

ILLINOIS POLLUTION CONTROL BOARD  
December 4, 1997

IN THE MATTER OF: )  
)  
TIERED APPROACH TO CORRECTIVE )  
ACTION OBJECTIVES (TACO): ) R97-12(B)  
AMENDMENTS TO 35 ILL. ) (Rulemaking - Land)  
ADM. CODE 742.105, 742.200, 742.505, )  
742.805, and 742.915 )

Adopted Rule. Final Order.

OPINION AND ORDER OF THE BOARD (by M. McFawn and J. Yi):

The Board adopts today as final amendments to 35 Ill. Adm. Code 742: Tiered Approach to Corrective Action Objectives, also known as TACO. The TACO program establishes a three tiered approach for establishing corrective action objectives, *i.e.*, remediation objectives based on risks to human health and the environment, allowing for consideration of the proposed land use at a subject site. The amendments adopted today (also know as the mixture rule) address the effect of similar-acting chemicals on the same target organ when determining remediation objectives under TACO. Specifically, the amendments consider the effects of similar-acting chemicals, *i.e.*, noncarcinogens and carcinogens, under Tiers 1, 2, and 3 of the TACO process. The statutory premise for the mixture rule is found at Section 58.5(c) of the Illinois Environmental Protection Act (Act) (415 ILCS 5/58.5(c) (1996)) and 35 Ill. Adm. Code 620 of the Board's regulations. The amendments were originally proposed by the Illinois Environmental Protection Agency (Agency) during the course of Docket A of this rulemaking.<sup>1</sup>

PROCEDURAL MATTERS

Public hearings were held in Docket B on May 21, 1997, and May 29, 1997, to consider the proposal of the Agency.<sup>2</sup> On July 10, 1997, the Board proceeded to first notice, pursuant to the Illinois Administrative Procedure Act (APA) (5 ILCS 100/1-1 (1996)). Subsequently, on July 25, 1997, the amendments to Part 742 were published in the *Illinois Register* (21 Ill. Reg. 9687 (July 25, 1997)), upon which a 45-day comment period began. One such comment was received by the Site Remediation Advisory Committee (SRAC). On October 2, 1997, the Board adopted the amendments for second notice review by the Joint Committee on Administrative Rules (JCAR). On November 12, 1997, JCAR issued a certificate of no objection. No substantive changes were requested by JCAR. A few minor

<sup>1</sup> See Tiered Approach to Corrective Action Objectives (TACO): 35 Ill. Adm. Code 742 (June 5, 1997), R97-12(A) (effective July 1, 1997).

<sup>2</sup> The May 21, 1997, hearing will be referred to as Tr.1 at \_\_; the May 29, 1997, hearing will be referred to as Tr.2 at \_\_.

editorial changes were suggested by JCAR and those changes have been incorporated into the final order.

On April 17, 1997, the Board adopted for second notice the majority of TACO rules under Docket A which were adopted as final on June 5, 1997.<sup>3</sup> At second notice and at final notice during Docket A, the Board adopted a limited mixture rule at the recommendation of the Agency. However, the record did not support the entire mixture rule proposed by the Agency. On that same day, the Board opened this Docket B to fully consider the type and to what extent a mixture rule is necessary under TACO to protect human health. The purpose of bifurcating the rulemaking was twofold. First, under Docket A, the Board could proceed to adopt the TACO methodology as final at new Part 742 in tandem with the rulemaking, In the Matter of: the Site Remediation Program and Groundwater Quality Standards (June 5, 1997), R97-11, which had a statutory deadline of June 16, 1997. Second, Docket B allowed the Board to consider the full measure of a mixture rule necessary to protect human health.

On December 3, 1997, the SRAC and the Agency filed a “Joint Motion to Correct” (joint motion) wherein they request that the Board change the risk concentrations listed in Appendix A. Table H: “Chemicals Whose Tier I Class Groundwater Remediation Objective Exceed the 1 in 1,000,000 Cancer Risk Concentration” (Table H). At this point in the R97-12 rulemaking process, the APA does not provide for the expeditious correction of Table H. See 5 ILCS 5-40(c), (d) (1994). So the merits and evidence necessary to support the joint motion can be considered, the Board will today open a Docket C in this rulemaking. See In the Matter of: Tiered Approach to Corrective Action Objectives: Amendments to Part 742 (December 4, 1997), R97-12(C). The Board intends to expedite rulemaking under this new docket to the extent possible under the APA.

#### ESTABLISHING REMEDIATION OBJECTIVES USING THE MIXTURE RULE

The TACO methodology codified at Part 742 is not independent. It must be used in conjunction with remediation programs, most specifically found at Part 740: Site Remediation Program; Part 732: Underground Storage Tank rules; and the closure requirements under the Resource Conservation and Recovery program at Parts 724 and 725. Regardless of the remediation program with which TACO is being used, the TACO rules provide a three tiered approach for establishing remediation objectives based upon risks to human health and the environment, allowing for consideration of the proposed land use at the subject site. The mixture rule adopted today requires further evaluation of the soil and/or groundwater remediation objectives established for multiple, similar-acting chemicals under any of the three tiers.

