

## **Note Regarding Changes To the Following Memo:**

The only section that has been changed since the document was first posted on April 6, 2001 is:

### **“Impacts Over Water” of SECTION II**

Scroll down to see the memo.

# Texas Natural Resource Conservation Commission

## INTEROFFICE MEMORANDUM

**To:** Interested Parties

**Date:** draft August, 2001

**From:** Alan Thomas, M.S., and Zarena L. Post, Ph.D.  
Toxicology & Risk Assessment Section  
Office of Permitting, Registration & Remediation

**Subject:** Effects Evaluation Procedure: Marine Vessels

### I. INTRODUCTION

The purpose of this memo is to describe how the effects evaluation portion of the technical review of an air permit application pertaining to marine vessels are conducted. This document is not intended to serve as a “check list” for the applicant or reviewing engineer, but rather, serves as a continuum to the Effects Evaluation Procedure, Attachment C of the Modeling and Effects Review Applicability Technical Guidance Package (RG-324). Details specific to the effects evaluation related to loading, unloading, degassing, cleaning, blasting, and painting of marine vessels will be described.

By way of review, the reader is reminded that the effects evaluation is conducted in a tiered fashion, with progressively greater detailed information being required to complete Tier III evaluations compared to Tier I evaluations. Tier I evaluations are those for which all predicted concentrations are less than Effects Screening Levels (ESLs). Tier II evaluations are those for which the maximum predicted off-property concentration is less than two times the ESL in an industrial area AND the concentrations predicted to occur at non-industrial receptors are less than the ESL. If a project cannot meet the criteria for Tier I or II review, a more refined analysis (case-by-case, Tier III review) must be done. To that end, the following sections describe 1) “extended” (Tier II review guidelines which may be applicable to marine projects, 2) Tier III case-specific factors relevant to the review of marine vessels, and finally, 3) additional considerations that are made in the review of marine vessels.

### II. EXTENDED TIER II REVIEW GUIDELINES FOR COMPOUNDS WITH HEALTH-BASED ESLs

This section describes guidelines which generally a project may meet, resulting in less extensive evaluation of the Tier III case-specific factors described in the next section. Occasionally clarifying information may still be requested to complete the evaluation. The guidelines have evolved as a result of case-by-case evaluations conducted over the past 20 years. The guidelines are applicable to the review of compounds with health-based ESLs. Review of compounds with odor-based ESLs is addressed in “Additional Considerations.” The guidelines presented in this section describe ESL exceedances of greater magnitude and frequency than typical Tier II criteria allow, but projects meeting the extended guidelines are *usually* deemed acceptable. It should be emphasized that even if these guidelines are exceeded in a specific project, concentrations may still be considered on a case-by-case basis in a Tier III review.

The guidelines in this section are laid out according to various exposure scenarios (land/water, industrial/non-industrial). For each scenario, magnitude and frequency of ESL exceedance “targets” are

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presented. These targets vary according to exposure scenarios, and depend on the sensitivity of individuals exposed, and the expected frequency of exposure. The magnitude of an exceedance target is presented to limit the magnitude of the concentration resulting from the reviewed emissions. The purpose of the frequency of exceedance target is two-fold: to reduce the likelihood that an individual would be exposed repeatedly to high concentrations, as well as to reduce the likelihood that worst-case concentrations would even occur.

In the following paragraphs, the maximum predicted ground level concentration is referred to as the  $GLC_{max}$ , while the maximum concentration predicted in non-industrial areas is referred to as the  $GLC_{ni}$ .

### Impacts over Land

Industrial Use: The short-term  $GLC_{max}$  should be less than or equal to 10 times the ESL, and should not exceed 2 times the ESL more than 24 hrs/yr. Not more than 10 of those hours should have concentrations which exceed 4 times the ESL (Table 1). The long-term  $GLC_{max}$  should be less than or equal to 2 times the ESL. These magnitudes of exceedance guidelines represent concentrations that would be allowable for healthy workers at neighboring industry, while still providing some margin of safety. The corresponding frequency guidelines limit the likelihood that all factors would “line up” (healthy worker present at the point of maximum exposure when worst case meteorological and operational conditions occur) such that the concentrations would actually occur. Concentrations which are greater in magnitude, or which occur with greater than the described frequency, need to be evaluated on a case-by-case basis. These guidelines are not applicable to scenarios in which members of the general public are expected to be exposed.

