundwater objective.
2279 For chemicals for which there is no Tier 1 groundwater
2280 remediation objective, the value for GW_{obj} shall be the
2281 concentration determined according to the procedures specified in
2282 35 Ill. Adm. Code 620, Subpart F. As an alternative to using Tier
2283 1 groundwater remediation objectives or concentrations
2284 determined according to the procedures specified in 35 Ill. Adm.
2285 Code 620, Subpart F, GW_{obj} may be developed using Equations
2286 R25 and R26, if approved institutional controls are in place as
2287 required in Subpart J.
2288
2289 2) If the area and depth of the contaminant source are known or can be
2290 estimated reliably, mass limit considerations may be used to calculate the
2291 remediation objective for this exposure route using Equation S28. The
2292 parameters in Equation S28 have default values listed in Appendix C,
2293 Table B.
2294

2295 (Source: Amended at 36 Ill. Reg. _____, effective _____)
2296

2297 **Section 742.712 SSL Soil Gas Equation for the Outdoor Inhalation Exposure Route**
2298

- 2299 a) This Section sets forth the equation and parameters used to develop Tier 2 soil gas
2300 remediation objectives for the outdoor inhalation exposure route using the SSL
2301 approach.
2302
2303 b) Equation S30 is used to calculate Tier 2 soil gas remediation objectives for the
2304 outdoor inhalation exposure route for residential, industrial/commercial, and
2305 construction worker populations.
2306
2307 c) Equations S4 through S16, S26 and S27, which calculate Tier 2 soil remediation
2308 objectives as described in Section 742.710(c), form the basis for developing the
2309 Tier 2 soil gas remediation objectives for the outdoor inhalation exposure route
2310 using the SSL model.
2311
2312 d) The remaining parameters used to calculate Equation S30 are listed in Appendix
2313 C, Table B, except for Dimensionless Henry's Law Constant (25°C), a chemical
2314 specific value listed in Appendix C, Table E.
2315

2316 (Source: Added at 36 Ill. Reg. _____, effective _____)
2317

2318 **Section 742.715 RBCA Soil Equations**
2319

- 2320 a) This Section presents the RBCA model and describes the equations and
 2321 parameters used to develop Tier 2 soil remediation objectives.
 2322
- 2323 b) Ingestion, Outdoor Inhalation, and Dermal Contact
 2324
- 2325 1) The two sets of equations in subsections (b)(2) and (b)(3) of this Section
 2326 shall be used to generate Tier 2 soil remediation objectives for the
 2327 combined ingestion, outdoor inhalation, and dermal contact with soil
 2328 exposure routes.
 2329
- 2330 2) Combined Exposure Routes of Soil Ingestion, Outdoor Inhalation of
 2331 Vapors and Particulates, and Dermal Contact with Soil
 2332
- 2333 A) Equations R1 and R2 form the basis for deriving Tier 2
 2334 remediation objectives for the set of equations that evaluates the
 2335 combined exposure routes of soil ingestion, outdoor inhalation of
 2336 vapors and particulates, and dermal contact with soil using the
 2337 RBCA approach. Equation R1 is used to calculate soil remediation
 2338 objectives for carcinogenic contaminants. Equation R2 is used to
 2339 calculate soil remediation objectives for noncarcinogenic
 2340 contaminants. Soil remediation objectives for the outdoor
 2341 inhalation exposure~~ambient vapor inhalation (outdoor)~~ route from
 2342 subsurface soils must also be calculated in accordance with the
 2343 procedures outlined in subsection (b)(3) of this Section and
 2344 compared to the values generated from Equations R1 or R2. The
 2345 smaller value (i.e., R1 and R2 compared to R7 and R8,
 2346 respectively) from these calculations is the Tier 2 soil remediation
 2347 objective for the combined exposure routes of soil ingestion,
 2348 outdoor inhalation, and dermal contact with soil.
 2349
- 2350 B) In Equation R1, numerical values are calculated for two
 2351 parameters:
 2352
- 2353 i) The volatilization factor for surficial soils (VF_{ss}) using
 2354 Equations R3 and R4; and
 2355
- 2356 ii) The volatilization factor for surficial~~subsurface~~ soils
 2357 regarding particulates (VF_p using Equation R5).
 2358
- 2359 C) VF_{ss} uses Equations R3 and R4 to derive a numerical value.
 2360 Equation R3 requires the use of Equation R6. Both equations must
 2361 be used to calculate the VF_{ss} . The lowest calculated value from
 2362 these equations must be substituted into Equation R1.

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- D) The remaining parameters in Equation R1 have either default values listed in Appendix C, Table D or toxicological-specific information (i.e., SF_o , SF_i), which can be obtained by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210 from IRIS or requested from the program under which the remediation is being performed.
 - E) For Equation R2, the parameters VF_{ss} and VF_p are calculated. The remaining parameters in Equation R2 have either default values listed in Appendix C, Table D or toxicological-specific information (i.e., RfD_o , RfD_i), which can be obtained by following the guidelines in OSWER Directive 9285.7-53, as incorporated by reference in Section 742.210 from IRIS or requested from the program under which the remediation is being performed.
 - F) For chemicals other than inorganics which do not have default values for the dermal absorption factor (RAF_d) in Appendix C, Table D a dermal absorption factor of 0.5 shall be used for Equations R1 and R2. For inorganics, dermal absorption may be disregarded (i.e., $RAF_d = 0$).
- 3) Outdoor Inhalation Exposure Route~~Ambient Vapor Inhalation (outdoor)~~ route from Subsurface Soils (soil below one meter)
- A) Equations R7 and R8 form the basis for deriving Tier 2 remediation objectives for the outdoor inhalation exposure~~ambient vapor inhalation (outdoor)~~ route from subsurface soils using the RBCA approach. Equation R7 is used to calculate soil remediation objectives for carcinogenic contaminants. Equation R8 is used to calculate soil remediation objectives for noncarcinogenic contaminants.
 - B) For Equation R7, the carcinogenic risk-based screening level for air ($RBSL_{air}$) and the volatilization factor for soils below one meter to ambient air (VF_{samb}) have numerical values that are calculated using Equations R9 and R11, respectively. Both equations rely on input parameters from a variety of sources.
 - C) The noncarcinogenic risk-based screening level for air ($RBSL_{air}$) and the volatilization factor for soils below one meter to ambient air (VF_{samb}) in Equation R8 have numerical values that can be calculated using Equations R10 and R11, respectively.

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- c) Soil Component of the Groundwater Ingestion Exposure Route
 - 1) Equation R12 forms the basis for deriving Tier 2 remediation objectives for the soil component of the groundwater ingestion exposure route using the RBCA approach. The parameters, groundwater at the source (GW_{source}) and Leaching Factor (LF_{sw}), have numerical values that are calculated using Equations R13 and R14, respectively.
 - 2) Equation R13 requires numerical values that are calculated using Equation R15.
 - 3) Equation R14 requires numerical values that are calculated using Equations R21, R22, and R24. For non-ionizing organics, the Soil Water Sorption Coefficient (k_s) shall be calculated using Equation R20. For ionizing organics and inorganics, the values for (k_s) are listed in Appendix C, Tables I and J, respectively. The pH-dependent k_s values for ionizing organics can be calculated using Equation R20 and the pH dependent K_{oc} values in Appendix C, Table I. The remaining parameters in Equation R14 are field measurements or default values listed in Appendix C, Table D.
- d) The default value for GW_{comp} is the Tier 1 groundwater remediation objective. For chemicals for which there is no Tier 1 groundwater remediation objective, the value for GW_{comp} shall be the concentration determined according to the procedures specified in 35 Ill. Adm. Code 620, Subpart F. As an alternative to using the above concentrations, GW_{comp} may be developed using Equations R25 and R26, if approved institutional controls are in place as may be required in Subpart J.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.717 J&E Soil Gas Equations for the Indoor Inhalation Exposure Route

- a) This Section sets forth the equations and parameters to be used to develop Tier 2 soil gas remediation objectives for the indoor inhalation exposure route using the modified J&E model.
- b) Equations J&E1 and J&E2 calculate, for carcinogens and noncarcinogens, respectively, an acceptable concentration of the contaminant of concern in indoor air that adequately protects humans who inhale this air. Equation J&E3 converts indoor air concentrations from parts per million volume to milligrams per cubic meter.

- 2449
- 2450 c) Equation J&E4 calculates an acceptable concentration of the contaminant of
- 2451 concern in the soil gas at the source of contamination. This calculation is made
- 2452 using:
- 2453
- 2454 1) an attenuation factor developed in accordance with Equations J&E7
- 2455 through 18; and
- 2456
- 2457 2) the acceptable concentration of the contaminant of concern in indoor air
- 2458 calculated in accordance with Equation J&E1 (for carcinogens) or J&E2
- 2459 (for noncarcinogens).
- 2460
- 2461 d) The attenuation factor (Equation J&E7 or J&E8) accounts for the following
- 2462 processes:
- 2463
- 2464 1) Migration of contaminants from the source upwards through the vadose
- 2465 zone;
- 2466
- 2467 2) Migration of contaminants through the earthen filled cracks in the slab-on-
- 2468 grade or basement floor and walls; and
- 2469
- 2470 3) Mixing of the contaminants with air inside the building.
- 2471
- 2472 e) Equation J&E7 is used when the mode of contaminant transport is both diffusion
- 2473 and advection. In this scenario, the Q_{soil} value equals $83.33 \text{ cm}^3/\text{sec}$ as described
- 2474 in Section 742.505.
- 2475
- 2476 f) Equation J&E8 is used when the mode of contaminant transport is diffusion only.
- 2477 In this scenario, the Q_{soil} value equals $0.0 \text{ cm}^3/\text{sec}$ as described in Section
- 2478 742.505.
- 2479
- 2480 g) Equations J&E9a through J&E18 calculate input parameters for either Equation
- 2481 J&E7 or J&E8 (the equations used to calculate an attenuation factor). These
- 2482 equations assume there are "n" different soil layers between the source of the
- 2483 contamination and the floor of the building. Equations J&E11, 16, 17 and 18 shall
- 2484 be used to calculate the needed parameters for each of the n layers (the general
- 2485 soil layer is referred to as soil layer "i" and $i = 1, 2, \dots, n$). Equations J&E16, 17,
- 2486 and 18 shall also be used to calculate needed parameters for the soil in the cracks
- 2487 of the floor of the building (it is through these cracks that contaminants flow from
- 2488 the subsurface into the building).
- 2489

- 2490 h) The default representative subsurface temperature for Henry's Law Constant is
2491 13°C. This value shall be used, as appropriate, in all calculations needed to
2492 represent the system by which contaminants migrate through the subsurface.
2493
- 2494 i) The calculated soil gas remediation objective shall be compared with the saturated
2495 vapor concentration (C_v^{sat} , Equation J&E6b) for each volatile chemical. The
2496 calculated C_v^{sat} shall use the default representative subsurface temperature
2497 specified in subsection (g). If the calculated soil gas remediation objective is
2498 greater than C_v^{sat} , then C_v^{sat} is used as the soil gas remediation objective.
2499
- 2500 j) The calculated soil gas remediation objective shall be compared to concentrations
2501 of soil gas collected at a depth at least 3 feet below ground surface and above the
2502 saturated zone. If a valid sample cannot be collected, a soil gas sampling plan
2503 shall be approved by the Agency under Tier 3.
2504

2505 (Source: Added at 36 Ill. Reg. _____, effective _____)
2506

2507 SUBPART H: TIER 2 GROUNDWATER EVALUATION 2508

2509 **Section 742.805 Tier 2 Groundwater Remediation Objectives** 2510

- 2511 a) To develop a groundwater remediation objective under this Section that exceeds
2512 the applicable Tier 1 groundwater remediation objective, or for which there is no
2513 Tier I groundwater remediation objective, a person may request approval from the
2514 Agency if the person has performed the following:
2515
- 2516 1) Identified the horizontal and vertical extent of groundwater for which the
2517 Tier 2 groundwater remediation objective is sought;
2518
 - 2519 2) Taken corrective action, to the maximum extent practicable to remove any
2520 free product;
2521
 - 2522 3) Using Equation R26 in accordance with Section 742.810, demonstrated
2523 that the concentration of any contaminant of concern in groundwater will
2524 meet:
2525
- 2526 A) The applicable Tier 1 groundwater remediation objective at the
2527 point of human exposure; or
2528
 - 2529 B) For any contaminant of concern for which there is no Tier 1
2530 groundwater remediation objective, the concentration determined
2531 according to the procedures specified in 35 Ill. Adm. Code 620 at
2532 the point of human exposure. A person may request the Agency to

- 2533 provide these concentrations or may propose these concentrations
 2534 under Subpart I;
 2535
 2536 4) Using Equation R26 in accordance with Section 742.810, demonstrated
 2537 that the concentration of any contaminant of concern in groundwater
 2538 within the minimum or designated maximum setback zone of an existing
 2539 potable water supply well will meet the applicable Tier 1 groundwater
 2540 remediation objective or, if there is no Tier 1 groundwater remediation
 2541 objective, the concentration determined according to the procedures
 2542 specified in 35 Ill. Adm. Code 620. A person may request the Agency to
 2543 provide these concentrations or may propose these concentrations under
 2544 Subpart I;
 2545
 2546 5) Using Equation R26 in accordance with Section 742.810, demonstrated
 2547 that the concentration of any contaminant of concern in groundwater
 2548 discharging into a surface water will meet the applicable water quality
 2549 standard under 35 Ill. Adm. Code 302;
 2550
 2551 6) Demonstrated that the source of the release is not located within the
 2552 minimum or designated maximum setback zone or within a regulated
 2553 recharge area of an existing potable water supply well; and
 2554
 2555 7) If the selected corrective action includes an engineered barrier as set forth
 2556 in Subpart K to minimize migration of ~~contaminant~~ contaminant of
 2557 concern from the soil to the groundwater, demonstrated that the
 2558 engineered barrier will remain in place for post-remediation land use
 2559 through an institutional control as set forth in Subpart J.
 2560
 2561 b) A groundwater remediation objective that exceeds the water solubility of that
 2562 chemical (refer to Appendix C, Table E for solubility values) is not allowed.
 2563
 2564 c) The contaminants of concern for which a Tier 1 remediation objective has been
 2565 developed shall be included in any mixture of similar-acting chemicals under
 2566 consideration in Tier 2. The evaluation of 35 Ill. Adm. Code 620.615 regarding
 2567 mixtures of similar-acting chemicals shall be considered satisfied for Class I
 2568 groundwater at the point of human exposure if either of the following
 2569 requirements are achieved:
 2570
 2571 1) Calculate the weighted average using the following equations:
 2572

$$W_{ave} = \frac{x_1}{CUO_{x_1}} + \frac{x_2}{CUO_{x_2}} + \frac{x_3}{CUO_{x_3}} + \dots + \frac{x_a}{CUO_{x_a}}$$

2573
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2575

where:

- W_{ave} = Weighted Average
- x_1 through x_a = Concentration of each individual contaminant at the location of concern. Note that, depending on the target organ, the actual number of contaminants will range from 2 to 33.
- CUO_{x_a} = A Tier 1 or Tier 2 remediation objective must be developed for each x_a .

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- A) If the value of the weighted average calculated in accordance with the equations above is less than or equal to 1.0, then the remediation objectives are met for those chemicals.
 - B) If the value of the weighted average calculated in accordance with the equations above is greater than 1.0, then additional remediation must be carried out until the level of contaminants remaining in the remediated area has a weighted average calculated in accordance with the equation above less than or equal to one; or
- 2) Divide each individual chemical's remediation objective by the number of chemicals in that specific target organ group that were detected at the site. Each of the contaminant concentrations at the site is then compared to the remediation objectives that have been adjusted to account for this potential additivity.
- d) The evaluation of 35 Ill. Adm. Code 620.615 regarding mixtures of similar-acting chemicals are considered satisfied if the cumulative risk from any contaminant~~contaminant~~(s) of concern listed in Appendix A, Table I, plus any other contaminant~~contaminant~~(s) of concern detected in groundwater and listed in Appendix A, Table F as affecting the same target organ/organ system as the contaminant~~contaminant~~(s) of concern detected from Appendix A, Table I, does not exceed 1 in 10,000.
- e) Groundwater remediation objectives for the indoor inhalation exposure route shall be developed in accordance with Section 742.812.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.810 RBCA Calculations to Predict Impacts from Remaining Groundwater

2608 **Contamination**

2609

2610 a) Equation R26 predicts the contaminant concentration along the centerline of a
 2611 groundwater plume emanating from a vertical planar source in the aquifer
 2612 (dimensions S_w wide and S_d deep). This model accounts for both three-
 2613 dimensional dispersion (x is the direction of groundwater flow, y is the other
 2614 horizontal direction, and z is the vertical direction) and biodegradation.

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1) The parameters in this equation are:

X = distance from the planar source to the location of concern,
 along the centerline of the groundwater plume (i.e., $y = 0$, $z = 0$)

C_x = the concentration of the contaminant at a distance X from the
 source, along the centerline of the plume

C_{source} = the greatest potential concentration of the contaminant of
 concern in the groundwater at the source of the
 contamination, based on the concentrations of contaminants
 in groundwater due to the release and the projected
 concentration of the contaminant migrating from the soil to
 the groundwater. As indicated above, the model assumes a
 planar source discharging groundwater at a concentration
 equal to C_{source} .

α_x = dispersivity in the x direction (i.e., Equation R16)

α_y = dispersivity in the y direction (i.e., Equation R17)

α_z = dispersivity in the z direction (i.e., Equation R18)

U = specific discharge (i.e., actual groundwater flow velocity
 through a porous medium; takes into account the fact that the
 groundwater actually flows only through the pores of the
 subsurface materials) where the aquifer hydraulic
 conductivity (K), the hydraulic gradient (I) and the total soil
 porosity Θ_T must be known (i.e., Equation R19)

λ = first order degradation constant obtained from Appendix C,
 Table E or from measured groundwater data

S_w = width of planar groundwater source in the y direction

S_d = depth of planar groundwater source in the z direction

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2) The following parameters are determined through field measurements: U ,
 K , I , Θ_T , S_w , S_d .

A) The determination of values for U , K , I and Θ_T can be obtained
 through the appropriate laboratory and field techniques;

2625 B) From the immediate down-gradient edge of the source of the
 2626 groundwater contamination values for S_w and S_d shall be
 2627 determined. S_w is defined as the width of groundwater at the
 2628 source which exceeds the Tier 1 groundwater remediation
 2629 objective. S_d is defined as the depth of groundwater at the source
 2630 which exceeds the Tier 1 groundwater remediation objective; and

2631
 2632 C) Total soil porosity can also be calculated using Equation R23.
 2633

2634 b) Once values are obtained for all the input parameters identified in subsection (a)
 2635 of this Section, the contaminant concentration C_x along the centerline of the
 2636 plume at a distance X from the source shall be calculated so that X is the distance
 2637 from the down-gradient edge of the source of the contamination at the site to the
 2638 point where the contaminant concentration is equal to the Tier 1 groundwater
 2639 remediation objective or concentration determined according to the procedures
 2640 specified in 35 Ill. Adm. Code 620, Subpart F.
 2641

2642 1) If there are any potable water supply wells located within the calculated
 2643 distance X , then the Tier 1 groundwater remediation objective or
 2644 concentration shall be met at the edge of the minimum or designated
 2645 maximum setback zone of the nearest potable water supply down-gradient
 2646 of the source. To demonstrate that a minimum or maximum setback zone
 2647 of a potable water supply well will not be impacted above the applicable
 2648 Tier 1 groundwater remediation objective or concentration determined
 2649 according to the procedures specified in 35 Ill. Adm. Code 620, Subpart F,
 2650 X shall be the distance from the C_{source} location to the edge of the setback
 2651 zone.
 2652

2653 2) To demonstrate that no surface water is adversely impacted, X shall be the
 2654 distance from the down-gradient edge of the source of the contamination
 2655 site to the nearest surface water body. This calculation must show that the
 2656 contaminant in the groundwater at this location (C_x) does not exceed the
 2657 applicable water quality standard.
 2658

2659 (Source: Amended at 36 Ill. Reg. _____, effective _____)
 2660

2661 **Section 742.812 J&E Groundwater Equations for the Indoor Inhalation Exposure Route**
 2662

2663 Groundwater remediation objectives for the indoor inhalation exposure route are calculated using
 2664 the modified J&E model as described in Section 742.717, except as follows:
 2665

2666 a) In Equation J&E9a, the total number of layers of soil that contaminants migrate
 2667 through from the source to the building shall include a capillary fringe layer.

- 2668
2669 b) The thickness of the capillary fringe layer is 37.5 cm.
2670
2671 c) The volumetric water content of the capillary fringe shall be 90% of the total
2672 porosity of the soil that comprises the capillary fringe.
2673
2674 d) Equations J&E7 and J&E8 calculate an acceptable groundwater remediation
2675 objective.
2676
2677 1) This calculation is made using:
2678
2679 A) the soil gas remediation objective calculated in accordance with
2680 Equation J&E4; and
2681
2682 B) the assumption that this gas is in equilibrium with any
2683 contamination in the groundwater.
2684
2685 2) Equation J&E7 is used when the mode of contaminant transport is both
2686 diffusion and advection. In this scenario, the Q_{soil} value equals 83.33
2687 cm³/sec as described in Section 742.505.
2688
2689 3) Equation J&E8 is used when the mode of contaminant transport is
2690 diffusion only. In this scenario, the Q_{soil} value equals 0.0 cm³/sec as
2691 described in Section 742.505.
2692
2693 e) A groundwater remediation objective that exceeds the water solubility of that
2694 chemical (refer to Appendix C, Table E for solubility values) is not allowed.
2695
2696 (Source: Added at 36 Ill. Reg. _____, effective _____)
2697

2698 SUBPART I: TIER 3 EVALUATION
2699

2700 **Section 742.900 Tier 3 Evaluation Overview**
2701

- 2702 a) Tier 3 sets forth a flexible framework to develop remediation objectives outside of
2703 the requirements of Tiers 1 and 2. Although Tier 1 and Tier 2 evaluations are not
2704 prerequisites to conduct Tier 3 evaluations, data from Tier 1 and Tier 2 can assist
2705 in developing remediation objectives under a Tier 3 evaluation.
2706
2707 b) The level of detail required to adequately characterize a site depends on the
2708 particular use of Tier 3. Tier 3 can require additional investigative efforts beyond
2709 those described in Tier 2 to characterize the physical setting of the site. However,
2710 in situations where remedial efforts have simply reached a physical obstruction

- 2711 additional investigation may not be necessary for a Tier 3 submittal.
2712
2713 c) Situations that can be considered for a Tier 3 evaluation include, but are not
2714 limited to:
2715
2716 1) Modification of parameters not allowed under Tier 2;
2717
2718 2) Use of models different from those used in Tier 2;
2719
2720 3) Use of additional site data, such as results of indoor air sampling, to
2721 improve or confirm predictions of exposed receptors to contaminants of
2722 concern;
2723
2724 4) Analysis of site-specific risks using formal risk assessment, probabilistic
2725 data analysis, and sophisticated fate and transport models (e.g., requesting
2726 a target hazard quotient greater than 1 or a target cancer risk greater than 1
2727 in 1,000,000);
2728
2729 5) Requests for site-specific remediation objectives because an assessment
2730 indicates further remediation is not practical;
2731
2732 6) Incomplete human exposure ~~parkways~~ pathway(s) not excluded under
2733 Subpart C;
2734
2735 7) Use of toxicological-specific information not available from the sources
2736 listed in Tier 2;
2737
2738 8) Land uses which are substantially different from the assumed residential
2739 or industrial/commercial property uses of a site (e.g., a site will be used for
2740 recreation in the future and cannot be evaluated in Tier 1 or 2); ~~and~~
2741
2742 9) Requests for site-specific remediation objectives that exceed Tier 1
2743 groundwater remediation objectives so long as the following is
2744 demonstrated:
2745
2746 A) *To the extent practical, the exceedance of the groundwater quality*
2747 *standard has been minimized and beneficial use appropriate to the*
2748 *groundwater that was impacted has been returned; and*
2749
2750 B) *Any threat to human health or the environment has been*
2751 *minimized*; [415 ILCS 5/58.5(d)(4)(A)]; and
2752

2753 10) Use of building control technologies, other than those described in Subpart
 2754 L, to prevent completion of the indoor inhalation exposure route.
 2755

- 2756 d) For requests of a target cancer risk ranging between 1 in 1,000,000 and 1 in
 2757 10,000 at the point of human exposure or a target hazard quotient greater than 1 at
 2758 the point of human exposure, the requirements of Section 742.915 shall be
 2759 followed. Requests for a target cancer risk exceeding 1 in 10,000 at the point of
 2760 human exposure are not allowed.
 2761
 2762 e) Requests for approval of a Tier 3 evaluation must be submitted to the Agency for
 2763 review under the specific program under which remediation is performed. When
 2764 reviewing a submittal under Tier 3, the Agency shall consider *whether the*
 2765 *interpretations and conclusions reached are supported by the information*
 2766 *gathered*. [415 ILCS 58.7(e)(1)]. The Agency shall approve a Tier 3 evaluation if
 2767 the person submits the information required under this Part and establishes
 2768 through such information that public health is protected and that specified risks to
 2769 human health and the environment have been minimized.
 2770
 2771 f) If contaminants of concern include polychlorinated biphenyls (PCBs), requests for
 2772 approval of a Tier 3 evaluation must additionally address the applicability of 40
 2773 CFR 761.
 2774

2775 (Source: Amended at 36 Ill. Reg. _____, effective _____)
 2776

2777 **Section 742.920 Impractical Remediation**
 2778

2779 Any request for site-specific remediation objectives due to impracticality of remediation shall be
 2780 submitted to the Agency for review and approval. Any request for site-specific remediation
 2781 objectives due to impracticality of remediation that involves the indoor inhalation exposure route
 2782 shall follow Section 742.935 in lieu of this Section. A submittal under this Section shall include
 2783 the following information:
 2784

- 2785 a) The ~~reasons~~reason(s) why the remediation is impractical;
 2786
 2787 b) The extent of contamination;
 2788
 2789 c) Geology, including soil types;
 2790
 2791 d) The potential impact to groundwater;
 2792
 2793 e) Results and locations of sampling events;
 2794
 2795 f) Map of the area, including all utilities and structures; and

- 2796
2797 g) Present and post-remediation uses of the area of contamination, including human
2798 receptors at risk.
2799

2800 (Source: Amended at 36 Ill. Reg. _____, effective _____)
2801

2802 **Section 742.925 Exposure Routes**
2803

2804 Technical information may demonstrate that there is no actual or potential impact of
2805 contaminants of concern to receptors from a particular exposure route. In these instances, a
2806 demonstration excluding an exposure route shall be submitted to the Agency for review and
2807 approval. A demonstration that involves the indoor inhalation exposure route shall follow
2808 Section 742.935 in lieu of this Section. A submittal under this Section shall include the
2809 following information:
2810

- 2811 a) A description of the route evaluated;
2812
2813 b) A description of the site and physical site characteristics;
2814
2815 c) A discussion of the result and possibility of the route becoming active in the
2816 future; and
2817
2818 d) Technical support that may include, but is not limited to, the following:
2819
2820 1) a discussion of the natural or man-made barriers to that exposure route;
2821
2822 2) calculations and modeling;
2823
2824 3) physical and chemical properties of contaminants of concern; and
2825
2826 4) contaminant migration properties.
2827

2828 (Source: Amended at 36 Ill. Reg. _____, effective _____)
2829

2830 **Section 742.935 Indoor Inhalation Exposure Route**
2831

- 2832 a) Exclusion of Exposure Route
2833 Site information may demonstrate that there is no actual or potential impact of
2834 contaminants of concern to receptors from the indoor inhalation exposure route.
2835 In the instances, a demonstration excluding the exposure route shall be submitted
2836 to the Agency for review and approval. A submittal under this Section shall
2837 include the following information:
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- 1) A description of the site, physical site characteristics, existing and planned buildings, and existing and planned manmade pathways; and
 - 2) A discussion of the possibility of the route becoming active in the future.
- b) Exclusion of Exposure Route Using Building Control Technologies
Any proposals to use building control technologies as a means to prevent or mitigate human exposures under the indoor inhalation exposure route that differ from the requirements of Subpart L shall be submitted to the Agency for review and approval. A submittal under this Section shall include the following information:
- 1) A description of the site and physical site characteristics;
 - 2) The current extent of contamination;
 - 3) Geology, including soil parameters;
 - 4) Results and locations of sampling events;
 - 5) Scaled map of the area, including all buildings and man-made pathways;
 - 6) A description of building characteristics and methods of construction, including a description of man-made pathways;
 - 7) Present and post-remediation uses of the land above the area of contamination, including human receptors at risk;
 - 8) A description of any building control technologies currently in place or proposed for installation that can reduce or eliminate the potential for completion of the exposure route, including design and construction specifications;
 - 9) Information regarding the effectiveness of any building control technologies currently in place or proposed for installation and a schedule for performance testing to show the effectiveness of the control technology. For buildings not yet constructed, an approved building control technology shall be in place and operational prior to human occupancy;
 - 10) Identification of documents reviewed and the criteria used in the documents for determining whether building control technologies are effective and how those criteria compare to existing or potential buildings

2882 or man-made pathways at the site; and

2883
2884 11) A description as to how the effectiveness of the building control
2885 technologies will be operated and maintained for the life of the buildings
2886 and man-made pathways, or until soil gas and groundwater contaminant
2887 concentrations have reached remediation objectives that are approved by
2888 the Agency. This includes provisions for potential extended system
2889 inoperability due to power failure or other disruption.

