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

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:

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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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

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.

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

SUBPART B: GENERAL

Section

SUBPART C: EXPOSURE ROUTE EVALUATIONS

Section

SUBPART D: DETERMINING AREA BACKGROUND

Section

SUBPART E: TIER 1 EVALUATION

Section

SUBPART L: BUILDING CONTROL TECHNOLOGIES

Section
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742.1210 Building Control Technology Requirements

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742.APPENDIX H Memorandum of Understanding

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 ~~31~~36 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 ~~and~~ 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~~?~~ °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 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/m~~(~~3)~~)~~, 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 x 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~~um) 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.

~~"~~BIOVAPOR-A 1-D Vapor Intrusion Model with Oxygen-Limited Aerobic Biodegradation, Version 2.0 (January 2010)~~"~~.

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.

~~"~~Reference Handbook for Site-Specific Assessment of Subsurface Vapor Intrusion to Indoor Air,~~"~~ Electric Power Research Institute (EPRI), Inc., Program No. ~~1008492,~~1008492 (March 2005).

GPO. Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20401, (202) 783-3238.

USEPA Guidelines for Carcinogenic Risk Assessment, 51 Fed. Reg. 33992-34003 (September 24, 1986).

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA Publication number SW-846 (Third Edition, Final Update IIIA, April 1998), as amended by Updates I, IIA, III, and IIIA (Document No. 955-001-00000-1).

"Methods for the Determination of Organic Compounds in Drinking Water", EPA Publication No. EPA/600/4-88/039 (December 1988 (Revised July 1991)).

"Methods for the Determination of Organic Compounds in Drinking Water, Supplement I", EPA Publication No. EPA/600/4-90/020 (July 1990).

"Methods for the Determination of Organic Compounds in Drinking Water, Supplement II", EPA Publication No. EPA/600/R-92/129 (August 1992).

"Methods for the Determination of Organic Compounds in Drinking Water, Supplement III", EPA Publication No. EPA/600/R-95/131 (August 1995).

"Guidance for Data Quality Assessment, Practical Methods for Data Analysis, EPA QA/G-9, QAOO Update," EPA/600/R-96/084 (July 2000). Available at www.epa.gov/quality/qs-docs/g9-final.pdf.

"Assessment of Vapor Intrusion in Homes Near the Raymark Superfund Site Using Basement and Sub-Slab Air Samples", EPA Publication No. EPA/600/R-05/147 (March 2006).

"Model Standards and Techniques for Control of Radon in New Residential Buildings" EPA Publication No. EPA/402/R-94/009 (March 1994).

"Radon Reduction Techniques for Existing Detached Houses: Technical Guidance (Third Edition) for Active Soil Depressurization Systems", EPA Publication No. EPA/625/R-93/011 (October 1993).

Illinois Environmental Protection Agency, 1021 N. Grand Ave East, Springfield, IL ~~62701~~62701, (217) 785-0830.

"A Summary of Selected Background Conditions for Inorganics in Soil", Publication No. IEPA/ENV/94-~~161,~~ 161 (August ~~1994.~~1994).

IRIS. Integrated Risk Information System, National Center for Environmental Assessment, U.S. Environmental Protection Agency, 26 West Martin Luther King Drive, MS-190, Cincinnati, OH 45268, (513) 569-7254.

"Reference Dose (RfD): Description and Use in Health Risk Assessments", Background Document 1A (March 15, 1993).

"EPA Approach for Assessing the Risks Associated with Chronic Exposures to Carcinogens", Background Document 2 (January 17, 1992).

Johnson, Paul C. (2005). Identification of Application Specific Critical Inputs for the 1991 Johnson and Ettinger Vapor Intrusion Algorithm. Ground Water Monitoring and Remediation. 25(1), 63-78.

Murray, Donald M. and Burmaster, David E. (1995). Residential Air Exchange Rates in the United States: Empirical and Estimated Parametric Distributions by Season and Climatic Region. Risk Analysis. 15(4), 459-465.

Nelson, D.W., and L.E. Sommers (1982). Total carbon, organic carbon, and organic matter. In: A.L. Page (ed.), Methods of Soil Analysis. Part 2. Chemical and Microbiological Properties. 2nd Edition, pp. 539-579, American Society of Agronomy. Madison, WI.

NTIS. National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161, (703) 487-4600.

"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), PB 2003-104982.

"Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils", OSWER Draft Guidance. EPA Publication No. EPA/530D-02/004 (November 2002).

"Exposures Factors Handbook, Vol. I: General Factors", EPA Publication No. EPA/600/P-95/002Fa (August 1997).

"Exposures Factors Handbook, Vol. II: Food Ingestion Factors", EPA Publication No. EPA/600/P-95/002Fb (August 1997).

"Exposures Factors Handbook, Vol. III: Activity Factors", EPA Publication No. EPA/600/P-95/002Fc (August 1997).

"Risk Assessment Guidance for Superfund, Vol. I: Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors", OSWER Directive 9285.6-03 (March 1991).

"Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites", EPA Publication No. EPA/600/8-85/002 (February 1985), PB 85-192219.

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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~~oC~~°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~~oC~~°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~~.~~;

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 Qsoil 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 Qsoil 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 Qsoil 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 Qsoil 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 Qsoil 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 Qsoil 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~~d) 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 Qsoil value of 83.33 cm3/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 Qsoil value of 0.0 cm3/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 (ks) can only be used for ionizing organics and inorganics by substituting values for ks 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 (SFi, 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 (Cw), Soil-Water Partition Coefficient (Kd) for non-ionizing organics, Water-Filled Soil Porosity ~~Theta w~~Thetaw (~~qw~~Tw) and Air-

Filled Soil Porosity ~~Theta a~~Thetaa (~~qa~~Ta), 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 (~~rb~~?b), 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 (25? C), 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 R~~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 (RAFd) 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., RAFd = 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 Qsoil 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 Qsoil 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, ...~~1,2,...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 (Cvsat, Equation J&E6b) for each volatile chemical. The calculated Cvsat shall use the default representative subsurface temperature specified in ~~742.717~~subsection (g). If the calculated soil gas remediation objective is greater than Cvsat, then Cvsat 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:

Wave=x1+x2+x3+...+xaCUOxCUOxCUOxCUOx123a
where:

Wave = Weighted ~~Averagex~~Averagex1 through xa = 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.~~CUOxa~~ CUOx= A Tier 1 or Tier 2 remediation objective must be developed for each xa.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 Sw wide and Sd 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)Cx = the concentration of the contaminant at a distance X from the source, along the centerline of the ~~plumeCsource~~ plumeCsource= 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 Csource.ax = dispersivity in the x direction (i.e., Equation R16)ay = dispersivity in the y direction (i.e., Equation R17)az = 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 ~~q~~TT must be known (i.e., Equation R19)~~l~~?= first order degradation constant obtained from Appendix C, Table E or from measured groundwater ~~dataSw~~ dataSw= width of planar groundwater source in the y ~~directionSd~~ directionSd= depth of planar groundwater source in the z direction

2) The following parameters are determined through field measurements: U, K, I, ~~q~~TT, Sw, Sd.

A) The determination of values for U, K, I and ~~q~~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 Cx 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 Csource 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.

~~1~~2) 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.

~~2~~3) 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 voidance 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(c)(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 ~~NameCsat (mg/kg)67-64-1Acetone100,00071-43-2Benzene870111-44-4Bis(2-chloroethyl)ether3,300117-81-7Bis(2-ethylhexyl)phthalate31,00075-27-4Bromodichloromethane (Dichlorobromomethane)3,00075-25-2Bromoform1,90071-36-3Butanol10,00085-68-7Butyl benzyl phthalate93075-15-0Carbon disulfide72056-23-5Carbon tetrachloride1,100108-90-7Chlorobenzene (Monochlorobenzene)680124-48-1Chlorodibromomethane (Dibromochloromethane)1,30067-66-3Chloroform2,90096-12-81,2-Dibromo-3-chloropropane1,400106-93-41,2-Dibromoethane (Ethylene dibromide)2,80084-74-2Di-n-butyl phthalate2,30095-50-11,2-Dichlorobenzene (o-Dichlorobenzene)56075-34-31,1-Dichloroethane1,700107-06-21,2-Dichloroethane (Ethylene dichloride)1,80075-35-41,1-Dichloroethylene1,500156-59-2cis-1,2-Dichloroethylene1,200156-60-5trans-1,2-Dichloroethylene3,10078-87-51,2-Dichloropropane1,100542-75-61,3-Dichloropropene (1,3-Dichloropropylene, cis + trans)1,40084-66-2~~
~~Diethyl phthalate2,000117-84-0Di-n-octyl phthalate10,000100-41-4Ethylbenzene40077-47-4Hexachlorocyclopentadiene2,20078-59-1Isophorone4,60074-83-9Methyl bromide (Bromomethane)3,2001634-04-4Methyl tertiary butyl ether8,80075-09-2Methylene chloride (Dichloromethane)2,40098-95-3Nitrobenzene1,000100-42-5Styrene1,500127-18-4Tetrachloroethylene (Perchloroethylene)240108-88-3Toluene650120-82-11,2,4-Trichlorobenzene3,20071-55-61,1,1-Trichloroethane1,20079-00-51,1,2-Trichloroethane1,80079-01-6Trichloroethylene1,300108-05-4Vinyl acetate2,70075-01-4Vinyl chloride1,200108-38-3m-Xylene42095-47-6o-Xylene410106-42-3p-Xylene4601330-20-7Xylenes (total)320Ionizable Organics95-57-82-Chlorophenol53,000For~~~~Name~~For the Outdoor Inhalation Exposure Routea Csat (mg/kg)For the Soil Component of the Groundwater Ingestion Exposure Routeb Csat (mg/kg)~~CAS No.Chemical Name~~67-64-1Acetone1.00E+052.00E+0571-43-2Benzene8.00E+025.80E+02111-44-4Bis(2-chloroethyl)ether3.00E+033.90E+03117-81-7Bis(2-

ethylhexyl)phthalate2.00E+026.80E+0175-27-4Bromodichloromethane (Dichlorobromomethane)2.80E+032.00E+0375-25-2Bromoform2.00E+031.20E+0371-36-3Butanol1.00E+041.60E+0478-93-32-Butanone (MEK)2.50E+044.50E+0485-68-7Butyl benzyl phthalate1.00E+033.40E+0275-15-0Carbon disulfide8.50E+025.20E+0256-23-5Carbon tetrachloride1.20E+035.60E+02108-90-7Chlorobenzene (Monochlorobenzene)6.20E+022.90E+02124-48-1Chlorodibromomethane (Dibromochloromethane)1.40E+038.90E+0267-66-3Chloroform3.40E+032.50E+0395-57-82-~~Chlorophenol c~~Chlorophenolc (ionizable organic) 1.00E+047.10E+0375-99-0Dalapon1.20E+051.90E+0596-12-81,2-Dibromo-3-chloropropane6.90E+024.30E+02106-93-41,2-Dibromoethane (Ethylene dibromide)1.60E+031.20E+0384-74-2Di-n-butyl phthalate2.60E+038.80E+0295-50-11,2-Dichlorobenzene (o-Dichlorobenzene)5.60E+022.10E+0275-71-8Dichlorodifluoromethane 8.70E+024.30E+0275-34-31,1-Dichloroethane1.70E+031.40E+03107-06-21,2-Dichloroethane (Ethylene dichloride)1.90E+032.10E+0375-35-41,1-Dichloroethylene1.40E+039.10E+02156-59-2cis-1,2-Dichloroethylene1.30E+031.00E+03156-60-5trans-1,2-Dichloroethylene3.00E+032.10E+0378-87-51,2-Dichloropropane1.20E+038.70E+02542-75-61,3-Dichloropropene (1,3-Dichloropropylene, cis + trans)1.00E+038.50E+0284-66-2
Diethyl phthalate2.20E+039.20E+02105-67-92,4-Dimethylphenol1.00E+044.70E+03117-84-0Di-n-octyl phthalate1.60E+015.20E+00123-91-1p-Dioxane1.00E+052.00E+05100-41-4Ethylbenzene3.50E+021.50E+0277-47-4Hexachlorocyclopentadiene1.30E+024.40E+0178-59-1Isophorone3.00E+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 ether8.40E+031.10E+0475-09-2Methylene chloride (Dichloromethane)2.50E+033.00E+0398-95-3Nitrobenzene7.10E+025.90E+02621-64-7n-Nitrosodi-n-propylamine1.90E+032.30E+03100-42-5Styrene6.30E+022.60E+02127-18-4Tetrachloroethylene (Perchloroethylene)8.00E+023.10E+02108-88-3Toluene5.80E+022.90E+02120-82-11,2,4-Trichlorobenzene3.40E+021.20E+0271-55-61,1,1-Trichloroethane1.30E+036.70E+0279-00-51,1,2-Trichloroethane1.80E+031.30E+0379-01-6Trichloroethylene1.20E+036.50E+0275-69-4Trichlorofluoromethane1.80E+038.90E+02108-05-4Vinyl acetate2.60E+034.20E+0375-01-4Vinyl chloride2.60E+032.90E+03108-38-3m-Xylene4.10E+021.60E+0295-47-6o-Xylene3.70E+021.50E+02106-42-3p-Xylene3.30E+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 GlandCentral 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)EndosulfanEthylbenzeneCirculatory SystemFluoranthenceAntimonyMethyl tertiary-butyl ether (Inhalation only)Barium (Ingestion only)Nitrobenzene2,4-DPyrenecis-1,2-Dichloroethylene (Ingestion only)Toluene (Ingestion only)Nitrobenzene2,4,5-Trichlorophenoltrans-1,2-Dichloroethylene (Ingestion only)Vinyl acetate (Ingestion only)2,4-DimethylphenolFluoranthenceLivcrFluorenceAcenaphthenceStyrene (Ingestion only)Acetone (Ingestion only)ZincButylbenzyl phthalate (Ingestion only)Chlorobenzene (Ingestion only)Gastrointestinal System1,1-Dichloroethylene (Ingestion only)Beryllium (Ingestion only)Di-n-octyl phthalate (Ingestion only)EndothallEndrinHexachlorocyclopentadiene (Ingestion only)EthylbenzeneMethyl bromide (Ingestion only)FluoranthenceMethyl tertiary-butyl ether (Ingestion only)Methyl tertiary-butyl ether (Inhalation only)NitrobenzenePicloramStyrene (Ingestion only)2,4,5-TP (Silvex)Toluene (Ingestion only)1,2,4-Trichlorobenzene (Inhalation only)2,4,5-TrichlorophenolImmune 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~~
~~PhenolRespiratory 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
~~CarbofuranDecreased 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
Ensosulfan
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)
Ensosulfan
2-Methylphenol (o-cresol)
Naphthalene (ingestion only)
Nickel (ingestion only)
n-Nitrosodiphenylamine
Phenol (ingestion only)
Simazine
Tetrachloroethylene (ingestion only)
~~Adrenal GlandDecreased Body Weight Gain (continued)IsopropylbenzeneEnsosulfan2-Methylphenol (o-cresol)Cholinesterase InhibitionNaphthalene (ingestion only)AldicarbNickel (ingestion only)Carbofurann-NitrosodiphenylaminePhenol (ingestion only)Circulatory SystemSimazineAlachlorTetrachloroethylene (ingestion only)Antimony (ingestion only)~~ 1,1,1-Trichloroethane (ingestion only)~~BenzeneVinyl~~
Vinyl acetate (ingestion only)~~Cobalt (ingestion only)~~
Xylenes (Res. & I/C only) (ingestion only)~~2,4-Dcis-1,2-Dichloroethylene (ingestion only)~~

