ILLINOIS POLLUTION CONTROL BOARD
October 2, 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	)	

Proposed Rule. Second Notice.

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

The Board proposes today for second notice amendments to 35 Ill. Adm. Code 742: Tiered Approach to Corrective Action Objectives, also known as TACO. The amendments address how the effect of similar-acting chemicals on the same target organ (also know as the mixture rule) is to be taken into account when determining remediation objectives under TACO. Specifically, the amendments consider the effects of similar-acting chemicals, *i.e.*, carcinogens and noncarcinogens, 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. Section 58.5(c) of the Act provides in pertinent part that the regulations establishing remediation objectives shall address "the presence of multiple substances of concern and multiple exposure pathways." 415 ILCS 5/58.5(c) (1996). Section 620.615 of the Board's regulations requires that the Agency determine "the need for additional health advice appropriate to site-specific conditions" when similar-acting chemicals are detected. 35 Ill. Adm. Code 620.615. The amendments were originally proposed by the Agency during the course of Docket A of this rulemaking.[1]

On April 17, 1997, 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. Public hearings were held on May 21, 1997, and May 29, 1997, to consider the proposal of the Illinois Environmental Protection Agency (Agency). 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.

The first notice comment period ended on September 8, 1997. No public comments were received during the first notice period, however, one public comment was received just prior to its initiation. The Site Remediation Advisory Committee (SRAC) filed a motion to

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

file instanter and supplemental post-hearing comments on July 15, 1997 (PC 3[2]). The Board hereby grants the SRAC's motion and considers its supplemental post-hearing comments in this second notice opinion.

Today the Board adopts the amendments to Part 742, unchanged from first notice, for the purpose of second notice pursuant to the APA. The amendments will be submitted to the Joint Committee on Administrative Rules for its consideration. The mixture rule is adopted for second notice for each of the three tiers. The mixture rule under Tier 1 applies to carcinogens and noncarcinogens detected in groundwater. There is no rule applicable to contaminants of concern in soil at Tier 1 sites. The mixture rule under Tier 2 applies to both carcinogens and noncarcinogens in groundwater, but only to noncarinogens in soil. Finally, the mixture rule under Tier 3 applies to both carcinogens and noncarcinogens in both groundwater and soil. Also adopted today is the definition of "similar-acting chemicals" and Appendix A.Table H which lists carcinogens with groundwater remediation objectives based on concentrations in excess of 1 in 1,000,000 cancer risk.

ANALYSIS

Definition of Similar-Acting Chemical

The Board proposed at first notice to adopt at Section 742.200 a definition of similar-acting chemicals. There was no such definition in the final rules adopted under Docket A because the term was defined within Sections 742.710 and 742.805(c). In response to public testimony, the Board proposed that, at Section 742.200, the following definition of "similar-acting chemicals" be inserted:

> "Similar-Acting Chemicals" are chemical substances that have toxic or harmful physiological 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.)

As stated in its first notice opinion, the Board finds that this definition parallels the description of similar-acting chemicals found at 35 Ill. Adm. Code 620.615. Since the mixture rule originates from that rule, the Board finds that its description of similar-acting chemicals is most appropriate for defining the same under TACO.

Appendix A.Table H: Carcinogens with Groundwater Remediation Objectives in Excess of a 1 in 1,000,000 Cancer Risk Concentration

[2] Docket B public comments and exhibits will be referred to as PC at __ and Exh. 1 at __, respectively; 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 __.

In its prefiled testimony under Docket B, the Agency proposed that a new Table H be added to Part 742 in Appendix A. Exh.1 at 10. Table H lists those 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. At first notice, the Board agreed with the Agency that the new Appendix A.Table H will assist the remediation applicant to more readily determine whether the similar-acting carcinogenic chemicals detected are subject to the mixture rule found under Tier 2 or 3. The Board continues to agree with the Agency that this new table will aid the remediation applicant when applying the mixture rule in the TACO process.