2890
2891 c) Calculations and Modeling Used to Establish Soil Gas Remediation Objectives
2892 The calculations and modeling shall account for contaminant transport through
2893 the mechanisms of diffusion and advection. Proposals to use soil gas data,
2894 including sub-slab samples, to establish remediation objectives for the indoor
2895 inhalation exposure route that differ from the requirements of Section 742.227
2896 shall be submitted to the Agency for review and approval. A submittal under this
2897 Section shall include the following information:

2898
2899 1) Scaled map of the area, showing all buildings and man-made pathways
2900 (current and planned);

2901
2902 2) The current extent of contamination;

2903
2904 3) Geology, including soil parameters;

2905
2906 4) Depth to groundwater (including seasonal variation) and flow direction;

2907
2908 5) Location of soil gas sampling points; and

2909
2910 6) A discussion of soil gas sampling procedures that, at a minimum,
2911 addresses the following:

2912
2913 A) sampling equipment;

2914
2915 B) soil gas collection protocol, including field tests and weather
2916 conditions; and

2917
2918 C) laboratory analytical methods.

2919
2920 d) Calculations and Modeling Used to Establish Soil Remediation Objectives
2921 The calculations and modeling shall account for contaminant transport through
2922 the mechanisms of diffusion and advection. Any proposals to use soil data in lieu
2923 of soil gas data to establish remediation objectives for the indoor inhalation
2924 exposure route shall be submitted to the Agency for review and approval. A

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submittal under this Section shall include the following information:

- 1) Scaled map of the area, showing all buildings and man-made pathways (current and planned);
- 2) The current extent of contamination;
- 3) Geology, including soil parameters;
- 4) Location of soil sampling points;
- 5) A discussion of soil sampling procedures that, at a minimum, addresses the following:
 - A) sampling equipment;
 - B) soil collection protocol, including field tests and weather conditions; and
 - C) laboratory analytical methods;
- 6) Mathematical and technical justification for the model proposed; and
- 7) Demonstration that the model was correctly applied.

e) Calculations and Modeling Used to Establish Groundwater Remediation

Objectives

The calculations and modeling shall account for contaminant transport through the mechanisms of diffusion and advection. Proposals to use groundwater data to establish remediation objectives for the indoor inhalation exposure route that differ from the requirements of Sections 742.805 and 742.812 shall be submitted to the Agency for review and approval. A submittal under this Section shall include the following information:

- 1) Scaled map of the area, showing all buildings and man-made pathways (current and planned);
- 2) The current extent of contamination;
- 3) Geology, including soil parameters and the thickness of the capillary fringe;
- 4) Depth to groundwater (including seasonal variation) and flow direction;

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- 5) Results and locations of groundwater sampling events;
- 6) Mathematical and technical justification for the model proposed; and
- 7) Demonstration that the model was correctly applied.

(Source: Added at 36 Ill. Reg. _____, effective _____)

SUBPART J: INSTITUTIONAL CONTROLS

Section 742.1000 Institutional Controls

- a) Institutional controls in accordance with this Subpart must be placed on the property when remediation objectives are based on any of the following assumptions:
 - 1) Industrial/Commercial property use;
 - 2) Target cancer risk greater than 1 in 1,000,000;
 - 3) Target hazard quotient greater than 1;
 - 4) Engineered barriers;
 - 5) The point of human exposure is located at a place other than at the source;
 - 6) Exclusion of exposure routes; or
 - 7) Use of remediation objectives based on a diffusion only mode of contaminant transport for the indoor inhalation exposure route;
 - 8) Use of an indoor inhalation building control technology; or
 - ~~9)~~ Any combination of the above.
- b) The Agency shall not approve any remediation objective under this Part that is based on the use of institutional controls unless the person has proposed institutional controls meeting the requirements of this Subpart and the requirements of the specific program under which the institutional control is proposed. A proposal for approval of institutional controls shall provide identification of the selected institutional controls from among the types recognized in this Subpart.

- 3011
- 3012 c) The following instruments may be institutional controls subject to the
- 3013 requirements of this Subpart J and the requirements of the specific program under
- 3014 which the institutional control is proposed:
- 3015
- 3016 1) No Further Remediation Letters;
- 3017
- 3018 2) Environmental Land Use Controls;
- 3019
- 3020 3) Land Use Control Memoranda of Agreement;
- 3021
- 3022 4) Ordinances adopted and administered by a unit of local government;
- 3023
- 3024 5) Agreements between a property owner (or, in the case of a petroleum
- 3025 leaking underground storage tank, the owner or operator of the tank) and a
- 3026 highway authority with respect to any contamination remaining under
- 3027 highways; and
- 3028
- 3029 6) Agreements between a highway authority that is also the property owner
- 3030 (or, in the case of a petroleum leaking underground storage tank, the
- 3031 owner or operator of the tank) and the Agency with respect to any
- 3032 contamination remaining under the highways.
- 3033
- 3034 d) No Further Remediation Letters and Environmental Land Use Controls that meet
- 3035 the requirements of this Subpart and the recording requirements of the program
- 3036 under which remediation is being performed are transferred with the property.
- 3037

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.1010 Environmental Land Use Controls

- 3041
- 3042 a) An Environmental Land Use Control (ELUC) is an institutional control that may
- 3043 be used under this Part to impose land use limitations or requirements related to
- 3044 environmental contamination. ELUCs are only effective when approved by the
- 3045 Agency in accordance with this Part. Activities or uses that may be limited or
- 3046 required include, but are not limited to, prohibition of use of groundwater for
- 3047 potable purposes, restriction to industrial/commercial uses, operation or
- 3048 maintenance of engineered barriers, indoor inhalation building control
- 3049 technologies, or worker safety plans. ELUCs may be used in the following
- 3050 circumstances:
- 3051
- 3052 1) When No Further Remediation Letters are not available, including but not
- 3053 limited to when contamination has migrated off-site or outside the

3054 remediation site; or

3055
3056 2) When No Further Remediation Letters are not issued under the program
3057 for which a person is undergoing remediation.

3058
3059 b) Recording requirements:

3060
3061 1) An ELUC approved by the Agency pursuant to this Section must be
3062 recorded in the Office of the Recorder or Registrar of Titles for the county
3063 in which the property that is the subject of the ELUC is located. A copy
3064 of the ELUC demonstrating that it has been recorded must be submitted to
3065 the Agency before the Agency will issue a no further remediation
3066 determination.

3067
3068 2) An ELUC approved under this Section will not become effective until
3069 officially recorded in the chain of title for the property that is the subject
3070 of the ELUC in accordance with subsection (b)(1) of this Section.

3071
3072 3) Reference to the recorded ELUC must be made in the instrument
3073 memorializing the Agency's no further remediation determination.
3074 Recording of the no further remediation determination and confirmation of
3075 recording must be in accordance with the requirements of the program
3076 under which the determination was issued.

3077
3078 4) The requirements of this Section do not apply to Federally Owned
3079 Property for which the Federal Landholding Entity does not have the
3080 authority under federal law to record land use limitations on the chain of
3081 title.

3082
3083 5) The requirements of this Section apply only to those sites for which a
3084 request for a no further remediation determination has not yet been made
3085 to the Agency by January 6, 2001.

3086
3087 c) Duration:

3088
3089 1) Except as provided in this subsection (c), an ELUC shall remain in effect
3090 in perpetuity.

3091
3092 2) *At no time shall any site for which an ELUC has been imposed as a result*
3093 *of remediation activities under this Part be used in a manner inconsistent*
3094 *with the land use limitation unless attainment of objectives appropriate for*
3095 *the new land use is achieved and a new no further remediation*
3096 *determination has been obtained and recorded in accordance with the*

3097 program under which the ELUC was first imposed or the Site Remediation
3098 Program (35 Ill. Adm. Code 740); [415 ILCS 58.8(c)]. In addition, the
3099 appropriate release or modification of the ELUC must be prepared by the
3100 Agency and filed on the chain of title for the property that is the subject of
3101 the ELUC.

3102
3103 A) For a Leaking Underground Storage Tank (LUST) site under 35
3104 Ill. Adm. Code ~~731, or 732, or 734~~ or a Site Remediation Program
3105 site under 35 Ill. Adm. Code 740, an ELUC may be released or
3106 modified only if the NFR Letter is also modified under the Site
3107 Remediation Program to reflect the change;

3108
3109 B) For a RCRA site under 35 Ill. Adm. Code 721-730, an ELUC may
3110 be released or modified only if there is also an amended
3111 certification of closure or a permit modification.

3112
3113 3) In addition to any other remedies that may be available, a failure to
3114 comply with the limitations or requirements of an ELUC may result in
3115 avoidance of an Agency no further remediation determination in
3116 accordance with the program under which the determination was made.
3117 The failure to comply with the limitations or requirements of an ELUC
3118 may also be grounds for an enforcement action pursuant to Title VIII of
3119 the Act.

3120
3121 d) An ELUC submitted to the Agency must match the form and contain the same
3122 substance, except for variable elements (e.g., name of property owner), as the
3123 model in Appendix F and must contain the following elements:

- 3124
3125 1) Name of property owners and declaration of property ownership;
3126
3127 2) Identification of the property to which the ELUC applies by common
3128 address, legal description, and Real Estate Tax Index/Parcel Index
3129 Number;
3130
3131 3) A reference to the Bureau of Land LPC numbers or 10-digit identification
3132 numbers under which the remediation was conducted;
3133
3134 4) A statement of the reason for the land use limitation or requirement
3135 relative to protecting human health and the surrounding environment from
3136 soil, groundwater, and/or other environmental contamination;
3137
3138 5) The language instituting such land use limitations or requirements;
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- 6) A statement that the limitations or requirements apply to the current owners, occupants, and all heirs, successors, assigns, and lessees;
 - 7) A statement that the limitations or requirements apply in perpetuity or until:
 - A) The Agency determines that there is no longer a need for the ELUC;
 - B) The Agency, upon written request, issues to the site that received the no further remediation determination that relies on the ELUC a new no further remediation determination approving modification or removal of the limitations or requirements;
 - C) The new no further remediation determination is filed on the chain of title of the site subject to the no further remediation determination; and
 - D) A release or modification of the land use limitation is filed on the chain of title for the property that is the subject of the ELUC;
 - 8) Scaled site maps showing:
 - A) The legal boundary of the property to which the ELUC applies;
 - B) The horizontal and vertical extent of contaminants of concern above applicable remediation objectives for soil, and groundwater, and soil gas to which the ELUC applies;
 - C) Any physical features to which an ELUC applies (e.g., engineered barriers, monitoring wells, caps, indoor inhalation building control technologies); and
 - D) The nature, location of the source, and direction of movement of the contaminants of concern;
 - 9) A statement that any information regarding the remediation performed on the property for which the ELUC is necessary may be obtained from the Agency through a request under the Freedom of Information Act [5 ILCS 140] and rules promulgated thereunder; and
 - 10) The dated, notarized signatures of the property owners or authorized agent.

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(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 742.1015 Ordinances

- a) An ordinance adopted by a unit of local government that effectively prohibits the installation of potable water supply wells (and the use of such wells) may be used as an institutional control to meet the requirements of Section 742.320(d) or 742.805(a)(3) if the requirements of this Section are met. A model ordinance is found in Appendix G. Ordinances prohibiting the installation of potable water supply wells (and the use of such wells) that do not expressly prohibit the installation of potable water supply wells (and the use of such wells) by units of local government may be acceptable as institutional controls if the requirements of this Section are met and a Memorandum of Understanding (MOU) is entered into under subsection (i) of this Section. For purposes of this Section, a unit of local government is considered to be expressly prohibited from installing and using potable water supply wells only if the unit of local government is included in the prohibition provision by name. The prohibition required by this Section shall satisfy the following requirements at a minimum:
 - 1) The prohibition shall not allow exceptions for potable water well installation and use other than for the adopting unit of local government;
 - 2) The prohibition shall apply at all depths and shall not be limited to particular aquifers or other geologic formations;
 - 3) If the prohibition does not apply everywhere within the boundaries of the unit of local government, the limited area to which the prohibition applies shall be easily identifiable and clearly defined by the ordinance (e.g., narrative descriptions accompanied by maps with legends or labels showing prohibition boundaries or narrative descriptions using fixed, common reference points such as street names). Boundaries of prohibitions limited by area shall be fixed by the terms of the ordinance and shall not be subject to change without amending the ordinance in which the prohibition has been adopted (e.g., no boundaries defined with reference to zoning districts or the availability of the public water supply); and
 - 4) The prohibition shall not in any way restrict or limit the Agency's approval of the use of the ordinance as an institutional control pursuant to this Part (e.g., no restrictions based on remediation program participation or no restrictions on persons performing remediation within the prohibition area who may use the ordinance).

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- b) A request for approval of a local ordinance as an institutional control shall provide the following:
- 1) A copy of the ordinance restricting groundwater use certified by an official of the unit of local government in which the site is located that it is a true and accurate copy of the ordinance, unless the Agency and the unit of local government have entered an agreement under subsection (i) of this Section, in which case the request may alternatively reference the MOU. The ordinance must demonstrate that potable use of groundwater from potable water supply wells is prohibited;
 - 2) A scaled map or maps~~map~~(s) delineating the area and extent of groundwater contamination modeled above the applicable remediation objectives including any measured data showing concentrations of contaminants of concern in which the applicable remediation objectives are exceeded;
 - 3) A scaled map delineating the boundaries of all properties under which groundwater is located ~~that~~~~which~~ exceeds the applicable groundwater remediation objectives;
 - 4) Information identifying the current owner~~owner~~(s) of each property identified in subsection (b)(3) of this Section; and
 - 5) A copy of the proposed written notification to the unit of local government that adopted the ordinance and to the current owners identified in subsection (b)(4) of this Section that includes the following information:
 - A) The name and address of the unit of local government that adopted the ordinance;
 - B) The ordinance's citation;
 - C) A description of the property being sent notice by adequate legal description, reference to a plat showing the boundaries of the property, or accurate street address;
 - D) Identification of the party requesting to use the groundwater ordinance as an institutional control, and a statement that the party has requested approval from the Agency to use the ordinance as an institutional control;

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- E) A statement that use of the ordinance as an institutional control allows contamination above groundwater ingestion remediation objectives to remain in groundwater beneath the affected properties, and that the ordinance strictly prohibits human and domestic consumption of the groundwater;
 - F) A statement as to the nature of the release and response action with the site name, site address, and Agency site number or Illinois inventory identification number; and
 - G) A statement that more information about the remediation site may be obtained by contacting the party requesting the use of the groundwater ordinance as an institutional control or by submitting a FOIA request to the Agency.
- c) Written notification proposed pursuant to subsection (b)(5) of this Section must be sent to the unit of local government that adopted the ordinance, as well as to all current property owners identified in subsection (b)(4). Written proof that the notification was sent to the unit of local government and the property owners shall be submitted to the Agency within 45 days from the date the Agency's no further remediation determination is recorded. Such proof may consist of the return card from certified mail, return receipt requested, a notarized certificate of service, or a notarized affidavit.
- d) Unless the Agency and the unit of local government have entered into a MOU under subsection (i) of this Section, the current owner or successors in interest of a site who have received approval of use of an ordinance as an institutional control under this Section shall:
- 1) Monitor activities of the unit of local government relative to variance requests or changes in the ordinance relative to the use of potable groundwater at properties identified in subsection (b)(3) of this Section; and
 - 2) Notify the Agency of any approved variance requests or ordinance changes within 30 days after the date such action has been approved.
- e) The information required in subsections (b)(1) through (b)(5) of this Section and the Agency letter approving the groundwater remediation objective shall be submitted to the unit of local government. Proof that the information has been filed with the unit of local government shall be provided to the Agency.
- f) Any ordinance or MOU used as an institutional control pursuant to this Section

3312 shall be recorded in the Office of the Recorder or Registrar of Titles of the county
3313 in which the site is located together with the instrument memorializing the
3314 Agency's no further remediation determination pursuant to the specific program
3315 within 45 days after receipt of the Agency's no further remediation determination.
3316

3317 g) An institutional control approved under this Section shall not become effective
3318 until officially recorded in accordance with subsection (f) of this Section. The
3319 person receiving the approval shall obtain and submit to the Agency within 30
3320 days after recording a copy of the institutional control demonstrating that it has
3321 been recorded.
3322

3323 h) The following shall be grounds for voidance of the ordinance as an institutional
3324 control and the instrument memorializing the Agency's no further remediation
3325 determination:
3326

- 3327 1) Modification of the ordinance by the unit of local government to allow
3328 potable use of groundwater;
- 3329 2) Approval of a site-specific request, such as a variance, to allow potable
3330 use of groundwater at a site identified in subsection (b)(3) of this Section;
3331
- 3332 3) Violation of the terms of an institutional control recorded under Section
3333 742.1005 or Section 742.1010; or
3334
- 3335 4) Failure to provide notification and proof of such notification pursuant to
3336 subsection (c) of this Section.
3337
3338

3339 i) The Agency and a unit of local government may enter into a MOU under this
3340 Section if the unit of local government has adopted an ordinance satisfying
3341 subsection (a) of this Section and if the requirements of this subsection are met.
3342 The MOU submitted to the Agency must match the form and contain the same
3343 substance as the model in Appendix H and shall include the following:
3344

- 3345 1) Identification of the authority of the unit of local government to enter the
3346 MOU;
- 3347 2) Identification of the legal boundaries, or equivalent, under which the
3348 ordinance is applicable;
3349
- 3350 3) A certified copy of the ordinance;
3351
- 3352 4) A commitment by the unit of local government to notify the Agency of
3353 any variance requests or proposed ordinance changes at least 30 days prior
3354

- 3355 to the date the local government is scheduled to take action on the request
3356 or proposed change;
- 3357
- 3358 5) A commitment by the unit of local government to maintain a registry of all
3359 sites within the unit of local government that have received no further
3360 remediation determinations pursuant to specific programs; and
3361
- 3362 6) If the ordinance does not expressly prohibit the installation of potable
3363 water supply wells (and the use of such wells) by units of local
3364 government, a commitment by the unit of local government:
- 3365
- 3366 A) To review the registry of sites established under subsection (i)(5)
3367 of this Section prior to siting potable water supply wells within the
3368 area covered by the ordinance;
- 3369
- 3370 B) To determine whether the potential source of potable water may be
3371 or has been affected by contamination left in place at those sites;
3372 and
3373
- 3374 C) To take whatever steps are necessary to ensure that the potential
3375 source of potable water is protected from the contamination or
3376 treated before it is used as a potable water supply.
3377
- 3378 j) A groundwater ordinance may not be used to exclude the indoor inhalation
3379 exposure route.

3380 (Source: Amended at 36 Ill. Reg. _____, effective _____)

3381

3382 **SUBPART K: ENGINEERED BARRIERS**

3383

3384 **Section 742.1105 Engineered Barrier Requirements**

- 3385
- 3386
- 3387 a) Natural attenuation, access controls, and point of use treatment shall not be
3388 considered engineered barriers. Engineered barriers may not be used to prevent
3389 direct human exposure to groundwater without the use of institutional controls.
3390
- 3391 b) For purposes of determining remediation objectives under Tier 1, engineered
3392 barriers are not recognized.
3393
- 3394 c) The following engineered barriers are recognized for purposes of calculating
3395 remediation objectives that exceed residential remediation objectives:
3396
- 3397 1) For the soil component of the groundwater ingestion exposure route, the

- 3398 following engineered barriers are recognized if they prevent completion of
3399 the exposure pathway:
3400
3401 A) Caps or walls constructed of compacted clay, asphalt, concrete or
3402 other material approved by the Agency; and
3403
3404 B) Permanent structures such as buildings and highways.
3405
3406 2) For the soil ingestion exposure route, the following engineered barriers are
3407 recognized if they prevent completion of the exposure pathway:
3408
3409 A) Caps or walls constructed of compacted clay, asphalt, concrete, or
3410 other material approved by the Agency;
3411
3412 B) Permanent structures such as buildings and highways; and
3413
3414 C) Soil, sand, gravel, or other geologic materials that:
3415
3416 i) Cover the contaminated media;
3417
3418 ii) Meet the soil remediation objectives under Subpart E for
3419 residential property for contaminants of concern; and
3420
3421 iii) Are a minimum of three feet in depth.
3422
3423 3) For the outdoor inhalation exposure route, the following engineered
3424 barriers are recognized if they prevent completion of the exposure
3425 pathway:
3426
3427 A) Caps or walls constructed of compacted clay, asphalt, concrete, or
3428 other material approved by the Agency;
3429
3430 B) Permanent structures such as buildings and highways; and
3431
3432 C) Soil, sand, gravel, or other geologic materials that:
3433
3434 i) Cover the contaminated media;
3435
3436 ii) Meet the soil remediation objectives under Subpart E for
3437 residential property for contaminants of concern; and
3438
3439 iii) Are a minimum of ten feet in depth and not within ten feet
3440 of any manmade pathway.