A Tier 1 analysis requires the remediation applicant to compare contamination levels of contaminants of concern at the remediation site to predetermined corrective action objectives, which are set forth in look-up tables in the rules in Appendix B. Generally, if any

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<sup>3</sup> The final rules were published in the *Illinois Register* at 21 Ill. Reg. 7942 (June 27, 1997).

contaminants of concern at a remediation site are found to exceed the predetermined levels, the remediation applicant is required to remediate the contamination until the corrective action objectives are achieved, or alternatively, to develop site-specific remediation objectives using a Tier 2 or Tier 3 analysis. However, if the contaminants of concern in Class I groundwater at a site include multiple, similar-acting chemicals, the instant regulations require further evaluation to assess the mixture effect of such chemicals using the procedures specified under Tier 2 or Tier 3. Such an evaluation must be performed if the contaminants of concern in Class I groundwater include: more than one similar-acting noncarcinogen; or at least one similar-acting carcinogen whose Tier 1 Class I groundwater remediation objective exceeds the 1 in 1,000,000 cancer risk concentration and one other similar-acting carcinogen.

A Tier 2 analysis uses the equations set forth in the rules to develop alternate remediation objectives for contaminants of concern, using site-specific information. The equations used to develop site-specific remediation objectives are from the United States Environmental Protection Agency's Soil Screening Level (SSL) and the American Society for Testing and Material's Risk Based Corrective Action (RBCA) approaches, and they are listed in the rules in Appendix C. If any contaminants of concern are found to exceed the remediation objectives developed using the Tier 2 equations, the remediation applicant is required to remediate the contamination until the objectives are achieved, remediate to Tier 1 objectives, or develop alternate objectives using a Tier 3 analysis. The mixture rule described above for evaluating the cumulative effect of multiple similar-acting noncarcinogens and carcinogens in groundwater is also applicable at sites evaluated under Tier 2. Additionally, under Tier 2 there is a mixture rule applicable when multiple similar-acting noncarcinogens are detected in the soil at these sites.

A Tier 3 analysis allows a remediation applicant to develop remediation objectives using alternative parameters not found in Tier 1 or Tier 2. It allows a remediation applicant to use modified parameters, provided the remediation applicant provides justification for the modification, and the technical and mathematical basis for the modification. Additionally, a Tier 3 analysis allows a remediation applicant to use alternative models if certain information is provided, including a licensed copy of the model, the mathematical and technical basis for the model, and a demonstration that the model was correctly applied. If any contaminants of concern are found to exceed the remediation objectives developed using the Tier 3 analysis, the remediation applicant is required to remediate the contamination until the objectives are achieved. Finally, the mixture rule is applicable when multiple, similar-acting chemicals are detected in groundwater or in soil under Tier 3.

#### SUMMARY OF THE MIXTURE RULE

As explained in our Docket A second notice opinion of April 17, 1997, the record before the Board at the time was insufficient to adopt the entire mixture rule ultimately requested by the Agency. See In the Matter: Tiered Approach to Corrective Action Objectives: 35 Ill. Adm. Code 742 (April 17, 1997), R97-12(A), slip op. at 3. However, we found the justification provided did indicate that absent such a rule, remediation objectives

determined using TACO may not be protective of human health at sites with multiple, similar-acting chemicals. Accordingly, a limited mixture rule was adopted under Docket A. That interim rule is amended today.

#### Mixture Rule Under Docket A

The interim mixture rule adopted under Docket A at Part 742 provided that only the cumulative effect of similar-acting noncarcinogenic chemicals in groundwater be examined under Tier 1 (Section 742.505(b)); it did not require that the cumulative effect of either carcinogenic or noncarcinogenic contaminants be evaluated for soil. Under Tier 2, the cumulative effects of noncarcinogenic contaminants in both soil and groundwater, respectively, must be considered (at Sections 742.720 and 742.850(c)). As for similar-acting carcinogens in groundwater or soil, their cumulative effect did not have to be evaluated under either Tier 1 or Tier 2. Finally, under Tier 3, there was no mixture rule articulated for either type of contaminant in either medium.

#### Mixture Rule Under Docket B

Having considered the evidence and the statutory mandates, the Board concludes that a broader mixture rule is necessary to protect human health. Accordingly, Part 742 as adopted under Docket A must be amended to accommodate such a rule. The mixture rules adopted herein for each of the three tiers is slightly different than that adopted under Docket A and described above. The mixture rule under Tier 1 still applies to similar-acting noncarcinogens detected in Class I groundwater, but now also applies to certain similar-acting carcinogens in groundwater whose Tier 1 Class I groundwater remediation objectives exceed the 1 in 1,000,000 cancer risk concentrations. Section 742.505(b)(3) and (4). There is still no mixture rule applicable to either type of contaminant of concern in soil under Tier 1. The mixture rule under Tier 2 likewise now applies to both similar-acting noncarcinogens and carcinogens in groundwater (Section 742.805). As for soil, the mixture rule under Tier 2 is not amended; it still only applies to noncarcinogens in soil. See Section 742.720. Finally, under Tier 3, language is added which specifically provides a mixture rule. New Section 742.915(h) requires that under Tier 3 both similar-acting carcinogens and noncarcinogens be evaluated for both groundwater and soil.