Table 1. Guidelines for Concentrations over Land in Industrial Areas

	Magnitude of exceedance	Frequency of exceedance
Short-term	$GLC_{max} \# 10x$ short-term ESL	$GLC_{max} > 2x$ ESL #24 hrs $GLC_{max} > 4x$ ESL #10 hrs
Long-term	average GLC # 2x annual ESL	not applicable

Non-Industrial Use: The non-industrial scenario is applicable when members of the general public are reasonably expected to be exposed. The typical Tier II review limits the short-term  $GLC_{ni}$  to less than the ESL. Here, the guidelines are extended: the short-term  $GLC_{ni}$  should be less than or equal to 2 times the ESL, and should not exceed the ESL for more than 24 hrs/yr. The long-term  $GLC_{ni}$  should be less than or equal to the ESL (Table 2). The magnitude guidelines assure that the general public is not exposed to excessive concentrations, and that exposure to maximum predicted concentrations results in no more than transient effects. The frequency guidelines limit how often an individual would be expected to experience even transient effects.

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Table 2. Guidelines for Concentrations over Land in Non-Industrial Areas

	Magnitude of exceedance	Frequency of exceedance
Short-term	GLC <sub>ni</sub> # 2x short-term ESL	GLC <sub>ni</sub> > 1x ESL #24 hrs
Long-term	average GLC # 1x annual ESL	not applicable

#### Impacts over Water

Determining the point of evaluation over water: If an applicant can demonstrate that an area immediately adjacent to his dock is controlled or restricted, concentrations will not need to be modeled or evaluated in that controlled or restricted area. Areas accessible to individuals other than the applicant's employees (which include personnel associated with marine vessel activities) must be evaluated. When exposure is predicted to be to off-site workers, concentrations will be evaluated against industrial guidelines. When exposure is predicted to be to members of the general public, but the public has been warned they are entering an area at their own risk, concentrations will be evaluated against industrial guidelines. Areas to which public access is in no way limited will be evaluated as recreational, unless the applicant can provide documentation to suggest an alternate exposure scenario would be appropriate.

It should be noted that the approach for evaluating impacts over water is similar to that used in the evaluation of impacts over land for any air permit. The difference is that the magnitudes of exceedance guidelines are significantly greater, which is made possible by the lower likelihood that individuals will actually be exposed.

Distinguishing waters used for industrial vs. recreational purposes: For the purposes of the effects evaluation of marine vessel facilities, a determination will be made on a case-by-case basis whether the adjacent water will be evaluated as industrial or recreational. In some evaluations, waters may not be specifically designated industrial or recreational during the review, but will be evaluated with consideration for who is likely to be exposed to emissions from the marine vessel activities. It will be important for applicants to characterize the land use adjacent to the dock, particularly if recreational areas are present within 1/4 - 1/2 mile. Applicants are encouraged to be resourceful in supplying documentation for an area which will help staff to distinguish industrial and recreational waters. Examples of types of information which may be useful in the distinction include water quality or Environmental Impact Statement maps, other regulations implemented by federal, state or local governmental agencies, or practices of the relevant Navigation District. It should not be assumed that just because a channel was dredged for commercial use under the authority of the Army Corps of Engineers, or if the predominant purpose of the water is to allow ship/barge traffic access to a series of docks, that recreational evaluation considerations can be automatically ruled out.

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### Effects Evaluation Examples

Example 1: A channel of water is lined on both sides with industry, and access to the channel by small pleasure craft and fishing boats is restricted by the port authority. The recreational exposure scenario can be ruled out. The only off-site traffic that would be expected in the vicinity of the applicant's dock is industrial. Thus, the portions of the channel to which the applicant is unable to control or restrict access by neighboring industry would be evaluated against the industrial guidelines.