- 3441
3442 4) For the ingestion of groundwater exposure route, the following engineered
3443 barriers are recognized if they prevent completion of the exposure
3444 pathway:
3445
3446 A) Slurry walls; and
3447
3448 B) Hydraulic control of groundwater.
3449
3450 d) Unless otherwise prohibited under Section 742.1100, any other type of engineered
3451 barrier may be proposed if it will be as effective as the options listed in subsection
3452 (c) of this Section.
3453

3454 (Source: Amended at 36 Ill. Reg. _____, effective _____)
3455

3456 SUBPART L: BUILDING CONTROL TECHNOLOGIES
3457

3458 **Section 742.1200 Building Control Technologies**
3459

- 3460 a) Any person who develops remediation objectives under this Part based on
3461 building control technologies shall meet the requirements of this Subpart and the
3462 requirements of Subpart J relative to institutional controls.
3463
3464 b) The Agency shall not approve any remediation objective under this Part that is
3465 based on the use of building control technologies unless the person has proposed
3466 building control technologies meeting the requirements of this Subpart or Subpart
3467 I and Subpart J relative to institutional controls.
3468
3469 c) The use of building control technologies can be recognized in determining
3470 remediation objectives only if the building control technologies are intended for
3471 use as part of the final corrective action.
3472
3473 d) An approved building control technology shall be in place and operational prior to
3474 human occupancy.
3475
3476 e) Any no further remediation determination based upon the use of building control
3477 technologies shall require effective maintenance of the building control
3478 technology. The maintenance requirements shall be included in an institutional
3479 control under Subpart J. This institutional control shall address provisions for
3480 inoperability by requiring the following if the building control technology is
3481 rendered inoperable:
3482

- 3483 1) The site owner/operator shall notify building occupants and workers in
3484 advance of intrusive activities. The notification shall enumerate the
3485 contaminant of concern known to be present;
3486
3487 2) The site owner/operator shall require building occupants and workers to
3488 implement protective measures consistent with good industrial hygiene
3489 practice; and
3490
3491 3) For a school, the site owner/operator shall notify the Agency upon any
3492 building control technology being rendered inoperable. For the purposes
3493 of this subsection (e)(3), the term "school" means any public educational
3494 facility in Illinois, including grounds and/or campus, consisting of
3495 students, comprising one or more grade groups or other identifiable
3496 groups, organized as one unit with one or more teachers to give instruction
3497 of a defined type. Public educational facility includes, but is not limited
3498 to, primary and secondary (kindergarten-12th grade), charter, vocational,
3499 alternative, and special education schools. Public educational facility does
3500 not include junior colleges, colleges, or universities.
3501
3502 f) Failure to install or maintain a building control technology in accordance with a
3503 no further remediation determination shall be grounds for voidance of the
3504 determination and the instrument memorializing the Agency's no further
3505 remediation determination.
3506

3507 (Source: Added at 36 Ill. Reg. _____, effective _____)
3508

3509 **Section 742.1205 Building Control Technology Proposals**
3510

3511 A proposal to use a building control technology under this Subpart shall include the following
3512 information:
3513

- 3514 a) A description of the site and physical site characteristics;
3515
3516 b) The current extent and modeled migration of contamination;
3517
3518 c) Geology, including soil types;
3519
3520 d) Results and locations of sampling events;
3521
3522 e) Scaled map of the area, including all buildings and man-made pathways;
3523
3524 f) A description of building characteristics and methods of construction, including a
3525 description of man-made pathways; and

3526
3527 g) Present and post-remediation uses of the land above the area of contamination,
3528 including human receptors at risk.

3529
3530 (Source: Added at 36 Ill. Reg. _____, effective _____)

3531
3532 **Section 742.1210 Building Control Technology Requirements**

3533
3534 a) Natural attenuation, access controls, and point of use treatment shall not be
3535 considered building control technologies.

3536
3537 b) For purposes of determining compliance with remediation objectives under Tier
3538 1, building control technologies are not recognized.

3539
3540 c) The following building control technologies are recognized for purposes of
3541 pathway exclusion under Section 742.312.

3542
3543 1) Sub-slab depressurization (SSD) systems meeting the following
3544 requirements:

3545
3546 A) A suction pit is installed that is at least two cubic feet and extends
3547 at least 6 inches below the slab (larger suction pits may be
3548 excavated as needed to achieve the performance criteria in
3549 subsection (c)(1)(B));

3550
3551 B) A PVC pipe of at least 3 inches in diameter extends from the
3552 suction pit to the intake side of an in-line fan capable of achieving
3553 a static vacuum of at least 0.25 inches water column (wc) at the
3554 suction point and measureable vacuum at the farthest edges of the
3555 area served by the suction pit under worst case conditions (all
3556 exhaust fans and heating systems running during cold weather) as
3557 determined by a differential pressure reading of at least -0.003
3558 inches wc below the slab or visible downward flow of air at test
3559 holes using chemical or smoke sticks;

3560
3561 C) All visible cracks and joints in the slab (including the place where
3562 the pipe exits the slab) and foundation walls are sealed;

3563
3564 D) The pipe exhausts outside the building at least 10 feet above
3565 ground and at least 10 feet from any door or window; and

3566
3567 E) Additional suction pits meeting the requirements of subsection
3568 (c)(1)(A) shall be installed as necessary to achieve measureable

vacuum below the slab in all areas, including in any area where subsurface or foundation conditions (e.g., a sub-slab grade beam) prevent adequate suction field extension.

2) Sub-membrane depressurization (SMD) systems meeting the following requirements:

- A) A non-woven geotextile is installed on the exposed earthen material;
- B) A cross-laminated polyethylene membrane liner at least 0.10 mm (or 4 mil) thick is placed over the geotextile and sealed to foundation walls using a low volatile adhesive that is recommended by the liner manufacturer (e.g., acrylic latex adhesive);
- C) A 3 inch diameter PVC pipe extends from a hole cut in the liner to the intake side of an in-line fan capable of achieving a static vacuum of at least 0.25 inches water column (wc) at the riser pipe and measureable vacuum at the farthest edges of the liner under worst case conditions (all exhaust fans running during cold weather) as determined by a differential pressure reading of at least -0.003 inches wc below the liner or visible downward flow of air in test holes using chemical or smoke sticks;
- D) The pipe is sealed to the liner;
- E) The pipe exhausts outside the building at least 10 feet above ground and at least 10 feet from any door or window; and
- F) No leaks based on smoke stick tests along the entire perimeter of the liner (i.e., at all sealed edges) with the fan running. Where leaks are identified, appropriate repairs are undertaken and smoke stick testing repeated until no leaks are detected.

3) Membrane barrier systems when placed below concrete slabs meeting the following requirements:

- A) The membrane is impermeable to volatile chemicals and is not less than 1.5 mm (or 60 mil) thick;

- 3610 B) The membrane is sealed to foundation walls and any penetrating
3611 pipes according to membrane manufacturer/installer
3612 recommendations;
- 3613
- 3614 C) The membrane is installed in accordance with the manufacturer's
3615 requirements and by an applicator trained and approved by the
3616 manufacturer;
- 3617
- 3618 D) A smoke test of the membrane system (where smoke is injected
3619 below the installed liner prior to slab installation), in accordance
3620 with the manufacturer's requirements, is performed to ensure no
3621 leaks exist. Where leaks are identified, appropriate repairs are
3622 undertaken and smoke testing repeated until no leaks are detected;
- 3623
- 3624 E) The membrane is puncture resistant to slab installation
3625 construction activities and protected by sand layers or geotextiles
3626 as recommended by the manufacturer; and
- 3627
- 3628 F) Construction activities following membrane installation do not
3629 damage, puncture or tear the membrane or otherwise compromise
3630 its ability to prevent the migration of volatile chemicals.
- 3631
- 3632 4) Vented raised floors meeting the following requirements:
- 3633
- 3634 A) An interconnected void system below the slab sufficient to allow
3635 free movement of air and communication of negative pressures to
3636 all points below the slab;
- 3637
- 3638 B) Sealing of all construction joints, open cracks, and penetrations
3639 through the slab (e.g., for utilities and riser pipes) with a low
3640 volatile caulk; and
- 3641
- 3642 C) At least one 3 inch diameter riser pipe venting to the atmosphere
3643 above the roof line (at least 10 feet from any doors or windows) for
3644 each 5000 square feet of membrane area, with the capability of
3645 converting passively vented floor systems to actively vented or
3646 SSD systems meeting the performance requirements of subsection
3647 (c)(1).
- 3648
- 3649

(Source: Added at 36 Ill. Reg. _____, effective _____)

3650 **Section 742.APPENDIX A General**

3651
3652 **Section 742.TABLE A Soil Saturation Limits (C_{sat}) for Chemicals Whose Melting Point is**
3653 **Less than 30°C**
3654

<u>CAS No.</u>	<u>Chemical Name</u>	<u>For the Outdoor Inhalation Exposure Route^a C_{sat} (mg/kg)</u>	<u>For the Soil Component of the Groundwater Ingestion Exposure Route^b C_{sat} (mg/kg)</u>
<u>67-64-1</u>	<u>Acetone</u>	<u>1.00E+05</u>	<u>2.00E+05</u>
<u>71-43-2</u>	<u>Benzene</u>	<u>8.00E+02</u>	<u>5.80E+02</u>
<u>111-44-4</u>	<u>Bis(2-chloroethyl)ether</u>	<u>3.00E+03</u>	<u>3.90E+03</u>
<u>117-81-7</u>	<u>Bis(2-ethylhexyl)phthalate</u>	<u>2.00E+02</u>	<u>6.80E+01</u>
<u>75-27-4</u>	<u>Bromodichloromethane (Dichlorobromomethane)</u>	<u>2.80E+03</u>	<u>2.00E+03</u>
<u>75-25-2</u>	<u>Bromoform</u>	<u>2.00E+03</u>	<u>1.20E+03</u>
<u>71-36-3</u>	<u>Butanol</u>	<u>1.00E+04</u>	<u>1.60E+04</u>
<u>78-93-3</u>	<u>2-Butanone (MEK)</u>	<u>2.50E+04</u>	<u>4.50E+04</u>
<u>85-68-7</u>	<u>Butyl benzyl phthalate</u>	<u>1.00E+03</u>	<u>3.40E+02</u>
<u>75-15-0</u>	<u>Carbon disulfide</u>	<u>8.50E+02</u>	<u>5.20E+02</u>
<u>56-23-5</u>	<u>Carbon tetrachloride</u>	<u>1.20E+03</u>	<u>5.60E+02</u>
<u>108-90-7</u>	<u>Chlorobenzene (Monochlorobenzene)</u>	<u>6.20E+02</u>	<u>2.90E+02</u>
<u>124-48-1</u>	<u>Chlorodibromomethane (Dibromochloromethane)</u>	<u>1.40E+03</u>	<u>8.90E+02</u>
<u>67-66-3</u>	<u>Chloroform</u>	<u>3.40E+03</u>	<u>2.50E+03</u>
<u>95-57-8</u>	<u>2-Chlorophenol^c (ionizable organic)</u>	<u>1.00E+04</u>	<u>7.10E+03</u>
<u>75-99-0</u>	<u>Dalapon</u>	<u>1.20E+05</u>	<u>1.90E+05</u>
<u>96-12-8</u>	<u>1,2-Dibromo-3-chloropropane</u>	<u>6.90E+02</u>	<u>4.30E+02</u>

<u>CAS No.</u>	<u>Chemical Name</u>	<u>For the Outdoor Inhalation Exposure Route^a C_{sat} (mg/kg)</u>	<u>For the Soil Component of the Groundwater Ingestion Exposure Route^b C_{sat} (mg/kg)</u>
<u>106-93-4</u>	<u>1,2-Dibromoethane (Ethylene dibromide)</u>	<u>1.60E+03</u>	<u>1.20E+03</u>
<u>84-74-2</u>	<u>Di-<i>n</i>-butyl phthalate</u>	<u>2.60E+03</u>	<u>8.80E+02</u>
<u>95-50-1</u>	<u>1,2-Dichlorobenzene (o-Dichlorobenzene)</u>	<u>5.60E+02</u>	<u>2.10E+02</u>
<u>75-71-8</u>	<u>Dichlorodifluoromethane</u>	<u>8.70E+02</u>	<u>4.30E+02</u>
<u>75-34-3</u>	<u>1,1-Dichloroethane</u>	<u>1.70E+03</u>	<u>1.40E+03</u>
<u>107-06-2</u>	<u>1,2-Dichloroethane (Ethylene dichloride)</u>	<u>1.90E+03</u>	<u>2.10E+03</u>
<u>75-35-4</u>	<u>1,1-Dichloroethylene</u>	<u>1.40E+03</u>	<u>9.10E+02</u>
<u>156-59-2</u>	<u><i>cis</i>-1,2-Dichloroethylene</u>	<u>1.30E+03</u>	<u>1.00E+03</u>
<u>156-60-5</u>	<u><i>trans</i>-1,2-Dichloroethylene</u>	<u>3.00E+03</u>	<u>2.10E+03</u>
<u>78-87-5</u>	<u>1,2-Dichloropropane</u>	<u>1.20E+03</u>	<u>8.70E+02</u>
<u>542-75-6</u>	<u>1,3-Dichloropropene (1,3-Dichloropropylene, <i>cis</i> + <i>trans</i>)</u>	<u>1.00E+03</u>	<u>8.50E+02</u>
<u>84-66-2</u>	<u>Diethyl phthalate</u>	<u>2.20E+03</u>	<u>9.20E+02</u>
<u>105-67-9</u>	<u>2,4-Dimethylphenol</u>	<u>1.00E+04</u>	<u>4.70E+03</u>
<u>117-84-0</u>	<u>Di-<i>n</i>-octyl phthalate</u>	<u>1.60E+01</u>	<u>5.20E+00</u>
<u>123-91-1</u>	<u>p-Dioxane</u>	<u>1.00E+05</u>	<u>2.00E+05</u>
<u>100-41-4</u>	<u>Ethylbenzene</u>	<u>3.50E+02</u>	<u>1.50E+02</u>
<u>77-47-4</u>	<u>Hexachlorocyclopentadiene</u>	<u>1.30E+02</u>	<u>4.40E+01</u>
<u>78-59-1</u>	<u>Isophorone</u>	<u>3.00E+03</u>	<u>3.00E+03</u>
<u>98-82-8</u>	<u>Isopropylbenzene (Cumene)</u>	<u>9.40E+02</u>	<u>4.00E+02</u>
<u>7439-97-6</u>	<u>Mercury (elemental)</u>	<u>3.10E+00</u>	<u>N/A</u>

<u>CAS No.</u>	<u>Chemical Name</u>	<u>For the Outdoor Inhalation Exposure Route^a C_{sat} (mg/kg)</u>	<u>For the Soil Component of the Groundwater Ingestion Exposure Route^b C_{sat} (mg/kg)</u>
<u>74-83-9</u>	<u>Methyl bromide (Bromomethane)</u>	<u>3.10E+03</u>	<u>3.60E+03</u>
<u>1634-04-4</u>	<u>Methyl tertiary-butyl ether</u>	<u>8.40E+03</u>	<u>1.10E+04</u>
<u>75-09-2</u>	<u>Methylene chloride (Dichloromethane)</u>	<u>2.50E+03</u>	<u>3.00E+03</u>
<u>98-95-3</u>	<u>Nitrobenzene</u>	<u>7.10E+02</u>	<u>5.90E+02</u>
<u>621-64-7</u>	<u>n-Nitrosodi-n-propylamine</u>	<u>1.90E+03</u>	<u>2.30E+03</u>
<u>100-42-5</u>	<u>Styrene</u>	<u>6.30E+02</u>	<u>2.60E+02</u>
<u>127-18-4</u>	<u>Tetrachloroethylene (Perchloroethylene)</u>	<u>8.00E+02</u>	<u>3.10E+02</u>
<u>108-88-3</u>	<u>Toluene</u>	<u>5.80E+02</u>	<u>2.90E+02</u>
<u>120-82-1</u>	<u>1,2,4-Trichlorobenzene</u>	<u>3.40E+02</u>	<u>1.20E+02</u>
<u>71-55-6</u>	<u>1,1,1-Trichloroethane</u>	<u>1.30E+03</u>	<u>6.70E+02</u>
<u>79-00-5</u>	<u>1,1,2-Trichloroethane</u>	<u>1.80E+03</u>	<u>1.30E+03</u>
<u>79-01-6</u>	<u>Trichloroethylene</u>	<u>1.20E+03</u>	<u>6.50E+02</u>
<u>75-69-4</u>	<u>Trichlorofluoromethane</u>	<u>1.80E+03</u>	<u>8.90E+02</u>
<u>108-05-4</u>	<u>Vinyl acetate</u>	<u>2.60E+03</u>	<u>4.20E+03</u>
<u>75-01-4</u>	<u>Vinyl chloride</u>	<u>2.60E+03</u>	<u>2.90E+03</u>
<u>108-38-3</u>	<u>m-Xylene</u>	<u>4.10E+02</u>	<u>1.60E+02</u>
<u>95-47-6</u>	<u>o-Xylene</u>	<u>3.70E+02</u>	<u>1.50E+02</u>
<u>106-42-3</u>	<u>p-Xylene</u>	<u>3.30E+02</u>	<u>1.40E+02</u>
<u>1330-20-7</u>	<u>Xylenes (total)</u>	<u>2.80E+02</u>	<u>1.10E+02</u>

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3657

^a Soil Saturation Limits calculated using an foc of 0.006 g/g and a system temperature of 25°C.

- 3658 ^b Soil Saturation Limits calculated using an foc of 0.002 g/g and a system temperature of 25°C.
 3659
 3660 ^c C_{sat} for pH of 6.8. If soil pH is other than 6.8, a site-specific C_{sat} should be calculated using
 3661 equations S19 and S29 and the pH-specific K_{oc} values in Appendix C, Table I.
 3662

CAS No.	Chemical Name	C _{sat} (mg/kg)
67-64-1	Acetone	100,000
71-43-2	Benzene	870
111-44-4	Bis(2-chloroethyl)ether	3,300
117-81-7	Bis(2-ethylhexyl)phthalate	31,000
75-27-4	Bromodichloromethane (Dichlorobromomethane)	3,000
75-25-2	Bromoform	1,900
71-36-3	Butanol	10,000
85-68-7	Butyl benzyl phthalate	930
75-15-0	Carbon disulfide	720
56-23-5	Carbon tetrachloride	1,100
108-90-7	Chlorobenzene (Monochlorobenzene)	680
124-48-1	Chlorodibromomethane (Dibromochloromethane)	1,300
67-66-3	Chloroform	2,900
96-12-8	1,2-Dibromo-3-chloropropane	1,400
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	2,800
84-74-2	Di- <i>n</i> -butyl phthalate	2,300
95-50-1	1,2-Dichlorobenzene (<i>o</i> -Dichlorobenzene)	560
75-34-3	1,1-Dichloroethane	1,700
107-06-2	1,2-Dichloroethane (Ethylene dichloride)	1,800
75-35-4	1,1-Dichloroethylene	1,500
156-59-2	<i>cis</i> -1,2-Dichloroethylene	1,200
156-60-5	<i>trans</i> -1,2-Dichloroethylene	3,100
78-87-5	1,2-Dichloropropane	1,100
542-75-6	1,3-Dichloropropene (1,3-Dichloropropylene, <i>cis</i> + <i>trans</i>)	1,400
84-66-2	Diethyl phthalate	2,000
117-84-0	Di- <i>n</i> -octyl phthalate	10,000
100-41-4	Ethylbenzene	400
77-47-4	Hexachlorocyclopentadiene	2,200
78-59-1	Isophorone	4,600
74-83-9	Methyl bromide (Bromomethane)	3,200
1634-04-4	Methyl tertiary butyl ether	8,800
75-09-2	Methylene chloride (Dichloromethane)	2,400
98-95-3	Nitrobenzene	1,000
100-42-5	Styrene	1,500
127-18-4	Tetrachloroethylene (Perchloroethylene)	240
108-88-3	Toluene	650

120-82-1	1,2,4-Trichlorobenzene	3,200
71-55-6	1,1,1-Trichloroethane	1,200
79-00-5	1,1,2-Trichloroethane	1,800
79-01-6	Trichloroethylene	1,300
108-05-4	Vinyl acetate	2,700
75-01-4	Vinyl chloride	1,200
108-38-3	m-Xylene	420
95-47-6	o-Xylene	410
100-42-3	p-Xylene	460
1330-20-7	Xylenes (total)	320
	Ionizable Organics	
92-57-8	2-Chlorophenol	53,000

3663
3664

(Source: Amended at 36 Ill. Reg. _____, effective _____)

3665 **Section 742.APPENDIX A General**

3666

3667 **Section 742.TABLE E Similar-Acting Noncarcinogenic Chemicals**

3668

3669 **Adrenal Gland**

3670 Isopropylbenzene

3671

3672 **Cholinesterase Inhibition**

3673 Aldicarb

3674 Carbofuran

3675

3676 **Circulatory System**

3677 Alachlor

3678 Antimony (ingestion only)

3679 Benzene

3680 Cobalt (ingestion only)

3681 2,4-D

3682 cis-1,2-Dichloroethylene (ingestion only)

3683 2,4-Dimethylphenol

3684 2,4-Dinitrotoluene

3685 2,6-Dinitrotoluene

3686 Enzosulfan

3687 Fluoranthene

3688 Fluorene

3689 Methylene Chloride (inhalation only)

3690 Nickel (Res. & I/C only) (inhalation only)

3691 Nitrate as N

3692 Nitrobenzene (ingestion only)

3693 Selenium

3694 Simazine

3695 Styrene (ingestion only)

3696 1,3,5-Trinitrobenzene

3697 Zinc

3698

3699 **Decreased Body Weight Gain**

3700 Atrazine

3701 Bis(2-chloroethyl)ether

3702 Cyanide

3703 1,2-Dichlorobenzene (inhalation only)

3704 Diethyl phthalate (ingestion only)

3705 Enzosulfan

3706 2-Methylphenol (o-cresol)

3707 Naphthalene (ingestion only)

- 3708 Nickel (ingestion only)
- 3709 n-Nitrosodiphenylamine
- 3710 Phenol (ingestion only)
- 3711 Simazine
- 3712 Tetrachloroethylene (ingestion only)
- 3713 1,1,1-Trichloroethane (ingestion only)
- 3714 Vinyl acetate (ingestion only)
- 3715 Xylenes (Res. & I/C only) (ingestion only)
- 3716
- 3717 **Endocrine System**
- 3718 Cyanide
- 3719 1,2-Dibromoethane (ingestion only)
- 3720 Di-n-octyl phthalate (ingestion only)
- 3721 Nitrobenzene
- 3722 1,2,4-Trichlorobenzene (ingestion only)
- 3723
- 3724 **Eye**
- 3725 2,4-Dinitrophenol
- 3726 n-Nitrosodiphenylamine
- 3727 Polychlorinated biphenyls (PCBs)
- 3728 Trichloroethylene
- 3729
- 3730 **Gastrointestinal System**
- 3731 Beryllium (ingestion only)
- 3732 Copper
- 3733 1,3-Dichloropropene (cis + trans)
- 3734 Endothall
- 3735 Fluoride
- 3736 Hexachlorocyclopentadiene (ingestion only)
- 3737 Iron
- 3738 Methyl bromide (ingestion only)
- 3739 Methyl tertiary-butyl ether (ingestion only)
- 3740
- 3741 **Immune System**
- 3742 4-Chloroaniline
- 3743 2,4-Dichlorophenol
- 3744 Mercury (ingestion only)
- 3745 Polychlorinated biphenyls (PCBs)
- 3746
- 3747 **Kidney**
- 3748 Acetone (ingestion only)
- 3749 Aldrin (CW only)
- 3750 Barium

- 3751 Bromodichloromethane (ingestion only)
- 3752 Cadmium
- 3753 2,4-D
- 3754 Dalapon
- 3755 1,1-Dichloroethane
- 3756 1,2-Dichloroethane (CW only) (ingestion only)
- 3757 Enzosulfan
- 3758 Ethylbenzene (ingestion only)
- 3759 Fluoranthene
- 3760 gamma-HCH (gamma-BHC)
- 3761 Hexachloroethane (ingestion only)
- 3762 Isopropylbenzene
- 3763 Mecoprop (MCP)
- 3764 Methyl tertiary-butyl ether (inhalation only)
- 3765 Pentachlorophenol
- 3766 Pyrene
- 3767 Toluene (ingestion only)
- 3768 2,4,5-Trichlorophenol
- 3769 Vinyl acetate (ingestion only)
- 3770
- 3771 **Liver**
- 3772 Acenaphthene
- 3773 Aldrin (Res. & I/C only)
- 3774 Bis(2-ethylhexyl)phthalate (Res.& I/C only) (ingestion only)
- 3775 Bromoform
- 3776 Butyl Benzyl Phthalate (ingestion only)
- 3777 Carbon Tetrachloride
- 3778 Chlordane
- 3779 Chlorobenzene (ingestion only)
- 3780 Chlorodibromomethane (ingestion only)
- 3781 Chloroform
- 3782 2,4-D
- 3783 DDT
- 3784 1,2-Dibromoethane (ingestion only)
- 3785 1,2-Dichlorobenzene (CW only) (ingestion only)
- 3786 1,4-Dichlorobenzene
- 3787 Dichlorodifluoromethane
- 3788 1,2-Dichloroethane (inhalation only)
- 3789 1,1-Dichloroethylene
- 3790 trans-1,2-Dichloroethylene
- 3791 1,2-Dichloropropane (ingestion only)
- 3792 Dieldrin (Res. & I/C only)
- 3793 2,4-Dinitrotoluene

- 3794 2,6-Dinitrotoluene
- 3795 Di-n-octyl phthalate (ingestion only)
- 3796 p-Dioxane
- 3797 Endrin
- 3798 Ethylbenzene (ingestion only)
- 3799 Fluoranthene
- 3800 Heptachlor
- 3801 Heptachlor epoxide
- 3802 Hexachlorobenzene
- 3803 alpha-HCH (alpha-BHC)
- 3804 gamma-HCH (gamma-BHC)
- 3805 High Melting Explosive, Octogen (HMX)
- 3806 Isophorone (inhalation only)
- 3807 Methyl tertiary-butyl ether
- 3808 Methylene Chloride (ingestion only)
- 3809 Pentachlorophenol
- 3810 Phenol (inhalation only)
- 3811 Picloram
- 3812 Styrene (ingestion only)
- 3813 Tetrachloroethylene (ingestion only)
- 3814 Toxaphene (CW only)
- 3815 2,4,5-TP (Silvex)
- 3816 1,2,4-Trichlorobenzene (inhalation only)
- 3817 1,1,1-Trichloroethane (inhalation only)
- 3818 1,1,2-Trichloroethane (ingestion only)
- 3819 2,4,5-Trichlorophenol
- 3820 2,4,6-Trinitrotoluene (TNT)
- 3821 Vinyl Chloride
- 3822
- 3823 **Mortality**
- 3824 Di-n-butyl phthalate (ingestion only)
- 3825 Xylenes (Res. & I/C only) (ingestion only)
- 3826
- 3827 **Nervous System**
- 3828 Butanol (ingestion only)
- 3829 Carbon disulfide (inhalation only)
- 3830 Cyanide
- 3831 Dieldrin
- 3832 2,4-Dimethylphenol
- 3833 2,4-Dinitrotoluene
- 3834 2,6-Dinitrotoluene
- 3835 Endrin
- 3836 Hexachloroethane (inhalation only) (CW only)