Also adopted today are the definition of “similar-acting chemicals” and an Appendix A.Table H. This new Table H lists those carcinogenic chemicals whose Tier 1 Class I groundwater remediation objectives exceed the 1 in 1,000,000 cancer risk concentrations and therefore must undergo either the Tier 2 or Tier 3 procedure for evaluating the mixture effect of similar-acting chemicals. These two amendments serve to clarify how and when the rule is applied under TACO.

#### HOW THE MIXTURE RULE WORKS

When considering the mixture rule to be applied under TACO, two questions must be asked and answered initially: (1) is the rule being applied to determine groundwater or soil remediation objectives; and (2) are the similar-acting contaminants of concern noncarcinogenic or carcinogenic chemicals? Focusing on these questions assists the remediation applicant in determining whether the mixture rule is applicable, as well as in better understanding the evolution and purpose of the mixture rule adopted at Part 742.

These questions are, of course, preceded by the question as to whether multiple, similar-acting chemicals are detected at the site. The mixture rule under any of the three tiers is only applicable if multiple, similar-acting chemicals are present.

“Similar-acting chemicals” is defined as:

“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.)

This definition of similar-acting chemicals parallels the description of similar-acting chemicals found at 35 Ill. Adm. Code 620.615. Although that rule concerns similar-acting chemicals in groundwater, the mixture rule originates from that regulation. The purpose of the mixture rule is to assess the cumulative effect of similar-acting chemicals as necessary to protect human health if they are detected in groundwater or soil.

#### Are The Similar-Acting Chemicals Noncarcinogens?

The list of similar-acting noncarcinogens is found at Appendix A. Table E. If more than one noncarcinogen on that list is detected in a single medium, groundwater or soil, the mixture rule may be applicable. It is not necessary that either noncarcinogen be detected at a level which exceed the remediation objectives established under Tier 1, Tier 2, or Tier 3.

As for the medium, under Tier 1 the mixture rule is only applicable if the noncarcinogens are detected in the groundwater. Under Tier 2, the mixture rule is applicable if the similar-acting noncarcinogens are detected in either medium--groundwater or soil. Likewise the mixture rule is applicable under Tier 3 to similar-acting noncarcinogens found in either medium. Section 742.915(h).

#### Are The Similar-Acting Chemicals Carcinogens?

The complete list of similar-acting carcinogens is found at Appendix A. Table F. There is a second, short list of similar-acting carcinogens found at Appendix A. Table H.<sup>4</sup> This new list, adopted today, lists 25 similar-acting carcinogens whose Tier 1 Class I groundwater remediation objective exceed the 1 in 1,000,000 cancer risk concentrations. If at least one carcinogen on that list is detected in the Class I groundwater at the site along with another similar-acting carcinogen, the mixture rule will apply. It is not necessary that either similar-acting carcinogen be detected at a level which exceed the remediation objectives established under Tier 1, Tier 2, or Tier 3.

As for carcinogens in soil, there is no mixture rule for similar-acting carcinogens detected in soil under either Tier 1 or Tier 2. Again, however, Tier 3 does not distinguish the applicability of the mixture rule based upon the medium. Pursuant to Section 742.915(h), if multiple carcinogens listed on Table F of Appendix A are detected in groundwater or soil and the remediation applicant is conducting a Tier 3 analysis, the cumulative effect of these contaminants must be addressed.

#### What if the Similar-Acting Chemicals Are Detected In Groundwater?

If the presence of noncarcinogens or carcinogens detected in groundwater trigger the mixture rule, the remediation applicant must take steps to satisfy Section 620.615 of the Board's groundwater regulations. Sections 742.505(b)(3) and 742.805(c) and (d) of Part 742 cross-reference Section 620.615 of the Board's groundwater quality standards. The mixture rule originates from that regulation. Under each of these TACO regulations, Section 620.615 is deemed satisfied if the conditions triggering the mixture rule are not present at the site. If they are present and the mixture rule is applicable, the remediation applicant must take steps to ensure that Section 620.615 is satisfied.

The steps necessary are set out in the rules. First, under all three tiers if more than one similar-acting noncarcinogenic chemical is detected at the site, the mixture rule set out at Section 742.805(c) or that developed under Tier 3 must be applied. Second, if a carcinogenic chemical listed on Appendix A. Table H is detected at the site along with a similar-acting carcinogen listed on Appendix A. Table F, the mixture rule at Section 742.805(d) or that developed under Tier 3 must be applied.