Satisfaction of Section 620.615 of the Board's Groundwater Regulations

In its prefiled testimony before first notice, the Agency proposed that the Board adopt language that the "requirements of 35 Ill. Adm. Code 620.615 regarding mixtures of similar-acting chemicals shall be considered met for Class I groundwater at the point of human exposure" if certain requirements under Tier 1 and Tier 2, respectively, are achieved. Exh. 2 at 4-5. Those requirements are (1) that the level of the contaminant of concern does not exceed the Tier 1 remediation objective, and (2) that the remediation objective is based on a risk level of 1 in 1,000,000. Because we adopted a mixture rule for both similar-acting carcinogenic and noncarcinogenic chemicals under all three tiers, the Board at first notice accepted the Agency's premise, but modified the language it proposed with the amendments adopted at first notice.

Accordingly, the language proposed at first notice at both Tiers 1 and 2 provides that the evaluation required under Section 620.615 shall be considered satisfied, subject to two exceptions. 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 similar-acting carcinogenic chemical listed on Appendix A.Table H is detected at the site, the mixture rule at Section 742.805(d) or that developed under Tier 3 must be applied. The Board finds that compliance with one of the applicable mixture rules under TACO serves to satisfy the statutory requirement that multiple chemicals be addressed. Further, the Board finds that the mixture rule serves as an appropriate alternative procedure to that set out at Section 620.615.

Prior to Docket B, the Agency requested that the mixture rule apply to both carcinogens and noncarcinogens to ensure that Section 620.615 is satisfied under TACO. The Agency now requests that the mixture rule only apply to similar-acting carcinogens in groundwater under Tier 1. The Agency's rationale for changing its position is that, as a matter of policy, a "look-up table" is preferable to a mixture rule, and therefore, the Agency is willing to forgo such a rule since no such table can be created for noncarcinogens. The Agency never explained the risk difference between carcinogens and noncarcinogens, *i.e.*, why it believes Section 620.615 could be deemed satisfied absent such a rule when similar-acting noncarcinogens are detected in groundwater. The only difference appears to be the ability to devise a "look-up table" for carcinogens. The Board did not agree with the Agency that the

Act and Section 620.615 can be deemed satisfied unless the cumulative affect of similar-acting chemicals is evaluated in all cases. We found that TACO and Section 620.615 would not be comparable if similar-acting noncarcinogenic chemicals in groundwater are not subject to the mixture rule under Tier 1. Therefore, we made all similar-acting contaminants subject to the mixture rule under Tier 1. See Tiered Approach to Corrective Action Objectives (TACO): Amendments to 35 Ill. Adm. Code 742.105, 742.200, 742.505, 742.805, and 742.915 (July 10, 1997), R97-12(B), slip op. at 8-9, 13.

The Board also modified the Agency's proposed language. Those principle modifications include substituting (1) "the requirements of Section 620.615" with the term "evaluations" and (2) "shall be considered met" with the term "satisfied". The Board believed these substitutions more accurately reflect the appropriate cross-reference and relationship between the two rules. See Sections 742.505(b)(3) and 742.805(c) and (d); Tiered Approach to Corrective Action Objectives (TACO): Amendments to 742.105, 742.200, 742.505, 742.805, and 742.915 (July 10, 1997), R97-12(B), slip op. at 9.

Tier 1

In Docket A on June 5, 1997, the Board adopted a mixture rule at Section 742.505(b) that is applicable only to noncarcinogenic chemicals for groundwater remediation objectives under Tier 1, regardless of whether the Tier 1 remediation objectives were exceeded. See Tiered Approach to Corrective Action Objectives (TACO): Amendments to 742.105, 742.200, 742.505, 742.805, and 742.915 (June 5, 1997), R97-12(B). The Board did not adopt a mixture rule for similar-acting carcinogens in groundwater because the record did not support the same. See Tiered Approach to Corrective Action Objectives (TACO): Amendments to 742.105, 742.200, 742.505, 742.805, and 742.915 (June 5, 1997), R97-12(B), slip op. at 19.