- 3837 Manganese
- 3838 Mercury (inhalation only)
- 3839 2-Methylphenol (o-cresol)
- 3840 Phenol (inhalation only)
- 3841 Selenium
- 3842 Styrene (inhalation only)
- 3843 Tetrachloroethylene (inhalation only)
- 3844 Toluene (inhalation only)
- 3845 Trichloroethylene
- 3846 Xylenes (CW only) (ingestion only)
- 3847 Xylenes (inhalation only)
- 3848
- 3849 **Reproductive System**
- 3850 Arsenic (inhalation only)
- 3851 Bis(2-ethylhexyl)phthalate (CW only) (ingestion only)
- 3852 Boron
- 3853 2-Butanone
- 3854 Carbofuran
- 3855 Carbon disulfide (ingestion only)
- 3856 2-Chlorophenol
- 3857 1,2-Dibromo-3-chloropropane
- 3858 1,2-Dibromoethane (ingestion only)
- 3859 Dicamba
- 3860 Dinoseb
- 3861 Ethylbenzene (inhalation only)
- 3862 Isophorone (inhalation only)
- 3863 Methoxychlor
- 3864 Royal Demolition Explosive, Cyclonite (RDX)
- 3865 2,4,6-Trichlorophenol
- 3866
- 3867 **Respiratory System**
- 3868 Antimony (inhalation only)
- 3869 Benzoic Acid (inhalation only)
- 3870 Beryllium (inhalation only)
- 3871 Cadmium (inhalation only)
- 3872 Chromium (hex) (inhalation only)
- 3873 Cobalt (inhalation only)
- 3874 1,2-Dibromoethane (inhalation only)
- 3875 trans-1,2-Dichloroethylene (inhalation only)
- 3876 1,2-Dichloropropane (inhalation only)
- 3877 1,3-Dichloropropene (cis + trans) (inhalation only)
- 3878 Hexachlorocyclopentadiene (inhalation only)
- 3879 Methyl bromide (inhalation only)

- 3880 Naphthalene (inhalation only)
- 3881 Nickel (inhalation only)
- 3882 Nitrobenzene (inhalation only)
- 3883 Vinyl acetate (inhalation only)
- 3884
- 3885 **Skin**
- 3886 Arsenic (ingestion only)
- 3887 Polychlorinated biphenyls (PCBs)
- 3888 Selenium
- 3889 Silver
- 3890
- 3891 **Spleen**
- 3892 1,3-Dinitrobenzene
- 3893 1,3,5-Trinitrobenzene
- 3894
- 3895 **Notes:**
- 3896 Res. = Residential receptor
- 3897 I/C = Industrial Commercial receptor
- 3898 CW = Construction Worker receptor
- 3899
- Adrenal Gland
- Nitrobenzene
- 1,2,4-Trichlorobenzene (Ingestion only)
- 3900
- Kidney
- Acetone (Ingestion only)
- Cadmium (Ingestion only)
- Chlorobenzene
- Dalapon
- 1,1-Dichloroethane
- Di-n-octyl phthalate (Ingestion only)
- Endosulfan
- Ethylbenzene
- Fluoranthene
- Methyl tertiary-butyl ether (Inhalation only)
- Nitrobenzene
- Pyrene
- Toluene (Ingestion only)
- 2,4,5-Trichlorophenol
- Vinyl acetate (Ingestion only)
- 3901
- Liver
- Acenaphthene

Acetone (Ingestion only)
Butylbenzyl phthalate (Ingestion only)
Chlorobenzene (Ingestion only)
1,1-Dichloroethylene (Ingestion only)
Di-n-octyl phthalate (Ingestion only)
Endrin
Ethylbenzene
Fluoranthene
Methyl tertiary-butyl ether (Inhalation only)
Nitrobenzene
Picloram
Styrene (Ingestion only)
2,4,5-TP (Silvex)
Toluene (Ingestion only)
1,2,4-Trichlorobenzene (Inhalation only)
2,4,5-Trichlorophenol

3902

Central Nervous System
Butanol (Ingestion only)
Cyanide (amenable)
2,4-Dimethylphenol
Endrin
Manganese
2-Methylphenol
Mercury (Inhalation only)
Styrene (Inhalation only)
Toluene (Inhalation only)
Xylenes (Ingestion only)

3903

Circulatory System
Antimony
Barium (Ingestion only)
2,4-D
cis-1,2-Dichloroethylene (Ingestion only)
Nitrobenzene
trans-1,2-Dichloroethylene (Ingestion only)
2,4-Dimethylphenol
Fluoranthene
Fluorene
Styrene (Ingestion only)
Zinc

3904

Gastrointestinal System

- Beryllium (Ingestion only)
 - Endothall
 - Hexachlorocyclopentadiene (Ingestion only)
 - Methyl bromide (Ingestion only)
 - Methyl tertiary butyl ether (Ingestion only)
- 3905
- Immune System
 - 2,4-Dichlorophenol
 - p-Chloroaniline
 - Mercury (Ingestion only)
- 3906
- Reproductive System
 - Barium (Inhalation only)
 - Boron (Ingestion only)
 - Carbon disulfide
 - 2-Chlorophenol (Ingestion only)
 - 1,2-Dibromo-3-Chloropropane (Inhalation only)
 - Dinoseb
 - Ethylbenzene (Inhalation only)
 - Methoxychlor
 - Phenol
- 3907
- Respiratory System
 - 1,2-Dichloropropane (Inhalation only)
 - 1,3-Dichloropropylene (Inhalation only)
 - Hexachlorocyclopentadiene (Inhalation only)
 - Methyl bromide (Inhalation only)
 - Napthalene (Inhalation only)
 - Toluene (Inhalation only)
 - Vinyl acetate (Inhalation only)
- 3908
- Cholinesterase Inhibition
 - Aldicarb
 - Carbofuran
- 3909
- Decreased Body Weight Gains and Circulatory System Effects
 - Atrazine
 - Simazine
- 3910
- 3911 (Source: Amended at 36 Ill. Reg. _____, effective _____)

3912 **Section 742.APPENDIX A General**

3913

3914 **Section 742.TABLE F Similar-Acting Carcinogenic Chemicals**

3915

3916 **Bladder**

3917 1,3-Dichloropropene (cis + trans) (ingestion only)

3918 n-Nitrosodiphenylamine

3919

3920 **Circulatory System**

3921 Benzene

3922 1,2-Dibromoethane

3923 1,2-Dichloroethane

3924 Pentachlorophenol

3925 2,4,6-Trichlorophenol

3926

3927 **Gall Bladder**

3928 p-Dioxane (inhalation only)

3929

3930 **Gastrointestinal System**

3931 Benzo(a)anthracene (ingestion only)

3932 Benzo(b)fluoranthene (ingestion only)

3933 Benzo(k)fluoranthene (ingestion only)

3934 Benzo(a)pyrene (ingestion only)

3935 Bromoform

3936 Chrysene (ingestion only)

3937 Dibenzo(a,h)anthracene (ingestion only)

3938 1,2-Dibromoethane (ingestion only)

3939 Indeno(1,2,3-cd)pyrene (ingestion only)

3940

3941 **Kidney**

3942 Bromodichloromethane (ingestion only)

3943 Chloroform (ingestion only)

3944 1,2-Dibromo-3-chloropropane (ingestion only)

3945 Nitrobenzene

3946

3947 **Liver**

3948 Aldrin

3949 Bis(2-chloroethyl)ether

3950 Bis(2-ethylhexyl)phthalate

3951 Carbazole

3952 Carbon Tetrachloride

3953 Chlordane

3954 Chloroform

- 3955 DDD
- 3956 DDE
- 3957 DDT
- 3958 1,2-Dichloropropane
- 3959 Dieldrin
- 3960 2,4-Dinitrotoluene
- 3961 2,6-Dinitrotoluene
- 3962 p-Dioxane
- 3963 Heptachlor
- 3964 Heptachlor epoxide
- 3965 Hexachlorobenzene
- 3966 alpha-HCH (alpha-BHC)
- 3967 gamma-HCH (gamma-BHC)
- 3968 Methylene Chloride
- 3969 Nitrobenzene
- 3970 n-Nitrosodiphenylamine (inhalation only)
- 3971 n-Nitrosodi-n-propylamine
- 3972 Pentachlorophenol
- 3973 Polychlorinated biphenyls (PCBs)
- 3974 Tetrachloroethylene
- 3975 Toxaphene
- 3976 Trichloroethylene
- 3977 Vinyl Chloride (I/C & CW)
- 3978 Vinyl Chloride (Res.)
- 3979
- 3980 **Mammary Gland**
- 3981 3,3'-Dichlorobenzidine
- 3982 2,4-Dinitrotoluene
- 3983 2,6-Dinitrotoluene
- 3984
- 3985 **Respiratory System**
- 3986 Arsenic (inhalation only)
- 3987 Benzo(a)anthracene (inhalation only)
- 3988 Benzo(b)fluoranthene (inhalation only)
- 3989 Benzo(k)fluoranthene (inhalation only)
- 3990 Benzo(a)pyrene (inhalation only)
- 3991 Beryllium
- 3992 Cadmium
- 3993 Chromium (hexavalent ion)
- 3994 Chrysene (inhalation only)
- 3995 Cobalt
- 3996 Dibenzo(a,h)anthracene (inhalation only)
- 3997 1,2-Dibromo-3-chloropropane (inhalation only)

- 3998 1,2-Dibromoethane (inhalation only)
- 3999 1,3-Dichloropropene (cis + trans) (inhalation only)
- 4000 p-Dioxane (inhalation only)
- 4001 Trichloroethylene
- 4002
- 4003 **Notes:**
- 4004 Res. = Residential receptor
- 4005 I/C = Industrial Commercial receptor
- 4006 CW = Construction Worker receptor
- 4007

Kidney

- ~~Bromodichloromethane (Ingestion-only)~~
- ~~Chloroform (Ingestion only)~~
- ~~1,2-Dibromo-3-chloropropane (Ingestion-only)~~
- ~~2,4-Dinitrotoluene~~
- ~~2,6-Dinitrotoluene~~
- ~~Hexachlorobenzene~~

Liver

- ~~Aldrin~~
- ~~Bis(2-chloroethyl)ether~~
- ~~Bis(2-ethylhexyl)phthalate (Ingestion only)~~
- ~~Carbazole~~
- ~~Carbon tetrachloride~~
- ~~Chlordane~~
- ~~Chloroform (Inhalation only)~~
- ~~DDD~~
- ~~DDE~~
- ~~DDT~~
- ~~1,2-Dibromo-3-chloropropane (Ingestion only)~~
- ~~1,2-Dibromoethane (Ingestion only)~~
- ~~3,3'-Dichlorobenzidine~~
- ~~1,2-Dichloroethane~~
- ~~1,2-Dichloropropane (Ingestion only)~~
- ~~1,3-Dichloropropylene (Ingestion only)~~
- ~~Dieldrin~~
- ~~2,4-Dinitrotoluene~~
- ~~2,6-Dinitrotoluene~~
- ~~Heptachlor~~
- ~~Heptachlor epoxide~~
- ~~Hexachlorobenzene~~
- ~~alpha-HCH~~
- ~~gamma-HCH (Lindane)~~

~~Methylene chloride~~
~~N-Nitrosodiphenylamine~~
~~N-Nitrosodi-n-propylamine~~
~~Pentachlorophenol~~
~~Tetrachloroethylene~~
~~Trichloroethylene~~
~~2,4,6-Trichlorophenol~~
~~Toxaphene~~
~~Vinyl chloride~~

Circulatory System

~~Benzene~~
~~2,4,6-Trichlorophenol~~

Gastrointestinal System

~~Benzo(a)anthracene~~
~~Benzo(b)fluoranthene~~
~~Benzo(k)fluoranthene~~
~~Benzo(a)pyrene~~
~~Chrysene~~
~~Dibenzo(a,h)anthracene~~
~~Indeno(1,2,3-c,d)pyrene~~
~~Bromodichloromethane (Ingestion only)~~
~~Bromoform~~
~~1,2-Dibromo-3-chloropropane (Ingestion only)~~
~~1,2-Dibromoethane (Ingestion only)~~
~~1,3-Dichloropropylene (Ingestion only)~~

Lung

~~Arsenic (Inhalation only)~~
~~Beryllium (Inhalation only)~~
~~Cadmium (Inhalation only)~~
~~Chromium, hexavalent (Inhalation only)~~
~~1,3-Dichloropropylene (Inhalation only)~~
~~Methylene chloride (Inhalation only)~~
~~N-Nitrosodi-n-propylamine~~
~~Nickel (Inhalation only)~~
~~Vinyl chloride~~

Nasal Cavity

~~1,2-Dibromo-3-chloropropane (Inhalation only)~~
~~1,2-Dibromoethane (Inhalation only)~~
~~N-Nitrosodi-n-propylamine~~

Bladder

~~3,3-Dichlorobenzidine~~

~~1,3-Dichloropropylene (Ingestion only)~~

~~N-Nitrosodiphenylamine~~

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4009

(Source: Amended at 36 Ill. Reg. _____, effective _____)

4010 **Section 742.APPENDIX A General**

4011
 4012 **Section 742.TABLE J List of TACO Volatile Chemicals for the Indoor Inhalation**
 4013 **Exposure Route**
 4014

<u>CAS No.</u>	<u>Chemical</u>
<u>67-64-1</u>	<u>Acetone</u>
<u>71-43-2</u>	<u>Benzene</u>
<u>111-44-4</u>	<u>Bis(2-chloroethyl)ether</u>
<u>75-27-4</u>	<u>Bromodichloromethane</u>
<u>75-25-2</u>	<u>Bromoform</u>
<u>71-36-3</u>	<u>Butanol</u>
<u>78-93-3</u>	<u>2-Butanone (MEK)</u>
<u>75-15-0</u>	<u>Carbon disulfide</u>
<u>56-23-5</u>	<u>Carbon tetrachloride</u>
<u>108-90-7</u>	<u>Chlorobenzene</u>
<u>124-48-1</u>	<u>Chlorodibromomethane</u>
<u>67-66-3</u>	<u>Chloroform</u>
<u>95-57-8</u>	<u>2-Chlorophenol</u>
<u>75-99-0</u>	<u>Dalapon</u>
<u>96-12-8</u>	<u>1,2-dibromo-3-chloropropane</u>
<u>106-93-4</u>	<u>1,2-Dibromoethane</u>
<u>95-50-1</u>	<u>1,2-Dichlorobenzene</u>
<u>106-46-7</u>	<u>1,4-Dichlorobenzene</u>
<u>75-71-8</u>	<u>Dichlorodifluoromethane</u>
<u>75-34-3</u>	<u>1,1-Dichloroethane</u>
<u>107-06-2</u>	<u>1,2-Dichloroethane</u>
<u>75-35-4</u>	<u>1,1-Dichloroethylene</u>
<u>156-59-2</u>	<u>cis-1,2-Dichloroethylene</u>
<u>156-60-5</u>	<u>Trans-1,2-Dichloroethylene</u>
<u>78-87-5</u>	<u>1,2-Dichloropropane</u>
<u>542-75-6</u>	<u>1,3-Dichloropropylene (cis + trans)</u>
<u>123-91-1</u>	<u>p-Dioxane</u>
<u>100-41-4</u>	<u>Ethylbenzene</u>
<u>76-44-8</u>	<u>Heptachlor</u>
<u>118-74-1</u>	<u>Hexachlorobenzene</u>
<u>77-47-4</u>	<u>Hexachlorocyclopentadiene</u>
<u>67-72-1</u>	<u>Hexachloroethane</u>
<u>78-59-1</u>	<u>Isophorone</u>
<u>98-82-8</u>	<u>Isopropylbenzene (Cumene)</u>
<u>7439-97-6</u>	<u>Mercury</u>
<u>74-83-9</u>	<u>Methyl bromide</u>

CAS No.	Chemical
<u>1634-04-4</u>	<u>Methyl tertiary-butyl ether</u>
<u>75-09-2</u>	<u>Methylene chloride</u>
<u>93-65-2</u>	<u>2-Methylnaphthalene</u>
<u>95-48-7</u>	<u>2-Methylphenol (o-cresol)</u>
<u>91-20-3</u>	<u>Naphthalene</u>
<u>98-95-3</u>	<u>Nitrobenzene</u>
<u>621-64-7</u>	<u>n-Nitrosodi-n-propylamine</u>
<u>108-95-2</u>	<u>Phenol</u>
<u>1336-36-3</u>	<u>Polychlorinated biphenyls (PCBs)</u>
<u>100-42-5</u>	<u>Styrene</u>
<u>127-18-4</u>	<u>Tetrachloroethylene</u>
<u>108-88-3</u>	<u>Toluene</u>
<u>120-82-1</u>	<u>1,2,4-Trichlorobenzene</u>
<u>71-55-6</u>	<u>1,1,1-Trichloroethane</u>
<u>79-00-5</u>	<u>1,1,2-Trichloroethane</u>
<u>79-01-6</u>	<u>Trichloroethylene</u>
<u>75-69-4</u>	<u>Trichlorofluoromethane</u>
<u>108-05-4</u>	<u>Vinyl acetate</u>
<u>75-01-4</u>	<u>Vinyl chloride</u>
<u>108-38-3</u>	<u>m-Xylene</u>
<u>95-47-6</u>	<u>o-Xylene</u>
<u>106-42-3</u>	<u>p-Xylene</u>
<u>1330-20-7</u>	<u>Xylenes (total)</u>

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(Source: Added at 36 Ill. Reg. _____, effective _____)

4017 **Section 742.APPENDIX A General**

4018 **Section 742.TABLE K Soil Vapor Saturation Limits (C_v^{sat}) for Volatile Chemicals**

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CAS No.	Chemical Name	C_v^{sat} (mg/m ³)
<u>67-64-1</u>	<u>Acetone</u>	<u>7.50E+05</u>
<u>71-43-2</u>	<u>Benzene</u>	<u>4.20E+05</u>
<u>111-44-4</u>	<u>Bis(2-chloroethyl)ether</u>	<u>1.20E+04</u>
<u>75-27-4</u>	<u>Bromodichloromethane</u>	<u>4.50E+05</u>
<u>75-25-2</u>	<u>Bromoform</u>	<u>7.80E+04</u>
<u>71-36-3</u>	<u>Butanol</u>	<u>2.90E+04</u>
<u>78-93-3</u>	<u>2-Butanone (MEK)</u>	<u>3.80E+05</u>
<u>75-15-0</u>	<u>Carbon disulfide</u>	<u>1.50E+06</u>
<u>56-23-5</u>	<u>Carbon tetrachloride</u>	<u>1.00E+06</u>
<u>108-90-7</u>	<u>Chlorobenzene</u>	<u>7.40E+04</u>
<u>124-48-1</u>	<u>Chlorodibromomethane</u>	<u>5.70E+04</u>
<u>67-66-3</u>	<u>Chloroform</u>	<u>1.30E+06</u>
<u>95-57-8</u>	<u>2-Chlorophenol (ionizable organic)</u>	<u>1.70E+04</u>
<u>75-99-0</u>	<u>Dalapon</u>	<u>1.50E+03</u>
<u>96-12-8</u>	<u>1,2-Dibromo-3-chloropropane</u>	<u>7.80E+03</u>
<u>106-93-4</u>	<u>1,2-Dibromoethane</u>	<u>1.40E+05</u>
<u>95-50-1</u>	<u>1,2-Dichlorobenzene</u>	<u>1.10E+04</u>
<u>106-46-7</u>	<u>1,4-Dichlorobenzene</u>	<u>8.40E+03</u>
<u>75-71-8</u>	<u>Dichlorodifluoromethane</u>	<u>3.30E+07</u>
<u>75-34-3</u>	<u>1,1-Dichloroethane</u>	<u>1.30E+06</u>
<u>107-06-2</u>	<u>1,2-Dichloroethane</u>	<u>4.40E+05</u>
<u>75-35-4</u>	<u>1,1-Dichloroethylene</u>	<u>3.30E+06</u>
<u>156-59-2</u>	<u>cis-1,2-Dichloroethylene</u>	<u>1.10E+06</u>

<u>CAS No.</u>	<u>Chemical Name</u>	<u>C_v^{sat} (mg/m³)</u>
<u>156-60-5</u>	<u>trans-1,2-Dichloroethylene</u>	<u>1.80E+06</u>
<u>78-87-5</u>	<u>1,2-Dichloropropane</u>	<u>3.20E+05</u>
<u>542-75-6</u>	<u>1,3-Dichloropropylene (cis + trans)</u>	<u>2.10E+05</u>
<u>123-91-1</u>	<u>p-Dioxane</u>	<u>1.90E+05</u>
<u>100-41-4</u>	<u>Ethylbenzene</u>	<u>5.90E+04</u>
<u>76-44-8</u>	<u>Heptachlor</u>	<u>8.30E+00</u>
<u>118-74-1</u>	<u>Hexachlorobenzene</u>	<u>2.80E-01</u>
<u>77-47-4</u>	<u>Hexachlorocyclopentadiene</u>	<u>9.10E+02</u>
<u>67-72-1</u>	<u>Hexachloroethane</u>	<u>2.80E+03</u>
<u>78-59-1</u>	<u>Isophorone</u>	<u>3.40E+03</u>
<u>98-82-8</u>	<u>Isopropylbenzene (Cumene)</u>	<u>3.00E+04</u>
<u>7439-97-6</u>	<u>Mercury (elemental)</u>	<u>2.20E+01</u>
<u>74-83-9</u>	<u>Methyl bromide</u>	<u>8.60E+06</u>
<u>1634-04-4</u>	<u>Methyl tertiary-butyl ether</u>	<u>1.20E+06</u>
<u>75-09-2</u>	<u>Methylene chloride</u>	<u>2.00E+06</u>
<u>93-65-2</u>	<u>2-Methylnaphthalene</u>	<u>5.30E+02</u>
<u>1634-04-4</u>	<u>2-Methylphenol (o-cresol)</u>	<u>1.80E+03</u>
<u>91-20-3</u>	<u>Naphthalene</u>	<u>6.20E+02</u>
<u>98-95-3</u>	<u>Nitrobenzene</u>	<u>1.70E+03</u>
<u>621-64-7</u>	<u>n-Nitrosodi-n-propylamine</u>	<u>9.50E+02</u>
<u>108-95-2</u>	<u>Phenol</u>	<u>1.50E+03</u>
<u>1336-36-3</u>	<u>Polychlorinated biphenyls (PCBs)</u>	<u>9.00E+00</u>
<u>100-42-5</u>	<u>Styrene</u>	<u>3.40E+04</u>
<u>127-18-4</u>	<u>Tetrachloroethylene</u>	<u>1.80E+05</u>
<u>108-88-3</u>	<u>Toluene</u>	<u>1.40E+05</u>
<u>120-82-1</u>	<u>1,2,4-Trichlorobenzene</u>	<u>4.30E+03</u>

<u>CAS No.</u>	<u>Chemical Name</u>	<u>C_v^{sat} (mg/m³)</u>
<u>71-55-6</u>	<u>1,1,1-Trichloroethane</u>	<u>8.70E+05</u>
<u>79-00-5</u>	<u>1,1,2-Trichloroethane</u>	<u>1.70E+05</u>
<u>79-01-6</u>	<u>Trichloroethylene</u>	<u>5.30E+05</u>
<u>75-69-4</u>	<u>Trichlorofluoromethane</u>	<u>6.30E+06</u>
<u>108-05-4</u>	<u>Vinyl acetate</u>	<u>4.30E+05</u>
<u>75-01-4</u>	<u>Vinyl chloride</u>	<u>1.10E+07</u>
<u>108-38-3</u>	<u>m-Xylene</u>	<u>5.20E+04</u>
<u>95-47-6</u>	<u>o-Xylene</u>	<u>4.10E+04</u>
<u>106-42-3</u>	<u>p-Xylene</u>	<u>5.50E+04</u>
<u>1330-20-7</u>	<u>Xylenes (total)</u>	<u>4.90E+04</u>

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(Source: Added at 36 Ill. Reg. _____, effective _____)

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Section 742.APPENDIX B Tier 1 Illustrations and Tables

Section 742.TABLE G Tier 1 Soil Gas Remediation Objectives for theOutdoor Inhalation Exposure Route^a