### SUMMARY OF FINDINGS

#### Tier 1

Based on the evidence presented to the Board by the Agency in Dockets A and B, the Board finds (1) that a mixture rule is not necessary for either noncarcinogenic or carcinogenic

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<sup>4</sup> As explained above under "Procedural Matters," this new Table H in Appendix A is the subject of further rulemaking under Docket C and amendments thereto will be proposed at first notice under the APA.

chemicals when developing soil remediation objectives under Tier 1, and (2) that a mixture rule is necessary for both similar-acting noncarcinogenic and carcinogenic chemicals when developing groundwater remediation objectives under Tier 1.

Our first finding is based on testimony from Dr. Hornshaw at hearing that the inherent protection built into the process of developing the Tier 1 soil remediation objectives, for similar-acting noncarcinogens and carcinogenic, makes consideration of the additivity of effects of similar-acting chemicals unnecessary in Tier 1. Tr.1 at 14, 19. Accordingly, Tier 1 contains no requirements that similar-acting noncarcinogens or carcinogens be considered in developing soil remediation objectives.

Given our second finding, Tier 1 contains a mixture rule for similar-acting noncarcinogens and carcinogens in groundwater although the Agency and participants requested that the Tier 1 mixture rule apply only to carcinogens in groundwater. Under Docket A, we adopted a mixture rule applicable to noncarcinogens in groundwater because the evidence demonstrated that such a rule is necessary to protect public health. Nothing in the record developed in this Docket supports changing that finding.

In Docket A, the Agency advocated that the Board adopt a mixture rule for both similar-acting carcinogenic and noncarcinogenic chemicals in groundwater. In Docket B, however, the Agency advocated such a rule for carcinogens only for policy reasons. At hearing, Dr. Hornshaw testified that the Agency and the SRAC agreed that consideration of mixtures of similar-acting chemicals is not necessary under Tier 1 except for those carcinogens whose groundwater remediation objectives are not based on a 1 in 1,000,000 cancer risk. Tr.1 at 23. The Agency and the participants believed that the preferred policy is the simplicity of look-up tables under Tier 1 for noncarcinogens under Tier 1 at the expense of a mixture rule.

The Board sympathizes with the desire of the Agency and the participants for the simplicity of look-up tables under Tier 1, but the evidence does not support a simple look-up table when the cumulative effect of similar-acting noncarcinogenic chemicals in groundwater exceeds the hazard quotient of one. A hazard quotient, also referred to as a hazard index, is the ratio of the chemical level present at a site and the acceptable level of each similar-acting chemical. If the hazard quotient exceeds one, pursuant to Section 620.615 of the groundwater rules, and therefore Section 742.805 (c) which cross references it, the groundwater remediation objectives must be corrected to levels equal to or less than one. As we found in Docket A, this analysis is necessary to protect human health. Furthermore, we find that the burden on a remediation applicant to determine the cumulative effect of similar-acting noncarcinogenic chemicals and to correct the remediation objectives as necessary is not unduly burdensome. See In the Matter of: Tiered Approach to Corrective Action Objectives: Amendments to Part 742 (October 2, 1997), R97-12(B), slip op. at 6-7.

Further, the Board finds that the mandate of Section 58.5(c) prevails over the Agency's policy argument, and a mixture rule is necessary to protect human health. The mixture rule assures that the cumulative effect of similar-acting chemicals in groundwater is evaluated, and

the applicable remediation objectives are corrected to a level which does not pose a risk to human health. This is equally true for both carcinogens and noncarcinogens. We note that that the Agency proposed more than a look-up table for carcinogens, *i.e.*, that a mixture rule must be applied to determine the appropriate groundwater remediation objective. Accordingly, the current rule that similar-acting noncarcinogenic chemicals be evaluated under Tier 1 for groundwater is retained at Section 742.505(b)(3)(A), but amended at Section 742.505(B)(3)(B) to include the same requirement for carcinogenic chemicals when a carcinogenic chemical with a remediation objective set at a risk level higher than 1 in 1,000,000 is detected at the site along with another similar-acting carcinogens. A list of those carcinogens is adopted as proposed by the Agency. Tr.1 at 23-27, 36. Today we adopt as final this two-part rule as the mixture rule for a Tier 1 analysis.

### Tier 2

The Board's finding under Docket A that a mixture rule for similar-acting noncarcinogenic chemicals is necessary for soil and groundwater remediation objectives remains unchanged. Accordingly, the mixture rule adopted under Docket A which applies to similar-acting noncarcinogenic chemicals under Tier 2 is retained. The groundwater component of this rule is amended, however, to require that the cumulative effect of carcinogenic chemicals with Class I groundwater remediation objectives in excess of 1 in 1,000,000 cancer risk concentrations (Appendix A. Table H carcinogens) be evaluated when developing groundwater remediation objectives.

As for mixtures of similar-acting noncarcinogenic chemicals in groundwater, we agree with the Agency and the SRAC that consideration of similar-acting noncarcinogenic chemicals under Tier 2 is required. Tr.1 at 20.