Endocrine System~~2,4-DimethylphenolCyanide2,4-Dinitrotoluene~~
Cyanide
1,2-Dibromoethane (ingestion only)~~2,6-DinitrotolueneDi~~
Di-n-octyl phthalate (ingestion only)~~EnsosulfanNitrobenzeneFluoranthene~~
Nitrobenzene
1,2,4-Trichlorobenzene (ingestion only)~~FluoreneMethylene Chloride (inhalation only)EyeNickel (Res. & I/C only) (inhalation only)2,4-DinitrophenolNitrate as Nn-NitrosodiphenylamineNitrobenzene (ingestion only)~~

Eye
2,4-Dinitrophenol
n-Nitrosodiphenylamine
Polychlorinated biphenyls (PCBs)~~SeleniumTrichloroethyleneSimazineStyrene (ingestion only)~~
Trichloroethylene

Gastrointestinal System~~1,3,5-Trinitrobenzene~~
Beryllium (ingestion only)~~ZincCopper~~
Copper
1,3-Dichloropropene (cis + trans)
Endothall
Fluoride

Hexachlorocyclopentadiene (ingestion only)Decreased Body Weight GainEndothallAtrazine FluorideBis(2-chloroethyl)etherHexachlorocyclopentadiene (ingestion only)CyanideIron1,2-Dichlorobenzene (inhalation only)
Iron
Methyl bromide (ingestion only)Diethyl phthalate (ingestion only)
Methyl tertiary-butyl ether (ingestion only)Immune SystemLiver (continued)4-ChloroanilineChlorobenzene (ingestion only)2,4-DichlorophenolChlorodibromomethane (ingestion only)

Immune System
4-Chloroaniline
2,4-Dichlorophenol
Mercury (ingestion only)ChloroformPolychlorinated
Polychlorinated biphenyls (PCBs)2,4-DDDTKidney1,2-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)
Ensosulfan
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-DichlorobenzeneBariumDichlorodifluoromethaneBromodichloromethane (ingestion only)

1,4-Dichlorobenzene
Dichlorodifluoromethane
1,2-Dichloroethane (inhalation only)~~Cadmium~~
1,1-Dichloroethylene~~2,4-Dtrans-1,2-DichloroethyleneDalapon~~
trans-1,2-Dichloroethylene
1,2-Dichloropropane (ingestion only)~~1,1-DichloroethaneDieldrin (Res. & I/C only)1,2-Dichloroethane (CW only) (ingestion only)2,4-DinitrotolueneEnsosulfan2,6-DinitrotolueneEthylbenzene (ingestion only)~~
Dieldrin (Res. & I/C only)
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Di-n-octyl phthalate (ingestion only)~~Fluoranthenep~~
p-Dioxane ~~gamma-HCH (gamma-BHC)EndrinHexachloroethane (ingestion only)~~
Endrin
Ethylbenzene (ingestion only)~~IsopropylbenzeneFluorantheneMecoprop (MCPP)HeptachlorMethyl tertiary-butyl ether (inhalation only)Heptachlor epoxidePentachlorophenolHexachlorobenzenePyrenealpha-HCH (alpha-BHC)Toluene (ingestion only)gamma-HCH (gamma-BHC)2,4,5-TrichlorophenolHigh Melting Exlosive~~
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 ~~etherLiverMethylene~~ether
Methylene Chloride (ingestion only)~~AcenaphthenePentachlorophenolAldrin (Res. & I/C only)Phenol (inhalation only)Bis(2-ethylhexyl)phthalate (Res.& I/C only) (ingestion only)PicloramBromoformStyrene (ingestion only)Butyl Benzyl Phthalate (ingestion only)~~
Pentachlorophenol
Phenol (inhalation only)
Picloram
Styrene (ingestion only)
Tetrachloroethylene (ingestion only)~~Carbon TetrachlorideToxaphene~~
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~~DicambaDinosebMortalityEthylbenzene (inhalation only)~~

Mortality
Di-n-butyl phthalate (ingestion only)~~Isophorone (inhalation only)~~
Xylenes (Res. & I/C only) (ingestion only)~~Reproductive System (continued)~~

Nervous ~~SystemMethoxychlorButanol~~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-TrichlorophenolCyanideDieldrin (CW only)~~
2,4,6-Trichlorophenol

Respiratory System~~2,4-DimethylphenolAntimony~~
Antimony (inhalation only)~~2,4-DinitrotolueneBenzoic~~
Benzoic Acid (inhalation only)~~2,6-DinitrotolueneBeryllium~~
Beryllium (inhalation only)~~EndrinCadmium~~
Cadmium (inhalation only)~~Hexachloroethane (inhalation only) (CW only)~~
Chromium (hex) (inhalation only)~~ManganeseCobalt~~
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)~~TrichloroethyleneNickel~~
Nickel (inhalation only)~~Xylenes (CW only) (ingestion only)Nitrobenezene (inhalation only)Xylenes (inhalation only)~~
Nitrobenzene (inhalation only)
Vinyl acetate (inhalation only)~~Reproductive SystemSkinArsenic (inhalation only)~~

Skin
Arsenic (ingestion only)~~Bis(2-ethylhexyl)phthalate (CW only) (ingestion only)~~
Polychlorinated biphenyls (PCBs)~~BoronSelenium2-ButanoneSilverSpleen~~
Selenium

Silver

Spleen
1,3-Dinotrobenzene
1,3,5-~~TrinitrobenzeneNotes~~Trinitrobenzene

Notes:
Res. = Residential ~~receptorI~~receptor
I/C = Industrial Commercial ~~receptorCW~~receptor
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
~~N~~n-Nitrosodiphenylamine (inhalation only)
~~N~~n-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 SystemalphaHCH (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 ~~receptorI~~receptor
I/C = Industrial Commercial ~~receptorCW~~receptor
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-Dioxane100-41-4Ethylbenzene76-44-8Heptachlor118-74-1Hexachlorobenzene77-47-4Hexachlorocyclopentadiene67-72-1Hexachloroethane78-59-1Isophorone 98-82-8Isopropylbenzene (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 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 NameResidential (mg/m3)Industrial/Commercial (mg/m3)Construction Worker (mg/m3)67-64-1Acetone750,000e750,000e750,000e71-43-2Benzene420c800c1,100c111-44-4Bis(2-chloroethyl)ether1.3c2.4c3.4c75-27-4Bromodichloromethane450,000e450,000e450,000e75-25-2Bromoform1,800c3,500c4,900c71-36-3Butanol29,000e29,000e29,000e78-93-32-Butanone (MEK)380,000e380,000e15,000b75-15-0Carbon disulfide1,500,000e1,500,000e48,000b56-23-5Carbon tetrachloride290c550c770c108-90-7Chlorobenzene36,000b57,000b3,700b124-48-1Chlorodibromomethane57,000e57,000e150b67-66-3Chloroform110c200c290c95-57-82-Chlorophenol17,000e17,000e17,000e75-99-0Dalapon1,500e1,500e1,500e96-12-81,2-Dibromo-3-chloropropane0.14c0.27c0.38c106-93-41,2-Dibromoethane2.9c5.6c7.9c95-50-11,2-Dichlorobenzene11,000e11,000e6,700b106-46-71,4-Dichlorobenzene8,400e8,400e6,400b75-71-8Dichlorodifluoromethane890,000b1,400,000b92,000b75-34-31,1-Dichloroethane870,000b1,300,000e90,000b107-06-21,2-Dichloroethane67c130c180c75-35-41,1-Dichloroethylene520,000b820,000b5,300b156-59-2cis-1,2-Dichloroethylene1,100,000e1,100,000e1,100,000e156-60-5trans-1,2-Dichloroethylene120,000b190,000b12,000b78-87-51,2-Dichloropropane240c470c110c542-75-61,3-Dichloropropylene (cis + trans)1,900c3,700c1,400c123-91-1p-Dioxane16c30c42c100-41-4Ethylbenzene59,000e59,000e8,500b76-44-8Heptachlor0.40c0.76c1.1c118-74-1Hexachlorobenzene0.26c0.28e0.28e77-47-4Hexachlorocyclopentadiene85b140b440b67-72-1Hexachloroethane2,800e2,800e2,800e78-59-1Isophorone3,400e3,400e1,500b98-82-8Isopropylbenzene (Cumene)30,000e30,000e30,000e7439-97-6Mercuryf22e22e0.62b74-83-9Methyl bromide12,000b19,000b2,400b1634-04-4Methyl tertiary-butyl ether1,200,000e1,200,000e23,000b75-09-2Methylene chloride6,100c12,000c5,100b91-57-62-Methylnaphthalene530e530e530e95-48-72-Methylphenol (o-cresol)1,800e1,800e410b91-20-3Naphthalene560b620e5.8b98-95-3Nitrobenzene6.5c12c10b621-64-7n-Nitrosodi-n-propylamine0.056c0.11c0.15c108-95-2Phenol1,500e1,500e79b1336-36-3Polychlorinated biphenyls (PCBs)---d---d---d100-42-5Styrene34,000e34,000e16,000b127-18-4Tetrachloroethylene360c690c970c108-88-3Toluene140,000e140,000e50,000b120-82-11,2,4-Trichlorobenzene1,000b1,600b110b71-55-61,1,1-Trichloroethane870,000e870,000e89,000b79-00-51,1,2-Trichloroethane170,000e170,000e170,000e79-01-6Trichloroethylene1,700c3,300c1,500b75-69-4Trichlorofluoromethane2,100,000b3,400,000b220,000b108-05-4Vinyl

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-chloropropanee0.0012c0.0062c0.00065c0.0027c106-93-41,2-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-
Dichloroethylene1,100,000f1,100,000f3,500g3,500g156-60-5trans-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-
5Styrene1,400b8,500b310g310g127-18-4Tetrachloroethylene0.55c4.0c0.091c0.34c108-
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-
6Trichloroethylene1.5c12c0.34c1.3c75-69-
4Trichlorofluoromethane860b5,600b26b82b108-05-4Vinyl
acetate250b1,600b160b550b75-01-4Vinyl chloride0.29c4.8c0.028c0.21c108-38-3m-
Xylene140b850b43b130b95-47-6o-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 RouteRemediation Objectives for Noncarcinogenic Contaminants
~~(mg/kg)~~ (mg/kg)S1Remediation Objectives for Carcinogenic Contaminants - Residential (mg/kg)S2Remediation Objectives for Carcinogenic Contaminants - Industrial/ Commercial, Construction Worker (mg/kg)S3
Equations for Inhalation Exposure Route (Organic Contaminants and ~~Mercury)Remediation~~MercuryRemediation Objectives for Noncarcinogenic Contaminants - Residential, Industrial/ Commercial (mg/kg)S4Remediation Objectives for Noncarcinogenic Contaminants - Construction Worker (mg/kg)S5Remediation Objectives for Carcinogenic Contaminants - Residential, Industrial/ Commercial (mg/kg)S6Remediation Objectives for Carcinogenic Contaminants - Construction Worker (mg/kg)S7Equation for Derivation of the Volatilization Factor - Residential, Industrial/ Commercial, VF (m3/kg)S8Equation for Derivation of the Volatilization Factor - Construction Worker, VF~~¢~~' (m3/kg)VF' = S9Equation 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) S11Remediation Objectives for Noncarcinogenic Contaminants - Construction Worker (mg/kg)S12Remediation Objectives for Carcinogenic Contaminants - Residential, Industrial/ Commercial (mg/kg)S13Remediation Objectives for Carcinogenic Contaminants - Construction Worker (mg/kg)S14Equation for Derivation of Particulate Emission Factor, PEF (m3/kg)S15Equation for Derivation of Particulate Emission Factor, PEF~~¢~~' - Construction Worker (m3/kg)