Example 2: Although few in number, there are specified locations in Texas where access is prohibited or limited to authorized persons. The Coast Guard and the Corps of Engineers designate these locations under authorization in the Code of Federal Regulations, Title 33. For example, the Coast Guard has designated "safety zones," and the Corps of Engineers has designated "danger zones" and "restricted areas." While in some cases the public may be able to transit these locations, it is likely that only industrial workers would be allowed to remain in one of these areas, depending on the specific details of the designation. Although these federal entities have the authority to require unauthorized parties to leave an area, most applicants do not. Thus, that portion of a waterway to which the applicant is able to control or restrict access would not need to be evaluated, but the portions of the waterway which an applicant cannot control or restrict would be evaluated against industrial guidelines.

Example 3: The applicant has control via a coastal easement agreement with the General Land Office over the area between his dock and the dredged channel. He reports that an annual fee is paid for the easement, which covers the dock structures in the water, and the river bottom dredged to connect the docks to the channel. With this easement agreement in place, the applicant has authority to restrict access by the public (including neighboring industry) to the area. Concentrations will be evaluated outside the restricted access area. Modeled concentrations and frequency of exceedance of target concentrations are greater than recreational guidelines, but less than industrial. It is concluded that it is unlikely that members of the public would have access to or frequent areas where concentrations are above recreational guidelines. Concentrations are deemed allowable, although the water has not been specifically designated as industrial or recreational.

Following are the magnitude and frequency of exceedance guidelines applicable to concentrations over water. The guidelines are applicable to the agreed upon point of evaluation.

Industrial Use: For volatile organic compounds and exempt solvents (VOCs) the short-term  $GLC_{max}$  should be less than or equal to 25 times the ESL, and should not exceed 10 times the ESL more than 24 hrs/yr. Not more than 10 of those hours should have concentrations which exceed 20 times the ESL (Table 3). This is clearly a more generous exceedance schedule than for the industrial land use scenario, indicating that the concentrations over land will be given more consideration in the effects review, but that concentrations over water will not be ignored. It is possible that even healthy workers exposed to 25 times an ESL could experience adverse health effects. However, these guidelines are allowable because exposure is unlikely (it is unlikely that a healthy worker would be at the point of maximum exposure when worst case meteorological and operational conditions occur) and would not be expected to be routine. The guidelines give magnitude of exceedance flexibility while still limiting the likelihood that exposure to excessive concentrations would actually occur.

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Table 3. Guidelines for Concentrations of VOCs over Water in Industrial Areas

	Magnitude of exceedance	Frequency of exceedance
Short-term	$GLC_{max} \# 25x$ short-term ESL	$GLC_{max} > 10x$ ESL # 24 hrs $GLC_{max} > 20x$ ESL # 10 hrs
Annual	average GLC # 2x annual ESL	not applicable

As always, the purpose of the effects evaluation is to determine the potential for off-property concentrations to adversely impact the general public, which includes workers at neighboring industry. Concentrations equivalent to occupational exposure standards are not appropriate for evaluating off-site exposures, even over water. Staff will work with applicants to assure appropriate placement of receptors for evaluation, and as suggested, will carefully consider water use, type of person potentially exposed, and frequency of exposure in determining the allowability of a specific proposed scenario.

For speciated particulates the short-term  $GLC_{max}$  should be less than or equal to 10 times the ESL and should not exceed 2 times the ESL more than 24 hrs/yr. Not more than 10 of those hours should have concentrations which exceed 4 times the ESL (Table 4). The magnitude guidelines are necessarily lower for particulates compared to VOCs because of the greater toxicity of particulate, in general. For example, ESLs for metals are often less than  $1 \mu\text{g}/\text{m}^3$ , while ESLs for VOCs are usually greater than  $100 \mu\text{g}/\text{m}^3$  (the lower the ESL, the more toxic the compound).