With regard to mixtures of carcinogenic chemicals in groundwater under Tier 2, the Board finds that there are carcinogenic chemicals whose groundwater objectives exceed the 1 in 1,000,000 cancer risk level, and which, if present in a mixture with other similar-acting carcinogenic chemicals, could potentially result in a cumulative cancer risk exceeding 1 in 10,000. Tr.1 at 24. Therefore, the Board concludes that similar-acting carcinogenic chemicals whose Tier 1 groundwater objectives exceed the 1 in 1,000,000 risk level must be evaluated for mixture effects under Tier 2. Tr.1 at 24. To facilitate such an evaluation, those similar-acting carcinogenic chemicals whose Tier 1 groundwater remediation objectives exceed the 1 in 1,000,000 risk level will be specifically identified in a look-up table. Tr.1 at 24; See Exh. 1, Appendix A. Table H.

The Tier 2 mixture rule for soil remediation objectives remains unchanged, applicable only to similar-acting noncarcinogenic chemicals. Unlike Tier 1, Tier 2 requires that similar-acting noncarcinogenic chemicals be considered in developing soil remediation objectives. It does not require that carcinogenic chemicals listed on Table H be considered. The Board finds that it is only necessary to address mixture effects of similar-acting noncarcinogenic chemicals because, concerning carcinogenic chemicals, the language of Section 58.5(d) of the Act



specifically provides for the establishment of remediation objectives at an excess lifetime cancer risk of between 1 in 10,000 and 1 in 1,000,000. Tr.1 at 15.

### Tier 3

Tier 3 contains a requirement that similar-acting carcinogens and noncarcinogens be considered when developing both soil and groundwater remediation objectives. Under Docket A, language for a mixture rule was not adopted under Tier 3. We have decided to amend Section 742.915(h) to include such language to ensure that the cumulative effects of both carcinogenic and noncarcinogenic chemicals are evaluated under the Tier 3 site-specific approach.

As noted in our final opinion in Docket A of June 5, 1997, remediation objectives greater than the Part 620 groundwater quality standards may only be developed under Tier 3. See Section 742.105(f). There is no evidence on the record to support this provision. Instead, it is provided because Section 58.5 of the Act allows the remediation applicant to propose, and the Agency to approve pursuant to Tier 3 of TACO, remediation objectives greater than the State's groundwater quality standards. Although we anticipated possibly considering under this docket whether such remediation objectives might also be allowed under Tier 1 or Tier 2, no evidence supporting the same was offered. We note, however, that groundwater remediation objectives greater than the State's groundwater quality standards may be established under Tier 2 so long as the State's groundwater quality standard is met at the point of human exposure.

### CONCLUSIONS

The Board proposes for adoption the same mixture rule as that proposed for first and second notice. The mixture rule for similar-acting chemicals in soil is graduated. At Tier 1, it is not applicable. At Tier 2, it is applicable to noncarcinogens only. And, at Tier 3, it is applicable to carcinogens and noncarcinogens. The mixture rule for similar-acting chemicals in Class I groundwater uniformly spans all three tiers of TACO. It is applicable to both similar-acting carcinogens and noncarcinogens under all three tiers. The mixture rule is basically that proposed by the Agency in this docket with one exception. That exception is that the mixture rule under Tier 1 applies to similar-acting noncarcinogenic chemicals as well as similar-acting carcinogens detected in groundwater at sites being analyzed under TACO.

Further, the Board concludes, as we did at first and second notice, that a mixture rule for similar-acting noncarcinogenic chemicals in groundwater is required under Tier 1, as well as under Tiers 2 and 3, because the remediation objective for similar-acting noncarcinogenic chemicals in groundwater is premised upon a hazard quotient of one. Finally, having proposed the mixture rule to be all-inclusive, the Board adopts the cross-reference to Section 620.615 of the Board's groundwater rules. Thus, the remediation applicant and the public are assured that an evaluation of similar-acting chemicals provided thereunder is also provided under TACO.

ORDER

The Board directs the Clerk to cause the filing of the following adopted rule for final notice publication in the *Illinois Register* with the Secretary of State:

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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## SUBPART G: TIER 2 SOIL EVALUATION

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#### APPENDIX A General

ILLUSTRATION A Developing Soil Remediation Objectives Under the Tiered Approach

ILLUSTRATION B Developing Groundwater Remediation Objectives Under the Tiered Approach

Table A Soil Saturation Limits ( $C_{sat}$ ) for Chemicals Whose Melting Point is Less Than 30°C

Table B Tolerance Factor (K)

Table C Coefficients  $\{A_{N-I+1}\}$  for W Test of Normality, for  $N=2(1)50$

Table D Percentage Points of the W Test for  $N=3(1)50$

Table E ~~Similar-Acting Noncarcinogenic Chemicals with Noncarcinogenic Toxic Effects on Specific Target Organs/Organ Systems or Similar Modes of Action~~