NOTE: PEF must be the industrial/commercial ~~value~~S~~value~~S16

Equations for the Soil Component of the Groundwater Ingestion Exposure ~~Route~~Remediation~~Route~~ Remediation Objective
~~(mg/kg)~~
(mg/kg)

NOTE: This equation can only be used to model contaminant migration not in the water bearing unit.S17Target Soil Leachate Concentration, Cw (mg/L)~~S~~Cw = DF • GWobjS18Soil-Water Partition Coefficient, Kd (cm3/g)~~S~~Kd = Koc • focS19Water-Filled Soil Porosity,
Tw ~~qw~~(Lwater/Lsoil)S20Air-Filled Soil Porosity,
Ta ~~qa~~(Lair/Lsoil)~~S~~?a = ? - ?wS21Dilution Factor, DF (unitless)S22Groundwater Remediation ~~Objective~~Objection for Carcinogenic Contaminants, GWobj (mg/L)S23Total Soil Porosity, ~~h~~(? Lpore/Lsoil)S24Equation for Estimation of Mixing Zone Depth, d (m)S25
Mass-Limit Equations for Inhalation Exposure Route and Soil Component of the Groundwater Ingestion Exposure RouteMass-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.S26Mass-Limit Volatilization Factor for the Inhalation Exposure Route - Construction Worker, ~~VF¢~~VT' - (m3/kg)S27Mass-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.S28Equation for Derivation of the Soil Saturation Limit, ~~CsatS~~CsatS29Equation 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

SymbolParameterUnitsSourceParameter Value(s)ATAveraging Time for Noncarcinogens in Ingestion EquationyrResidential = 6
Industrial/Commercial = 25
Construction Worker = 0.115ATAveraging Time for Noncarcinogens in Inhalation ~~EquationyrResidential = 30~~Equationyr Residential = 30
Industrial/Commercial = 25
Construction Worker = 0.115ATcAveraging Time for ~~CarcinogensyrSSL~~Carcinogensyr SSL70BWBody ~~WeightkgResidential~~Weightkg Residential = 15, noncarcinogens
70, carcinogens
Industrial/Commercial = 70
Construction Worker = 70CsatSoil Saturation Concentrationmg/kgAppendix A, Table A or Equation S29 in Appendix C, Table AChemical-Specific or Calculated ValueCwTarget Soil Leachate Concentrationmg/LEquation S18 in Appendix C, Table ~~A-Groundwater~~AGroundwater Standard, Health Advisory concentration, or Calculated ValuedMixing Zone DepthmSSL or Equation S25 in Appendix C, Table A2 m or Calculated ValuedaAquifer ThicknessmField MeasurementSite-SpecificdsDepth of Source

(Vertical thickness of contamination)mField Measurement or EstimationSite-~~SpecificDAApparent~~Specific SymbolParameterUnitsSourceParameter Value(s)DAApparent Diffusivitycm2/sEquation S10 in Appendix C, Table ACalculated ValueDiDiffusivity in Aircm2/sAppendix C, Table EChemical-SpecificDwDiffusivity in Watercm2/sAppendix C, Table EChemical-SpecificDFDilution FactorunitlessEquation S22 in Appendix C, Table A20 or Calculated ValueEDExposure Duration for Ingestion of CarcinogensyrIndustrial/Commercial = 25
Construction Worker = 1EDExposure Duration for Inhalation of CarcinogensyrResidential = 30
Industrial/Commercial = 25
Construction Worker = 1EDExposure Duration for Ingestion of NoncarcinogensyrResidential = 6
Industrial/Commercial = 25
Construction Worker = 1EDExposure Duration for Inhalation of NoncarcinogensyrResidential = 30
Industrial/Commercial = 25
Construction Worker = 1EDExposure Duration for the Direct Ingestion of GroundwateryrResidential = 30
Industrial/Commercial = 25
Construction Worker = 1EDM-LExposure Duration for Migration to Groundwater Mass-Limit Equation S28yrSSL70EFExposure Frequencyd/yrResidential = 350
Industrial/Commercial = 250
Construction Worker = 30F(x) Function dependent on Um/~~UtunitlessSSL~~Utunitless SSL0.194focOrganic Carbon Content of Soilg/gSSL or Field Measurement (See Appendix C, Table F)Surface Soil = 0.006
Subsurface soil = 0.002, or Site-SpecificGWobjGroundwater Remediation Remediation Objectivemg/LAppendix B, Table E, 35 IAC 620.Subpart F, or Equation

S23 in Appendix C, Table AChemical-Specific or CalculatedH'Henry's Law ConstantunitlessAppendix C, Table EChemical-SpecificiHydraulic Gradientm/mField Measurement (See Appendix C, Table F)Site-SpecificIInfiltration Ratem/yrSSL 0.3IM-LInfiltration Rate for Migration to Groundwater Mass-Limit Equation S28m/yrSSL0.18IFsoil-adj (residential)Age Adjusted Soil Ingestion Factor for Carcinogens(mg-yr)/ (kg-d)SSL114IRsoilSoil Ingestion Ratemg/dResidential = 200
Industrial/Commercial = 50
Construction Worker = 480IRWDaily Water Ingestion RateL/dResidential = 2
Industrial/Commercial = 1KAquifer Hydraulic Conductivitym/yrField Measurement (See Appendix C, Table F)Site-SpecificKd (Non-ionizing organics) Soil-Water Partition Coefficientcm3/g or L/kgEquation S19 in Appendix C, Table ACalculated ValueKd (Ionizing organics)Soil-Water Partition Coefficientcm3/g or L/kgEquation S19 in Appendix C, Table AChemical and pH-Specific (see Appendix C, Table I)Kd (~~Inorganics~~In-organics)Soil-Water Partition Coefficientcm3/g or L/kgAppendix C, Table JChemical and pH-SpecificKocOrganic Carbon Partition Coefficientcm3/g or L/kgAppendix C, Table E or Appendix C, Table IChemical-SpecificKsSaturated Hydraulic Conductivitym/yrAppendix C, Table K
Appendix C, Illustration CSite-SpecificLSource Length Parallel to Groundwater FlowmField MeasurementSite-SpecificPEFParticulate Emission Factorm3/kgSSL or Equation S15 in Appendix C, Table AResidential = 1.32 *• 109 or Site-Specific
Industrial/Commercial = 1.24 *• 109 or Site-SpecificPEF~~◊~~'Particulate Emission Factor adjusted for Agitation (construction worker)m3/kgEquation S16 in Appendix C, Table A using PEF (industrial/commercial)1.24 *• 108 or Site-SpecificQ/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 HResidential = 68.81
Industrial/Commercial = 85.81
Construction Worker = 85.81Q/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 HResidential = 90.80
Industrial/Commercial = 85.81
Construction Worker = 85.81RfCInhalation Reference Concentrationmg/m3~~IEPA (IRIS/HEASTa)~~ Illinois EPA: http://www.epa.state.il.us/land/taco/toxicity-values.xlsToxicological-Specific (Note: for Construction Workers use subchronic reference concentrations)RfDoOral Reference Dosemg/(kg-d)~~IEPA (IRIS/HEASTa)~~ Illinois EPA: http://www.epa.state.il.us/land/taco/toxicity-values.xlsToxicological-Specific (Note: for Construction ~~Worker~~Workers use subchronic reference doses)~~ROsoilSoil remediation objectivemg/kgEquation S30 in Appendix C, Table ACalculated valueROsoil gasSoil gas remediation objectivemg/m3Equation S30 in Appendix C, Table ACalculated valueSSolubility~~SSolubility in Watermg/LAppendix C, Table EChemical-SpecificSFoOral Slope Factor(mg/kg-d)-1~~IEPA (IRIS/HEASTa)~~ Illinois EPA: http://www.epa.state.il.us/land/taco/toxicity-values.xlsToxicological-SpecificTExposure IntervalsResidential = 9.5 *• 108
Industrial/Commercial = 7.9 *• 108
Construction Worker = 3.6 *• 106TM-~~L Exposure~~LExposure Interval for Mass-Limit Volatilization Factor Equation S26yrSSL30THQTarget Hazard QuotientunitlessSSL1TRTarget Cancer RiskunitlessResidential = 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 exposureUmMean Annual Windspeedm/sSSL4.69URFInhalation Unit Risk Factor(~~ug~~ug/m3)-1~~IEPA (IRIS/HEASTa)~~ Illinois EPA: http://www.epa.state.il.us/land/taco/toxicity-values.xlsToxicological-SpecificUtEquivalent Threshold Value of Windspeed at 7 mm/sSSL11.32VFraction of Vegetative CoverunitlessSSL or Field Measurement0.5 ~~or~~of Site-SpecificVFVolatilization Factorm3/kgEquation S8 in Appendix C, Table ACalculated ValueVF~~◊~~'Volatilization Factor adjusted for Agitationm3/kgEquation S9 in Appendix C, Table ACalculated ValueVFM-LMass-Limit Volatilization

Factorm3/kgEquation S26 in Appendix C, Table ACalculated ValueVF~~ϕ~~'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 ~~ValueqaAir~~Value?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 ~~ValueqwWater~~Value?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 ~~ValuerbDry~~Value?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-~~SpecifiersSoil~~Specific?sSoil Particle Densityg/cm3SSL or Field Measurement (See Appendix C, Table F)2.65, or
Site-~~SpecifierwWater~~Specific?wWater Densityg/cm3SSL11/(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.~~Table~~TABLE E~~:~~ Default Physical and Chemical ~~Parameters~~Parameters

CAS No.

~~ChemicalSolubility~~ChemicalSolubility in Water (S) (mg/L)Diffusivity in Air (~~Di~~di) (cm2/s)Diffusivity in Water (Dw) (cm2/s)Dimensionless Henry's Law Constant (H')~~(25oC)Organic Carbon Partition Coefficient (Koc) (L/kg)First Order Degradation Constant (1)~~

~~(d-1)Neutral Organics83-32-9Acenaphthene4.24 0.04217.69E-6 0.00636 7,080 0.003467-64-1Acetone1,000,0000.124 1.14E-50.00159 0.575 0.049515972-60-8Alachlor242 0.01985.69E-60.00000132 394 No Data116-06-3Aldicarb6,000 0.03057.19E-60.0000000574120.00109309-00-2Aldrin0.18 0.0132 4.86E-60.006972,450,0000.00059120-12-7Anthracene0.0434 0.0324 7.74E-60.00267 29,500 0.000751912-24-9Atrazine700.02586.69E-60.00000005 451 No Data71-43-2Benzene1,750 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') (25oC) Organic Carbon Partition Coefficient (Koc) (L/kg) First Order Degradation Constant (1)~~