Based on the evidence presented to the Board by the Agency in Dockets A and B, the Board found at first notice (1) that a mixture rule is not necessary for either carcinogenic or noncarcinogenic chemicals when developing soil remediation objectives under Tier 1, and (2) that a mixture rule is necessary for both similar-acting carcinogenic and noncarcinogenic chemicals when developing groundwater remediation objectives under Tier 1. Accordingly, the current rule at Section 742.505(b) that similar-acting noncarcinogenic chemicals be evaluated under Tier 1 for groundwater was retained, but amended to include the same requirement for similar-acting carcinogenic chemicals when the Tier 1 remediation objectives are exceeded or when similar-acting carcinogenic chemicals have remediation objectives set at risk levels higher than 1 in 1,000,000. We adopt for second notice the same mixture rule for a Tier 1 analysis.

Soil

With regard to Tier 1 soil remediation objectives, Dr. Hornshaw testified at hearing that the inherent protection built into the process of developing the Tier 1 soil remediation objectives, for similar-acting carcinogenic and noncarcinogen, made consideration of the

additivity of effects of similar-acting chemicals unnecessary in Tier 1. Tr.1 at 14, 19. Therefore, Dr. Hornshaw testified that the remediation objectives set forth in Appendix A.Tables E and F are protective of human health in the context of soil remediation objectives.

Groundwater

In Docket A, the Agency advocated that the Board adopt a mixture rule for both similar-acting noncarcinogens and carcinogens in groundwater. In Docket B, however, the Agency advocated such a rule for carcinogens only. At hearing, Dr. Hornshaw testified that, initially, the Agency and the SRAC agreed that consideration of mixtures of similar-acting chemicals is not necessary under Tier 1 but for those carcinogens whose groundwater remediation objectives are not based on a 1 in 1,000,000 cancer risk. Tr.1 at 23.

In support of this agreement, the Agency explained that, unlike the Tier 1 soil remediation objectives, there is not necessarily the same degree of protection built into the groundwater remediation objectives. Tr.1 at 21. Dr. Hornshaw argued that the only conservatisms built into development of the remediation objectives for groundwater are assumptions regarding the toxicity and the actual intake of the chemical. Tr.1 at 21-22. Further, Dr. Hornshaw maintained that, for certain similar-acting carcinogenic chemicals whose Tier 1 groundwater remediation objective are based on the chemical's drinking water standard, the groundwater remediation objectives do not have the same degree of conservatism as the corresponding soil remediation objectives. Tr.1 at 22. For that reason, the Agency only advocated that similar-acting carcinogens be subject to a mixture rule under Tier 1.

At hearing, the SRAC witness agreed with the Agency. Mr. Harry Walton, testifying on behalf of the SRAC, maintained that the mixture rule need not be applicable under Tier 1 to noncarcinogens in groundwater because the site cleanup will be driven by carcinogens. Tr.2 at 44-45, 49. The example relied upon by Mr. Walton and other participants was a site where benzene, toluene, ethyl benzene, and xylene are present. Mr. Walton testified that similar-acting noncarcinogenic chemicals will be cleaned up to acceptable levels coincidental to the benzene cleanup. Tr.2 at 44-45, 49.

At first notice, we agreed with the Agency in part. We adopted a proposed mixture rule for carcinogens under Tier 1. However, the Board also found that a mixture rule is necessary for similar-acting noncarcinogenic chemicals when developing groundwater remediation objectives. The Board noted that it sympathized with the desire by the Agency and the participants for the simplicity of "look-up tables" under Tier 1. However, the Agency and the participants agreed that under Tier 1 more than a simple look-up table is necessary when determining groundwater remediation objectives for similar-acting carcinogenic chemicals which exceed the high end of the statutory risk range of 1 in 1,000,000 cancer risk. We concluded that, likewise, 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/index of one. Furthermore, we found 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. For instance, in the example most used by the participants at hearing, including the SRAC's witness, Mr. Walton, the only additional burden on the remediation applicant will be to perform the necessary calculations to determine the cumulative effect and the corrected remediation objectives, and prove that the latter were achieved as part of the benzene remediation. See Tiered Approach to Corrective Objectives (TACO) (July 10, 1997), R97-12(B), slip op. at 9-13 for additional discussion.