CAS No.	Chemical Name	Residential (mg/m ³)	Industrial/Commercial (mg/m ³)	Construction Worker (mg/m ³)
67-64-1	Acetone	750,000 ^c	750,000 ^e	750,000 ^e
71-43-2	Benzene	420 ^c	800 ^c	1,100 ^c
111-44-4	Bis(2-chloroethyl)ether	1.3 ^c	2.4 ^c	3.4 ^c
75-27-4	Bromodichloromethane	450,000 ^e	450,000 ^e	450,000 ^e
75-25-2	Bromoform	1,800 ^c	3,500 ^c	4,900 ^c
71-36-3	Butanol	29,000 ^e	29,000 ^e	29,000 ^e
78-93-3	2-Butanone (MEK)	380,000 ^e	380,000 ^e	15,000 ^b
75-15-0	Carbon disulfide	1,500,000 ^c	1,500,000 ^c	48,000 ^b
56-23-5	Carbon tetrachloride	290 ^c	550 ^c	770 ^c
108-90-7	Chlorobenzene	36,000 ^b	57,000 ^b	3,700 ^b
124-48-1	Chlorodibromomethane	57,000 ^c	57,000 ^c	150 ^b
67-66-3	Chloroform	110 ^c	200 ^c	290 ^c
95-57-8	2-Chlorophenol	17,000 ^c	17,000 ^c	17,000 ^e
75-99-0	Dalapon	1,500 ^e	1,500 ^e	1,500 ^e
96-12-8	1,2-Dibromo-3-chloropropane	0.14 ^c	0.27 ^c	0.38 ^c
106-93-4	1,2-Dibromoethane	2.9 ^c	5.6 ^c	7.9 ^c
95-50-1	1,2-Dichlorobenzene	11,000 ^c	11,000 ^c	6,700 ^b
106-46-7	1,4-Dichlorobenzene	8,400 ^c	8,400 ^c	6,400 ^b
75-71-8	Dichlorodifluoromethane	890,000 ^b	1,400,000 ^b	92,000 ^b
75-34-3	1,1-Dichloroethane	870,000 ^b	1,300,000 ^e	90,000 ^b
107-06-2	1,2-Dichloroethane	67 ^c	130 ^c	180 ^c
75-35-4	1,1-Dichloroethylene	520,000 ^b	820,000 ^b	5,300 ^b
156-59-2	cis-1,2-Dichloroethylene	1,100,000 ^c	1,100,000 ^c	1,100,000 ^e
156-60-5	trans-1,2-Dichloroethylene	120,000 ^b	190,000 ^b	12,000 ^b
78-87-5	1,2-Dichloropropane	240 ^c	470 ^c	110 ^c
542-75-6	1,3-Dichloropropylene (cis + trans)	1,900 ^c	3,700 ^c	1,400 ^c
123-91-1	p-Dioxane	16 ^c	30 ^c	42 ^c
100-41-4	Ethylbenzene	59,000 ^e	59,000 ^e	8,500 ^b
76-44-8	Heptachlor	0.40 ^c	0.76 ^c	1.1 ^c
118-74-1	Hexachlorobenzene	0.26 ^c	0.28 ^c	0.28 ^e

CAS No.	Chemical Name	Residential (mg/m ³)	Industrial/Commercial (mg/m ³)	Construction Worker (mg/m ³)
77-47-4	Hexachlorocyclopentadiene	85 ^b	140 ^b	440 ^b
67-72-1	Hexachloroethane	2,800 ^e	2,800 ^e	2,800 ^e
78-59-1	Isophorone	3,400 ^e	3,400 ^e	1,500 ^b
98-82-8	Isopropylbenzene (Cumene)	30,000 ^e	30,000 ^e	30,000 ^e
7439-97-6	Mercury ^f	22 ^e	22 ^e	0.62 ^b
74-83-9	Methyl bromide	12,000 ^b	19,000 ^b	2,400 ^b
1634-04-4	Methyl tertiary-butyl ether	1,200,000 ^e	1,200,000 ^e	23,000 ^b
75-09-2	Methylene chloride	6,100 ^e	12,000 ^e	5,100 ^b
91-57-6	2-Methylnaphthalene	530 ^e	530 ^e	530 ^e
95-48-7	2-Methylphenol (o-cresol)	1,800 ^e	1,800 ^e	410 ^b
91-20-3	Naphthalene	560 ^b	620 ^e	5.8 ^b
98-95-3	Nitrobenzene	6.5 ^e	12 ^e	10 ^b
621-64-7	n-Nitrosodi-n-propylamine	0.056 ^e	0.11 ^e	0.15 ^e
108-95-2	Phenol	1,500 ^e	1,500 ^e	79 ^b
1336-36-3	Polychlorinated biphenyls (PCBs)	--- ^d	--- ^d	--- ^d
100-42-5	Styrene	34,000 ^e	34,000 ^e	16,000 ^b
127-18-4	Tetrachloroethylene	360 ^e	690 ^e	970 ^e
108-88-3	Toluene	140,000 ^e	140,000 ^e	50,000 ^b
120-82-1	1,2,4-Trichlorobenzene	1,000 ^b	1,600 ^b	110 ^b
71-55-6	1,1,1-Trichloroethane	870,000 ^e	870,000 ^e	89,000 ^b
79-00-5	1,1,2-Trichloroethane	170,000 ^e	170,000 ^e	170,000 ^e
79-01-6	Trichloroethylene	1,700 ^e	3,300 ^e	1,500 ^b
75-69-4	Trichlorofluoromethane	2,100,000 ^b	3,400,000 ^b	220,000 ^b
108-05-4	Vinyl acetate	160,000 ^b	250,000 ^b	1,600 ^b
75-01-4	Vinyl chloride	780 ^e	3,000 ^e	3,000 ^b
108-38-3	m-Xylene	52,000 ^e	52,000 ^e	3,100 ^b
95-47-6	o-Xylene	41,000 ^e	41,000 ^e	2,600 ^b
106-42-3	p-Xylene	55,000 ^e	55,000 ^e	3,300 ^b
1330-20-7	Xylenes (total)	49,000 ^e	49,000 ^e	2,900 ^b

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Chemical Name and Remediation Objective Notations

^a For the outdoor inhalation exposure route, it is acceptable to determine compliance by meeting either the soil or soil gas remediation objectives. The soil remediation objectives for the outdoor inhalation route are located in Appendix B, Tables A and B.

- 4035 b Calculated values correspond to a target hazard quotient of 1.
4036
- 4037 c Calculated values correspond to a cancer risk level of 1 in 1,000,000.
4038
- 4039 d PCBs are a mixture of different congeners. The appropriate values to use for the
4040 physical/chemical and toxicity parameters depend on the congeners present at the site.
4041 Persons remediating sites should consult with BOL if calculation of Tier 2 or 3 remediation
4042 objectives is desired.
4043
- 4044 e The value shown is the Cvsat value of the chemical in soil gas. The Cvsat of the chemical
4045 becomes the remediation objective if the calculated value exceeds the Cvsat value or if there
4046 are no toxicity criteria available for the inhalation route of exposure.
4047
- 4048 f Value for the inhalation exposure route is based on Reference Concentration for elemental
4049 Mercury (CAS No. 7439-97-6). Inhalation remediation objectives only apply at sites where
4050 elemental Mercury is a contaminant of concern.
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4052 (Source: Added at 36 Ill. Reg. _____, effective _____)

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Section 742.APPENDIX B Tier 1 Illustrations and Tables

Section 742.TABLE H Tier 1 Soil Gas and Groundwater Remediation Objectives for the Indoor Inhalation Exposure Route – Diffusion and Advection

Q_{soil} equals $83.33 \text{ cm}^3/\text{sec}^a$

CAS No.	Chemical Name	Soil Gas		Groundwater	
		Residential (mg/m ³)	Industrial/ Commercial (mg/m ³)	Residential (mg/L)	Industrial/ Commercial (mg/L)
67-64-1	Acetone	750,000 ^f	750,000 ^f	1,000,000 ^g	1,000,000 ^g
71-43-2	Benzene	0.37 ^c	2.8 ^c	0.11 ^c	0.41 ^c
111-44-4	Bis(2-chloroethyl)ether	0.014 ^c	0.087 ^c	0.083 ^c	0.43 ^c
75-27-4	Bromodichloromethane	450,000 ^f	450,000 ^f	6,700 ^g	6,700 ^g
75-25-2	Bromoform	11 ^c	52 ^c	3.1 ^c	12 ^c
71-36-3	Butanol	29,000 ^f	29,000 ^f	74,000 ^g	74,000 ^g
78-93-3	2-Butanone (MEK)	6,400 ^b	40,000 ^b	10,000 ^b	48,000 ^b
75-15-0	Carbon disulfide	780 ^b	5,300 ^b	67 ^b	210 ^b
56-23-5	Carbon tetrachloride	0.21 ^c	1.5 ^c	0.020 ^c	0.076 ^c
108-90-7	Chlorobenzene	69 ^b	420 ^b	26 ^b	82 ^b
124-48-1	Chlorodibromomethane	57,000 ^f	57,000 ^f	2,600 ^g	2,600 ^g
67-66-3	Chloroform	0.11 ^c	0.92 ^c	0.07 ⁱ	0.15 ^c
95-57-8	2-Chlorophenol	17,000 ^f	17,000 ^f	22,000 ^g	22,000 ^g
75-99-0	Dalapon ^e	1,500 ^f	1,500 ^f	900,000 ^g	900,000 ^g
96-12-8	1,2-Dibromo-3-chloropropane ^e	0.0012 ^c	0.0062 ^c	0.00065 ^c	0.0027 ^c
106-93-4	1,2-Dibromoethane	0.0078 ^c	0.048 ^c	0.0035 ^c	0.014 ^c
95-50-1	1,2-Dichlorobenzene	290 ^b	1,700 ^b	140 ^b	160 ^g
106-46-7	1,4-Dichlorobenzene	1,200 ^b	6,800 ^b	79 ^g	79 ^g
75-71-8	Dichlorodifluoromethane	270 ^b	1,700 ^b	3.0 ^b	9.2 ^b
75-34-3	1,1-Dichloroethane	690 ^b	4,200 ^b	180 ^b	580 ^b
107-06-2	1,2-Dichloroethane	0.099 ^c	0.81 ^c	0.054 ^c	0.22 ^c
75-35-4	1,1-Dichloroethylene	240 ^b	1,600 ^b	24 ^b	74 ^b
156-59-2	cis-1,2-Dichloroethylene	1,100,000 ^f	1,100,000 ^f	3,500 ^g	3,500 ^g
156-60-5	trans-1,2-Dichloroethylene	85 ^b	510 ^b	16 ^b	51 ^b
78-87-5	1,2-Dichloropropane	0.31 ^c	2.3 ^c	0.12 ^c	0.48 ^c
542-75-6	1,3-Dichloropropylene (cis + trans)	0.90 ^c	6.2 ^c	0.14 ^c	0.52 ^c
123-91-1	p-Dioxane	0.22 ^c	2.3 ^c	2.9 ^c	25 ^c
100-41-4	Ethylbenzene	1.3 ^c	9.3 ^c	0.37 ^c	1.4 ^c

76-44-8	<u>Heptachlor</u>	<u>0.0063^c</u>	<u>0.032^c</u>	<u>0.0025^c</u>	<u>0.0096^c</u>
118-74-1	<u>Hexachlorobenzene</u>	<u>0.0087^c</u>	<u>0.057^c</u>	<u>0.0059^c</u>	<u>0.0062^g</u>
77-47-4	<u>Hexachlorocyclopentadiene</u>	<u>0.58^b</u>	<u>2.6^b</u>	<u>0.084^b</u>	<u>0.26^b</u>
67-72-1	<u>Hexachloroethane</u>	<u>2,800^f</u>	<u>2,800^f</u>	<u>50^g</u>	<u>50^g</u>
78-59-1	<u>Isophorone</u>	<u>2,900^b</u>	<u>3,400^f</u>	<u>12,000^g</u>	<u>12,000^g</u>
98-82-8	<u>Isopropylbenzene (Cumene)</u>	<u>600^b</u>	<u>3,500^b</u>	<u>2.7^b</u>	<u>8.4^b</u>
7439-97-6	<u>Mercury^h</u>	<u>0.42^b</u>	<u>2.5^b</u>	<u>0.053^b</u>	<u>0.060^g</u>
74-83-9	<u>Methyl bromide</u>	<u>6.9^b</u>	<u>42^b</u>	<u>1.5^b</u>	<u>4.8^b</u>
1634-04-4	<u>Methyl tertiary-butyl ether</u>	<u>3,700^b</u>	<u>24,000^b</u>	<u>1,900^b</u>	<u>6,800^b</u>
75-09-2	<u>Methylene chloride</u>	<u>5.6^c</u>	<u>45^c</u>	<u>2.1^c</u>	<u>8.2^c</u>
91-57-6	<u>2-Methylnaphthalene</u>	<u>530^f</u>	<u>530^f</u>	<u>25^g</u>	<u>25^g</u>
95-48-7	<u>2-Methylphenol (o-cresol)</u>	<u>600^b</u>	<u>1,800^f</u>	<u>26,000^g</u>	<u>26,000^g</u>
91-20-3	<u>Naphthalene</u>	<u>0.11^c</u>	<u>0.75^c</u>	<u>0.075^c</u>	<u>0.32^c</u>
98-95-3	<u>Nitrobenzene</u>	<u>0.077^c</u>	<u>0.57^c</u>	<u>0.34^c</u>	<u>2.0^c</u>
621-64-7	<u>n-Nitrosodi-n-propylamine</u>	<u>0.0016^c</u>	<u>0.012^c</u>	<u>0.044^c</u>	<u>0.27^c</u>
108-95-2	<u>Phenol</u>	<u>140^b</u>	<u>1,300^b</u>	<u>28,000^b</u>	<u>83,000^g</u>
1336-36-3	<u>Polychlorinated biphenyls (PCBs)</u>	<u>---^d</u>	<u>---^d</u>	<u>---^d</u>	<u>---^d</u>
100-42-5	<u>Styrene</u>	<u>1,400^b</u>	<u>8,500^b</u>	<u>310^g</u>	<u>310^g</u>
127-18-4	<u>Tetrachloroethylene</u>	<u>0.55^c</u>	<u>4.0^c</u>	<u>0.091^c</u>	<u>0.34^c</u>
108-88-3	<u>Toluene</u>	<u>6,200^b</u>	<u>40,000^b</u>	<u>530^g</u>	<u>530^g</u>
120-82-1	<u>1,2,4-Trichlorobenzene</u>	<u>5.4^b</u>	<u>25^b</u>	<u>1.8</u>	<u>5.9^b</u>
71-55-6	<u>1,1,1-Trichloroethane</u>	<u>6,600^b</u>	<u>41,000^b</u>	<u>1,000^b</u>	<u>1,300^g</u>
79-00-5	<u>1,1,2-Trichloroethane</u>	<u>170,000^f</u>	<u>170,000^f</u>	<u>4,400^g</u>	<u>4,400^g</u>
79-01-6	<u>Trichloroethylene</u>	<u>1.5^c</u>	<u>12^c</u>	<u>0.34^c</u>	<u>1.3^c</u>
75-69-4	<u>Trichlorofluoromethane</u>	<u>860^b</u>	<u>5,600^b</u>	<u>26^b</u>	<u>82^b</u>
108-05-4	<u>Vinyl acetate</u>	<u>250^b</u>	<u>1,600^b</u>	<u>160^b</u>	<u>550^b</u>
75-01-4	<u>Vinyl chloride</u>	<u>0.29^c</u>	<u>4.8^c</u>	<u>0.028^c</u>	<u>0.21^c</u>
108-38-3	<u>m-Xylene</u>	<u>140^b</u>	<u>850^b</u>	<u>43^b</u>	<u>130^b</u>
95-47-6	<u>o-Xylene</u>	<u>120^b</u>	<u>790^b</u>	<u>40^b</u>	<u>130^b</u>
106-42-3	<u>p-Xylene</u>	<u>130^b</u>	<u>820^b</u>	<u>38^b</u>	<u>120^b</u>
1330-20-7	<u>Xylenes (total)^e</u>	<u>140^b</u>	<u>840^b</u>	<u>30^b</u>	<u>93^b</u>

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Chemical Name and Remediation Objective Notations

^a Compliance is determined by meeting either the soil gas remediation objectives or the groundwater remediation objectives. See Sections 742.505 and 742.515.

- 4065 ^b Calculated values correspond to a target hazard quotient of 1.
- 4066
- 4067 ^c Calculated values correspond to a cancer risk level of 1 in 1,000,000.
- 4068
- 4069 ^d PCBs are a mixture of different congeners. The appropriate values to use for the
4070 physical/chemical and toxicity parameters depend on the congeners present at the site.
4071 Persons remediating sites should consult with BOL if calculation of Tier 2 or 3 remediation
4072 objectives is desired.
- 4073
- 4074 ^e Groundwater remediation objective calculated at 25°C. For Dalapon and 1,2-Dibromo-3-
4075 chloropropane, the critical temperature (Tc) and enthalpy of vaporization at the normal
4076 boiling point (Hv,b) are not available. For Xylenes (total), the enthalpy of vaporization at the
4077 normal boiling point (Hv,b) is not available.
- 4078
- 4079 ^f The value shown is the Cvsat value of the chemical in soil gas. The Cvsat of the chemical
4080 becomes the remediation objective if the calculated value exceeds the Cvsat value or if there
4081 are no toxicity criteria available for the inhalation route of exposure.
- 4082
- 4083 ^g The value shown is the solubility of the chemical in water. The solubility of the chemical
4084 becomes the remediation objective if the calculated value exceeds the solubility or if there
4085 are no toxicity criteria available for the ingestion route of exposure.
- 4086
- 4087 ^h Value for the inhalation exposure route is based on Reference Concentration for elemental
4088 Mercury (CAS No. 7439-97-6). Inhalation remediation objectives only apply at sites where
4089 elemental Mercury is a contaminant of concern.
- 4090
- 4091 ⁱ The value shown is the Groundwater Remediation Objective listed in Appendix B, Table E.
4092
- 4093 (Source: Added at 36 Ill. Reg. _____, effective _____)

4094 **Section 742.APPENDIX B Tier 1 Illustrations and Tables**

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4096 **Section 742.TABLE I Tier 1 Soil Gas and Groundwater Remediation Objectives for the**
4097 **Indoor Inhalation Exposure Route – Diffusion Only**

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4099 Q_{soil} equals $0.0 \text{ cm}^3/\text{sec}^{\text{a,b}}$

CAS No.	Chemical Name	Soil Gas		Groundwater	
		Residential (mg/m ³)	Industrial/ Commercial (mg/m ³)	Residential (mg/L)	Industrial/ Commercial (mg/L)
<u>67-64-1</u>	Acetone	750,000 ^g	750,000 ^g	1,000,000 ^h	1,000,000 ^h
<u>71-43-2</u>	Benzene	41 ^d	300 ^d	0.41 ^d	2.6 ^d
<u>111-44-4</u>	Bis(2-chloroethyl)ether	1.9 ^d	14 ^d	6.6 ^d	48 ^d
<u>75-27-4</u>	Bromodichloromethane	450,000 ^g	450,000 ^g	6,700 ^h	6,700 ^h
<u>75-25-2</u>	Bromoform	1,800 ^d	13,000 ^d	170 ^d	1,300 ^d
<u>71-36-3</u>	Butanol	29,000 ^g	29,000 ^g	74,000 ^h	74,000 ^h
<u>78-93-3</u>	2-Butanone (MEK)	380,000 ^g	380,000 ^g	220,000 ^h	220,000 ^h
<u>75-15-0</u>	Carbon disulfide	81,000 ^c	500,000 ^c	170 ^c	820 ^c
<u>56-23-5</u>	Carbon tetrachloride	24 ^d	180 ^d	0.052 ^d	0.31 ^d
<u>108-90-7</u>	Chlorobenzene	8,300 ^c	51,000 ^c	130 ^c	470 ^h
<u>124-48-1</u>	Chlorodibromomethane	57,000 ^g	57,000 ^g	2,600 ^h	2,600 ^h
<u>67-66-3</u>	Chloroform	12 ^d	87 ^d	0.17 ^d	1.1 ^d
<u>95-57-8</u>	2-Chlorophenol	17,000 ^g	17,000 ^g	22,000 ^h	22,000 ^h
<u>75-99-0</u>	Dalapon ^f	1,500 ^g	1,500 ^g	900,000 ^h	900,000 ^h
<u>96-12-8</u>	1,2-Dibromo-3-chloropropane ^f	0.17 ^d	1.3 ^d	0.029 ^d	0.21 ^d
<u>106-93-4</u>	1,2-Dibromoethane	1.1 ^d	7.9 ^d	0.073 ^d	0.52 ^d
<u>95-50-1</u>	1,2-Dichlorobenzene	11,000 ^g	11,000 ^g	160 ^h	160 ^h
<u>106-46-7</u>	1,4-Dichlorobenzene	8,400 ^g	8,400 ^g	79 ^h	79 ^h
<u>75-71-8</u>	Dichlorodifluoromethane	32,000 ^c	200,000 ^c	6.8 ^c	33 ^c
<u>75-34-3</u>	1,1-Dichloroethane	81,000 ^c	500,000 ^c	750 ^c	4,100 ^c
<u>107-06-2</u>	1,2-Dichloroethane	10 ^d	76 ^d	0.50 ^d	3.5 ^d
<u>75-35-4</u>	1,1-Dichloroethylene	27,000 ^c	160,000 ^c	61 ^c	300 ^c
<u>156-59-2</u>	cis-1,2-Dichloroethylene	1,100,000 ^g	1,100,000 ^g	3,500 ^h	3,500 ^h
<u>156-60-5</u>	trans-1,2-Dichloroethylene	10,000 ^c	63,000 ^c	58 ^c	310 ^c
<u>78-87-5</u>	1,2-Dichloropropane	36 ^d	260 ^d	0.67 ^d	4.5 ^d
<u>542-75-6</u>	1,3-Dichloropropylene (cis + trans)	110 ^d	830 ^d	0.42 ^d	2.6 ^d
<u>123-91-1</u>	p-Dioxane	15 ^d	110 ^d	140 ^d	1,000 ^d
<u>100-41-4</u>	Ethylbenzene	150 ^d	1,100 ^d	1.3 ^d	8.1 ^d

CAS No.	Chemical Name	Soil Gas		Groundwater	
		Residential (mg/m ³)	Industrial/ Commercial (mg/m ³)	Residential (mg/L)	Industrial/ Commercial (mg/L)
76-44-8	Heptachlor	0.97 ^d	7.1 ^d	0.058 ^d	0.18 ^h
118-74-1	Hexachlorobenzene	0.28 ^g	0.28 ^g	0.0062 ^h	0.0062 ^h
77-47-4	Hexachlorocyclopentadiene	86 ^c	530 ^c	0.29 ^c	1.5 ^c
67-72-1	Hexachloroethane	2,800 ^g	2,800 ^g	50 ^h	50 ^h
78-59-1	Isophorone	3,400 ^g	3,400 ^g	12,000 ^h	12,000 ^h
98-82-8	Isopropylbenzene (Cumene)	30,000 ^g	30,000 ^g	6.2 ^c	30 ^c
7439-97-6	Mercury ⁱ	22 ^g	22 ^g	0.060 ^h	0.060 ^h
74-83-9	Methyl bromide	830 ^c	5,100 ^c	6.1 ^c	33 ^c
1634-04-4	Methyl tertiary-butyl ether	420,000 ^c	1,200,000 ^g	30,000 ^c	51,000 ^h
75-09-2	Methylene chloride	590 ^d	4,400 ^d	12 ^d	84 ^d
91-57-6	2-Methylnaphthalene	530 ^g	530 ^g	25 ^h	25 ^h
95-48-7	2-Methylphenol (o-cresol)	1,800 ^g	1,800 ^g	26,000 ^h	26,000 ^h
91-20-3	Naphthalene	14 ^d	100 ^d	1.8 ^d	13 ^d
98-95-3	Nitrobenzene	9.0 ^d	66 ^d	23 ^d	170 ^d
621-64-7	n-Nitrosodi-n-propylamine	0.18 ^d	1.3 ^d	3.3 ^d	24 ^d
108-95-2	Phenol	1,500 ^g	1,500 ^g	83,000 ^h	83,000 ^h
1336-36-3	Polychlorinated biphenyls (PCBs)	--- ^c	--- ^c	--- ^c	--- ^c
100-42-5	Styrene	34,000 ^g	34,000 ^g	310 ^h	310 ^h
127-18-4	Tetrachloroethylene	66 ^d	490 ^d	0.26 ^d	1.6 ^d
108-88-3	Toluene	140,000 ^g	140,000 ^g	530 ^h	530 ^h
120-82-1	1,2,4-Trichlorobenzene	800 ^c	4,300 ^g	35 ^h	35 ^h
71-55-6	1,1,1-Trichloroethane	770,000 ^c	870,000 ^g	1,300 ^h	1,300 ^h
79-00-5	1,1,2-Trichloroethane	170,000 ^g	170,000 ^g	4,400 ^h	4,400 ^h
79-01-6	Trichloroethylene	180 ^d	1,300 ^d	1.1 ^d	6.7 ^d
75-69-4	Trichlorofluoromethane	97,000 ^c	600,000 ^c	62 ^c	300 ^c
108-05-4	Vinyl acetate	28,000 ^c	170,000 ^c	2,500 ^c	15,000 ^c
75-01-4	Vinyl chloride	30 ^d	440 ^d	0.065 ^d	0.75 ^d
108-38-3	m-Xylene	17,000 ^d	52,000 ^c	160 ^c	160 ^h
95-47-6	o-Xylene	14,000 ^d	41,000 ^c	170 ^c	180 ^h
106-42-3	p-Xylene	16,000 ^d	55,000 ^c	140 ^c	160 ^h
1330-20-7	Xylenes (total) ^f	17,000 ^d	49,000 ^c	96 ^c	110 ^h

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Chemical Name and Remediation Objective Notations

- 4103 ^a Compliance is determined by meeting both the soil gas remediation objectives and the
4104 groundwater remediation objectives. See Sections 742.505 and 742.515.
4105
- 4106 ^b Remediation objectives relying on this table require use of institutional controls in
4107 accordance with Subpart J.
4108
- 4109 ^c Calculated values correspond to a target hazard quotient of 1.
4110
- 4111 ^d Calculated values correspond to a cancer risk level of 1 in 1,000,000.
4112
- 4113 ^e PCBs are a mixture of different congeners. The appropriate values to use for the
4114 physical/chemical and toxicity parameters depend on the congeners present at the site.
4115 Persons remediating sites should consult with BOL if calculation of Tier 2 or 3 remediation
4116 objectives is desired
- 4117 ^f Groundwater remediation objective calculated at 25°C. For Dalapon and 1,2-Dibromo-3-
4118 chloropropane, the critical temperature (T_c) and enthalpy of vaporization at the normal
4119 boiling point (H_{v,b}) are not available. For Xylenes (total), the enthalpy of vaporization at the
4120 normal boiling point (H_{v,b}) is not available.
4121
- 4122 ^g The value shown is the C_{vsat} value of the chemical in soil gas. The C_{vsat} of the chemical
4123 becomes the remediation objective if the calculated value exceeds the C_{vsat} value or if there
4124 are no toxicity criteria available for the inhalation route of exposure.
4125
- 4126 ^h The value shown is the solubility of the chemical in water. The solubility of the chemical
4127 becomes the remediation objective if the calculated value exceeds the solubility or if there
4128 are no toxicity criteria available for the inhalation route of exposure.
4129
- 4130 ⁱ Value for the inhalation exposure route is based on Reference Concentration for elemental
4131 Mercury (CAS No. 7439-97-6). Inhalation remediation objectives only apply at sites where
4132 elemental Mercury is a contaminant of concern.
4133