~~(d-1)56-55-3Benzo(a)anthracene0.00940.0510 9.00E-60.000137 398,000 0.00051205-99-2Benzo(b)fluoranthene0.00150.0226 5.56E-60.004551,230,000 0.00057207-08-9Benzo(k)fluoranthene0.00080.0226 5.56E-60.0000341,230,000 0.0001665-85-0Benzoic Acid3,500 0.0536 7.97E-60.0000631 0.600No Data50-32-8Benzo(a)pyrene0.00162 0.0439.00E-60.0000463 1,020,000 0.00065111-44-4Bis(2-chloroethyl)ether17,2000.0692 7.53E-60.000738 15.5 0.0019117-81-7Bis(2-ethylhexyl)phthalate0.340.03513.66E-60.00000418 15,100,000 0.001875-27-4Bromodichloromethane6,740 0.0298 1.06E-50.065655.0 No Data75-25-2Bromoform3,1000.0149 1.03E-50.021987.1 0.001971-36-3Butanol74,0000.0800 9.30E-60.0003616.920.0128385-68-7Butyl Benzyl Phthalate2.69 0.0174 4.83E-60.000051757,5000.0038586-74-8Carbazole7.48 0.0390 7.03E-60.0000006263,390No 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')~~
~~(25oC)Organic Carbon Partition Coefficient (Koc)~~
~~(L/kg)First~~
~~Order~~
~~Degradation Constant~~
~~(1)~~
~~(d-1)1563-66-2Carbofuran3200.02496.63E-6.0037737No Data75-15-0Carbon Disulfide1,190 0.104 1.00E-51.2445.7 No Data56-23-5Carbon Tetrachloride793 0.0780 8.80E-61.25174 0.001957-74-9Chlordane0.0560.0118 4.37E-60.00199120,0000.00025106-47-8p-Chloroaniline5,3000.0483 1.01E-50.000013666.1No Data108-90-7Chlorobenzene472 0.0730 8.70E-60.152219 0.0023124-48-1Chlorodibromomethane2,6000.0196 1.05E-50.032163.1 0.0038567-66-3Chloroform7,920 0.104 1.00E-50.1539.8 0.0003995-57-82-Chlorophenol22,000 0.0501 9.46E-60.016388 No Data218-01-9Chrysene0.0016 0.02486.21E-60.00388398,0000.0003594-75-72,4-D6800.02317.31E-60.000000414510.0038572-54-84,4'-DDD0.090.0169 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')~~
~~(25oC)Organic Carbon Partition Coefficient (Koc)~~
~~(L/kg)First~~
~~Order~~
~~Degradation Constant~~
~~(1)~~
~~(d-1)72-55-94,4'-DDE0.120.0144 5.87E-60.0008614,470,0000.000062 50-29-34,4'-DDT0.0250.0137 4.95E-60.0003322,630,0000.000062 75-99-0Dalapon900,0000.0414 9.46E-6 0.000002645.8 0.00577553-70-3Dibenzo(a,h)anthracene0.00249 0.0202 5.18E-60.0000006033,800,0000.0003796-12-81,2-Dibromo-3-chloropropane1,2000.0212 7.02E-60.00615182 0.001925106-93-41,2-Dibromoethane4,200 0.02878.06E-60.030393 0.00577584-74-2Di-n-butyl Phthalate11.2 0.0438 7.86E-60.000000038533,9000.0301395-50-11,2-Dichlorobenzene1560.0690 7.90E-60.0779617 0.0019106-46-71,4-Dichlorobenzene73.8 0.0690 7.90E-60.0996617 0.001991-94-13,3-Dichlorobenzidine3.110.0194 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')~~
~~(25oC)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-60.0000185288O.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')~~
~~(25oC)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-60.0004592,1400.07629145-73-3Endothall21,0000.02918.07E-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')~~
~~(25oC)Organic Carbon Partition Coefficient (Koc)~~
~~(L/kg)First~~
~~Order~~
~~Degradation Constant~~
~~(l)~~
~~(d-1)118-74-1Hexachlorobenzene6.2 0.0542 5.91E-60.0541 55,000 0.00017319-84-6Alpha-HCH (alpha-BHC)2.00.0142 7.34E-60.0004351,2300.002558-89-9Gamma-HCH (Lindane)6.80.0142 7.34E-60.0005741,0700.002977-47-4Hexachlorocyclo-Pentadiene1.80.0161 7.21E-61.11200,000 0.01267-72-1Hexachloroethane500.00256.80E-60.1591,780 0.00192193-39-5Indeno(1,2,3-c,d)pyrene0.0000220.0190 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 Data72-43-5Methoxychlor0.0450.01564.46E-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')~~
~~(25oC)Organic Carbon Partition Coefficient (Koc)~~
~~(L/kg)First~~
~~Order~~
~~Degradation Constant~~
~~(l)~~
~~(d-1)95-48-72-Methylphenol (o-cresol)26,000 0.0740 8.30E-60.000049291.2 0.049591-20-3Naphthalene31.00.0590 7.50E-60.01982,000 0.002798-95-3Nitrobenzene2,0900.0760 8.60E-60.00098464.6 0.0017686-30-6N-Nitrosodiphenylamine35.10.03126.35E-60.0002051,2900.01621-64-7N-Nitrosodi-n-propylamine9,8900.0545 8.17E-60.000092324.0 0.001987-86-5Pentachlorophenol1,9500.05606.10E-60.000001592 0.00045108-95-2Phenol82,800 0.0820 9.10E-60.000016328.8 0.0991918-02-1Picloram4300.02555.28E-60.000000001661.98No Data1336-36-3Polychlorinated biphenyls (PCBs)0.7------a ------a---------a 309,000 No Data129-00-0Pyrene0.1350.0272 7.24E-60.000451105,0000.00018122-34-9Simazine50.0277.36E-60.0000000133133No Data100-42-5Styrene3100.0710 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') (25oC) Organic Carbon Partition Coefficient (Koc) (L/kg) First Order Degradation Constant (1)~~

~~(d-1) 93-72-1 2,4,5-TP (Silvex) 310.01945.83E-60.00000000325,440 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 120-82-1 1,2,4-Trichlorobenzene 3000.0300 8.23E-60.05821,780 0.001971-55-6 1,1,1-Trichloroethane 1,330 0.0780 8.80E-60.705110 0.001379-00-5 1,1,2-Trichloroethane 4,420 0.0780 8.80E-60.037450.10.0009579-01-6 Trichloroethylene 1,100 0.0790 9.10E-60.422166 0.0004295-95-4 2,4,5-Trichlorophenol 1,2000.0291 7.03E-60.0001781,6000.0003888-06-2 2,4,6-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 0.00024108-38-3 m-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') (25oC) Organic Carbon Partition Coefficient (Koc) (L/kg) First Order Degradation Constant (1)~~

~~(d-1) 95-47-6 o-Xylene 178 0.0871.00E-50.213363 0.0019106-42-3 p-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;~~

~~b. 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')~~
~~(25oC)Dimensionless~~ (25°C)Dimensionless Henry's Law Constant (H') (13~~oC)~~°C)

For the indoor inhalation exposure routeOrganic Carbon Partition Coefficient (Koc) (L/kg)First Order Degradation Constant (l)(d-1)Vapor Pressure (mm/Hg)Neutral Organics83-32-9Acenaphthene3.60E+004.76E-027.69E-066.60E-03------b6.30E+033.40E-032.50E-0367-64-1Acetone1.00E+061.24E-011.14E-051.60E-039.73E-047.80E-014.95E-022.30E+0215972-60-8Alachlor2.40E+022.13E-025.28E-063.40E-06------b3.20E+03No Data2.20E-05116-06-3Aldicarb6.03E+033.18E-027.24E-065.90E-08------b1.29E+011.09E-033.47E-05309-00-2Aldrin1.70E-021.96E-024.86E-067.00E-03------b2.50E+055.90E-046.00E-06120-12-7Anthracene4.30E-023.85E-027.74E-062.70E-03------b2.50E+047.50E-042.70E-061912-24-9Atrazine7.00E+012.59E-026.67E-069.68E-08------b3.63E+02No Data2.70E-0771-43-2Benzene1.80E+038.80E-021.02E-052.30E-011.34E-015.00E+019.00E-049.50E+01
56-55-3Benzo(a)anthracene9.40E-035.10E-029.00E-061.39E-04-------b4.00E+055.10E-041.10E-07205-99-2Benzo(b)fluoranthene1.50E-032.23E-025.56E-064.55E-03-------b1.05E+065.70E-045.00E-07207-08-9Benzo(k)fluoranthene8.00E-042.23E-025.56E-063.40E-05-------b1.00E+061.60E-042.00E-0965-85-0Benzoic Acid3.40E+037.02E-027.97E-061.56E-06-------b1.21E+00dNo Data7.00E-0450-32-8Benzo(a)pyrene1.60E-034.30E-029.49E-064.50E-05-------b7.90E+056.50E-045.50E-09111-44-4Bis(2-chloroethyl) ether1.72E+044.13E-027.53E-067.40E-042.94E-041.26E+011.90E-031.55E+00117-81-7Bis(2-ethylhexyl)phthalate3.40E-013.51E-023.66E-064.10E-06------b1.00E+051.80E-036.80E-0875-27-4Bromodichloromethane6.70E+035.61E-021.06E-056.60E-023.71E-025.00E+01No Data5.00E+0175-25-2Bromoform3.10E+031.49E-021.03E-052.19E-021.06E-029.12E+011.90E-035.51E+0071-36-3Butanol7.40E+048.00E-029.30E-063.61E-041.55E-046.00E+001.28E-027.00E+0078-93-32-Butanone (MEK)2.20E+058.08E-029.8E-062.30E-031.32E-032.00E+004.95E-029.50E+0185-68-7Butyl Benzyl Phthalate2.70E+001.99E-024.89E-065.30E-05-------b6.30E+043.85E-038.30E-0686-74-8Carbazole1.20E+004.17E-027.45E-063.60E-06-------b4.00E+03No Data7.00E-041563-66-2Carbofuran3.20E+022.37E-025.95E-061.27E-07-------b1.91E+02No Data4.85E-0675-15-0Carbon Disulfide1.20E+031.04E-011.00E-051.23E+008.06E-016.30E+01No Data3.60E+0256-23-5Carbon Tetrachloride7.90E+027.80E-028.80E-061.23E+007.48E-012.00E+021.90E-031.20E+0257-74-9Chlordane5.60E-021.79E-024.37E-062.00E-03------b2.50E+052.50E-049.80E-06106-47-8p-Chloroaniline5.30E+039.99E-021.01E-054.76E-

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-06123-91-1p-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-
~~Pentadiene~~pentadiene 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 (MCPP) 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-------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-Xylene1.60E+027.00E-027.80E-062.99E-011.52E-013.98E+021.90E-038.50E+00
95-47-6o-Xylene1.80E+028.70E-021.00E-052.13E-011.07E-013.16E+021.90E-036.60E+00106-42-3p-Xylene1.60E+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); Water~~9~~ (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 ~~Matterb~~Matter appropriately adjusted to estimate the fraction of organic carbon as stated in Nelson and Sommers (1982)b ? or ~~?T~~TT (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?a~~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?w~~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 5084-90Flexible Wall PermeameterbK~~ModelK (hydraulic conductivity)Surface or ~~SubsurfacePump~~SubsurfaceASTM-D 5084-90 Flexible Wall PermeameterbPump TestSlug Testi (hydraulic gradient)Surface or SubsurfaceField 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&E1For noncarcinogenic contaminants
J&E2To 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&E3Soil gas remediation objective (mg/m3)
J&E4Soil Vapor Saturation Limit
(mg/m3-air)J&E5Groundwater remediation objectives
J&E6Attenuation factor
Attenuation factor when the mode of contaminant transport is both diffusion and advection

Qsoil = 83.33 cm3/sec
J&E7Attenuation factor when the mode of contaminant transport is diffusion only

Qsoil= 0 cm3/sec
J&E8Total overall effective diffusion coefficient for vapor transport in porous media for multiple soil layers (cm2/s)J&E9~~aIn~~aIn Equation J&E9a, the following condition must be satisfied:J&E9b
Source to building separation (cm)J&E10Effective 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 ~~buildingJ~~buildingJ&E12aSurface ~~are~~area of enclosed space at or below grade (cm2)For a building with a basementJ&E12bBuilding ventilation rate (cm3/s)
J&E13
Area of total cracks (cm2)
J&E14Effective diffusion coefficient through the cracks (cm2/s)

J&E15Total ~~porosity J~~porosityJ&E16Water-filled soil ~~porosityJ~~porosityJ&E17Air-filled soil ~~porosityJ~~porosityJ&E18

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

Section 742.APPENDIX C~~:~~ Tier 2 Tables

Section 742.~~Table~~TABLE M~~:~~ J&E Parameters

Symbol~~ParameterUnits~~ Parameter Units SourceTier 1 or Calculated ValueABSurface area of enclosed space at or below gradecm2Equation J&E 12a or 12b, Appendix C, Table ~~LResidential~~LResidential = 1 x 106 Industrial/Commercial = 4.0 x 106AcrackArea of total crackscm2Equation J&E 14, Appendix C, Table ~~LCalculated~~LCalculated ValueATcAveraging time for ~~carcinogensyearSSL~~carcinogensyearSSL, May ~~199670~~199670ATncAveraging time for ~~noncarcinogensyear~~noncarcinogensyearATnc = EDResidential = 30 ~~ATnc= ED~~

~~Residential = 30~~
Industrial/Commercial = 25

~~Cvsat Soil~~CvsatSoil vapor saturation limitmg/m3-airEquation J&E 5, Appendix C, Table LChemical-Specific or Calculated ValueDcrackeffEffective diffusion coefficient through the crackscm2~~/sEquation~~/sEquation J&E 15, Appendix C, Table ~~LCalculated~~LCalculated ValueDiDiffusivity in aircm2~~/s Appendix~~/sAppendix C, Table ~~E~~
~~Chemical-SpecificDieffEffective~~EChemical-SpecificDieffEffective diffusion coefficient for each soil ~~layer cm2 /sEquation~~layercm2/sEquation J&E 11, Appendix C, Table ~~L~~

~~Calculated Value~~
~~DsourceDistance~~LCalculated ValueDsourceDistance from ground surface to top of ~~contamination cm Field MeasurementSoil~~contaminationcmField MeasurementSoil Contamination = 152.4 Groundwater Contamination = 304.8 Site-~~Specific~~ ~~DTeffTotal~~SpecificDTeffTotal overall effective diffusion ~~coefficientcm~~coefficientcm2 /sEquation J&E 9a, Appendix C, Table LCalculated ValueDwDiffusivity in watercm2~~/sAppendix~~/sAppendix C, Table ~~EChemical~~EChemical-SpecificEDExposure ~~durationyearResidential~~durationyearResidential: SSL, May 1996
Industrial/Commercial: SSL 2002Residential = 30 Industrial/Commercial = 25~~EFExposure~~EFExposure frequency day/~~yearResidential~~yearResidential: SSL, May 1996
Industrial/Commercial: SSL 2002Residential = 350 Industrial/ Commercial = 250ERAir exchange rateexchanges per ~~hour~~
~~Illinois EPAResidential~~hourIllinois EPAResidential = 0.53 Industrial/ Commercial = 0.93focFraction organic carbon ~~content g/gSSL~~contentg/gSSL, May 1996, or Field Measurement
Appendix C, Table F0.002 or Site-~~Specific~~
~~HBHeight of buildingcm~~
~~Illinois EPASlab on Grade~~SpecificHBHeight of buildingcmIllinois 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 3H'~~TSDimensionless~~TSDimensionless Henry's law constant at the system (soil) temperature
~~13°CunitlessAppendix C, Table E~~
~~Chemical-SpecificLB~~
~~Length of buildingcm~~

~~Illinois EPAResidential = 1000~~ 13°CunitlessAppendix C, Table EChemical-SpecificLBLength of buildingcmIllinois EPAResidential = 1000
Industrial/Commercial = 2000 or Site-Specific in Tier 3LcrackSlab ~~thicknesscmUS EPA~~thicknesscmUSEPA, Users Guide ~~2004 10~~
~~LFDistance~~, 200410LFDistance from ground surface to bottom of ~~slab cmUS EPA~~slabcmUSEPA, Users Guide ~~200410~~, 200410 (slab on grade) 200 (basement)~~LiThickness~~LiThickness of soil layer ~~i cmField~~icmField Measurement~~For capillary fringe~~ for Capillary Fringe, USEPA, 2004Site-Specific
For ~~capillary fringe~~Capillary Fringe, 37.5 cmLTDistance from bottom of slab to top of ~~contaminationcmField~~contaminationcmField Measurement or Equation J&E 10, Appendix C, Table L 142.4 or Site-~~Specific MWMolecular~~SpecificMWMolecular weightg/~~mole~~
~~Illinois EPA Chemical-SpecificnTotal~~moleIllinois EPAChemical-SpecificnTotal 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 measurementSite~~unitlessField MeasurementSite-SpecificPVapor PressureatmAppendix C, Table EChemical-~~SpecificQbldgBuilding~~SpecificQbldgBuilding ventilation ratecm3/~~sEquation~~sEquation J&E 13, Appendix C, Table ~~LSlab~~ LSlab-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~~QsoilVolumetric~~QsoilVolumetric flow rate of soil gas into the enclosed ~~space cm3/sUS EPA~~spacecm3/sUSEPA, Users Guide for Evaluating Subsurface Vapor Intrusion into Buildings, 2004 If LT is less than 5 feet (152 cm), Qsoil equals ~~83.33~~83.33.