In its supplemental post-hearing comments (received after adoption of the July 10, 1997 first notice opinion and order), the SRAC reiterated the arguments it made at hearing why a mixture rule is unnecessary when determining remediation objectives for groundwater under Tier 1. PC 3 at 2. First, the SRAC asserts that Part 620 and Part 742 were developed in different contexts for different purposes. PC 3 at 2. The SRAC maintains that Part 620 was developed as statewide standards, without limited consideration of site specific conditions, and those standards were not intended to be imposed as remedial standards in the context of a remediation program. PC 3 at 2. The SRAC argues that, on the other hand, Part 742 is intended for use in context with various remediation programs to establish remediation objectives appropriate for a specific site. PC 3 at 3. Next the SRAC argues that a mixture rule is unnecessary because Part 742 requires sources of contamination be removed and/or controls installed in addition to the conservatism of the Tier 1 numbers. PC 3 at 3-4. Moreover, the SRAC again argues that in its practical application, mixtures of similar-acting chemicals will not be the driving force of TACO remediations. PC 3 at 4. Finally, the SRAC argues that Section 58.5(d)(1) of the Act mandates that Tier 1 remediation objectives be expressed as a table of numeric value for soil and groundwater objectives and that to do otherwise would be contrary to the language and intent of the authorizing legislation. PC 3 at 4-5.

For the most part, the Board has already addressed these arguments in the first notice opinion and order because Mr. Walton had testified to the same at hearing on May 29, 1997. However, two arguments warrant further discussion. They are the following two arguments made in the SRAC's supplemental post-hearing comment. First, the SRAC argues that Section 58.5(d)(1) of the Act (415 ILCS 5/58.5(d)(1) (1996)) mandates numeric tables for Tier 1 remediation objectives. PC 3 at 4. Second, the SRAC argues that the Part 620 groundwater quality standards were established for statewide applicability and were never intended to be imposed as remedial standards in the context of a remediation program. PC 3 at 2.

As to the SRAC's statutory argument, the Board recognizes that Section 58.5(d) of the Act requires that:

> d. [a]t a minimum, the objectives shall include the following:
>
> 1. Tier 1 remediation objectives expressed as a table of numeric values for soil and groundwater. (Emphasis added.) 415 ILCS 5/58.5(d) (1996).

Such tables were adopted in Docket A. Specifically, the numerical groundwater remediation objectives are found at Appendix B.Table E. We also recognize that Section 58.5(c)(4) of the Act provides in pertinent part that:

> 4. The methodologies adopted under this Section shall ensure that the following factors are taken into account in determining remediation objectives:
>
> A. potential risks posed by carcinogens and noncarcinogens; and
>
> B. the presence of multiple substances of concern and multiple exposure pathways. (Emphasis added.) 415 ILCS 5/58.5(c)(4) (1996).

We have concluded that both statutory provisions can be satisfied, and are not irreconcilable when read together. Furthermore, we have concluded that more than a numeric table is necessary to determine the groundwater remediation objectives for similar-acting carcinogens, *i.e.*, that a mixture rule must be applied. The Agency testified that it and other participants have agreed that this is necessary to properly manage the risk posed by the similar-acting chemicals at a site. Tr.1 at 21-22; Tr.2 at 36-37. At hearing, no one argued that Section 58.5(d) of the Act prohibits this approach. And, in the context of similar-acting noncarcinogens, the Agency did not argue that a mixture rule is contrary to Section 58.5(d). Instead, it explained that it wants to preserve the user-friendly approach a numeric table affords. 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. As for the statutory argument made by the SRAC, we do not agree that a mixture rule is contrary to the language or intent of Section 58.5 of the Act when read in its entirety.