4134 (Source: Added at 36 Ill. Reg. _____, effective _____)
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4136 **Section 742.APPENDIX C Tier 2 Illustrations and Tables**

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4138 **Section 742.TABLE A SSL Equations**

4139

Equations for Soil Ingestion Exposure Route	Remediation Objectives for Noncarcinogenic Contaminants (mg/kg)	$\frac{THQ \cdot BW \cdot AT \cdot 365 \frac{d}{yr}}{\frac{1}{RfD_o} \cdot 10^{-6} \frac{kg}{mg} \cdot EF \cdot ED \cdot IR_{soil}}$	S1
	Remediation Objectives for Carcinogenic Contaminants – Residential (mg/kg)	$\frac{TR \cdot AT_c \cdot 365 \frac{d}{yr}}{SF_o \cdot 10^{-6} \frac{kg}{mg} \cdot EF \cdot IF_{soil-adj}}$	S2
	Remediation Objectives for Carcinogenic Contaminants – Industrial/Commercial, Construction Worker (mg/kg)	$\frac{TR \cdot BW \cdot AT_c \cdot 365 \frac{d}{yr}}{SF_o \cdot 10^{-6} \frac{kg}{mg} \cdot EF \cdot ED \cdot IR_{soil}}$	S3
Equations for Inhalation Exposure Route (Organic Contaminants and Mercury)	Remediation Objectives for Noncarcinogenic Contaminants – Residential, Industrial/Commercial (mg/kg)	$\frac{THQ \cdot AT \cdot 365 \frac{d}{yr}}{EF \cdot ED \cdot \left(\frac{1}{RFC} \cdot \frac{1}{VF} \right)}$	S4
	Remediation Objectives for Noncarcinogenic Contaminants – Construction Worker (mg/kg)	$\frac{THQ \cdot AT \cdot 365 \frac{d}{yr}}{EF \cdot ED \cdot \left(\frac{1}{RfC} \cdot \frac{1}{VF'} \right)}$	S5
	Remediation Objectives for Carcinogenic Contaminants – Residential, Industrial/Commercial (mg/kg)	$\frac{TR \cdot AT_c \cdot 365 \frac{d}{yr}}{URF \cdot 1000 \frac{\mu g}{mg} \cdot EF \cdot ED \cdot \frac{1}{VF}}$	S6
	Remediation Objectives for Carcinogenic Contaminants – Construction Worker (mg/kg)	$\frac{TR \cdot AT_c \cdot 365 \frac{d}{yr}}{URF \cdot 1000 \frac{\mu g}{mg} \cdot EF \cdot ED \cdot \frac{1}{VF'}}$	S7
	Equation for Derivation of the Volatilization Factor – Residential, Industrial/Commercial, VF (m ³ /kg)	$VF = \frac{Q}{C} \cdot \frac{(3.14 \cdot D_A \cdot T)^{1/2}}{(2 \cdot \rho_b \cdot D_A)} \cdot 10^{-4} \frac{m^2}{cm^2}$	S8

	Equation for Derivation of the Volatilization Factor – Construction Worker, VF' (m ³ /kg)	$VF' = \frac{VF}{10}$	S9
	Equation for Derivation of Apparent Diffusivity, D _A (cm ² /s)	$D_A = \frac{(\theta_a^{3.33} \cdot D_i \cdot H') + (\theta_w^{3.33} \cdot D_w)}{\eta^2} \cdot \frac{1}{(\rho_b \cdot K_d)} + \theta_w + (\theta_a \cdot H')$	S10
Equations for Inhalation Exposure Route (Fugitive Dusts)	Remediation Objectives for Noncarcinogenic Contaminants – Residential, Industrial/Commercial (mg/kg)	$\frac{THQ \cdot AT \cdot 365 \frac{d}{yr}}{EF \cdot ED \cdot \left(\frac{1}{RfC} \cdot \frac{1}{PEF} \right)}$	S11
	Remediation Objectives for Noncarcinogenic Contaminants – Construction Worker (mg/kg)	$\frac{THQ \cdot AT \cdot 365 \frac{d}{yr}}{EF \cdot ED \cdot \left(\frac{1}{RfC} \cdot \frac{1}{PEF'} \right)}$	S12
	Remediation Objectives for Carcinogenic Contaminants – Residential, Industrial/Commercial (mg/kg)	$\frac{TR \cdot AT_c \cdot 365 \frac{d}{yr}}{URF \cdot 1000 \frac{\mu g}{mg} \cdot EF \cdot ED \cdot \frac{1}{PEF}}$	S13
	Remediation Objectives for Carcinogenic Contaminants – Construction Worker (mg/kg)	$\frac{TR \cdot AT_c \cdot 365 \frac{d}{yr}}{URF \cdot 1000 \frac{\mu g}{mg} \cdot EF \cdot ED \cdot \frac{1}{PEF'}}$	S14
	Equation for Derivation of Particulate Emission Factor, PEF (m ³ /kg)	$PEF = \frac{Q}{C} \cdot \frac{3,600 \frac{s}{hr}}{0.036 \cdot (1-V) \cdot \left(\frac{U_m}{U_t} \right)^3 \cdot F(x)}$	S15
	Equation for Derivation of Particulate Emission Factor, PEF' – Construction Worker (m ³ /kg)	$PEF' = \frac{PEF}{10}$	S16

NOTE: PEF must be the industrial/commercial value

Equations for the Soil Component of the Groundwater Ingestion Exposure Route	Remediation Objective (mg/kg)	$C_w \cdot \left[K_d + \frac{(\theta_w + \theta_a \cdot H')}{\rho_b} \right]$	S17
	Target Soil Leachate Concentration, C_w (mg/L)	$C_w = DF \cdot GW_{obj}$	S18
	Soil-Water Partition Coefficient, K_d (cm ³ /g)	$K_d = K_{oc} \cdot f_{oc}$	S19
	Water-Filled Soil Porosity, Θ_w (L _{water} /L _{soil})	$\theta_w = \eta \cdot \left(\frac{I}{K_2} \right)^{1/(2b+3)}$	S20
	Air-Filled Soil Porosity, Θ_a (L _{air} /L _{soil})	$\theta_a = \eta - \theta_w$	S21
	Dilution Factor, DF (unitless)	$DF = 1 + \frac{K \cdot i \cdot d}{I \cdot L}$	S22
	Groundwater Remediation Objection for Carcinogenic Contaminants, GW_{obj} (mg/L)	$\frac{TR \cdot BW \cdot AT_c \cdot 365 \frac{d}{yr}}{SF_o \cdot IR_2 \cdot EF \cdot ED}$	S23
	Total Soil Porosity, η (L _{soil} /L _{soil})	$\eta = 1 - \frac{\rho_b}{\rho_s}$	S24
	Equation for Estimation of Mixing Zone Depth, d (m)	$d = (0.0112 \cdot L^2)^{0.5} + d_a \left[1 - \exp \left(\frac{-L \cdot 1}{K \cdot i \cdot d_a} \right) \right]$	S25
Mass-Limit Equations for Inhalation Exposure Route and Soil Component of the Groundwater Ingestion Exposure Route	Mass-Limit Volatilization Factor for the Inhalation Exposure Route – Residential, Industrial/Commercial VF (m ³ /kg)	$VF_{M-L} = \frac{Q}{C} \cdot \frac{\left[T_{M-L} \cdot \left(3.15 \cdot 10^7 \frac{s}{yr} \right) \right]}{\rho_b \cdot d_s \cdot 10^6 \frac{cm^3}{m^3}}$	S26
	Mass-Limit Volatilization Factor for the Inhalation Exposure Route – Construction Worker, VT' – (m ³ /kg)	$VF'_{M-L} = \frac{VF_{M-L}}{10}$	S27

NOTE: This equation can only be used to model contaminant migration not in the water bearing unit.

NOTE: This equation may be used when vertical thickness of contamination is known or can be estimated reliably.

	<p>Mass-Limit Remediation Objective for Soil Component of the Groundwater Ingestion Exposure Route (mg/kg)</p>	$\frac{(C_w \cdot I_{M-L} \cdot ED_{M-L})}{\rho_b \cdot d_s}$ <p>NOTE: This equation may be used when vertical thickness is known or can be estimated reliably.</p>	<p>S28</p>
<p>Equation for Derivation of the Soil Saturation Limit, C_{sat}</p>		$C_{sat} = \frac{S}{\rho_b} \cdot [(K_d \cdot \rho_b) + \theta_w + (H' \cdot \theta_a)]$	<p>S29</p>
<p><u>Equation for the soil gas component of the Outdoor Inhalation Exposure Route</u></p>		$RO_{soil\ gas} = \frac{RO_{soil} \times H \times \rho_b \times 1000}{H' \times \Theta_a + \Theta_w + K_d \times \rho_b}$	<p><u>S30</u></p>

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(Source: Amended at 36 Ill. Reg. _____, effective _____)

4144 Section 742.APPENDIX C Tier 2 Illustrations and Tables

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4146 Section 742.TABLE B SSL Parameters

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Symbol	Parameter	Units	Source	Parameter Value(s)
AT	Averaging Time for Noncarcinogens in Ingestion Equation	yr		Residential = 6 Industrial/Commercial = 25 Construction Worker = 0.115
AT	Averaging Time for Noncarcinogens in Inhalation Equation	yr		Residential = 30 Industrial/Commercial = 25 Construction Worker = 0.115
AT _c	Averaging Time for Carcinogens	yr	SSL	70
BW	Body Weight	kg		Residential = 15, noncarcinogens 70, carcinogens Industrial/Commercial = 70 Construction Worker = 70
C _{sat}	Soil Saturation Concentration	mg/kg	Appendix A, Table A or Equation S29 in Appendix C, Table A	Chemical-Specific or Calculated Value
C _w	Target Soil Leachate Concentration	mg/L	Equation S18 in Appendix C, Table A	Groundwater Standard, Health Advisory concentration, or Calculated Value
d	Mixing Zone Depth	m	SSL or Equation S25 in Appendix C, Table A	2 m or Calculated Value
d _a	Aquifer Thickness	m	Field Measurement	Site-Specific
d _s	Depth of Source (Vertical thickness of contamination)	m	Field Measurement or Estimation	Site-Specific
Symbol	Parameter	Units	Source	Parameter Value(s)
D _A	Apparent Diffusivity	cm ² /s	Equation S10 in Appendix C, Table A	Calculated Value
D _i	Diffusivity in Air	cm ² /s	Appendix C, Table E	Chemical-Specific
D _w	Diffusivity in Water	cm ² /s	Appendix C, Table E	Chemical-Specific
DF	Dilution Factor	unitless	Equation S22 in Appendix C, Table A	20 or Calculated Value
ED	Exposure Duration for Ingestion of Carcinogens	yr		Industrial/Commercial = 25 Construction Worker = 1
ED	Exposure Duration for Inhalation of Carcinogens	yr		Residential = 30 Industrial/Commercial = 25 Construction Worker = 1
ED	Exposure Duration for Ingestion of Noncarcinogens	yr		Residential = 6 Industrial/Commercial = 25 Construction Worker = 1
ED	Exposure Duration for Inhalation of Noncarcinogens	yr		Residential = 30 Industrial/Commercial = 25 Construction Worker = 1
ED	Exposure Duration for the Direct Ingestion of	yr		Residential = 30 Industrial/Commercial = 25

	Groundwater			Construction Worker = 1
ED _{M-L}	Exposure Duration for Migration to Groundwater Mass-Limit Equation S28	yr	SSL	70
EF	Exposure Frequency	d/yr		Residential = 350 Industrial/Commercial = 250 Construction Worker = 30
F(x)	Function dependent on U _m /U _t	unitless	SSL	0.194
f _{oc}	Organic Carbon Content of Soil	g/g	SSL or Field Measurement (See Appendix C, Table F)	Surface Soil = 0.006 Subsurface soil = 0.002, or Site-Specific
GW _{obj}	Groundwater Remediation Remediation Objective	mg/L	Appendix B, Table E, 35 IAC 620.Subpart F, or Equation S23 in Appendix C, Table A	Chemical-Specific or Calculated
H'	Henry's Law Constant	unitless	Appendix C, Table E	Chemical-Specific
i	Hydraulic Gradient	m/m	Field Measurement (See Appendix C, Table F)	Site-Specific
I	Infiltration Rate	m/yr	SSL	0.3
I _{M-L}	Infiltration Rate for Migration to Groundwater Mass-Limit Equation S28	m/yr	SSL	0.18
IF _{soil-adj} (residential)	Age Adjusted Soil Ingestion Factor for Carcinogens	(mg-yr)/(kg-d)	SSL	114
IR _{soil}	Soil Ingestion Rate	mg/d		Residential = 200 Industrial/Commercial = 50 Construction Worker = 480
IR _w	Daily Water Ingestion Rate	L/d		Residential = 2 Industrial/Commercial = 1
K	Aquifer Hydraulic Conductivity	m/yr	Field Measurement (See Appendix C, Table F)	Site-Specific
K _d (Non-ionizing organics)	Soil-Water Partition Coefficient	cm ³ /g or L/kg	Equation S19 in Appendix C, Table A	Calculated Value
K _d (Ionizing organics)	Soil-Water Partition Coefficient	cm ³ /g or L/kg	Equation S19 in Appendix C, Table A	Chemical and pH-Specific (see Appendix C, Table I)
K _d (In-organics)	Soil-Water Partition Coefficient	cm ³ /g or L/kg	Appendix C, Table J	Chemical and pH-Specific
K _{oc}	Organic Carbon Partition Coefficient	cm ³ /g or L/kg	Appendix C, Table E or Appendix C, Table I	Chemical-Specific
K _s	Saturated Hydraulic Conductivity	m/yr	Appendix C, Table K Appendix C, Illustration C	Site-Specific
L	Source Length Parallel to Groundwater Flow	m	Field Measurement	Site-Specific
PEF	Particulate Emission Factor	m ³ /kg	SSL or Equation S15 in Appendix C, Table A	Residential = 1.32 • 10 ⁹ or Site-Specific Industrial/Commercial = 1.24 • 10 ⁹ or Site-Specific

PEF'	Particulate Emission Factor adjusted for Agitation (construction worker)	m ³ /kg	Equation S16 in Appendix C, Table A using PEF (industrial/commercial)	1.24 • 10 ⁸ or Site-Specific
Q/C (used in VF equations)	Inverse of the mean concentration at the center of a square source	(g/m ² -s)/(kg/m ³)	Appendix C, Table H	Residential = 68.81 Industrial/Commercial = 85.81 Construction Worker = 85.81
Q/C (used in PEF equations)	Inverse of the mean concentration at the center of a square source	(g/m ² -s)/(kg/m ³)	SSL or Appendix C, Table H	Residential = 90.80 Industrial/Commercial = 85.81 Construction Worker = 85.81
RfC	Inhalation Reference Concentration	mg/m ³	Illinois EPA: http://www.epa.state.il.us/land/taco/toxicity-values.xls EPA (IRIS/HEAST ^a)	Toxicological-Specific (Note: for Construction Workers use subchronic reference concentrations)
RfD _o	Oral Reference Dose	mg/(kg-d)	Illinois EPA: http://www.epa.state.il.us/land/taco/toxicity-values.xls EPA (IRIS/HEAST ^a)	Toxicological-Specific (Note: for Construction Workers use subchronic reference doses)
S	Solubility in Water	mg/L	Appendix C, Table E	Chemical-Specific
SF _o	Oral Slope Factor	(mg/kg-d) ⁻¹	Illinois EPA: http://www.epa.state.il.us/land/taco/toxicity-values.xls EPA (IRIS/HEAST ^a)	Toxicological-Specific
T	Exposure Interval	s		Residential = 9.5 • 10 ⁸ Industrial/Commercial = 7.9 • 10 ⁸ Construction Worker = 3.6 • 10 ⁶
T _{M-L}	Exposure Interval for Mass-Limit Volatilization Factor Equation S26	yr	SSL	30
THQ	Target Hazard Quotient	unitless	SSL	1
TR	Target Cancer Risk	unitless		Residential = 10 ⁻⁶ at the point of human exposure Industrial/Commercial = 10 ⁻⁶ at the point of human exposure Construction Worker = 10 ⁻⁶ at the point of human exposure
U _m	Mean Annual Windspeed	m/s	SSL	4.69
URF	Inhalation Unit Risk Factor	(µg/m ³) ⁻¹	Illinois EPA: http://www.epa.state.il.us/land/taco/toxicity-values.xls EPA (IRIS/HEAST ^a)	Toxicological-Specific
U _t	Equivalent Threshold Value of Windspeed at 7 m	m/s	SSL	11.32
V	Fraction of Vegetative Cover	unitless	SSL or Field Measurement	0.5 of Site-Specific
VF	Volatilization Factor	m ³ /kg	Equation S8 in Appendix C, Table A	Calculated Value

VF'	Volatilization Factor adjusted for Agitation	m ³ /kg	Equation S9 in Appendix C, Table A	Calculated Value
VF _{M-L}	Mass-Limit Volatilization Factor	m ³ /kg	Equation S26 in Appendix C, Table A	Calculated Value
VF' _{M-L}	Mass-Limit Volatilization Factor adjusted for Agitation	m ³ /kg	Equation S27 in Appendix C, Table A	Calculated Value
η	Total Soil Porosity	L _{pore} /L _{soil}	SSL or Equation S24 in Appendix C, Table A	0.43, or Gravel = 0.25 Sand = 0.32 Silt = 0.40 Clay = 0.36, or Calculated Value
θ _a	Air-Filled Soil Porosity	L _{air} /L _{soil}	SSL or Equation S21 in Appendix C, Table A	Surface Soil (top 1 meter) = 0.28 Subsurface Soil (below 1 meter) = 0.13, or Gravel = 0.05 Sand = 0.14 Silt = 0.24 Clay = 0.19, or Calculated Value
θ _w	Water-Filled Soil Porosity	L _{water} /L _{soil}	SSL or Equation S20 in Appendix C, Table A	Surface Soil (top 1 meter) = 0.15 Subsurface Soil (below 1 meter) = 0.30, or Gravel = 0.20 Sand = 0.18 Silt = 0.16 Clay = 0.17, or Calculated Value
ρ _b	Dry Soil Bulk Density	kg/L or g/cm ³	SSL or Field Measurement (See Appendix C, Table F)	1.5, or Gravel = 2.0 Sand = 1.8 Silt = 1.6 Clay = 1.7, or Site-Specific
ρ _s	Soil Particle Density	g/cm ³	SSL or Field Measurement (See Appendix C, Table F)	2.65, or Site-Specific
ρ _w	Water Density	g/cm ³	SSL	1
1/(2b+3)	Exponential in Equation S20	unitless	Appendix C, Table K Appendix C, Illustration C	Site-Specific

4149 a. ~~HEAST – Health Effects Assessment Summary Tables. USEPA, Office of Solid Waste and~~
4150 ~~Emergency Response. EPA/SQO/R-95/036. Updated Quarterly.~~
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4152 (Source: Amended at 36 Ill. Reg. _____, effective _____)

4153 Section 742.APPENDIX C Tier 2 Illustrations and Tables

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4155 Section 742.TABLE E Default Physical and Chemical Parameters

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CAS No.	Chemical	Solubility in Water (S) (mg/L)	Diffusivity in Air (D _i) (cm ² /s)	Diffusivity in Water (D _w) (cm ² /s)	Dimensionless Henry's Law Constant (H') (25°C)	Dimensionless Henry's Law Constant (H') (13°C) <small>For the indoor inhalation exposure route</small>	Organic Carbon Partition Coefficient (K _{oc}) (L/kg)	First Order Degradation Constant (λ)(d ⁻¹)	Vapor Pressure (mm/Hg)
Neutral Organics									
83-32-9	Acenaphthene	3.60E+00	4.76E-02	7.69E-06	6.60E-03	----- ^b	6.30E+03	3.40E-03	2.50E-03
67-64-1	Acetone	1.00E+06	1.24E-01	1.14E-05	1.60E-03	9.73E-04	7.80E-01	4.95E-02	2.30E+02
15972-60-8	Alachlor	2.40E+02	2.13E-02	5.28E-06	3.40E-06	----- ^b	3.20E+03	No Data	2.20E-05
116-06-3	Aldicarb	6.03E+03	3.18E-02	7.24E-06	5.90E-08	----- ^b	1.29E+01	1.09E-03	3.47E-05
309-00-2	Aldrin	1.70E-02	1.96E-02	4.86E-06	7.00E-03	----- ^b	2.50E+05	5.90E-04	6.00E-06
120-12-7	Anthracene	4.30E-02	3.85E-02	7.74E-06	2.70E-03	----- ^b	2.50E+04	7.50E-04	2.70E-06
1912-24-9	Atrazine	7.00E+01	2.59E-02	6.67E-06	9.68E-08	----- ^b	3.63E+02	No Data	2.70E-07
71-43-2	Benzene	1.80E+03	8.80E-02	1.02E-05	2.30E-01	1.34E-01	5.00E+01	9.00E-04	9.50E+01
56-55-3	Benzo(a)anthracene	9.40E-03	5.10E-02	9.00E-06	1.39E-04	----- ^b	4.00E+05	5.10E-04	1.10E-07
205-99-2	Benzo(b)fluoranthene	1.50E-03	2.23E-02	5.56E-06	4.55E-03	----- ^b	1.05E+06	5.70E-04	5.00E-07
207-08-9	Benzo(k)fluoranthene	8.00E-04	2.23E-02	5.56E-06	3.40E-05	----- ^b	1.00E+06	1.60E-04	2.00E-09
65-85-0	Benzoic Acid	3.40E+03	7.02E-02	7.97E-06	1.56E-06	----- ^b	1.21E+00 ^d	No Data	7.00E-04
50-32-8	Benzo(a)pyrene	1.60E-03	4.30E-02	9.49E-06	4.50E-05	----- ^b	7.90E+05	6.50E-04	5.50E-09
111-44-4	Bis(2-chloroethyl) ether	1.72E+04	4.13E-02	7.53E-06	7.40E-04	2.94E-04	1.26E+01	1.90E-03	1.55E+00
117-81-7	Bis(2-ethylhexyl)phthalate	3.40E-01	3.51E-02	3.66E-06	4.10E-06	----- ^b	1.00E+05	1.80E-03	6.80E-08
75-27-4	Bromodichloromethane	6.70E+03	5.61E-02	1.06E-05	6.60E-02	3.71E-02	5.00E+01	No Data	5.00E+01
75-25-2	Bromoform	3.10E+03	1.49E-02	1.03E-05	2.19E-02	1.06E-02	9.12E+01	1.90E-03	5.51E+00
71-36-3	Butanol	7.40E+04	8.00E-02	9.30E-06	3.61E-04	1.55E-04	6.00E+00	1.28E-02	7.00E+00
78-93-3	2-Butanone (MEK)	2.20E+05	8.08E-02	9.8E-06	2.30E-03	1.32E-03	2.00E+00	4.95E-02	9.50E+01

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85-68-7	Butyl Benzyl Phthalate	2.70E+00	1.99E-02	4.89E-06	5.30E-05	----- ^b	6.30E+04	3.85E-03	8.30E-06
86-74-8	Carbazole	1.20E+00	4.17E-02	7.45E-06	3.60E-06	----- ^b	4.00E+03	No Data	7.00E-04
1563-66-2	Carbofuran	3.20E+02	2.37E-02	5.95E-06	1.27E-07	----- ^b	1.91E+02	No Data	4.85E-06
75-15-0	Carbon Disulfide	1.20E+03	1.04E-01	1.00E-05	1.23E+00	8.06E-01	6.30E+01	No Data	3.60E+02
56-23-5	Carbon Tetrachloride	7.90E+02	7.80E-02	8.80E-06	1.23E+00	7.48E-01	2.00E+02	1.90E-03	1.20E+02
57-74-9	Chlordane	5.60E-02	1.79E-02	4.37E-06	2.00E-03	----- ^b	2.50E+05	2.50E-04	9.80E-06
106-47-8	p-Chloroaniline	5.30E+03	6.99E-02	1.01E-05	4.76E-05	----- ^b	6.31E+01	No Data	1.23E-02
108-90-7	Chlorobenzene	4.70E+02	7.30E-02	8.70E-06	1.50E-01	7.93E-02	2.00E+02	2.30E-03	1.20E+01
124-48-1	Chlorodibromomethane	2.60E+03	3.66E-02	1.05E-05	3.20E-02	2.07E-02	6.92E+01	3.85E-03	4.90E+00
67-66-3	Chloroform	7.90E+03	1.04E-01	1.00E-05	1.50E-01	9.18E-02	5.00E+01	3.90E-04	2.00E+02
95-57-8	2-Chlorophenol	2.20E+04	6.61E-02	9.46E-06	1.60E-02	7.28E-03	5.93E+01 ^d	No Data	2.34E+00
218-01-9	Chrysene	6.30E-03	2.44E-02	6.21E-06	3.90E-03	----- ^b	4.00E+05	3.50E-04	6.20E-09
94-75-7	2,4-D	6.77E+02	5.88E-02	6.49E-06	4.18E-07	----- ^b	5.75E+02	3.85E-03	6.00E-07
72-54-8	4,4'-DDD	9.00E-02	2.27E-02	5.79E-06	1.60E-04	----- ^b	7.90E+05	6.20E-05	6.70E-07
72-55-9	4,4'-DDE	1.20E-01	2.38E-02	5.87E-06	8.60E-04	----- ^b	4.00E+05	6.20E-05	6.00E-06
50-29-3	4,4'-DDT	2.50E-02	1.99E-02	4.95E-06	3.30E-04	----- ^b	2.00E+06	6.20E-05	1.60E-07
75-99-0	Dalapon	9.00E+05	6.08E-02	9.45E-06	2.64E-06	NA	4.80E+00	5.78E-03	1.90E-01
53-70-3	Dibenzo(a,h)anthracene	2.50E-03	2.11E-02	5.24E-06	6.10E-07	----- ^b	2.50E+06	3.70E-04	1.00E-10
96-12-8	1,2-Dibromo-3-chloropropane	1.20E+03	2.68E-02	7.02E-06	6.20E-03 ^c	NA	7.90E+01	1.93E-03	5.80E-01
106-93-4	1,2-Dibromoethane	4.00E+03	4.37E-02	8.44E-06	3.00E-02	1.54E-02	5.00E+01	5.78E-03	1.30E+01
84-74-2	Di-n-butyl Phthalate	1.10E+01	4.38E-02	7.86E-06	7.40E-05	----- ^a	4.00E+04	3.01E-02	7.30E-05
1918-00-9	Dicamba	4.50E+03	2.37E-02	5.95E-06	2.18E-09	----- ^a	2.95E+00	No Data	3.38E-05
95-50-1	1,2-Dichlorobenzene	1.56E+02	6.90E-02	7.90E-06	7.79E-02	3.56E-02	5.75E+02	1.90E-03	1.36E+00
106-46-7	1,4-Dichlorobenzene	7.90E+01	6.90E-02	7.90E-06	9.80E-02	4.69E-02	7.90E+02	1.90E-03	1.00E+00
91-94-1	3,3-Dichlorobenzidine	3.10E+00	2.59E-02	6.74E-06	1.60E-07	----- ^a	2.82E+03	1.90E-03	3.71E-08
75-71-8	Dichlorodifluoromethane	2.80E+02	7.60E-02	1.08E-05	1.41E+01	8.14E+00	6.17E+01	1.92E-03	4.85E+03