Table F ~~Similar-Acting Carcinogenic Chemicals with Carcinogenic Toxic Effects on Specific Target Organs/Organ Systems or Similar Modes of Action~~

Table G Concentrations of Inorganic Chemicals in Background Soils

Table H Chemicals Whose Tier 1 Class I Groundwater Remediation Objective Exceeds the 1 in 1,000,000 Cancer Risk Concentration

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ILLUSTRATION A Tier 1 Evaluation

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Table J	Values to be Substituted for $k_s$ When Evaluating Inorganics as a Function of pH (cm <sup>3</sup> [water]/g[soil])
Table K	Parameter Estimates for Calculating Water-Filled Soil Porosity ( $\theta_w$ )

AUTHORITY: Implementing Sections 22.4, 22.12, Title XVI, and Title XVII and authorized by Sections 27, 57.14, and 58.5 of the Environmental Protection Act [415 ILCS 5/22.4, 22.12, 27, 57.14 and 58.5 and Title XVI and Title XVII]. ~~(see P.A. 88-496, effective September 13, 1993 and P.A. 89-0431, effective December 15, 1995).~~

MAIN-SOURCE: Adopted at 21 Ill. Reg. 7942, effective July 1, 1997, amended at 21 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_.

NOTE: Capitalization 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 5/1 et seq.) (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. 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 and 732);
  - 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(a) 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. 2601).

SOURCE: Amended at 21 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 5/4-~~et seq.~~].

“ADL” means Acceptable Detection Limit, which is the detectable concentration of a substance which 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.

“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. (Section 58.2 of the Act)

“ASTM” means the American Society for Testing and Materials.

“Board” means the Illinois Pollution Control Board.

“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.

“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 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. (Section 58.2 of the Act)

“Class I Groundwater” means groundwater that meets the Class I: Potable Resource Groundwater criteria set forth in 35 Ill.~~inois~~ Adm.~~inistrative~~ Code 620.

“Class II Groundwater” means groundwater that meets the Class II: General Resource Groundwater criteria set forth in 35 Ill.~~inois~~ Adm.~~inistrative~~ 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. (Section 58.2 of the Act)

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

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

“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).

“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. (Section 3.64 of the Act)



“Groundwater Quality Standards” means the standards for groundwater as set forth in 35 Ill. ~~nois~~ ~~Adm. inistrative~~ 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 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.

“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 VAULTS, BUILDING FOUNDATIONS, BASEMENTS, CRAWL SPACES, DRAINAGE DITCHES, OR PREVIOUSLY EXCAVATED AND FILLED AREAS. (Section 58.2 of the Act)

“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. (Section 58.2 of the Act)

“Negative Easement” means a right of the owner of the dominant or benefitted estate or property to restrict the property rights of the owner of the servient or burdened estate or property.

“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. (Section 58.2 of the Act)

“Point of Human Exposure” means the point(s) 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.

“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.

“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. 6921).

“Reference Concentration (RfC)” means an estimate of a daily exposure, in units of milligrams of chemical per cubic meter of air ( $\text{mg}/\text{m}^3$ ), 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 (RfD)” means an estimate of a daily exposure, in units of milligrams of chemical per kilogram of body weight per day ( $\text{mg}/\text{kg}/\text{d}$ ), 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). (Section 58.2 of the Act)

“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 at

educational facilities, health care facilities, child care facilities or outdoor recreational areas.

“Restrictive Covenant or Deed Restriction” means a provision placed in a deed limiting the use of the property and prohibiting certain uses. (Black's Law Dictionary, 5th Edition)

“Right of Way” means THE LAND, OR INTEREST THEREIN, ACQUIRED FOR OR DEVOTED TO A HIGHWAY. (Illinois Highway Code [605 ILCS 5/2-217])

“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. (Section 58.2 of the Act)

“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 Saturation Limit ( $C_{sat}$ )” 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.

“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.

“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.

“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.

“Total Petroleum Hydrocarbon (TPH)” means the additive total of all petroleum hydrocarbons found in an analytical sample.

“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 8010, 8011, 8015, 8020, 8021, 8030, 8031, 8240, 8260, 8315, and 8316. For analytes not listed in any category in those methods, those analytes which have a boiling point less than 200<sup>0</sup>C and a vapor pressure greater than 0.1 Torr (mm Hg) at 20<sup>0</sup>C.

SOURCE: Amended at 21 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_.