If LT is 5 feet (152 cm) or greater, Qsoil equals zero .

An input value of zero requires an institutional control. See Section 742.505(b) and (c). RIdeal gas constantatm-L/mol-~~KUS EPA~~KUSEPA, Users Guide, 20040.08206 ~~RfCReference~~RfCReference concentration~~ug~~ug/m3Illinois EPA: http://www.epa.state.il.us/land/taco/toxicity-values.~~xls~~

~~Toxicological Specific ROgwGroundwater~~xlsToxicological-SpecificROgwGroundwater remediation objectivemg/~~LAppendix~~LAppendix B, Table E, or Equation J&E 6, Appendix C, Table ~~L Chemical~~LChemical-Specific or Calculated ~~Value~~

~~ROindoor airIndoor~~ValueROindoor-airIndoor air remediation objectivemg/m3Equations J&E 1 and 2, Appendix C, Table ~~L Calculated Value~~
~~ROsoilgasSoil~~LCalculated ValueROsoilgasSoil gas remediation objectivemg/m3Equation J&E 4, Appendix C, Table ~~LCalculated~~LCalculated ValueSSolubility in watermg/~~LAppendix~~LAppendix C, Table ~~EChemical~~EChemical-SpecificTTemperature ~~KUS EPA~~°KUSEPA, Users Guide, 2004286 (converted from 13oC)THQTarget hazard quotient for a ~~chemicalunitless SSL, May 1996~~
~~1TRTarget~~chemicalunitlessSSL, May 19961TRTarget risk or the increased chance of developing cancer over a lifetime due to exposure to a

~~chemicalunitlessSSL~~chemicalunitlessSSL, May 1996Residential = 10-6 at the point of human exposure
Industrial/Commercial = 10-6 at the point of human ~~exposure~~

~~URFUnit~~exposureURFUnit risk factor(~~ug~~ug/m3) -1Illinois EPA: http://www.epa.state.il.us/land/taco/toxicity-values.~~xls Toxicological Specificw Floor~~xlsToxicological- SpecificwFloor-wall seam ~~gap cmUS EPA~~gapcmUSEPA, Users Guide, 20040.1 WMoisture contentg of water/g of soilField Measurement, Appendix C, Table FSite-~~Specific~~SpecificWBWidth of buildingcmIllinois EPAResidential = 1000
~~WB~~
~~Width of buildingcm~~
~~Illinois EPA~~

~~Residential = 1000~~
Industrial/ Commercial = 2000
or Site-Specific in Tier 3aAttenuation ~~factor unitlessEquations~~factorunitlessEquations J&E 7 or 8, Appendix C, Table ~~LSite-SpecificqaAir~~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~~?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, ~~qa~~Ta,i = 0.1 ~~qT~~TT,i~~qT~~?T,crackTotal porosity for soil in crackscm3/cm3SSL, May 1996 or
Equation J&E 16, Appendix C, Table L0.43~~qT~~?T,iTotal porosity of soil layer icm3/cm3SSL, May 1996 or
Equation J&E 16, Appendix C, Table L0.43 or Calculated Value~~qwWater~~?wWater-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~~?bDry 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~~ real property 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~~ A 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~~Countyand State, DO HEREBY CERTIFY, ~~that~~ _____ ~~and~~ _____, thatand,personally known to me to be the Property Owner(s) of_____, ~~and personally~~, andpersonally 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__~~.

thisday 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~~theProperty 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__.

, thisday 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 IllinoisofIllinois, commonly known as _____, _____, Illinois and,, Illinoisand more particularly described as:LIST THE COMMON ADDRESS;
LEGAL DESCRIPTION; AND
REAL ESTATE TAX INDEX OR PARCEL #
(PURSUANT TO SECTION 742. 1010742.1010(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~~

Document comparison done by DeltaView on Friday, May 11, 2012 11:55:05 AM

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Total changes	1602

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

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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 36 Ill. Reg. _____, effective _____.

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 USC~~U.S.C.~~ 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 routes~~route(s)~~ 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 ~~and~~ 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 and Risk Based Corrective Action (RBCA) model and modified Johnson and Ettinger (J&E) 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;

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

"District 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°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 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.

"Q_{soil}" 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 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/m^3), 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 "C_{sat}" means 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 that are liquid at ambient soil temperatures) do not apply, and alternative modeling approaches are required

~~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~~.

"Soil Vapor Saturation Limit" or "C_v^{sat}" 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 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" or "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 International. ~~American Society for Testing and Materials,~~ 100 Barr Harbor Drive, West Conshohocken~~,~~ PA 19428-2959, (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.

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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).

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 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;

3) All samples shall be collected within the contaminated area;~~.~~

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~~,~~ 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 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® 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 requirements in 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;

b)~~a)~~ 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 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 requirements in subsections (b)(1)(A), (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 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 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

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 cm^3/cm^3.

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 cm^3/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 cm^3/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 cm^3/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.

c)~~b)~~ 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 cm^3/cm^3.

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 cm^3/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 cm^3/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 cm^3/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 whenwhere 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 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 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~~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.

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~~b~~)(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)~~c)~~ 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, 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 ~~inhalation~~ 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 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.

h)~~f)~~ 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.

i)~~g)~~ If the calculated Tier 2 soil remediation objective for an exposure route is more stringent than the Tier 1 soil remediation objectives~~objective(s)~~ 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.

j)~~h)~~ 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 routes~~route(s)~~ 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 units~~unit(s)~~ 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; and ~~for:~~

~~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 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 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 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 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 equations~~equation(s)~~, 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 (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 $(mg/kg\text{-}d)^{-1}$);

D) Inhalation Unit Risk Factor (URF expressed in $(\mu g/m^3)\text{-}^{-1}$);

E) Inhalation Chronic Reference Concentration (RfC, expressed in mg/m^3);

F) Inhalation Subchronic Reference Concentration (RfC_s, expressed in mg/m^3, shall be used for construction worker remediation

objective calculations);

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

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

I) Inhalation Slope Factor (SF_i, expressed in $(mg/kg\text{-}d)^{-1}$);

2) Toxicological information can be obtained by following the guidelines in OSWER Directive 9285.7-53~~from IRIS~~, 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, Tables~~Table~~ 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 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,

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.

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 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 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 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) 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 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.

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~~Partion~~ Coefficient (K_d) for non-ionizing organics, Water-Filled Soil Porosity Theta$_w$ (Θ_w) and Air-Filled Soil Porosity Theta$_a$ (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.

C) The default value for GW_{obj} is the Tier 1 groundwater objective. For chemicals for which there is no Tier 1 groundwater remediation objective, the value for GW_{obj} 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, GW_{obj} 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 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 (25°C), 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 outdoor inhalation exposure~~ambient vapor inhalation (outdoor)~~ 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 (VF_{ss}) using Equations R3 and R4; and

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

C) VF_{ss} 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 VF_{ss}. 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., 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.

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.

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 when the mode of contaminant transport is both diffusion and advection. In this scenario, the Q_{soil} value equals 83.33 cm^3/sec as described in Section 742.505.

f) Equation J&E8 is used when the mode of contaminant transport is diffusion only. In this scenario, the Q_{soil} value equals 0.0 cm^3/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,…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 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_v^{sat}, Equation J&E6b) for each volatile chemical. The calculated C_v^{sat} shall use the default representative subsurface temperature specified in subsection (g). If the calculated soil gas remediation objective is greater than C_v^{sat}, then C_v^{sat} 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~~contaminant~~ 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:

$$W_{ave} = \frac{x_1}{CUO_{x_1}} + \frac{x_2}{CUO_{x_2}} + \frac{x_3}{CUO_{x_3}} + \ldots + \frac{x_a}{CUO_{x_a}}$$

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.

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 contaminants~~contaminant(s)~~ of concern listed in Appendix A, Table I, plus any other contaminants~~contaminant(s)~~ of concern detected in groundwater and listed in Appendix A, Table F as affecting the same target organ/organ system as the contaminants~~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

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	=	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

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;

B) From the immediate down-gradient edge of the source of the groundwater contamination values for S_w and S_d shall be determined. S_w is defined as the width of groundwater at the source which exceeds the Tier 1 groundwater remediation objective. S_d 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 (C_x) 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:

A) the soil gas remediation objective calculated in accordance with Equation J&E4; and

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

2) Equation J&E7 is used when the mode of contaminant transport is both diffusion and advection. In this scenario, the Q_{soil} value equals 83.33 cm^3/sec as described in Section 742.505.

3) Equation J&E8 is used when the mode of contaminant transport is diffusion only. In this scenario, the Q_{soil} value equals 0.0 cm^3/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 parkwayspathway(s) 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 reasons~~reason(s)~~ 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 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 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;

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;

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 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 voidance 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 or mapsmap(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 thatwhich exceeds the applicable groundwater remediation objectives;

4) Information identifying the current ownersowner(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;

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. 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 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 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 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 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 subsection (c)(1).

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

Section 742.APPENDIX A General

Section 742.TABLE A Soil Saturation Limits (C_{sat}) for Chemicals Whose Melting Point is Less than 30°C

CAS No.	Chemical Name	For the Outdoor Inhalation Exposure Route[a] C_{sat} (mg/kg)	For the Soil Component of the Groundwater Ingestion Exposure Route[b] C_{sat} (mg/kg)
67-64-1	Acetone	1.00E+05	2.00E+05
71-43-2	Benzene	8.00E+02	5.80E+02
111-44-4	Bis(2-chloroethyl)ether	3.00E+03	3.90E+03
117-81-7	Bis(2-ethylhexyl)phthalate	2.00E+02	6.80E+01
75-27-4	Bromodichloromethane (Dichlorobromomethane)	2.80E+03	2.00E+03
75-25-2	Bromoform	2.00E+03	1.20E+03
71-36-3	Butanol	1.00E+04	1.60E+04
78-93-3	2-Butanone (MEK)	2.50E+04	4.50E+04
85-68-7	Butyl benzyl phthalate	1.00E+03	3.40E+02
75-15-0	Carbon disulfide	8.50E+02	5.20E+02
56-23-5	Carbon tetrachloride	1.20E+03	5.60E+02
108-90-7	Chlorobenzene (Monochlorobenzene)	6.20E+02	2.90E+02
124-48-1	Chlorodibromomethane (Dibromochloromethane)	1.40E+03	8.90E+02
67-66-3	Chloroform	3.40E+03	2.50E+03
95-57-8	2-Chlorophenol[c] (ionizable organic)	1.00E+04	7.10E+03
75-99-0	Dalapon	1.20E+05	1.90E+05
96-12-8	1,2-Dibromo-3-chloropropane	6.90E+02	4.30E+02

CAS No.	Chemical Name	For the Outdoor Inhalation Exposure Route[a] C_{sat} (mg/kg)	For the Soil Component of the Groundwater Ingestion Exposure Route[b] C_{sat} (mg/kg)
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	1.60E+03	1.20E+03
84-74-2	Di-*n*-butyl phthalate	2.60E+03	8.80E+02
95-50-1	1,2-Dichlorobenzene (o-Dichlorobenzene)	5.60E+02	2.10E+02
75-71-8	Dichlorodifluoromethane	8.70E+02	4.30E+02
75-34-3	1,1-Dichloroethane	1.70E+03	1.40E+03
107-06-2	1,2-Dichloroethane (Ethylene dichloride)	1.90E+03	2.10E+03
75-35-4	1,1-Dichloroethylene	1.40E+03	9.10E+02
156-59-2	*cis*-1,2-Dichloroethylene	1.30E+03	1.00E+03
156-60-5	*trans*-1,2-Dichloroethylene	3.00E+03	2.10E+03
78-87-5	1,2-Dichloropropane	1.20E+03	8.70E+02
542-75-6	1,3-Dichloropropene (1,3-Dichloropropylene, *cis* + *trans*)	1.00E+03	8.50E+02
84-66-2	Diethyl phthalate	2.20E+03	9.20E+02
105-67-9	2,4-Dimethylphenol	1.00E+04	4.70E+03
117-84-0	Di-*n*-octyl phthalate	1.60E+01	5.20E+00
123-91-1	p-Dioxane	1.00E+05	2.00E+05
100-41-4	Ethylbenzene	3.50E+02	1.50E+02
77-47-4	Hexachlorocyclopentadiene	1.30E+02	4.40E+01
78-59-1	Isophorone	3.00E+03	3.00E+03
98-82-8	Isopropylbenzene (Cumene)	9.40E+02	4.00E+02
7439-97-6	Mercury (elemental)	3.10E+00	N/A