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75-34-3	1,1-Dichloroethane	5.10E+03	7.42E-02	1.05E-05	2.30E-01	1.42E-01	3.20E+01	1.90E-03	2.30E+02
107-06-2	1,2-Dichloroethane	8.50E+03	1.04E-02	9.90E-06	4.00E-02	2.29E-02	2.00E+01	1.90E-03	7.90E+01
75-35-4	1,1-Dichloroethylene	2.30E+03	9.00E-02	1.04E-05	1.10E+00	7.10E-01	5.00E+01	5.30E-03	6.00E+02
156-59-2	Cis-1,2-Dichloroethylene	3.50E+03	8.86E-02	1.13E-05	1.70E-01	1.00E-01	4.00E+01	2.40E-04	2.00E+02
156-60-5	Trans-1,2-Dichloroethylene	6.30E+03	7.03E-02	1.19E-05	3.90E-01	2.43E-01	5.00E+01	2.40E-04	3.30E+02
120-83-2	2,4-Dichlorophenol	4.50E+03	4.89E-02	8.77E-06	1.30E-04	----- ^a	7.32E+02 ^d	2.70E-04	6.70E-02
78-87-5	1,2-Dichloropropane	2.80E+03	7.82E-02	8.73E-06	1.10E-01	6.52E-02	5.00E+01	2.70E-04	5.20E+01
542-75-6	1,3-Dichloropropylene (cis + trans)	2.80E+03	6.26E-02	1.00E-05	7.40E-01	3.98E-01	2.00E+01	6.10E-02	3.40E+01
60-57-1	Dieldrin	2.00E-01	1.92E-02	4.74E-06	6.2E-04	----- ^a	2.50E+04	3.20E-04	5.9E-06
84-66-2	Diethyl Phthalate	1.10E+03	2.49E-02	6.35E-06	1.80E-05	----- ^a	3.20E+02	6.19E-03	1.60E-03
105-67-9	2,4-Dimethylphenol	7.90E+03	6.43E-02	8.69E-06	8.20E-05	----- ^a	2.00E+02	4.95E-02	9.80E-02
75-71-8	1,3-Dinitrobenzene	8.60E+02	4.55E-02	8.46E-06	2.30E-07	----- ^a	3.20E+01	1.92E-03	9.00E-04
51-28-5	2,4-Dinitrophenol	2.79E+03	2.73E-02	9.06E-06	1.82E-05	----- ^a	3.24E+01	1.32E-03	5.10E-03
121-14-2	2,4-Dinitrotoluene	2.70E+02	2.03E-01	7.06E-06	3.80E-06	----- ^a	8.90E+01	1.92E-03	1.47E-04
606-20-2	2,6-Dinitrotoluene	1.82E+02	3.70E-02	7.76E-06	3.06E-05	----- ^a	4.90E+01	1.92E-03	5.67E-04
88-85-7	Dinoseb	5.20E+01	2.45E-02	6.25E-06	1.87E-05	----- ^a	9.17E+01 ^d	2.82E-03	7.50E-05
117-84-0	Di-n-octyl Phthalate	2.00E-02	1.73E-02	4.17E-06	2.74E-03	----- ^a	1.30E+05	1.90E-03	2.60E-06
123-91-1	p-Dioxane	1.00E+06	2.29E-01	1.02E-05	1.97E-04	1.07E-04	7.20E-01	1.92E-03	3.81E+01
115-29-7	Endosulfan	5.10E-01	1.85E-02	4.55E-06	4.51E-04	----- ^a	5.00E+03	7.63E-02	1.00E-05
145-73-3	Endothall	2.10E+04	2.91E-02	8.07E-06	1.58E-14	----- ^a	7.59E+01	No Data	1.57E-10
72-20-8	Endrin	2.50E-01	1.92E-02	4.74E-6	3.08E-04	----- ^a	3.20E+04	3.20E-04	3.00E-06
100-41-4	Ethylbenzene	1.70E+02	7.50E-02	7.80E-06	3.24E-01	1.64E-01	3.20E+02	3.00E-03	9.60E+00
206-44-0	Fluoranthene	2.06E-01	2.51E-02	6.35E-06	6.60E-04	----- ^a	7.40E+04	1.90E-04	1.23E-08
86-73-7	Fluorene	2.00E+00	4.40E-02	7.88E-06	2.62E-03	----- ^a	1.30E+04	6.91E-04	6.30E-04
76-44-8	Heptachlor	1.80E-01	2.23E-02	5.69E-06	6.07E-02	1.73E-02	3.00E+03	1.30E-01	4.00E-04
1024-57-3	Heptachlor epoxide	2.00E-01	2.19E-02	5.57E-06	3.90E-04	----- ^a	2.00E+05	6.30E-04	1.90E-05

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118-74-1	Hexachlorobenzene	6.20E-03	5.42E-02	5.91E-06	5.33E-02	1.35E-02	2.00E+04	1.70E-04	1.80E-05
319-84-6	Alpha-HCH (alpha-BHC)	2.00E+00	2.04E-02	5.04E-06	4.51E-04	----- ^a	5.00E+03	2.50E-03	4.50E-05
58-89-9	Gamma-HCH (Lindane)	7.30E+00	2.75E-02	7.34E-06	5.74E-04	----- ^a	3.00E+03	2.90E-03	4.10E-04
2691-41-0	High Melting Explosive, Octogen (HMX)	5.00E+00	2.69E-02	7.15E-06	8.67E-10	3.55E-08	1.40E+00	No Data	3.30E-14
77-47-4	Hexachlorocyclopentadiene	1.80E+00	2.79E-02	7.21E-06	1.11E+00	4.22E-01	1.20E+04	1.20E-02	5.96E-02
67-72-1	Hexachloroethane	5.00E+01	2.50E-03	6.80E-06	1.59E-01	7.26E-02	1.50E+03	1.92E-03	2.10E-01
193-39-5	Indeno(1,2,3-c,d)pyrene	2.20E-05	2.25E-02	5.66E-06	6.56E-05	----- ^a	3.10E+06	4.70E-04	1.00E-10
78-59-1	Isophorone	1.20E+04	6.23E-02	6.76E-06	2.72E-04	1.12E-04	2.50E+01	1.24E-02	4.38E-01
98-82-8	Isopropylbenzene (Cumene)	6.10E+01	6.50E-02	7.10E-06	4.92E+01	2.10E+01	1.02E+03	4.33E-02	4.50E+00
93-65-2	Mecoprop (MCPP)	8.95E+02	2.40E-02	6.05E-06	7.70E-09	----- ^a	1.84E+01 ^d	3.85E-03	2.44E-05
7439-97-6	Mercury	6.00E-02	7.14E-02	3.01E-05	4.51E-01	1.59E-01	8.70E+03	No Data	2.00E-03
72-43-5	Methoxychlor	4.50E-02	1.84E-02	4.46E-06	6.56E-04	----- ^a	5.00E+04	1.90E-03	6.00E-07
74-83-9	Methyl Bromide	1.50E+04	7.28E-02	1.21E-05	2.56E-01	1.79E-01	1.00E+01	1.82E-02	1.62E+03
1634-04-4	Methyl tertiary-butyl ether	5.10E+04	8.59E-02	1.10E-05	2.42E-02	1.50E-02	1.00E+01	No Data	2.50E+02
75-09-2	Methylene Chloride	1.30E+04	1.01E-01	1.17E-05	9.02E-02	5.70E-02	1.30E+01	1.20E-02	4.30E+02
93-65-2	2-Methylnaphthalene	2.50E+01	5.22E-02	7.75E-06	2.10E-02	6.95E-03	1.60E+03	No Data	6.80E-02
95-48-7	2-Methylphenol (o-cresol)	2.60E+04	7.40E-02	8.30E-06	4.92E-05	2.00E-05	4.20E+01	4.95E-02	2.99E-01
91-20-3	Naphthalene	3.10E+01	5.90E-02	7.50E-06	1.97E-02	8.29E-03	5.00E+02	2.70E-03	8.50E-02
98-95-3	Nitrobenzene	2.09E+03	7.60E-02	8.60E-06	9.84E-04	3.99E-04	4.00E+01	1.76E-03	2.40E-01
86-30-6	N-Nitrosodiphenylamine	3.50E+01	2.83E-02	7.19E-06	2.10E-04	----- ^a	1.00E+03	1.00E-02	6.70E-04
621-64-7	N-Nitrosodi-n-propylamine	9.89E+03	5.87E-02	8.17E-06	9.20E-05	5.48E-05	1.45E+01	1.90E-03	1.30E-01
87-86-5	Pentachlorophenol	2.00E+03	5.60E-02	6.10E-06	9.84E-07	----- ^a	2.77E+03 ^d	4.50E-04	3.20E-05
108-95-2	Phenol	8.30E+04	8.20E-02	9.10E-06	1.64E-05	6.67E-06	2.00E+01	9.90E-02	2.80E-01
1918-02-1	Picloram	4.30E+02	2.26E-02	5.64E-06	2.19E-12	----- ^a	2.00E+00	No Data	7.21E-11
1336-36-3	Polychlorinated biphenyls (PCBs)	----- ^a	----- ^a	----- ^a	----- ^a	----- ^a	----- ^a	----- ^a	----- ^a

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129-00-0	Pyrene	1.40E+00	2.77E-02	7.24E-06	4.51E-04	----- ^a	6.31E+04	1.80E-04	4.60E-06
121-82-4	Royal Demolition Explosive, Cyclonite (RDX)	5.97E+01	3.11E-02	8.49E-06	2.01E-11	----- ^a	7.20E+00	No Data	4.10E-09
122-34-9	Simazine	6.20E+00	2.48E-02	6.28E-06	3.80E-08	----- ^a	1.32E+02	No Data	2.21E-08
100-42-5	Styrene	3.10E+02	7.10E-02	8.00E-06	1.11E-01	5.48E-03	3.16E+02	3.30E-03	6.10E+00
93-72-1	2,4,5-TP (Silvex)	7.10E+01	2.30E-02	5.83E-06	3.71E-07	----- ^a	5.50E+03	No Data	9.97E-06
127-18-4	Tetrachloroethylene	2.00E+02	7.20E-02	8.20E-06	7.38E-01	4.00E-01	6.31E+02	9.60E-04	1.90E+01
108-88-3	Toluene	5.30E+02	8.70E-02	8.60E-06	2.71E-01	1.49E-01	1.58E+02	1.10E-02	2.80E+01
8001-35-2	Toxaphene	7.40E-01	2.16E-02	5.51E-06	2.46E-04	----- ^a	5.01E+04	No Data	9.80E-07
120-82-1	1,2,4-Trichlorobenzene	3.50E+01	3.00E-02	8.23E-06	5.74E-02	2.38E-02	1.58E+03	1.90E-03	4.30E-01
71-55-6	1,1,1-Trichloroethane	1.30E+03	7.80E-02	8.80E-06	6.97E-01	4.21E-01	1.26E+02	1.30E-03	1.20E+02
79-00-5	1,1,2-Trichloroethane	4.40E+03	7.80E-02	8.80E-06	3.73E-02	1.98E-02	5.01E+01	9.50E-04	2.30E+01
79-01-6	Trichloroethylene	1.50E+03	7.90E-02	9.10E-06	4.10E-01	2.41E-01	1.00E+02	4.20E-04	7.30E+01
75-69-4	Trichlorofluoromethane	1.10E+03	8.70E-02	9.70E-06	3.98E+00	2.69E+00	1.30E+02	9.63E-04	8.00E+02
95-95-4	2,4,5-Trichlorophenol	1.20E+03	2.91E-02	7.03E-06	1.78E-04	----- ^a	2.68E+03 ^d	3.80E-04	2.40E-02
88-06-2	2,4,6-Trichlorophenol	8.00E+02	2.61E-02	6.36E-06	3.53E-04	----- ^a	8.78E+02 ^d	3.80E-04	2.00E-02
108-05-4	Vinyl Acetate	2.00E+04	8.50E-02	9.20E-06	2.09E-02	1.18E-02	4.57E+00	No Data	9.00E+01
99-35-4	1,3,5-Trinitrobenzene	2.80E+02	2.41E-02	6.08E-06	3.30E-10	----- ^a	1.60E+01	No Data	6.40E-06
118-96-7	2,4,6-Trinitrotoluene (TNT)	1.24E+02	2.94E-02	7.90E-06	4.87E-09	----- ^a	3.72E+01	1.92E-03	2.02E-06
57-01-4	Vinyl Chloride	8.80E+03	1.06E-01	1.23E-06	1.11E+00	8.14E-01	1.58E+01	2.40E-04	3.00E+03
108-38-3	m-Xylene	1.60E+02	7.00E-02	7.80E-06	2.99E-01	1.52E-01	3.98E+02	1.90E-03	8.50E+00
95-47-6	o-Xylene	1.80E+02	8.70E-02	1.00E-05	2.13E-01	1.07E-01	3.16E+02	1.90E-03	6.60E+00
106-42-3	p-Xylene	1.60E+02	7.69E-02	8.44E-06	3.16E-01	1.59E-01	3.16E+02	1.90E-03	8.90E+00
1330-20-7	Xylenes (total)	1.10E+02	7.35E-02	9.23E-06	2.71E-01	NA	3.98E+02	1.90E-03	8.00E+00

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Chemical Abstracts Service (CAS) registry number. This number in the format xxx-xx-x, is unique for each chemical and allows efficient searching on computerized databases.

- 4162 ^a Soil remediation objectives are determined pursuant to 40 CFR 761, as incorporated by
 4163 reference at Section 742.210(b) (the USEPA "PCB Spill Cleanup Policy"), for most sites;
 4164 persons remediating sites should consult with BOL if calculation of Tier 2 or 3 remediation
 4165 objectives is desired. PCBs are a mixture of different congeners. The appropriate values to
 4166 use for the physical/chemical parameters depend on congeners present at the site.
 4167
 4168 ^b Dimensionless Henry's Law Constant at 13°C is not calculated because the chemical is not
 4169 volatile and does not require evaluation under the indoor inhalation exposure route.
 4170
 4171 ^c Dimensionless Henry's Law Constant = 20°C
 4172
 4173 ^d These chemicals are ionizing and its K_{oc} value will change with pH. The K_{oc} values listed in
 4174 this table is the effective K_{oc} at pH of 6.8. If the site-specific pH is a value other than 6.8, the
 4175 K_{oc} value listed Appendix C, Table I should be used.
 4176
 4177 ^e The values in this table were taken from the following sources (in order of preference):
 4178 SCDMS online database (<http://www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm>);
 4179 CHEMFATE online database ([http://www.srcinc.com/what-we-](http://www.srcinc.com/what-we-do/databaseforms.aspx?id=381)
 4180 [do/databaseforms.aspx?id=381](http://www.srcinc.com/what-we-do/databaseforms.aspx?id=381)); PhysProp online database ([http://www.srcinc.com/what-we-](http://www.srcinc.com/what-we-do/databaseforms.aspx?id=386)
 4181 [do/databaseforms.aspx?id=386](http://www.epa.gov/ttn/chief/software/water/)); Water (<http://www.epa.gov/ttn/chief/software/water/>) for
 4182 diffusivity values; and Handbook of Environmental Degradation Rates by P.H. Howard (1991)
 4183 for first order degradation constant values.
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 4185

CAS No.	Chemical	Solubility in Water (S) (mg/L)	Diffusivity in Air (Di) (cm ² /s)	Diffusivity in Water (D _w) (cm ² /s)	Dimensionless Henry's Law Constant (H ¹) (25°C)	Organic Carbon Partition Coefficient (K _{oc}) (L/kg)	First Order Degradation Constant (λ) (d ⁻¹)
83-32-9	Acenaphthene	4.24	0.0421	7.69E-6	0.00636	7,080	0.0034
67-64-1	Acetone	1,000,000	0.124	1.14E-5	0.00159	0.575	0.0495
15972-60-8	Alachlor	242	0.0198	5.69E-6	0.00000132	394	No Data
116-06-3	Aldicarb	6,000	0.0305	7.19E-6	0.0000000574	12	0.00109
309-00-2	Aldrin	0.18	0.0132	4.86E-6	0.00697	2,450,000	0.00059
120-12-7	Anthracene	0.0434	0.0324	7.74E-6	0.00267	29,500	0.00075
1912-24-9	Atrazine	70	0.0258	6.69E-6	0.00000005	451	No Data
71-43-2	Benzene	1,750	0.088	9.80E-6	0.228	58.9	0.0009
56-55-3	Benzo(a)anthracene	0.0094	0.0510	9.00E-6	0.000137	398,000	0.00051
205-99-2	Benzo(b)fluoranthene	0.0015	0.0226	5.56E-6	0.00455	1,230,000	0.00057

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207-08-9	Benzo(k)fluoranthene	0.0008	0.0226	5.56E-6	0.000034	1,230,000	0.00016
65-85-0	Benzoic Acid	3,500	0.0536	7.97E-6	0.0000631	0.600	No-Data
50-32-8	Benzo(a)pyrene	0.00162	0.043	9.00E-6	0.0000463	1,020,000	0.00065
111-44-4	Bis(2-chloroethyl)ether	17,200	0.0692	7.53E-6	0.000738	15.5	0.0019
117-81-7	Bis(2-ethylhexyl)phthalate	0.34	0.0351	3.66E-6	0.00000418	15,100,000	0.0018
75-27-4	Bromodichloromethane	6,740	0.0298	1.06E-5	0.0656	55.0	No-Data
75-25-2	Bromoform	3,100	0.0149	1.03E-5	0.0219	87.1	0.0019
71-36-3	Butanol	74,000	0.0800	9.30E-6	0.000361	6.92	0.01283
85-68-7	Butyl-Benzyl-Phthalate	2.69	0.0174	4.83E-6	0.0000517	57,500	0.00385
86-74-8	Carbazole	7.48	0.0390	7.03E-6	0.000000626	3,390	No-Data
1563-66-2	Carbofuran	320	0.0249	6.63E-6	.00377	37	No-Data
75-15-0	Carbon Disulfide	1,190	0.104	1.00E-5	1.24	45.7	No-Data
56-23-5	Carbon Tetrachloride	793	0.0780	8.80E-6	1.25	174	0.0019
57-74-9	Chlordane	0.056	0.0118	4.37E-6	0.00199	120,000	0.00025
106-47-8	p-Chloroaniline	5,300	0.0483	1.01E-5	0.0000136	66.1	No-Data
108-90-7	Chlorobenzene	472	0.0730	8.70E-6	0.152	219	0.0023
124-48-1	Chlorodibromomethane	2,600	0.0196	1.05E-5	0.0321	63.1	0.00385
67-66-3	Chloroform	7,920	0.104	1.00E-5	0.15	39.8	0.00039
95-57-8	2-Chlorophenol	22,000	0.0501	9.46E-6	0.016	388	No-Data
218-01-9	Chrysene	0.0016	0.0248	6.21E-6	0.00388	398,000	0.00035
94-75-7	2,4-D	680	0.0231	7.31E-6	0.00000041	451	0.00385
72-54-8	4,4'-DDD	0.09	0.0169	4.76E-6	0.000164	1,000,000	0.000062
72-55-9	4,4'-DDE	0.12	0.0144	5.87E-6	0.000861	4,470,000	0.000062
50-29-3	4,4'-DDT	0.025	0.0137	4.95E-6	0.000332	2,630,000	0.000062
75-99-0	Dalapon	900,000	0.0414	9.46E-6	0.00000264	5.8	0.005775
53-70-3	Dibenzo(a,h)anthracene	0.00249	0.0202	5.18E-6	0.000000603	3,800,000	0.00037
96-12-8	1,2-Dibromo-3-	1,200	0.0212	7.02E-6	0.00615	182	0.001925
106-93-4	1,2-Dibromoethane	4,200	0.0287	8.06E-6	0.0303	93	0.005775
84-74-2	Di-n-butyl Phthalate	11.2	0.0438	7.86E-6	0.0000000385	33,900	0.03013
95-50-1	1,2-Dichlorobenzene	156	0.0690	7.90E-6	0.0779	617	0.0019
106-46-7	1,4-Dichlorobenzene	73.8	0.0690	7.90E-6	0.0996	617	0.0019
91-94-1	3,3-Dichlorobenzidine	3.11	0.0194	6.74E-6	0.000000164	724	0.0019
75-34-3	1,1-Dichloroethane	5,060	0.0742	1.05E-5	0.23	31.6	0.0019

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107-06-2	1,2-Dichloroethane	8,520	0.104	9.90E-6	0.0401	17.4	0.0019
75-35-4	1,1-Dichloroethylene	2,250	0.0900	1.04E-5	1.07	58.9	0.0053
156-59-2	cis-1,2-Dichloroethylene	3,500	0.0736	1.13E-5	0.167	35.5	0.00024
156-60-5	trans-1,2-Dichloroethylene	6,300	0.0707	1.19E-5	0.385	52.5	0.00024
120-83-2	2,4-Dichlorophenol	4,500	0.0346	8.77E-6	0.00013	147	0.00027
78-87-5	1,2-Dichloropropane	2,800	0.0782	8.73E-6	0.115	43.7	0.00027
542-75-6	1,3-Dichloropropylene (cis + trans)	2,800	0.0626	1.00E-5	0.726	45.7	0.061
60-57-1	Dieldrin	0.195	0.0125	4.74E-6	0.000619	21,400	0.00032
84-66-2	Diethyl-Phthalate	1,080	0.0256	6.35E-6	0.0000185	288	0.00619
105-67-9	2,4-Dimethylphenol	7,870	0.0584	8.69E-6	0.000082	209	0.0495
51-28-5	2,4-Dinitrophenol	2,790	0.0273	9.06E-6	0.0000182	0.01	0.00132
121-14-2	2,4-Dinitrotoluene	270	0.203	7.06E-6	0.0000038	95.5	0.00192
606-20-2	2,6-Dinitrotoluene	182	0.0327	7.26E-6	0.0000306	69.2	0.00192
88-85-7	Dinoseb	52	0.0215	6.62E-6	0.0000189	1,120	0.002817
117-84-0	Di-n-oetyl-Phthalate	0.02	0.0151	3.58E-6	0.00274	83,200,000	0.0019
115-29-7	Endosulfan	0.51	0.0115	4.55E-6	0.000459	2,140	0.07629
145-73-3	Endothall	21,000	0.0291	8.07E-6	0.0000000107	0.29	No Data
72-20-8	Endrin	0.25	0.0125	4.74E-6	0.000308	12,300	0.00032
100-41-4	Ethylbenzene	169	0.0750	7.80E-6	0.323	363	0.003
206-44-0	Fluoranthene	0.206	0.0302	6.35E-6	0.00066	107,000	0.00019
86-73-7	Fluorene	1.98	0.0363	7.88E-6	0.00261	13,800	0.000691
76-44-8	Heptachlor	0.18	0.0112	5.69E-6	60.7	1,410,000	0.13
1024-57-3	Heptachlor-epoxide	0.2	0.0132	4.23E-6	0.00039	83,200	0.00063
118-74-1	Hexachlorobenzene	6.2	0.0542	5.91E-6	0.0541	55,000	0.00017
319-84-6	alpha-HCH (alpha-BHC)	2.0	0.0142	7.34E-6	0.000435	1,230	0.0025
58-89-9	gamma-HCH (Lindane)	6.8	0.0142	7.34E-6	0.000574	1,070	0.0029
77-47-4	Hexachlorocyclopentadiene	1.8	0.0161	7.21E-6	1.11	200,000	0.012
67-72-1	Hexachloroethane	50	0.0025	6.80E-6	0.159	1,780	0.00192
193-39-5	Indeno(1,2,3-c,d)pyrene	0.000022	0.0190	5.66E-6	0.0000656	3,470,000	0.00047
78-59-1	Isophorone	12,000	0.0623	6.76E-6	0.000272	46.8	0.01238
7439-97-6	Mercury	---	0.0307	6.30E-6	0.467	---	No Data
72-43-5	Methoxychlor	0.045	0.0156	4.46E-6	0.000648	97,700	0.0019
74-83-9	Methyl Bromide	15,200	0.0728	1.21E-5	0.256	10.5	0.01824

1634-04-4	Methyl tertiary-butyl ether	51,000	0.102	1.10E-5	0.0241	11.5	No Data
75-09-2	Methylene Chloride	13,000	0.101	1.17E-5	0.0898	11.7	0.012
95-48-7	2-Methylphenol	26,000	0.0740	8.30E-6	0.0000492	91.2	0.0495
91-20-3	Naphthalene	31.0	0.0590	7.50E-6	0.0198	2,000	0.0027
98-95-3	Nitrobenzene	2,090	0.0760	8.60E-6	0.000984	64.6	0.00176
86-30-6	N-Nitrosodiphenylamine	35.1	0.0312	6.35E-6	0.000205	1,290	0.01
621-64-7	N-Nitrosodi-n-propylamine	9,890	0.0545	8.17E-6	0.0000923	24.0	0.0019
87-86-5	Pentachlorophenol	1,950	0.0560	6.10E-6	0.000001	592	0.00045
108-95-2	Phenol	82,800	0.0820	9.10E-6	0.0000163	28.8	0.099
1918-02-1	Picloram	430	0.0255	5.28E-6	0.00000000166	1.98	No Data
1336-36-3	Polychlorinated biphenyls	0.7	----- ^a	----- ^a	----- ^a	309,000	No Data
129-00-0	Pyrene	0.135	0.0272	7.24E-6	0.000451	105,000	0.00018
122-34-9	Simazine	5	0.027	7.36E-6	0.0000000133	133	No Data
100-42-5	Styrene	310	0.0710	8.00E-6	0.113	776	0.0033
93-72-1	2,4,5-TP (Silvex)	31	0.0194	5.83E-6	0.0000000032	5,440	No Data
127-18-4	Tetrachloroethylene	200	0.0720	8.20E-6	0.754	155	0.00096
108-88-3	Toluene	526	0.0870	8.60E-6	0.272	182	0.011
8001-35-2	Toxaphene	0.74	0.0116	4.34E-6	0.000246	257,000	No Data
120-82-1	1,2,4-Trichlorobenzene	300	0.0300	8.23E-6	0.0582	1,780	0.0019
71-55-6	1,1,1-Trichloroethane	1,330	0.0780	8.80E-6	0.705	110	0.0013
79-00-5	1,1,2-Trichloroethane	4,420	0.0780	8.80E-6	0.0374	50.1	0.00095
79-01-6	Trichloroethylene	1,100	0.0790	9.10E-6	0.422	166	0.00042
95-95-4	2,4,5-Trichlorophenol	1,200	0.0291	7.03E-6	0.000178	1,600	0.00038
88-06-2	2,4,6-Trichlorophenol	800	0.0318	6.25E-6	0.000319	381	0.00038
108-05-4	Vinyl Acetate	20,000	0.0850	9.20E-6	0.021	5.25	No Data
57-01-4	Vinyl Chloride	2,760	0.106	1.23E-6	1.11	18.6	0.00024
108-38-3	m-Xylene	161	0.070	7.80E-6	0.301	407	0.0019
95-47-6	o-Xylene	178	0.087	1.00E-5	0.213	363	0.0019
106-42-3	p-Xylene	185	0.0769	8.44E-6	0.314	389	0.0019
1330-20-7	Xylenes (total)	186	0.0720	9.34E-6	0.25	260	0.0019

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Chemical Abstracts Service (CAS) registry number. This number in the format xxx-xx-x, is unique for each chemical and allows efficient searching on computerized data bases.