Table 4. Guidelines for Concentrations of Speciated Particulates over Water in Industrial Areas

	Magnitude of exceedance	Frequency of exceedance
Short-term	$GLC_{max} \# 10x$ short-term ESL	$GLC_{max} > 2x$ ESL # 24 hrs $GLC_{max} > 4x$ ESL # 10 hrs
Annual	average GLC # 2x annual ESL	not applicable

For both VOCs and speciated particulates, the long-term  $GLC_{max}$  should be less than or equal to 2 times the ESL. (Tables 3 and 4) The guidelines described here for industrially-used water are not applicable to scenarios in which the general public is expected to be exposed because the described concentrations would be expected to result in adverse health effects even in healthy members of the general public, if exposure to maximum concentrations actually occurred.

**Non-industrial (recreational) Use:** The maximum predicted short-term ground level concentration over a recreational water body ( $GLC_{rec}$ ) should be less than or equal to 5 times the ESL, and should not exceed 2 times the ESL more than 24 hrs/yr. Not more than 10 of those hours should have concentrations which exceed 4 times the ESL. The long-term  $GLC_{rec}$  should be less than or equal to 2 times the ESL. (Table 5) As with the industrial scenarios, the exceedance schedule for non-industrial water use is more generous than that associated with non-industrial land. This is, again, because exposure is not expected to be as routine. In the event that exposure to the maximum predicted concentrations actually occurred, exposure would be infrequent and to limited concentrations, and effects would be expected to be transient in nature.

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Table 5. Guidelines for Concentrations of VOCs over Water in Recreational Areas

	Magnitude of exceedance	Frequency of exceedance
Short-term	$GLC_{rec} \# 5x$ short-term ESL	$GLC_{rec} > 2x$ ESL # 24 hrs $GLC_{rec} > 4x$ ESL # 10 hrs
Annual	average GLC # 2x annual ESL	not applicable

### III. TIER III CASE-SPECIFIC FACTORS

The typical Tier III Effects Evaluation case-specific factors are still applicable in the review of marine vessels and are listed here. As necessary, additional marine-relevant details are noted. Most obviously, in addition to evaluating impacts over land, impacts over water need to be addressed.

Surrounding Land/Water Use: Are areas adjacent to the site under review industrial or non-industrial? Is the surrounding area (land or water) obviously industrial? If the surrounding area is not industrial, it would be considered non-industrial. Of specific concern in these areas are locations where sensitive members of the general public could be exposed, for example, residences, recreational areas, day care centers, hospitals, schools, and some commercial areas. If the surrounding area is non-industrial can sensitive individuals, be exposed, now or in the future? Can recreational use of the adjacent water reasonably be ruled out?

Magnitude of the Concentration Exceeding the ESL: What is the  $GLC_{max}$ ? Is it ten times the ESL? or 100? What is the  $GLC_{ni}$ ? How conservative is the modeling analysis are the predicted concentrations likely to actually occur? What are the predicted annual average concentrations?

Frequency of Exceedance: How many hours per year is the  $GLC_{max}$  predicted to exceed the target multiple of the ESL at an industrial receptor, how often is 2 times the ESL exceeded? 4 times? (Consideration of hours of exceedance of various multiples of the ESL gives us a picture of the distribution of exceedances, and helps us to determine whether maximum predicted concentrations are typical or unusual.) How many hours per year is the  $GLC_{ni}$  predicted to exceed the ESL? How conservative is the frequency estimate? Have actual hours of operation been factored into the frequency of exceedance prediction?

Type of Toxic Effect Caused by the Constituent: If exposure to a constituent results in an acute health or welfare effect, then short-term ESL exceedances carry more weight in the review. However, if a constituent is primarily a chronic toxicant, more attention is given to the long-term concentrations, with consideration given to how short-term excursions contribute to long-term exposure and effects.

Likelihood of Exposure and Exposure Duration: Who *could* be exposed, healthy worker or sensitive member of the general public? How *likely* is it that the exposure will actually occur? Will the exposure be momentary or prolonged?