#### SUBPART E: TIER I EVALUATION

##### Section 742.505 Tier 1 Soil and Groundwater Remediation Objectives

- a) Soil
  - 1) 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.
  - 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) 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: The Class I groundwater remediation objectives set forth in Appendix B, Table E shall be corrected for cumulative effect of mixtures of similar-acting noncarcinogenic chemicals in accordance with the methodologies set forth in either subsection (b)(3)(A) or (B), if more than one chemical listed in Appendix A, Table E is detected at a site and if such chemicals affect the same target organ (i.e., has the same critical effect as defined by the RfD)

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 Calculate the weighted average using the following equations:

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

where:

~~W<sub>ave</sub>~~ = ~~Weighted Average~~

~~x<sub>1</sub> through x<sub>a</sub>~~ = ~~Concentration of each individual contaminant at the location of concern. Note that, depending on the target organ/mode of action, the actual number of contaminants will range from 2 to 14.~~

~~CUO<sub>x<sub>a</sub></sub>~~ = ~~A Tier 1 remediation objective each x[a] from Appendix B, Table E.~~

~~ii) 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.~~

~~ii) 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 have a weighted average calculated in accordance with the equation above less than or equal to one;~~

B) No carcinogenic contaminant of concern as listed in Appendix A, Table H 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. 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

4) If the conditions of subsection (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.

SOURCE: Amended at 21 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, 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 Health Advisory concentration determined according to the procedures specified in 35 Ill. Adm. Code 620, Subpart F 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 Health Advisory concentration;
  - 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 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: ~~Groundwater remediation objectives for chemicals which affect the same target organ, organ system or similar mode of action shall be met the requirements of Section 743.505(b)(3). Contaminants of concern for which a Tier 1 remediation objective has been developed shall be included in any mixture of similar acting substances under consideration in Tier 2.~~

1) Calculate the weighted average using the following equations:

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

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 14.

$CUO_{x_a}$  = A Tier 1 or Tier 2 remediation objective must be developed for each  $x_a$ .

- i) 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.
- ii) 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 have 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) of concern listed in Appendix A, Table H, plus any other contaminant(s) of concern detected in groundwater and listed in Appendix A, Table F as affecting the same target organ/organ system as the contaminant(s) of concern detected from Appendix A, Table H, does not exceed 1 in 10,000.

SOURCE: Amended at 21 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_.

SUBPART I: TIER 3 EVALUATION

Section 742.915 Formal Risk Assessments

A comprehensive site-specific risk assessment shall demonstrate that contaminants of concern at a site do not pose a significant risk to any human receptor. All site-specific risk assessments shall be submitted to the Agency for review and approval. A submittal under this Section shall address the following factors:

- a) Whether the risk assessment procedure used is nationally recognized and accepted including, but not limited to, those procedures incorporated by reference in Section 742.210;
- b) Whether the site-specific data reflect actual site conditions;
- c) The adequacy of the investigation of present and post-remediation exposure routes and risks to receptors identified at the site;
- d) The appropriateness of the sampling and analysis;
- e) The adequacy and appropriateness of toxicity information;
- f) The extent of contamination;
- g) Whether the calculations were accurately performed; ~~and~~
- h) Similar-acting chemicals shall be specifically addressed. At a minimum, the chemicals subject to this requirement are identified in Appendix A, Tables E and F; and
- i) Proposals seeking to modify the target risk consistent with Section 742.900(d) shall address the following factors:
  - 1) the presence of sensitive populations;

- 2) the number of receptors potentially impacted;
- 3) the duration of risk at the differing target levels; and
- 4) the characteristic of the chemicals of concern.

SOURCE: Amended at 21 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_.

Section 742.APPENDIX A: General

Section 742.TABLE E: ~~Similar-Acting Noncarcinogenic Chemicals with Noncarcinogenic Toxic Effects on Specific Target Organs/Organ Systems or Similar Modes of Action~~

2,4,5-Trichlorophenol

Kidney

Acetone

Cadmium (Ingestion only)

Chlorobenzene

Dalapon

1,1-Dichloroethane

Di-n-octyl phthalate

Endosulfan

Ethylbenzene

Fluoranthene

Nitrobenzene

Pyrene

Toluene

2,4,5-Trichlorophenol

Vinyl acetate

Liver

Acenaphthene

Acetone

Butylbenzyl phthalate

Chlorobenzene

1,1-Dichloroethylene

Endrin

Ethylbenzene

Fluoranthene

Nitrobenzene

Picloram

Styrene

2,4,5-TP (Silvex)

Toluene

Central Nervous System

Butanol  
 Cyanide (amenable)  
 2,4-Dimethylphenol  
 Endrin  
 Manganese  
 2-Methylphenol  
 Mercury  
 Styrene  
 Xylenes

Circulatory System

Antimony  
 Barium  
 2,4-D  
 cis-1,2-Dichloroethylene  
 Nitrobenzene  
 trans-1,2-Dichloroethylene  
 2,4-Dimethylphenol  
 Fluoranthene  
 Fluorene  
Cholinesterase Inhibition  
 Aldicarb  
 Carbofuran

Decreased Body Weight Gains  
and Circulatory System Effects

Atrazine  
 Simazine

Adrenal Gland

Nitrobenzene  
 1,2,4-Trichlorobenzene

Respiratory System

1,2-Dichloropropane  
 Hexachlorocyclopentadiene  
 Methyl bromide  
 Vinyl acetate