4190 ~~Soil Remediation objectives are determined pursuant to 40 CFR 761, as incorporated by~~
4191 ~~reference at Section 732.104 (the USEPA "PCB Spill Cleanup Policy"), for most sites; persons~~
4192 ~~remediating sites should consult with BOL if calculation of Tier 2 soil remediation objectives~~
4193 ~~is desired.~~

4194 (Source: Amended at 36 Ill. Reg. _____, effective _____)
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Section 742.APPENDIX C Tier 2 Illustrations and Tables

Section 742.TABLE F Methods for Determining Physical Soil Parameters

Methods for Determining Physical Soil Parameters		
Parameter	Sampling Location ^a	Method
ρ_b (soil bulk density)	Surface	ASTM-D 1556-90 Sand Cone Method ^b
		ASTM-D 2167-94 Rubber Balloon Method ^b
		ASTM-D 2922-91 Nuclear Method ^b
	Subsurface	ASTM-D 2937-94 Drive Cylinder Method ^b
ρ_s (soil particle density)	Surface or Subsurface	ASTM-D 854-92 Specific Gravity of Soil ^b
w (moisture content)	Surface or Subsurface	ASTM-D 4959-89 (Reapproved 1994) Standard ^b
		ASTM-D D 4643-93 Microwave Oven ^b
		ASTM-D D2216-92 Laboratory Determination ^b
		ASTM-D D3017-88 (Reapproved 1993) Nuclear Method ^b
		Equivalent USEPA Method (e.g., sample preparation procedures described in methods 3541 or 3550)
f_{oc} (fraction organic carbon content)	Surface or Subsurface	ASTM-D 2974-00 Moisture, Ash, and Organic Matter ^b appropriately adjusted to estimate the fraction of organic carbon as stated in Nelson and Sommers (1982) ^b
η or Θ_T (total soil porosity)	Surface or Subsurface (calculated)	Equation S24 in Appendix C, Table A for SSL Model, or Equation R23 in Appendix C, Table C for RBCA Model, or Equation J&E 16 in Appendix C, Table L for J&E Model
Θ_a or Θ_{as} (air-filled soil porosity)	Surface or Subsurface (calculated)	Equation S21 in Appendix C, Table A for SSL Model, or Equation R21 in Appendix C, Table C for RBCA Model, or Equation J&E 18 in Appendix C, Table L for J&E Model

Θ_w or Θ_{ws} (water-filled soil porosity)	Surface or Subsurface (calculated)	Equation S20 in Appendix C, Table A for SSL Model, or Equation R22 in Appendix C, Table C for RBCA Model, or Equation J&E 17 in Appendix C, Table L for J&E Model
K (hydraulic conductivity)	Surface or Subsurface	ASTM-D 5084-90 Flexible Wall Permeameter ^b
		Pump Test
		Slug Test
i (hydraulic gradient)	Surface or Subsurface	Field Measurement

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^a This is the location where the sample is collected

^b As incorporated by reference in Section 742.120.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

4205 **Section 742.APPENDIX C Tier 2 Tables**

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4207 **Section 742.TABLE L J&E Equations**

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<p>Indoor air remediation objectives (mg/m³)</p>	<p>For carcinogenic contaminants</p>	$RO_{indoor\ air} = \frac{TR \times AT_c \times 365 \frac{days}{yr}}{ED \times EF \times URF \times 1000 \frac{\mu g}{mg}}$	<p><u>J&E1</u></p>
	<p>For noncarcinogenic contaminants</p>	$RO_{indoor\ air} = \frac{THQ \times AT_{nc} \times 365 \frac{days}{yr} \times RFC}{ED \times EF}$	<p><u>J&E2</u></p>
<p>To convert mg/m³ from parts per million volume</p>		$mg / m^3 = \frac{ppmv \times MW}{24.45}$ <p>Note: 24.45 equals the molar volume of air in liters at normal temperature (25°C) and pressure (760 mmHg).</p>	<p><u>J&E3</u></p>
<p>Soil gas remediation objective (mg/m³)</p>		$RO_{soil\ gas} = \frac{RO_{indoor\ air}}{\alpha}$	<p><u>J&E4</u></p>
<p>Soil Vapor Saturation Limit (mg/m³-air)</p>		$C_v^{sat} = \frac{P \times MW}{R \times T} \times 10^6$	<p><u>J&E5</u></p>
<p>Groundwater remediation objectives</p>		$RO_{gw} = \frac{RO_{soil\ gas}}{H' ts \times 1000 \frac{L_3}{m}}$	<p><u>J&E6</u></p>

4211 **Section 742.APPENDIX C Tier 2 Tables**

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4213 **Section 742.TABLE M J&E Parameters**

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Symbol	Parameter	Units	Source	Tier 1 or Calculated Value
A_B	Surface area of enclosed space at or below grade	cm^2	Equation J&E 12a or 12b, Appendix C, Table L	Residential = 1×10^6 Industrial/Commercial = 4.0×10^6
A_{crack}	Area of total cracks	cm^2	Equation J&E 14, Appendix C, Table L	Calculated Value
AT_c	Averaging time for carcinogens	year	SSL, May 1996	70
AT_{nc}	Averaging time for noncarcinogens	year	$AT_{nc} = ED$	Residential = 30 Industrial/Commercial = 25
C_v^{sat}	Soil vapor saturation limit	mg/m^3 -air	Equation J&E 5, Appendix C, Table L	Chemical-Specific or Calculated Value
D_{crack}^{eff}	Effective diffusion coefficient through the cracks	cm^2/s	Equation J&E 15, Appendix C, Table L	Calculated Value
D_i	Diffusivity in air	cm^2/s	Appendix C, Table E	Chemical-Specific
D_i^{eff}	Effective diffusion coefficient for each soil layer	cm^2/s	Equation J&E 11, Appendix C, Table L	Calculated Value
D_{source}	Distance from ground surface to top of contamination	cm	Field Measurement	Soil Contamination = 152.4 Groundwater Contamination = 304.8 Site-Specific
D_T^{eff}	Total overall effective diffusion coefficient	cm^2/s	Equation J&E 9a, Appendix C, Table L	Calculated Value
D_w	Diffusivity in water	cm^2/s	Appendix C, Table E	Chemical-Specific
ED	Exposure duration	year	Residential: SSL, May 1996 Industrial/Commercial: SSL 2002	Residential = 30 Industrial/Commercial = 25
EF	Exposure frequency	day/year	Residential: SSL, May 1996 Industrial/Commercial: SSL 2002	Residential = 350 Industrial/Commercial = 250
ER	Air exchange rate	exchanges per hour	Illinois EPA	Residential = 0.53 Industrial/Commercial = 0.93

<p><u>Attenuation factor</u></p>	<p><u>Attenuation factor when the mode of contaminant transport is both diffusion and advection</u></p> <p>$Q_{soil} = 83.33 \text{ cm}^3/\text{sec}$</p>	$\alpha = \frac{\left[\left(\frac{D_T^{eff} \times A_B}{Q_{bldg} \times L_T} \right) \times \exp\left(\frac{Q_{soil} \times L_{crack}}{D_{crack}^{eff} \times A_{crack}} \right) \right]}{\exp\left(\frac{Q_{soil} \times L_{crack}}{D_{crack}^{eff} \times A_{crack}} \right) + \left(\frac{D_T^{eff} \times A_B}{Q_{bldg} \times L_T} \right) + \left(\frac{D_T^{eff} \times A_B}{Q_{soil} \times L_T} \right)} \exp\left(\frac{Q_{soil}}{D_{crack}^{eff}} \right)$	<p>J&E7</p>
	<p><u>Attenuation factor when the mode of contaminant transport is diffusion only</u></p> <p>$Q_{soil} = 0 \text{ cm}^3/\text{sec}$</p>	$a = \frac{(D_T^{eff} \times A_B)}{1 + \left(\frac{D_T^{eff} \times A_B}{Q_{bldg} \times L_T} \right) + \left(\frac{D_T^{eff} \times A_B \times L_{crack}}{L_T \times D_{crack}^{eff} \times A_{crack}} \right)}$	<p>J&E8</p>
<p><u>Total overall effective diffusion coefficient for vapor transport in porous media</u></p>		$D_T^{eff} = \frac{L_T}{\sum_{i=1}^n L_i \cdot D_i^{eff}}$	<p>J&E9a</p>
<p><u>In Equation J&E9a, the following condition must be satisfied:</u></p>		$\sum_{i=1}^n L_i = L_T$	<p>J&E9b</p>
<p><u>Source to building separation (cm)</u></p>		$L_T = D_{source} - L_F$	<p>J&E10</p>
<p><u>Effective diffusion coefficient for each soil layer (cm²/s)</u></p>		$D_{i^{eff}} = \left(\frac{\Theta^{3.33_{a,i}}}{\Theta^{2_{r,i}}} \right) + \left(\frac{D_w}{H_{TS}} \right) \left(\frac{\Theta^{3.33_{wi}}}{\Theta^{2_{r,i}}} \right)$	<p>J&E11</p>
<p><u>Surface area of enclosed space at or below grade (cm²)</u></p>	<p><u>For a slab-on-grade building</u></p>	$A_B = (L_B \times W_B)$	<p>J&E12a</p>

<u>Surface area of enclosed space at or below grade (cm²)</u>	<u>For a building with a basement</u>	$A_B = (L_B \times W_B) + (2 \times L_F \times L_B) + (2 \times L_F \times W_B)$	<u>J&E12b</u>
<u>Building ventilation rate (cm³/s)</u>		$Q_{bldg} = \frac{L_B \times W_B \times H_B \times ER}{3600 \text{ sec/hr}}$	<u>J&E13</u>
<u>Area of total cracks (cm²)</u>		$A_{crack} = 2 \times (L_B + W_B) \times w$	<u>J&E14</u>
<u>Effective diffusion coefficient through the cracks (cm²/s)</u>		$D^{eff}_{crack} = D_i \left(\frac{\Theta^{3.33}_{a,crack}}{\Theta^{2T}_{crack}} \right) + \left(\frac{D_w}{H_{TS}} \right) \left(\frac{\Theta^{3.33}_{w,crack}}{\Theta^{2T}_{crack}} \right)$	<u>J&E15</u>
<u>Total porosity</u>		$\Theta_{Ti} = 1 - \frac{\rho_{bi}}{\rho_s}$	<u>J&E16</u>
<u>Water-filled soil porosity</u>		$\Theta_w = W \times \frac{\rho_b}{\rho_w}$	<u>J&E17</u>
<u>Air-filled soil porosity</u>		$\Theta_a = \Theta_T - \Theta_w$	<u>J&E18</u>

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(Source: Added at 36 Ill. Reg. _____, effective _____)

URF	Unit risk factor	($\mu\text{g}/\text{m}^3$) ⁻¹	Illinois EPA: http://www.epa.state.il.us/land/taco/toxicity-values.xls	Toxicological- Specific
w	Floor-wall seam gap	cm	USEPA, Users Guide, 2004	0.1
W	Moisture content	g of water/g of soil	Field Measurement, Appendix C, Table F	Site-Specific
W _B	Width of building	cm	Illinois EPA	Residential = 1000 Industrial/ Commercial = 2000 or Site-Specific in Tier 3
α	Attenuation factor	unitless	Equations J&E 7 or 8, Appendix C, Table L	Site-Specific
Θ_a	Air-filled soil porosity	cm^3/cm^3	SSL, May 1996 or Equation J&E 18, Appendix C, Table L	0.28 or Calculated Value
$\Theta_{a,crack}$	Air-filled porosity for soil in cracks	cm^3/cm^3	SSL, May 1996 or Equation J&E 18, Appendix C, Table L	0.13
$\Theta_{a,i}$	Air-filled porosity of soil layer i	cm^3/cm^3	SSL, May 1996 or Equation J&E 18, Appendix C, Table L	0.13 or Calculated Value For capillary fringe, $\Theta_{a,i} = 0.1 \Theta_{T,i}$
$\Theta_{T,crack}$	Total porosity for soil in cracks	cm^3/cm^3	SSL, May 1996 or Equation J&E 16, Appendix C, Table L	0.43
$\Theta_{T,i}$	Total porosity of soil layer i	cm^3/cm^3	SSL, May 1996 or Equation J&E 16, Appendix C, Table L	0.43 or Calculated Value
Θ_w	Water-filled soil porosity	cm^3/cm^3	SSL, May 1996 or Equation J&E 17, Appendix C, Table L	0.15 or Calculated Value
$\Theta_{w,crack}$	Water-filled porosity for soil in cracks	cm^3/cm^3	SSL, May 1996 or Equation J&E 17, Appendix C, Table L	0.15
$\Theta_{w,i}$	Water-filled porosity of soil layer i	cm^3/cm^3	SSL, May 1996 or Equation J&E 17, Appendix C, Table L For capillary fringe, US EPA, Users Guide 2004	0.15 or Calculated Value For capillary fringe = 0.375 or 0.9 $\Theta_{T,i}$
Θ_b	Dry soil bulk density	g/cm^3	SSL, May 1996 or Field Measurement, Appendix C, Table F	1.5 or Calculated Value
$\Theta_{s,i}$	Soil particle density	g/cm^3	SSL, May 1996 or Field Measurement, Appendix C, Table F	2.65 or Calculated Value
Θ_w	Density of water	g/cm^3	Illinois EPA	1

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(Source: Added at 36 Ill. Reg. _____, effective _____)

				<p><u>Industrial/ Commercial = 3.15×10^5</u> <u>or Site-Specific in Tier 3</u></p> <p><u>Basement Residential = 6.28×10^4</u> <u>Industrial/Commercial = 5.04×10^5</u> <u>or Site-Specific in Tier 3</u></p>
<u>Q_{soil}</u>	<u>Volumetric flow rate of soil gas into the enclosed space</u>	<u>cm³/s</u>	<u>USEPA, Users Guide for Evaluating Subsurface Vapor Intrusion into Buildings, 2004</u>	<p>If <u>L_T</u> is less than 5 feet (152 cm), <u>Q_{soil}</u> equals 83.33.</p> <p>If <u>L_T</u> is 5 feet (152 cm) or greater, <u>Q_{soil}</u> equals zero.</p> <p>An input value of zero requires an institutional control. See Section 742.505(b) and (c).</p>
<u>R</u>	<u>Ideal gas constant</u>	<u>atm-L/mol-K</u>	<u>USEPA, Users Guide, 2004</u>	<u>0.08206</u>
<u>RfC</u>	<u>Reference concentration</u>	<u>µg/m³</u>	<u>Illinois EPA: http://www.epa.state.il.us/land/taco/toxicity-values.xls</u>	<u>Toxicological-Specific</u>
<u>RO_{gw}</u>	<u>Groundwater remediation objective</u>	<u>mg/L</u>	<u>Appendix B, Table E, or Equation J&E 6, Appendix C, Table L</u>	<u>Chemical-Specific or Calculated Value</u>
<u>RO_{indoor-air}</u>	<u>Indoor air remediation objective</u>	<u>mg/m³</u>	<u>Equations J&E 1 and 2, Appendix C, Table L</u>	<u>Calculated Value</u>
<u>RO_{soilgas}</u>	<u>Soil gas remediation objective</u>	<u>mg/m³</u>	<u>Equation J&E 4, Appendix C, Table L</u>	<u>Calculated Value</u>
<u>S</u>	<u>Solubility in water</u>	<u>mg/L</u>	<u>Appendix C, Table E</u>	<u>Chemical-Specific</u>
<u>T</u>	<u>Temperature</u>	<u>°K</u>	<u>USEPA, Users Guide, 2004</u>	<u>286 (converted from 13°C)</u>
<u>THQ</u>	<u>Target hazard quotient for a chemical</u>	<u>unitless</u>	<u>SSL, May 1996</u>	<u>1</u>
<u>TR</u>	<u>Target risk or the increased chance of developing cancer over a lifetime due to exposure to a chemical</u>	<u>unitless</u>	<u>SSL, May 1996</u>	<p><u>Residential = 10^{-6} at the point of human exposure</u></p> <p><u>Industrial/Commercial = 10^{-6} at the point of human exposure</u></p>

4217 **Section 742.APPENDIX F Environmental Land Use Control**

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4219 PREPARED BY:

4220

Name: _____

Address: _____

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4223 RETURN TO:

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Name: _____

Address: _____

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THE ABOVE SPACE FOR RECORDER'S OFFICE

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Model Environmental Land Use Control

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THIS ENVIRONMENTAL LAND USE CONTROL ("ELUC"), is made this _____ day of _____, 20__ by _____, ("Property Owner") of the real property located at the common address _____ ("Property").

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WHEREAS, 415 ILCS 5/58.17 and 35 Ill. Adm. Code 742 provide for the use of an ELUC as an institutional control in order to impose land use limitations or requirements related to environmental contamination so that persons conducting remediation can obtain a No Further Remediation determination from the Illinois Environmental Protection Agency ("IEPA"). The reason for an ELUC is to ensure protection of human health and the environment. The limitations and requirements contained herein are necessary in order to protect against exposure to contaminated soil, ~~or~~ groundwater, or soil gas~~both~~, that may be present on the property as a result of [VARIABLE] activities. Under 35 Ill. Adm. Code 742, the use of risk-based, site-specific remediation objectives may require the use of an ELUC on real property, and the ELUC may apply to certain physical features (e.g., engineered barriers, indoor inhalation building control technologies, monitoring wells, caps, etc.).

WHEREAS, [the party performing remediation] intends to request risk-based, site specific soil, ~~and~~ groundwater, or soil gas remediation objectives from IEPA under 35 Ill. Adm. Code 742 to obtain risk-based closure of the site, identified by Bureau of Land of Land

[10-digit LPC or Identification number] , utilizing an ELUC.

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NOW, THEREFORE, the recitals set forth above are incorporated by reference as if fully set forth herein, and the Property Owner agrees as follows:

Date: _____ By: _____
Director

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Section One. Property Owner does hereby establish an ELUC on the real estate, situated in the County of _____, State of Illinois and further described in Exhibit A attached hereto and incorporated herein by reference (the "Property").

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Attached as Exhibit B are site maps that show the legal boundary of the Property, any physical features to which the ELUC applies, the horizontal and vertical extent of the contaminants of concern above the applicable remediation objectives for soil, ~~or~~ groundwater, or soil gas~~both~~, and the nature, location of the source, and direction of movement of the contaminants of concern, as required under 35 Ill. Adm. Code 742.

Section Two. Property Owner represents and warrants **he/she** is the current owner of the Property and has the authority to record this ELUC on the chain of title for the Property with the Office of the Recorder or Registrar of Titles in _____ County, Illinois.

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Section Three. The Property Owner hereby agrees, for **himself/herself**, and **his/her** heirs, grantees, successors, assigns, transferees and any other owner, occupant, lessee, possessor or user of the Property or the holder of any portion thereof or interest therein, that **[INSERT RESTRICTION (e.g., the groundwater under the Property shall not be used as a potable supply of water, and any contaminated groundwater or soil that is removed, excavated, or disturbed from the Property described in Exhibit A herein must be handled in accordance with all applicable laws and regulations)]**.

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Section Four. This ELUC is binding on the Property Owner, **his/her** heirs, grantees, successors, assigns, transferees and any other owner, occupant, lessee, possessor or user of the Property or the holder of any portion thereof or interest therein. This ELUC shall apply in perpetuity against the Property and shall not be released until the IEPA determines there is no longer a need for this ELUC as an institutional control; until the IEPA, upon written request, issues to the site that received the no further remediation determination a new no further remediation determination approving modification or removal of the limitation(s) or requirement(s); the new no further remediation determination is filed on the chain of title of the site subject to the no further remediation determination; and until a release or modification of the land use limitation or requirement is filed on the chain of title for the Property.

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Section Five. Information regarding the remediation performed on the Property may be obtained from the IEPA through a request under the Freedom of Information Act [5 ILCS 140]

4277 and rules promulgated thereunder by providing the IEPA with the 10-digit LPC or identification
4278 number listed above.

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4280 Section Six. The effective date of this ELUC shall be the date that it is officially
4281 recorded in the chain of title for the Property to which the ELUC applies.

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4284 WITNESS the following signatures:
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4286 Property Owner(s)

4287 By: _____

Its: _____

Date: _____

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4289

STATE OF ILLINOIS)
) SS:
_____)
COUNTY OF _____)

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I, _____ the undersigned, a Notary Public for said County
and State, DO HEREBY CERTIFY, that _____ and _____,
personally known to me to be the Property Owner(s) of _____, and
personally known to me to be the same persons whose names are subscribed to the foregoing
instrument, appeared before me this day in person and severally acknowledged that in said
capacities they signed and delivered the said instrument as their free and voluntary act for the
uses and purposes therein set forth.

4291

Given under my hand and official seal, this _____ day of _____, 20 ____.

Notary Public

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STATE OF ILLINOIS)
) SS:
_____)
COUNTY OF _____)

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I, _____ a notary public, do hereby certify that before me

this day in person appeared _____, personally known to me to be the Property Owner(s) of _____, each severally acknowledged that they signed and delivered the foregoing instrument as the Property Owner(s) herein set forth, and as their own free and voluntary act, for the uses and purposes herein set forth.

4297

Given under my hand and official seal, this ____ day of _____, 20 ____.

Notary Public

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PIN NO. XX-XX-XXX-XXX-XXXX
(Parcel Index Number)

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Exhibit A

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The subject property is located in the City of _____, _____ County, State of Illinois, commonly known as _____, _____, Illinois and more particularly described as:

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LIST THE COMMON ADDRESS;

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LEGAL DESCRIPTION; AND

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REAL ESTATE TAX INDEX OR PARCEL #

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(PURSUANT TO SECTION 742.1010(D)(2))

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Exhibit B

IN ACCORDANCE WITH SECTION 742.1010(d)(8)(A)-(D), PROVIDE ALL THE FOLLOWING ELEMENTS. ATTACH SEPARATE SHEETS, LABELED AS EXHIBIT B, WHERE NECESSARY.

- (A) A scaled map showing the legal boundary of the property to which the ELUC applies.
- (B) Scaled maps showing the horizontal and vertical extent of contaminants of concern above the applicable remediation objectives for soil, and groundwater, and soil gas to which the ELUC applies.
- (C) Scaled maps showing the physical features to which an ELUC applies (e.g., engineered barriers, indoor inhalation building control technologies, monitoring wells, caps, etc.).
- (D) Scaled maps showing the nature, location of the source, and direction of movement of the contaminants of concern.

(Source: Amended at 36 Ill. Reg. _____, effective _____)