The SRAC's second argument is that the Part 620 groundwater quality standards were established for statewide applicability, "without limited consideration of site-specific conditions." PC 3 at 2. Yet Section 620.615 requires the Agency to take into account "the need for additional health advice appropriate to site-specific conditions" (emphasis added) when similar-acting chemicals are detected. In any event, the Part 620 groundwater quality standards were adopted as remediation objectives in this rulemaking. They are the remediation objectives at Appendix B.Table E to be applied on a site-specific basis. Under Part 620, specifically Section 620.615, the groundwater quality standards are subject to a mixture rule when site-specific groundwater conditions so required. So that these numerical values under TACO are equally protective, the mixture rule is necessary. The mixture rule assures that the cumulative effect of similar-acting chemicals 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 similar-acting carcinogens and noncarcinogens. Neither the Agency nor the SRAC has explained why levels of similar-acting noncarcinogens in excess of the hazard quotient/index do not pose a risk to public health. They simply argue that remediation objectives are sufficiently conservative. However, absent such a rule, contamination at the site

could remain at a level in excess of the hazard quotient of one – the value at which a chemical exposure is measured to be greater than the reference dose. The reference dose is the acceptable daily chemical exposure at which no harmful consequences occur. See Section 742.200 (definition of "reference dose"); Tr.2 at 29-31.

Tier 2

Under Docket A, the adopted mixture rule is applicable only for similar-acting noncarcinogenic chemicals in the context of both groundwater and soil remediation objectives. The Board did not adopt a mixture rule for similar-acting carcinogenic chemicals because the record did not support the same. Tiered Approach to Corrective Action Objectives (TACO): Amendments to 742.105, 742.200, 742.505, 742.805, and 742.915 (June 5, 1997), R97-12(A) slip. op. at 49-50.

The Agency's position under Docket B is that a mixture rule for similar-acting noncarcinogenic chemicals is still necessary for soil and groundwater remediation objectives, but maintains that the only mixture rule necessary for similar-acting carcinogenic chemicals is in the context of groundwater remediation objectives. Based upon the evidence presented by the Agency, the Board agrees with the Agency's analysis and conclusions regarding this issue. Accordingly, the mixture rule proposed under Tier 2 which applies to similar-acting noncarcinogenic chemicals is also retained, but amended to require that the cumulative effect of similar-acting carcinogenic chemicals be evaluated when developing groundwater remediation objectives. However, the Tier 2 mixture rule for soil remediation objectives remains unchanged, applicable only to similar-acting noncarcinogenic chemicals. A brief summary of that evidence follows.

Soil

As for mixtures of similar-acting chemicals in soil under Tier 1 or 2, Dr. Hornshaw testified at hearing that it was only necessary to address mixture effects of similar-acting noncarcinogenic chemicals because, for similar-acting 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. Dr. Hornshaw further explained that the Agency and the SRAC were in agreement that, "since the statute provides for an acceptable cancer risk range and since even if there are 10 carcinogens present at their respective 1 in 1,000,000 remediation objectives (an unusual event), the cumulative cancer risk of 1 in 100,000 is still within an acceptable range." Tr.1 at 15. On the other hand, because the Act does not specify an acceptable risk range for similar-acting noncarcinogenic chemicals, Dr. Hornshaw concluded that the additive effects of similar-acting noncarcinogenic chemicals need to be considered and provided for under Tier 2. Tr.1 at 15, 19.

Groundwater

With regard to mixtures of similar-acting carcinogenic chemicals in groundwater under Tier 2, the Agency maintained that there are similar-acting 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. The Agency maintained that, given the statutory and regulatory requirements to consider mixture effects in groundwater, the mixture rule should be applied to Tier 2 mixtures of similar-acting carcinogenic chemicals. Tr.1 at 22-23. Accordingly, the Agency concluded 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, the Agency proposed that 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 Agency also testified that those similar-acting carcinogenic chemicals whose Tier 1 groundwater remediation objectives are not based on a 1 in 1,000,000 risk level should be subject to the mixture rule. Tr.1 at 24.

As for mixtures of similar-acting noncarcinogenic chemicals in groundwater, Dr. Hornshaw testified that the Agency and the SRAC agreed that consideration of similar-acting noncarcinogenic chemicals in Tier 2 is required. Tr.1 at 20.