CAS No.	Chemical Name	For the Outdoor Inhalation Exposure Route[a] C_{sat} (mg/kg)	For the Soil Component of the Groundwater Ingestion Exposure Route[b] C_{sat} (mg/kg)
74-83-9	Methyl bromide (Bromomethane)	3.10E+03	3.60E+03
1634-04-4	Methyl tertiary-butyl ether	8.40E+03	1.10E+04
75-09-2	Methylene chloride (Dichloromethane)	2.50E+03	3.00E+03
98-95-3	Nitrobenzene	7.10E+02	5.90E+02
621-64-7	n-Nitrosodi-n-propylamine	1.90E+03	2.30E+03
100-42-5	Styrene	6.30E+02	2.60E+02
127-18-4	Tetrachloroethylene (Perchloroethylene)	8.00E+02	3.10E+02
108-88-3	Toluene	5.80E+02	2.90E+02
120-82-1	1,2,4-Trichlorobenzene	3.40E+02	1.20E+02
71-55-6	1,1,1-Trichloroethane	1.30E+03	6.70E+02
79-00-5	1,1,2-Trichloroethane	1.80E+03	1.30E+03
79-01-6	Trichloroethylene	1.20E+03	6.50E+02
75-69-4	Trichlorofluoromethane	1.80E+03	8.90E+02
108-05-4	Vinyl acetate	2.60E+03	4.20E+03
75-01-4	Vinyl chloride	2.60E+03	2.90E+03
108-38-3	m-Xylene	4.10E+02	1.60E+02
95-47-6	o-Xylene	3.70E+02	1.50E+02
106-42-3	p-Xylene	3.30E+02	1.40E+02
1330-20-7	Xylenes (total)	2.80E+02	1.10E+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] C_{sat} for pH of 6.8. If soil pH is other than 6.8, a site-specific C_{sat} should be calculated using equations S19 and S29 and the pH-specific K_{oc} values in Appendix C, Table I.

~~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-*n*-butyl phthalate~~	~~2,300~~
~~95-50-1~~	~~1,2-Dichlorobenzene (o-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~~	~~*cis*-1,2-Dichloroethylene~~	~~1,200~~
~~156-60-5~~	~~*trans*-1,2-Dichloroethylene~~	~~3,100~~
~~78-87-5~~	~~1,2-Dichloropropane~~	~~1,100~~
~~542-75-6~~	~~1,3-Dichloropropene (1,3-Dichloropropylene, *cis* + *trans*)~~	~~1,400~~
~~84-66-2~~	~~Diethyl phthalate~~	~~2,000~~
~~117-84-0~~	~~Di-*n*-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~~

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

Section 742.APPENDIX A General

Section 742.TABLE E Similar-Acting Noncarcinogenic Chemicals

Adrenal Gland
Isopropylbenzene

Cholinesterase Inhibition
Aldicarb
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
Ensosulfan
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)
Ensosulfan
2-Methylphenol (o-cresol)
Naphthalene (ingestion only)

Nickel (ingestion only)
n-Nitrosodiphenylamine
Phenol (ingestion only)
Simazine
Tetrachloroethylene (ingestion only)
1,1,1-Trichloroethane (ingestion only)
Vinyl acetate (ingestion only)
Xylenes (Res. & I/C only) (ingestion only)

Endocrine System
Cyanide
1,2-Dibromoethane (ingestion only)
Di-n-octyl phthalate (ingestion only)
Nitrobenzene
1,2,4-Trichlorobenzene (ingestion only)

Eye
2,4-Dinitrophenol
n-Nitrosodiphenylamine
Polychlorinated biphenyls (PCBs)
Trichloroethylene

Gastrointestinal System
Beryllium (ingestion only)
Copper
1,3-Dichloropropene (cis + trans)
Endothall
Fluoride
Hexachlorocyclopentadiene (ingestion only)
Iron
Methyl bromide (ingestion only)
Methyl tertiary-butyl ether (ingestion only)

Immune System
4-Chloroaniline
2,4-Dichlorophenol
Mercury (ingestion only)
Polychlorinated biphenyls (PCBs)

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)
Ensosulfan
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)
1,4-Dichlorobenzene
Dichlorodifluoromethane
1,2-Dichloroethane (inhalation only)
1,1-Dichloroethylene
trans-1,2-Dichloroethylene
1,2-Dichloropropane (ingestion only)
Dieldrin (Res. & I/C only)
2,4-Dinitrotoluene

2,6-Dinitrotoluene
Di-n-octyl phthalate (ingestion only)
p-Dioxane
Endrin
Ethylbenzene (ingestion only)
Fluoranthene
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
alpha-HCH (alpha-BHC)
gamma-HCH (gamma-BHC)
High Melting Explosive, Octogen (HMX)
Isophorone (inhalation only)
Methyl tertiary-butyl ether
Methylene Chloride (ingestion only)
Pentachlorophenol
Phenol (inhalation only)
Picloram
Styrene (ingestion only)
Tetrachloroethylene (ingestion only)
Toxaphene (CW only)
2,4,5-TP (Silvex)
1,2,4-Trichlorobenzene (inhalation only)
1,1,1-Trichloroethane (inhalation only)
1,1,2-Trichloroethane (ingestion only)
2,4,5-Trichlorophenol
2,4,6-Trinitrotoluene (TNT)
Vinyl Chloride

Mortality
Di-n-butyl phthalate (ingestion only)
Xylenes (Res. & I/C only) (ingestion only)

Nervous 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)
2,4,6-Trichlorophenol

Respiratory System
Antimony (inhalation only)
Benzoic Acid (inhalation only)
Beryllium (inhalation only)
Cadmium (inhalation only)
Chromium (hex) (inhalation only)
Cobalt (inhalation only)
1,2-Dibromoethane (inhalation only)
trans-1,2-Dichloroethylene (inhalation only)
1,2-Dichloropropane (inhalation only)
1,3-Dichloropropene (cis + trans) (inhalation only)
Hexachlorocyclopentadiene (inhalation only)
Methyl bromide (inhalation only)

Naphthalene (inhalation only)
Nickel (inhalation only)
Nitrobenzene (inhalation only)
Vinyl acetate (inhalation only)

Skin
Arsenic (ingestion only)
Polychlorinated biphenyls (PCBs)
Selenium
Silver

Spleen
1,3-Dinotrobenzene
1,3,5-Trinitrobenzene

Notes:
Res. = Residential receptor
I/C = Industrial Commercial receptor
CW = Construction Worker receptor

~~Adrenal Gland~~
~~Nitrobenzene~~
~~1,2,4-Trichlorobenzene (Ingestion only)~~

~~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)~~

~~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)~~

~~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)~~
~~Napthalene (Inhalation only)~~
~~Toluene (Inhalation only)~~
~~Vinyl acetate (Inhalation only)~~

~~Cholinesterase Inhibition~~
~~Aldicarb~~
~~Carbofuran~~

~~Decreased Body Weight Gains and Circulatory System Effects~~
~~Atrazine~~
~~Simazine~~

(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 only)
Chloroform (ingestion only)
1,2-Dibromo-3-chloropropane (ingestion only)
Nitrobenzene

Liver
Aldrin
Bis(2-chloroethyl)ether
Bis(2-ethylhexyl)phthalate
Carbazole
Carbon Tetrachloride
Chlordane
Chloroform

DDD
DDE
DDT
1,2-Dichloropropane
Dieldrin
2,4-Dinitrotoluene
2,6-Dinitrotoluene
p-Dioxane
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
alpha-HCH (alpha-BHC)
gamma-HCH (gamma-BHC)
Methylene Chloride
Nitrobenzene
n-Nitrosodiphenylamine (inhalation only)
n-Nitrosodi-n-propylamine
Pentachlorophenol
Polychlorinated biphenyls (PCBs)
Tetrachloroethylene
Toxaphene
Trichloroethylene
Vinyl Chloride (I/C & CW)
Vinyl Chloride (Res.)

Mammary Gland
3,3'-Dichlorobenzidine
2,4-Dinitrotoluene
2,6-Dinitrotoluene

Respiratory System
Arsenic (inhalation only)
Benzo(a)anthracene (inhalation only)
Benzo(b)fluoranthene (inhalation only)
Benzo(k)fluoranthene (inhalation only)
Benzo(a)pyrene (inhalation only)
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)
Trichloroethylene

Notes:
Res. = Residential receptor
I/C = Industrial Commercial receptor
CW = Construction Worker receptor

~~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~~

~~3,30-Dichlorobenzidine~~
~~1,3-Dichloropropylene (Ingestion only)~~
~~N-Nitrosodiphenylamine~~

(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

CAS No.	Chemical
67-64-1	Acetone
71-43-2	Benzene
111-44-4	Bis(2-chloroethyl)ether
75-27-4	Bromodichloromethane
75-25-2	Bromoform
71-36-3	Butanol
78-93-3	2-Butanone (MEK)
75-15-0	Carbon disulfide
56-23-5	Carbon tetrachloride
108-90-7	Chlorobenzene
124-48-1	Chlorodibromomethane
67-66-3	Chloroform
95-57-8	2-Chlorophenol
75-99-0	Dalapon
96-12-8	1,2-dibromo-3-chloropropane
106-93-4	1,2-Dibromoethane
95-50-1	1,2-Dichlorobenzene
106-46-7	1,4-Dichlorobenzene
75-71-8	Dichlorodifluoromethane
75-34-3	1,1-Dichloroethane
107-06-2	1,2-Dichloroethane
75-35-4	1,1-Dichloroethylene
156-59-2	cis-1,2-Dichloroethylene
156-60-5	Trans-1,2-Dichloroethylene
78-87-5	1,2-Dichloropropane
542-75-6	1,3-Dichloropropylene (cis + trans)
123-91-1	p-Dioxane
100-41-4	Ethylbenzene
76-44-8	Heptachlor
118-74-1	Hexachlorobenzene
77-47-4	Hexachlorocyclopentadiene
67-72-1	Hexachloroethane
78-59-1	Isophorone
98-82-8	Isopropylbenzene (Cumene)
7439-97-6	Mercury
74-83-9	Methyl bromide

CAS No.	Chemical
1634-04-4	Methyl tertiary-butyl ether
75-09-2	Methylene chloride
93-65-2	2-Methylnaphthalene
95-48-7	2-Methylphenol (o-cresol)
91-20-3	Naphthalene
98-95-3	Nitrobenzene
621-64-7	n-Nitrosodi-n-propylamine
108-95-2	Phenol
1336-36-3	Polychlorinated biphenyls (PCBs)
100-42-5	Styrene
127-18-4	Tetrachloroethylene
108-88-3	Toluene
120-82-1	1,2,4-Trichlorobenzene
71-55-6	1,1,1-Trichloroethane
79-00-5	1,1,2-Trichloroethane
79-01-6	Trichloroethylene
75-69-4	Trichlorofluoromethane
108-05-4	Vinyl acetate
75-01-4	Vinyl chloride
108-38-3	m-Xylene
95-47-6	o-Xylene
106-42-3	p-Xylene
1330-20-7	Xylenes (total)

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

4017 **Section 742.APPENDIX A General**

4018

4019 **Section 742.TABLE K Soil Vapor Saturation Limits (C_v^{sat}) for Volatile Chemicals**

4020

CAS No.	Chemical Name	C_v^{sat} (mg/m^3)
67-64-1	Acetone	7.50E+05
71-43-2	Benzene	4.20E+05
111-44-4	Bis(2-chloroethyl)ether	1.20E+04
75-27-4	Bromodichloromethane	4.50E+05
75-25-2	Bromoform	7.80E+04
71-36-3	Butanol	2.90E+04
78-93-3	2-Butanone (MEK)	3.80E+05
75-15-0	Carbon disulfide	1.50E+06
56-23-5	Carbon tetrachloride	1.00E+06
108-90-7	Chlorobenzene	7.40E+04
124-48-1	Chlorodibromomethane	5.70E+04
67-66-3	Chloroform	1.30E+06
95-57-8	2-Chlorophenol (ionizable organic)	1.70E+04
75-99-0	Dalapon	1.50E+03
96-12-8	1,2-Dibromo-3-chloropropane	7.80E+03
106-93-4	1,2-Dibromoethane	1.40E+05
95-50-1	1,2-Dichlorobenzene	1.10E+04
106-46-7	1,4-Dichlorobenzene	8.40E+03
75-71-8	Dichlorodifluoromethane	3.30E+07
75-34-3	1,1-Dichloroethane	1.30E+06
107-06-2	1,2-Dichloroethane	4.40E+05
75-35-4	1,1-Dichloroethylene	3.30E+06
156-59-2	cis-1,2-Dichloroethylene	1.10E+06