Immune System

2,4-Dichlorophenol  
 p-Chloroaniline

Styrene  
 Zinc

Gastrointestinal System

Endothall  
 Hexachlorocyclopentadiene  
 Methyl bromide

Reproductive System

Barium  
 Boron  
 Carbon disulfide  
 2-Chlorophenol  
 1,2 Dibromo-3-Chloropropane (Inhalation  
 only)  
 Dinoseb  
 Methoxychlor  
 Phenol

## Section 742.APPENDIX A: General

Section 742.TABLE F: Similar-Acting Carcinogenic Chemicals With Carcinogenic Toxic Effects on Specific Target Organs/Organ Systems or Similar Modes of ActionKidney

Bromodichloromethane

Chloroform

1,2-Dibromo-3-chloropropane

2,4-Dinitrotoluene

2,6-Dinitrotoluene

Hexachlorobenzene

Liver

Aldrin

Bis(2-chloroethyl)ether

Bis(2-ethylhexyl)phthalate

Carbazole

Carbon tetrachloride

Chlordane

Chloroform

DDD

DDE

DDT

1,2-Dibromo-3-chloropropane

1,2-Dibromoethane

3,3'-Dichlorobenzidine

1,2-Dichloroethane

1,3-Dichloropropane (Ingestion only)

1,3-Dichloropropylene

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  
 Bromoform  
 1,2-Dibromo-3-chloropropane  
 1,2-Dibromoethane  
 1,3-Dichloropropylene

Lung

Arsenic  
 Beryllium (Inhalation only)  
 Cadmium (Inhalation only)  
 Chromium, hexavalent (Inhalation only)  
 1,3-Dichloropropylene  
 Methylene chloride  
 N-Nitrosodi-n-propylamine  
 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  
 N-Nitrosodiphenylamine

SOURCE: Amended at 21 Ill. Reg. \_\_\_\_\_, effective  
 \_\_\_\_\_.

## Section 742.APPENDIX A: General

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

<u>Chemical</u>	<u>Class I Groundwater Remediation Objective (mg/l)</u>	<u>1 in 1,000,000 Cancer Risk Concentration (mg/l)</u>	<u>ADL (mg/l)</u>
Aldrin	0.00004	0.000002	0.00004
Benzo(a)pyrene	0.0002	0.000005	0.00023
Bis(2-chloroethyl)ether	0.01	0.00003	0.01
Bis(2-ethylhexyl)phthalate	0.006	0.003	0.0027
Carbon Tetrachloride	0.005	0.0003	0.00003
Chlordane	0.002	0.00003	0.00014
Dibenzo(a, h)anthracene	0.0003	0.000005	0.0003
1,2-Dibromo-3-chloropropane	0.0002	0.00003	0.0002
1,2-Dibromoethane	0.00005	0.0000004	0.00005
3,3'-Dichlorobenzidine	0.02	0.00008	0.02
1,2-Dichloroethane	0.005	0.0004	0.00003
Dieldrin	0.00002	0.000002	0.00002
Heptachlor	0.0004	0.000008	0.00003
Heptachlor epoxide	0.0002	0.000004	0.00032
Hexachlorobenzene	0.00006	0.00002	0.00006
alpha-HCH	0.00003	0.000006	0.00003
Tetrachloroethylene	0.005	0.0007	0.00001
Toxaphene	0.003	0.00003	0.00086
Vinyl chloride	0.002	0.000015	0.00006
<u>Ionizable Organics</u>			
N-Nitrosodiphenylamine	0.01	0.007	0.01
N-Nitrosodi-n-propylamine	0.01	0.000005	0.01
Pentachlorophenol	0.001	0.0003	0.001
2,4,6-Trichlorophenol	0.0064	0.003	0.0064
<u>Inorganics</u>			
Arsenic	0.05	0.00002	0.001
Beryllium	0.004	0.0000083	0.004

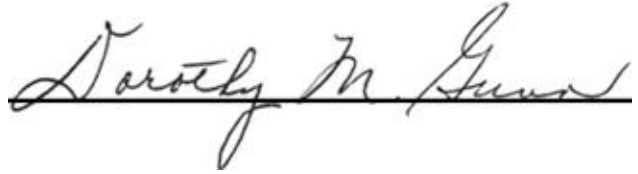
SOURCE: Added at 21 Ill. Reg. \_\_\_\_\_, effective \_\_\_\_\_.

IT IS SO ORDERED.



Section 41 of the Environmental Protection Act, 415 ILCS 5/41 (1996), provides for the appeal of final Board orders to the Illinois Appellate Court within 35 days of service of this order. Illinois Supreme Court Rule 335 establishes such filing requirements. See 145 Ill. 2d R. 335; see also 35 Ill. Adm. Code 101.246, Motions for Reconsideration.

I, Dorothy M. Gunn, Clerk of the Illinois Pollution Control Board, hereby certify that the above opinion and order was adopted on the 4th day of December 1997, by a vote of 6-0.

A handwritten signature in cursive script, reading "Dorothy M. Gunn", written over a solid horizontal line.

Dorothy M. Gunn, Clerk  
Illinois Pollution Control Board