Tier 3

Under Docket A, no mixture rule was adopted under Tier 3. Under Docket B, the Agency requested the mixture rule apply to both soil and groundwater remediation objectives for both similar-acting carcinogenic and noncarcinogenic chemicals. Tr.1 at 19, 27. The Agency proposed the following language towards that end:

> Contaminants of concern which affect the same target organ, organ system or similar mode of action shall be specifically addressed. At a minimum, the chemical subject to this requirement are identified in Appendix A, Tables E and F.

The Board proposed for first notice at Section 742.915(h) the amendments requested under Tier 3 by the Agency to ensure that the cumulative effects of both carcinogenic and noncarcinogenic chemicals are evaluated under the Tier 3 site-specific approach.

At the close of its first notice opinion, the Board questioned why the proposed language does not parallel more closely that requested under Tiers 1 and 2. The Board suggested that the mixture rule under Tier 3 (1) use the term "similar-acting chemical;" (2) provide minimum requirements for specifically addressing the cumulative effects of similar-acting chemicals, be they similar-acting carcinogenic or noncarcinogenic chemicals; and (3) that compliance with those minimum requirements be deemed protective of Class I groundwater in terms of human health. The term "similar-acting chemicals" was substituted but Section 742.915(e) was not otherwise amended at first notice. Finally, the Board asked the Agency and the participants to

consider and comment on these suggested revisions. No comments were received. We will therefore not change the rule from that proposed at first notice.

CONCLUSIONS

The Board proposes for second notice the same mixture rule as that proposed for first 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 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.

Further, the Board concludes, as we did at first 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 submission of the following proposal to the Joint Committee on Administrative Rules:

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

PART 742
TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES

SUBPART A: INTRODUCTION

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

SUBPART B: GENERAL

SUBPART C: EXPOSURE ROUTE EVALUATIONS

SUBPART D: DETERMINING AREA BACKGROUND

SUBPART E: TIER 1 EVALUATION

SUBPART F: TIER 2 GENERAL EVALUATION

SUBPART G: TIER 2 SOIL EVALUATION

SUBPART H: TIER 2 GROUNDWATER EVALUATION

SUBPART I: TIER 3 EVALUATION

SUBPART J: INSTITUTIONAL CONTROLS

SUBPART K: ENGINEERED BARRIERS

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~~/1 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 30ºC (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.~~inois~~ 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 (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 (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). (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 200^0C and a vapor pressure greater than 0.1 Torr (mm Hg) at 20^0C.

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 methodoligies 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:~~

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

~~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/mode of action, the actual number of contaminants will range from 2 to 14.~~

~~$CUOx_a$ = 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:

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

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 14.

$CUOx_a$ = 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~~

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
2,4,5-Trichlorophenol

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

SOURCE: Amended at 21 Ill. Reg. _____ , effective _____.

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 Action~~

Kidney
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

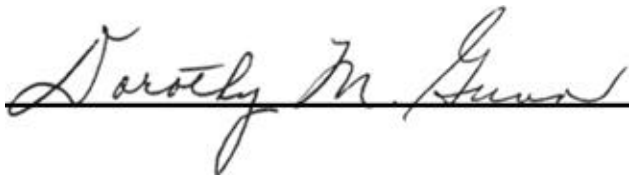
TABLE H: Chemicals Whose Tier 1 Class I Groundwater Remediation Objective Exceeds the 1 in 1,000,000 Cancer Risk Concentration.

Chemical	Class I Groundwater Remediation Objective (mg/l)	1 in 1,000,000 Cancer Risk Concentration (mg/l)	ADL (mg/l)
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
Ionizable Organics			
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
Inorganics			
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.

I, Dorothy M. Gunn, Clerk of the Illinois Pollution Control Board, hereby certify that the above opinion and order was adopted on the 2nd day of October 1997, by a vote of 7-0.



Dorothy M. Gunn, Clerk
Illinois Pollution Control Board