CAS No.	Chemical Name	C_v^{sat} (mg/m^3)
156-60-5	trans-1,2-Dichloroethylene	1.80E+06
78-87-5	1,2-Dichloropropane	3.20E+05
542-75-6	1,3-Dichloropropylene (cis + trans)	2.10E+05
123-91-1	p-Dioxane	1.90E+05
100-41-4	Ethylbenzene	5.90E+04
76-44-8	Heptachlor	8.30E+00
118-74-1	Hexachlorobenzene	2.80E-01
77-47-4	Hexachlorocyclopentadiene	9.10E+02
67-72-1	Hexachloroethane	2.80E+03
78-59-1	Isophorone	3.40E+03
98-82-8	Isopropylbenzene (Cumene)	3.00E+04
7439-97-6	Mercury (elemental)	2.20E+01
74-83-9	Methyl bromide	8.60E+06
1634-04-4	Methyl tertiary-butyl ether	1.20E+06
75-09-2	Methylene chloride	2.00E+06
93-65-2	2-Methylnaphthalene	5.30E+02
1634-04-4	2-Methylphenol (o-cresol)	1.80E+03
91-20-3	Naphthalene	6.20E+02
98-95-3	Nitrobenzene	1.70E+03
621-64-7	n-Nitrosodi-n-propylamine	9.50E+02
108-95-2	Phenol	1.50E+03
1336-36-3	Polychlorinated biphenyls (PCBs)	9.00E+00
100-42-5	Styrene	3.40E+04
127-18-4	Tetrachloroethylene	1.80E+05
108-88-3	Toluene	1.40E+05
120-82-1	1,2,4-Trichlorobenzene	4.30E+03

CAS No.	Chemical Name	C_v^{sat} (mg/m^3)
71-55-6	1,1,1-Trichloroethane	8.70E+05
79-00-5	1,1,2-Trichloroethane	1.70E+05
79-01-6	Trichloroethylene	5.30E+05
75-69-4	Trichlorofluoromethane	6.30E+06
108-05-4	Vinyl acetate	4.30E+05
75-01-4	Vinyl chloride	1.10E+07
108-38-3	m-Xylene	5.20E+04
95-47-6	o-Xylene	4.10E+04
106-42-3	p-Xylene	5.50E+04
1330-20-7	Xylenes (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 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[e]	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[e]	1,500,000[e]	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[e]	57,000[e]	150[b]
67-66-3	Chloroform	110[c]	200[c]	290[c]
95-57-8	2-Chlorophenol	17,000[e]	17,000[e]	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[e]	11,000[e]	6,700[b]
106-46-7	1,4-Dichlorobenzene	8,400[e]	8,400[e]	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[e]	1,100,000[e]	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[e]	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[c]	12,000[c]	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[c]	12[c]	10[b]
621-64-7	n-Nitrosodi-n-propylamine	0.056[c]	0.11[c]	0.15[c]
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[c]	690[c]	970[c]
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[c]	3,300[c]	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[c]	3,000[c]	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]

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

Q_{soil} equals 83.33 cm^3/sec[a]

		Soil Gas		Groundwater	
CAS No.	Chemical Name	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	Heptachlor	0.0063[c]	0.032[c]	0.0025[c]	0.0096[c]
118-74-1	Hexachlorobenzene	0.0087[c]	0.057[c]	0.0059[c]	0.0062[g]
77-47-4	Hexachlorocyclopentadiene	0.58[b]	2.6[b]	0.084[b]	0.26[b]
67-72-1	Hexachloroethane	2,800[f]	2,800[f]	50[g]	50[g]
78-59-1	Isophorone	2,900[b]	3,400[f]	12,000[g]	12,000[g]
98-82-8	Isopropylbenzene (Cumene)	600[b]	3,500[b]	2.7[b]	8.4[b]
7439-97-6	Mercury[h]	0.42[b]	2.5[b]	0.053[b]	0.060[g]
74-83-9	Methyl bromide	6.9[b]	42[b]	1.5[b]	4.8[b]
1634-04-4	Methyl tertiary-butyl ether	3,700[b]	24,000[b]	1,900[b]	6,800[b]
75-09-2	Methylene chloride	5.6[c]	45[c]	2.1[c]	8.2[c]
91-57-6	2-Methylnaphthalene	530[f]	530[f]	25[g]	25[g]
95-48-7	2-Methylphenol (o-cresol)	600[b]	1,800[f]	26,000[g]	26,000[g]
91-20-3	Naphthalene	0.11[c]	0.75[c]	0.075[c]	0.32[c]
98-95-3	Nitrobenzene	0.077[c]	0.57[c]	0.34[c]	2.0[c]
621-64-7	n-Nitrosodi-n-propylamine	0.0016[c]	0.012[c]	0.044[c]	0.27[c]
108-95-2	Phenol	140[b]	1,300[b]	28,000[b]	83,000[g]
1336-36-3	Polychlorinated biphenyls (PCBs)	---[d]	---[d]	---[d]	---[d]
100-42-5	Styrene	1,400[b]	8,500[b]	310[g]	310[g]
127-18-4	Tetrachloroethylene	0.55[c]	4.0[c]	0.091[c]	0.34[c]
108-88-3	Toluene	6,200[b]	40,000[b]	530[g]	530[g]
120-82-1	1,2,4-Trichlorobenzene	5.4[b]	25[b]	1.8	5.9[b]
71-55-6	1,1,1-Trichloroethane	6,600[b]	41,000[b]	1,000[b]	1,300[g]
79-00-5	1,1,2-Trichloroethane	170,000[f]	170,000[f]	4,400[g]	4,400[g]
79-01-6	Trichloroethylene	1.5[c]	12[c]	0.34[c]	1.3[c]
75-69-4	Trichlorofluoromethane	860[b]	5,600[b]	26[b]	82[b]
108-05-4	Vinyl acetate	250[b]	1,600[b]	160[b]	550[b]
75-01-4	Vinyl chloride	0.29[c]	4.8[c]	0.028[c]	0.21[c]
108-38-3	m-Xylene	140[b]	850[b]	43[b]	130[b]
95-47-6	o-Xylene	120[b]	790[b]	40[b]	130[b]
106-42-3	p-Xylene	130[b]	820[b]	38[b]	120[b]
1330-20-7	Xylenes (total)[e]	140[b]	840[b]	30[b]	93[b]

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

Q_{soil} equals 0.0 cm^3/sec[a,b]

		Soil Gas		Groundwater	
CAS No.	Chemical Name	Residential (mg/m^3)	Industrial/ Commercial (mg/m^3)	Residential (mg/L)	Industrial/ Commercial (mg/L)
67-64-1	Acetone	750,000[g]	750,000[g]	1,000,000[h]	1,000,000[h]
71-43-2	Benzene	41[d]	300[d]	0.41[d]	2.6[d]
111-44-4	Bis(2-chloroethyl)ether	1.9[d]	14[d]	6.6[d]	48[d]
75-27-4	Bromodichloromethane	450,000[g]	450,000[g]	6,700[h]	6,700[h]
75-25-2	Bromoform	1,800[d]	13,000[d]	170[d]	1,300[d]
71-36-3	Butanol	29,000[g]	29,000[g]	74,000[h]	74,000[h]
78-93-3	2-Butanone (MEK)	380,000[g]	380,000[g]	220,000[h]	220,000[h]
75-15-0	Carbon disulfide	81,000[c]	500,000[c]	170[c]	820[c]
56-23-5	Carbon tetrachloride	24[d]	180[d]	0.052[d]	0.31[d]
108-90-7	Chlorobenzene	8,300[c]	51,000[c]	130[c]	470[h]
124-48-1	Chlorodibromomethane	57,000[g]	57,000[g]	2,600[h]	2,600[h]
67-66-3	Chloroform	12[d]	87[d]	0.17[d]	1.1[d]
95-57-8	2-Chlorophenol	17,000[g]	17,000[g]	22,000[h]	22,000[h]
75-99-0	Dalapon[f]	1,500[g]	1,500[g]	900,000[h]	900,000[h]
96-12-8	1,2-Dibromo-3-chloropropane[f]	0.17[d]	1.3[d]	0.029[d]	0.21[d]
106-93-4	1,2-Dibromoethane	1.1[d]	7.9[d]	0.073[d]	0.52[d]
95-50-1	1,2-Dichlorobenzene	11,000[g]	11,000[g]	160[h]	160[h]
106-46-7	1,4-Dichlorobenzene	8,400[g]	8,400[g]	79[h]	79[h]
75-71-8	Dichlorodifluoromethane	32,000[c]	200,000[c]	6.8[c]	33[c]
75-34-3	1,1-Dichloroethane	81,000[c]	500,000[c]	750[c]	4,100[c]
107-06-2	1,2-Dichloroethane	10[d]	76[d]	0.50[d]	3.5[d]
75-35-4	1,1-Dichloroethylene	27,000[c]	160,000[c]	61[c]	300[c]
156-59-2	cis-1,2-Dichloroethylene	1,100,000[g]	1,100,000[g]	3,500[h]	3,500[h]
156-60-5	trans-1,2-Dichloroethylene	10,000[c]	63,000[c]	58[c]	310[c]
78-87-5	1,2-Dichloropropane	36[d]	260[d]	0.67[d]	4.5[d]
542-75-6	1,3-Dichloropropylene (cis + trans)	110[d]	830[d]	0.42[d]	2.6[d]
123-91-1	p-Dioxane	15[d]	110[d]	140[d]	1,000[d]
100-41-4	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)	---[e]	---[e]	---[e]	---[e]
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]

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 A SSL Equations

Equations for Soil Ingestion Exposure Route	Remediation Objectives for Noncarcinogenic Contaminants (mg/kg)	$\frac{THQ \bullet BW \bullet AT \bullet 365\frac{d}{yr}}{\frac{1}{RfD_o} \bullet 10^{-6}\frac{kg}{mg} \bullet EF \bullet ED \bullet IR_{soil}}$	S1
	Remediation Objectives for Carcinogenic Contaminants – Residential (mg/kg)	$\frac{TR \bullet AT_c \bullet 365\frac{d}{yr}}{SF_o \bullet 10^{-6}\frac{kg}{mg} \bullet EF \bullet IF_{soil-adj}}$	S2
	Remediation Objectives for Carcinogenic Contaminants – Industrial/Commercial, Construction Worker (mg/kg)	$\frac{TR \bullet BW \bullet AT_c \bullet 365\frac{d}{yr}}{SF_o \bullet 10^{-6}\frac{kg}{mg} \bullet EF \bullet ED \bullet IR_{soil}}$	S3
Equations for Inhalation Exposure Route (Organic Contaminants and Mercury	Remediation Objectives for Noncarcinogenic Contaminants – Residential, Industrial/Commercial (mg/kg)	$\frac{THQ \bullet AT \bullet 365\frac{d}{yr}}{EF \bullet ED \bullet \left(\frac{1}{RFC} \bullet \frac{1}{VF}\right)}$	S4
	Remediation Objectives for Noncarcinogenic Contaminants – Construction Worker (mg/kg)	$\frac{THQ \bullet AT \bullet 365\frac{d}{yr}}{EF \bullet ED \bullet \left(\frac{1}{RfC} \bullet \frac{1}{VF'}\right)}$	S5
	Remediation Objectives for Carcinogenic Contaminants – Residential, Industrial/ Commercial (mg/kg)	$\frac{TR \bullet AT_c \bullet 365\frac{d}{yr}}{URF \bullet 1000\frac{\mu g}{mg} \bullet EF \bullet ED\frac{1}{VF}}$	S6
	Remediation Objectives for Carcinogenic Contaminants – Construction Worker (mg/kg)	$\frac{TR \bullet AT_c \bullet 365\frac{d}{yr}}{URF \bullet 1000\frac{\mu g}{mg} \bullet EF \bullet ED\frac{1}{VF'}}$	S7
	Equation for Derivation of the Volatilization Factor – Residential, Industrial/ Commercial, VF (m^3/kg)	$VF = \frac{Q}{C} \bullet \frac{(3.14 \bullet D_A \bullet T)^{1/2}}{(2 \bullet \rho_b \bullet D_A)} \bullet 10^{-4}\frac{m^2}{cm^2}$	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)	$D_A = \frac{\left(\theta_a^{3.33} \bullet D_i \bullet H'\right) + \left(\theta_w^{3.33} \bullet D_w\right)}{\eta^2} \bullet \frac{1}{\left(\rho_b \bullet K_d\right)} + \theta_w + \left(\theta_a \bullet H'\right)$	S10
Equations for Inhalation Exposure Route (Fugitive Dusts)	Remediation Objectives for Noncarcinogenic Contaminants – Residential, Industrial/Commercial (mg/kg)	$\frac{THQ \bullet AT \bullet 365\frac{d}{yr}}{EF \bullet ED \bullet \left(\frac{1}{RfC} \bullet \frac{1}{PEF}\right)}$	S11
	Remediation Objectives for Noncarcinogenic Contaminants – Construction Worker (mg/kg)	$\frac{THQ \bullet AT \bullet 365\frac{d}{yr}}{EF \bullet ED \bullet \left(\frac{1}{RfC} \bullet \frac{1}{PEF'}\right)}$	S12
	Remediation Objectives for Carcinogenic Contaminants – Residential, Industrial/ Commercial (mg/kg)	$\frac{TR \bullet AT_c \bullet 365\frac{d}{yr}}{URF \bullet 1000\frac{\mu g}{mg} \bullet EF \bullet ED\frac{1}{PEF}}$	S13
	Remediation Objectives for Carcinogenic Contaminants – Construction Worker (mg/kg)	$\frac{TR \bullet AT_c \bullet 365\frac{d}{yr}}{URF \bullet 1000\frac{\mu g}{mg} \bullet EF \bullet ED\frac{1}{PEF'}}$	S14
	Equation for Derivation of Particulate Emission Factor, PEF (m^3/kg)	$PEF = \frac{Q}{C} \bullet \frac{3{,}600\frac{s}{hr}}{0.036 \bullet (1-V) \bullet \left(\frac{U_m}{U_t}\right)^3 \bullet F(x)}$	S15
	Equation for Derivation of Particulate Emission Factor, PEF′ – Construction Worker (m^3/kg)	$PEF' = \frac{PEF}{10}$ NOTE: PEF must be the industrial/commercial value	S16

