



# Minnesota Pollution Control Agency

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CERTIFIED MAIL  
RETURN RECEIPT REQUESTED

June 15, 1994

Mr. David Cabiness, Code 1862  
Commanding Officer  
Southern Division  
Naval Facilities Engineering Command  
P.O. Box 190010  
North Charleston, South Carolina 29419-9010

RE: Naval Industrial Reserve Ordnance Plant Site

Dear Mr. Cabiness:

Please find enclosed a copy of an internal U.S. Environmental Protection Agency (EPA) memorandum, dated February 11, 1993, concerning EPA's review of the Minnesota Pollution Control Agency Soil Cleanup Model which was applied to the Naval Industrial Reserve Ordnance Plant Site for your review. (Please see my letter to you dated June 8, 1994, concerning the same matter.) According to Jim Pennino of our staff, our model was changed to reflect model-specific comments in this memorandum.

If you have any questions regarding this letter, please contact me at (612) 296-7818.

Sincerely,

A handwritten signature in black ink that reads "Dan N. Douglas".

David N. Douglas, Project Manager  
Response Unit I  
Site Response Section  
Ground Water and Solid Waste Division

Enclosures

cc: Linda Hicken, RMT, Inc. (w/enclosure)  
Thomas Bloom, EPA, Region V (w/enclosure)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

ROBERT S. KERR ENVIRONMENTAL RESEARCH LABORATORY

P. O. BOX 1198  
ADA, OKLAHOMA 74820

FEB 16 93

February 11, 1993

MPCA, Ground Water  
& Solid Waste Div.

MEMORANDUM

SUBJECT: Review of Minnesota Pollution Control Agency Procedures for Establishing  
Soil Cleanup Levels

FROM: Joe R. Williams, Soil Scientist *JRW*  
Applications and Assistance Branch

TO: Edwin R. Smith, Remedial Project Manager (HSRM-6J)  
MN/OH Remedial Response Branch  
Office of Superfund, Region V

Ground Water & Solid Waste Division
Site Name
Category
Subcategory
Initials

The following comments are in response to your request letter, dated December 31, 1992, for the subject review. In preparing these comments, I have reviewed the actual model description documents and associated review comments provided.

The model is a screening level tool for the general establishment of cleanup levels. It should probably not be used for site-specific remediation design, except in the initial screening stages. This comment is based on the lack of actual data that will be available for utilization by the model and the dependence on estimated values. As presented, the model depends heavily on several parameters which are not commonly obtained at these sites, and are also parameters which have a large degree of uncertainty. This concern is partially addressed in the document by recommending site specific studies for the determination of biodegradation rates.

Regarding the actual documentation, there were a few errors which should be addressed. Otherwise misinterpretations will occur in the use.

- 1) Page 9 indicates that several site specific soil parameters will be obtained, including the "soil vertical hydraulic conductivity." I would assume that this is referring to saturated hydraulic conductivity measurements made on undisturbed cores. There are also *in situ* methods, however, they require the use of large amounts of water.

Page 9 also refers to the accessibility of soil parameters such as CEC, density, and pH from the Soil Conservation Service (SCS) soil surveys. While this may be true, it must be recognized that the maps reproduced in these surveys are generated using mapping units, and not soil series; *i.e.*, a mapping unit is generally named based on the prevalent soil series and other characteristics such as slope, erosion, or land use. It is not entirely appropriate to look at a soil survey map, locate a site and the mapping unit associated with the site, and use parameters associated with a soil series

with the same name. The actual soils at the site may not be that soil series. A rule-of-thumb used in the mapping of soils is that a mapping unit will contain approximately 70% similar soils and as much as 30% dissimilar soils. It is important to understand that "similar" soils are those that have formed in similar localized environments, or from the same parent material. It does not mean that the soils will necessarily have the same physical, chemical, and hydraulic characteristics. The use of incorrect parameter values could result without field verification of the site soils.

revised site process CFC 1

2) A basic assumption utilized in this model (p.31) is that an average annual recharge rate is assumed. As a screening level tool, this is appropriate, however, for more detailed modeling of the site processes for remediation and monitoring design, it may be more appropriate to utilize monthly or seasonal recharge information. There are several studies documented in the literature which have focussed the issue of weather variability, and the influence of large storm events on the migration of contaminants. In essence, these studies have shown that the frequency, duration, and intensity of storm events can have great influence on the actual mass of contaminants that could leach to ground water. These studies are interesting, and illustrate the need for understanding the active processes involved in the migration of contaminant mass from the unsaturated zone to ground water.

when factors in several decades of professional remediation

3) Volumetric water content ( $\theta$ ) is defined on pages 37 and 39 as "...the fraction of the void space in the soil which contains water." This should read that the volumetric water content is the fraction of the total soil volume which contains water. This was probably a simple mistake in wording, but it could lead to tremendous errors due to the fact that water contents calculated according to the definition given would be much larger than those using the correct definition.

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4) The volatilization flux rate equation given on page 36 is probably appropriate, however, the literature citation used for this equation is incorrect or additional assumptions were made to derive the equation given from the equations given in the cited reference [Dragun, 1988]. Also note that the Lyman reference is incorrectly cited, and should be cited as the 1982 document. The actual equation presented in the MPCA document could not be found in the available literature. A unit analysis of the equation indicates that the equation is incorrectly stated. Other assumptions are being made that are not explicit to the reader, such as which conversion factor to use, or are both to be used, and which form of the  $K_{oc}$  should be used. It is not clear why the Henry's Law constant is not in this equation, since it is extremely important to the determination of a volatilization flux. Henry's Law constant is utilized in the equation presented by Dragun [1988, p279].

this equation needs

5) It has been indicated to me via a telephone conversation with Jim Pennino (1/29/93) that MPCA has decided to proceed with the use of the van Genuchten equation presented by Bob Ambrose (ERL-Athens) in an October 30, 1992, memorandum for the estimation of metals migration. The equation is analytical solution C13 in "Analytical Solutions of the One-Dimensional Convective-Dispersive Solute Transport Equation, USDA-ARS Technical Bulletin #1661" by M.Th. van Genuchten and W.J.

Alves in 1982. This equation may be appropriate for metals, however, consideration must be given to speciation and complexation of these metals in soil systems. These concepts would have to be addressed through the use of dispersion and retardation terms that are not explicit to the equation, or easily concluded from existing site data. The application of this model without the consideration of other factors such as pH, CEC, and other metals specific parameters could produce errors in the estimation of metals migration.

The overall concern with the MPCA model presented is with the actual application. It would be more appropriate to address the actual decision process in justifying the use of the model for site specific application. To present a model as a recommended procedure for developing soil cleanup levels without aiding the user in the decision process for justifying the model applicability is questionable. I am very much in favor of the stated approach, which is that the procedures will facilitate the development of cleanup levels on a site by site basis. The concern with the stated procedures is that screening level methods are presented, which is understandable based on the typically obtained site data during a Remedial Investigation. However, increased emphasis should be placed on obtaining data that is actually needed to conduct the modeling effort rather than continuing to attempt modeling applications with existing data that may or may not be sufficient to make site specific decisions.

If I can be of further assistance, please feel free to give me a call at (405)436-8608.

cc: Doug Yeskis  
Luanne Vanderpool  
Louis Blume  
Jack Barnette  
Jim Pennino, MPCA