Have Technology Advances Been Exhausted? If concentrations are unacceptable, further control technologies may need to be evaluated. Projects which implement strategies that advance the control

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technology for the industry would result in decreased off-property concentrations, and thus, decreased likelihood of off-property exposure. Reductions in emissions are always encouraged!

#### IV. ADDITIONAL CONSIDERATIONS FOR EVALUATION

Supporting information needed: In support of the effects evaluation, the permit application should contain the actual modeling results with compound-specific ground level concentrations listed for each compound authorized by the permit. This information should be provided even if the modeled concentrations for all compounds meet the guidelines specified in the preceding sections. The applicant should provide all supporting data and assumptions that were used to develop the predicted GLCs for the project, for example, how conservative or representative are the concentrations? Applicants are encouraged to call TARA to discuss the details of specific projects early in the application process to ensure that all information necessary to evaluate a project is provided, as well as to prevent the unnecessary expenditure of time and resources on the applicant's part.

Evaluation of compounds with odor-based ESLs: Although health-based ESLs are set at levels *below* which adverse health effects have been reported, odor-based ESLs are set *at threshold effect levels*. Thus, there is not the same "margin of safety" in odor-based ESLs as there is in health-based ESLs. In attempting to identify potential exceedance guidelines for odor-based ESLs, similar to the guidelines which were specified in an earlier section for health-based ESLs, we recognized that magnitudes of exceedance which would be "needed" were at or above concentrations that would be considered complaint levels. We cannot knowingly permit a complaint situation. Thus, evaluations which address odor concerns will be conducted on a case-by-case basis, providing as much flexibility in concentrations allowed as possible, without setting up a complaint situation.

Evaluation of Total Suspended Particulate (TSP) concentrations: Evaluation of TSP concentrations which are not expected to exceed the 30 TAC Chapter 111 standards (30 TAC Chapter 111.155) are evaluated by the Air Permits Division. The routine evaluation of TSP resulting from marine emissions does not allow for exceedances of the standard. If the applicant predicts that 30 TAC Chapter 111 standards will be exceeded, the applicant must petition the commission for an exemption to the standard. TARA will be able to support a request for exemption only when the applicant is able to demonstrate to the Air Permits Division that all available and achievable emission reductions have been exhausted in attempting to meet 30 TAC Chapter 111 requirements, AND it has been determined that exceedances of the 30 TAC Chapter 111 standards will not result in adverse health effects. TARA always encourages efforts to reduce emissions, and thus exposure.

Potential for air emissions to impact water quality: As the agency moves toward conducting business with a consideration for multi-media issues, we want to note that deposition of air emissions resulting from activities associated with marine vessels has the potential to adversely impact the quality of adjacent waters. Water deposition issues will be addressed by the agency at a later date.

Note: the following paragraph is not intended to contradict the preceding paragraph. Rather, it is provided to alert stakeholders to emerging considerations regarding two relatively common blast media. These considerations will not directly affect effects evaluations immediately, but stakeholders may appreciate the alert.

Emerging considerations: Preliminary reports are that hematite as an abrasive blast medium is proving to be less cost-effective than anticipated. Thus, shipyards which had proposed using hematite may

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consider permit amendments which would authorize them to use copper slag or coal slag instead. This potential switch causes concern from a toxicological perspective for a couple of reasons. First, if air concentrations of non-criteria pollutants over water are disregarded from an inhalation perspective as HB3040 allows, copper slag may still pose a potential water quality problem, given the sensitivity of aquatic life to the toxicity of copper. Even if the copper content of copper slag is a small percent by weight, the amount of copper deposited from tons of spent blast media could significantly impact water quality. Second, the National Institute of Occupational Health & Safety is in the process of publishing a study that shows copper slag and coal slag cause a significant inflammatory response when inhaled. The results of this study may affect the ESLs for copper slag and coal slag, and as such, modeled air concentrations will be evaluated in light of this new information. As always, we would encourage the use of less toxic alternatives.

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