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Equations for the Soil Component of the Groundwater Ingestion Exposure Route	Remediation Objective (mg/kg)	$C_w \bullet \left[K_d + \frac{(\theta_w + \theta_a \bullet H')}{\rho_b} \right]$ 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)	$C_w = DF \bullet GW_{obj}$	S18
	Soil-Water Partition Coefficient, K_d (cm^3/g)	$K_d = K_{oc} \bullet f_{oc}$	S19
	Water-Filled Soil Porosity, Θ_w (L_{water}/L_{soil})	$\theta_w = \eta \bullet \left(\frac{I}{K_2} \right)^{1/(2b+3)}$	S20
	Air-Filled Soil Porosity, Θ_a (L_{air}/L_{soil})	$\theta_a = \eta - \theta_w$	S21
	Dilution Factor, DF (unitless)	$DF = 1 + \frac{K \bullet i \bullet d}{I \bullet L}$	S22
	Groundwater Remediation Objection for Carcinogenic Contaminants, GW_{obj} (mg/L)	$\frac{TR \bullet BW \bullet AT_c \bullet 365 \frac{d}{yr}}{SF_o \bullet IR_2 \bullet EF \bullet ED}$	S23
	Total Soil Porosity, η L_{pore}/L_{soil})	$\eta = 1 - \frac{\rho_b}{\rho_s}$	S24
	Equation for Estimation of Mixing Zone Depth, d (m)	$d = \left(0.0112 \bullet L^2\right)^{0.5} + d_a \left[1 - \exp \frac{(-L \bullet 1)}{K \bullet i \bullet d_a} \right]$	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 (m3/kg)	$VF_{M-L} = \frac{Q}{C} \bullet \frac{\left[T_{M-L} \bullet \left(3.15 \bullet 10^7 \frac{s}{yr} \right) \right]}{\rho_b \bullet d_s \bullet 10^6 \frac{cm^3}{m^3}}$ 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, VT' – (m3/kg)	$VF'_{M-L} = \frac{VF_{M-L}}{10}$	S27

	Mass-Limit Remediation Objective for Soil Component of the Groundwater Ingestion Exposure Route (mg/kg)	$\frac{(C_w \bullet I_{M-L} \bullet ED_{M-L})}{\rho_b \bullet d_s}$ 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, C_{sat}		$C_{sat} = \frac{S}{\rho_b} \bullet [(K_d \bullet \rho_b) + \theta_w + (H' \bullet \theta_a)]$	S29
Equation for the soil gas component of the Outdoor Inhalation Exposure Route		$RO_{soil\,gas} = \frac{RO_{soil} \times H \times \rho_b \times 1000}{H' \times \Theta_a + \Theta_w + K_d \times \rho_b}$	S30

(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 = $1.32 \cdot 10^9$ or Site-Specific Industrial/Commercial = $1.24 \cdot 10^9$ 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)	$1.24 \cdot 10^8$ or Site-Specific
Q/C (used in VF equations)	Inverse of the mean concentration at the center of a square source	$(g/m^2\text{-}s)/(kg/m^3)$	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	$(g/m^2\text{-}s)/(kg/m^3)$	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~~IEPA (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~~IEPA (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	$(mg/kg\text{-}d)^{-1}$	Illinois EPA: http://www.epa.state.il.us/land/taco/toxicity-values.xls~~IEPA (IRIS/HEAST[a])~~	Toxicological-Specific
T	Exposure Interval	s		Residential = $9.5 \cdot 10^8$ Industrial/Commercial = $7.9 \cdot 10^8$ Construction Worker = $3.6 \cdot 10^6$
$T_{M\text{-}L}$	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	$(\mu g/m^3)^{-1}$	Illinois EPA: http://www.epa.state.il.us/land/taco/toxicity-values.xls~~IEPA (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

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~~[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 _____)

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 (di) (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) For the indoor inhalation exposure route	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

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

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

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	Hexachlorocyclo-pentadiene	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]

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

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.

[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 K_{oc} value will change with pH. The K_{oc} values listed in 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 K_{oc} value listed 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); Water (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.

~~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') (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~~

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

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-octyl 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

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.~~

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

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

4200
4201 [a] This is the location where the sample is collected
4202 [b] As incorporated by reference in Section 742.120.
4203
4204 (Source: Amended at 36 Ill. Reg. _____, effective _____)

4205 **Section 742.APPENDIX C Tier 2 Tables**

4206

4207 **Section 742.TABLE L J&E Equations**

4208

Indoor air remediation objectives (mg/m^3)	For carcinogenic contaminants	$RO_{indoorair} = \frac{TR \times AT_c \times 365\ {}^{days}/_{yr}}{ED \times EF \times URF \times 1000\ \frac{\mu g}{mg}}$	J&E1
	For noncarcinogenic contaminants	$RO_{indoorair} = \frac{THQ \times AT_{nc} \times 365\ {}^{days}/_{yr} \times RFC}{ED \times EF}$	J&E2
To convert mg/m^3 from parts per million volume		$mg/m^3 = \frac{ppmv \times MW}{24.45}$ Note: 24.45 equals the molar volume of air in liters at normal temperature (25°C) and pressure (760 mmHg).	J&E3
Soil gas remediation objective (mg/m^3)		$RO_{soil\ gas} = \frac{RO_{indoor-air}}{\alpha}$	J&E4
Soil Vapor Saturation Limit (mg/m^3-air)		$C_v^{sat} = \frac{P \times MW}{R \times T} \times 10^6$	J&E5
Groundwater remediation objectives		$RO_{gw} = \frac{RO_{soil\ gas}}{H'ts \times 1000 \frac{L_3}{m}}$	J&E6

4211 **Section 742.APPENDIX C Tier 2 Tables**
4212
4213 **Section 742.TABLE M J&E Parameters**
4214

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

Attenuation factor	Attenuation factor when the mode of contaminant transport is both diffusion and advection Q_{soil} = 83.33 cm^3/sec	$$\alpha = \frac{\left[\left(\frac{D_T^{eff} \times A_B}{Q_{bldg} \times L_T}\right) \times \exp\left(\frac{Q_{soil} \times L_{crack}}{D_{crack}^{eff} \times A_{crack}}\right)\right]}{\left[\exp\left(\frac{Q_{soil} \times L_{crack}}{D_{crack}^{eff} \times A_{crack}}\right) + \left(\frac{D_T^{eff} \times A_B}{Q_{bldg} \times L_T}\right) + \left(\frac{D_T^{eff} \times A_B}{Q_{soil} \times L_T}\right)\left[\exp\left(\frac{Q_{soil}}{D_{crack}^{eff}}\right)\right.\right.}$$	J&E7
	Attenuation factor when the mode of contaminant transport is diffusion only Q_{soil}= 0 cm^3/sec	$$a = \frac{\left(D^{eff_T} \times A_B\right)}{1 + \left(\frac{D^{eff_T} \times A_B}{Q_{bldg} \times L_T}\right) + \left(\frac{D^{eff_T} \times A_B \times L_{crack}}{L_T \times D^{eff_{crack}} \times A_{crack}}\right)}$$	J&E8
Total overall effective diffusion coefficient for vapor transport in porous media for multiple soil layers (cm^2/s)		$$D^{eff_T} = \frac{L_T}{\sum_{i-1}^{n} L_i ID^{\frac{eff}{i}}}$$	J&E9a
	In Equation J&E9a, the following condition **must** be satisfied:	$$\sum_{i-1}^{n} L_i = L_T$$	J&E9b
Source to building separation (cm)		$$L_T = D_{source} - L_F$$	J&E10
Effective diffusion coefficient for each soil layer (cm^2/s)		$$D_{i^{eff}} = \left(\frac{\Theta^{3.33_{a,i}}}{\Theta^{2_{T,i}}}\right) + \left(\frac{D_w}{H_{TS}}\right)\left(\frac{\Theta^{3.33_{wi}}}{\Theta^{2_{T,i}}}\right)$$	J&E11
Surface area of enclosed space at or below grade (cm^2)	For a slab-on-grade building	$$A_B = \left(L_B \times W_B\right)$$	J&E12a

Surface area of enclosed space at or below grade (cm^2)	For a building with a basement	$A_B = (L_B \times W_B) + (2 \times L_F \times L_B) + (2 \times L_F \times W_B)$	J&E12b
Building ventilation rate (cm^3/s)		$Q_{bldg} = \frac{L_B \times W_B \times H_B \times ER}{3600\,\text{sec}/hr}$	J&E13
Area of total cracks (cm^2)		$A_{crack} = 2 \times (L_B + W_B) \times w$	J&E14
Effective diffusion coefficient through the cracks (cm^2/s)		$D^{eff}{}_{crack} = D_i \left(\frac{\Theta^{3.33}{}_{a,crack}}{\Theta^{2}{}_{T,crack}} \right) + \left(\frac{D_w}{H_{TS}} \right) \left(\frac{\Theta^{3.33}{}_{w,crack}}{\Theta^{2}{}_{T,crack}} \right)$	J&E15
Total porosity		$\Theta_{Ti} = 1 - \frac{\rho_{bi}}{\rho_s}$	J&E16
Water-filled soil porosity		$\Theta_w = W \times \frac{\rho_b}{\rho_w}$	J&E17
Air-filled soil porosity		$\Theta_a = \Theta_T - \Theta_w$	J&E18

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

f_{oc}	Fraction organic carbon content	g/g	SSL, May 1996, or Field Measurement Appendix C, Table F	0.002 or Site-Specific
H_B	Height of building	cm	Illinois EPA	Slab-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'_{TS}	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 Industrial/Commercial = 2000 or Site-Specific in Tier 3
L_{crack}	Slab thickness	cm	USEPA, Users Guide, 2004	10
L_F	Distance from ground surface to bottom of slab	cm	USEPA, Users Guide, 2004	10 (slab on grade) 200 (basement)
L_i	Thickness of soil layer i	cm	Field Measurement for Capillary Fringe, USEPA, 2004	Site-Specific For Capillary Fringe, 37.5 cm
L_T	Distance from bottom of slab to top of contamination	cm	Field Measurement or Equation J&E 10, Appendix C, Table L	142.4 or Site-Specific
MW	Molecular weight	g/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-Specific
P	Vapor Pressure	atm	Appendix C, Table E	Chemical-Specific
Q_{bldg}	Building ventilation rate	cm^3/s	Equation J&E 13, Appendix C, Table L	Slab-on-Grade Residential = 3.59×10^4

URF	Unit risk factor	$(\mu g/m^3)^{-1}$	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

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

				Industrial/ Commercial = 3.15×10^5 or Site-Specific in Tier 3 Basement Residential = 6.28×10^4 Industrial/Commercial = 5.04×10^5 or Site-Specific in Tier 3
Q_{soil}	Volumetric flow rate of soil gas into the enclosed space	cm^3/s	USEPA, Users Guide for Evaluating Subsurface Vapor Intrusion into Buildings, 2004	If L_T is less than 5 feet (152 cm), Q_{soil} equals 83.33. If L_T 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-K	USEPA, Users Guide, 2004	0.08206
RfC	Reference concentration	$\mu g/m^3$	Illinois EPA: http://www.epa.state.il.us/land/taco/toxicity-values.xls	Toxicological-Specific
RO_{gw}	Groundwater remediation objective	mg/L	Appendix B, Table E, or Equation J&E 6, Appendix C, Table L	Chemical-Specific or Calculated Value
$RO_{indoor\text{-}air}$	Indoor air remediation objective	mg/m^3	Equations J&E 1 and 2, Appendix C, Table L	Calculated Value
$RO_{soilgas}$	Soil gas remediation objective	mg/m^3	Equation J&E 4, Appendix C, Table L	Calculated Value
S	Solubility in water	mg/L	Appendix C, Table E	Chemical-Specific
T	Temperature	°K	USEPA, Users Guide, 2004	286 (converted from 13°C)
THQ	Target hazard quotient for a chemical	unitless	SSL, May 1996	1
TR	Target risk or the increased chance of developing cancer over a lifetime due to exposure to a chemical	unitless	SSL, May 1996	Residential = 10^{-6} at the point of human exposure Industrial/Commercial = 10^{-6} at the point of human exposure

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 _____ , ("Property Owner") of the real property 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 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: _____
Director

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").

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.

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,_____ 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.

Given under my hand and official seal, this _____day of_____, 20 ___.

_____
Notary Public

STATE OF 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 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.

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Given under my hand and official seal, 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, commonly known as _____, _____, Illinois and more particularly described as:

LIST THE COMMON ADDRESS;
LEGAL DESCRIPTION; AND
REAL ESTATE TAX INDEX OR PARCEL #
(PURSUANT TO SECTION 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 _____)