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NCBC GULFPORT
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TRANSMITTAL LETTER AND DRAGUN CORPORATION COMMENTS ON THE DELISTING
PETITION FOR THE HERBICIDE ORANGE SITE NCBC GULFPORT MS
6/24/1991
ABB ENVIRONMENTAL SERVICES



24 June 1991

Commanding Officer
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
Charleston SC 29411-0068

19.1.8.14

Attention: Jim Reed, Code 18215

SUBJECT: Evaluation of Delisting Petition for Herbicide Orange Site,
Naval Construction Battalion Center (NCBC), Gulfport, MS.
Phase I - CTO No. 24
Navy CLEAN District I, Contract N62467-89-D-0317

Dear Jim:

Enclosed are final comments for the Evaluation of Delisting Petition for the Herbicide Orange Site, NCBC, Gulfport, MS. The delisting petition was reviewed by Dr. Dragun. Dr. Dragun is a qualified expert in fate and transport assessment and modeling, in the application of VHS and OLM models, pertaining to 2,3,7,8-TCDD and other hydrophobic complex organic chemicals.

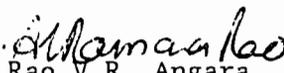
Dr. Dragun's comments have been reviewed by ABB Environmental Services, Inc. (ABB-ES), and we agree with his comments relative to the weaknesses in the delisting petition. Dr. Dragun identifies specific subjects and issues to be discussed in the petition prior to submittal to the U.S. Environmental Protection Agency (USEPA). Overall, we agree with the basic approach recommended by Dr. Dragun for modifying the petition (or preparing a new petition) to more strongly support the USAF/USN position. We feel that the revised addendum should clearly develop the analytical data, VHS and OLM models, and rationale. Based on this information, resubmittal of the petition is ~~not~~ recommended.

Also, per our telephone conversation on 19 June 1991, I spoke to Dr. Dragun concerning the level of effort required to amend the delisting petition. He suggested that it would take ^{Several months} about one month. Other details were not discussed.

If you have any questions, please call me at 904-656-1293.

Very truly yours,

ABB ENVIRONMENTAL SERVICES INC.


Rao V.R. Angara
Task Order Manager

cc: Tony Allen, ABB-ES
Elaine Morrison, SDIV
File: CTO-024

ABB Environmental Services Inc.

The Dragun Corporation

3240 Coolidge • Berkley, MI 48072-1634 • 313-542-2420 • FAX 313-542-1719

4.09

June 18, 1991

Mr. Rao Angara
ABB Environmental Services, Inc.
2571 Executive Center Circle East
Suite 100
Tallahassee, FL 32301

SUBJECT: Delisting Petition for
F028 Residues at the
Naval Construction Battalion Center
(Our Project #1017)

Dear Mr. Angara:

I have reviewed data and information presented in the following reports regarding the subject delisting petition.

It is my understanding that the Naval Construction Battalion Center (NCBC) asked Versar and the Idaho National Engineering Laboratory to author the initial petition entitled:

Versar, Inc, and The Idaho National Engineering Laboratory. November 9, 1988. Petition for Final Exclusion of F028 Residues Generated During Incineration of F027 Contaminated Soils at the Naval Construction Battalion Center, Gulfport, Mississippi. Revision No. 7 Final. Springfield, VA: Versar, Inc.

After NCBC submitted this petition to the U.S.Environmental Protection Agency (EPA), EPA reviewed it and subsequently issued the following draft letter to the NCBC:

U.S. EPA. Draft letter from Mr. Joseph Carra, Permits and State Programs Division, to Major F.T. Lubozynski, U.S. Air Force Engineering and Services Center.

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In this draft letter, EPA discusses the technical reasons for the denial of NCBC's petition. As a result of this denial, the NCBC asked Versar and the Idaho National Engineering Laboratory to prepare an addendum report that addressed these technical reasons. This report was titled:

Idaho National Engineering Laboratory and Versar, Inc.
March 27, 1989. Addendum Report. Petition for Final Exclusion of F028 Residues Generated During Incineration of F027 Contaminated Soils at the Naval Construction Battalion Center, Gulfport, Mississippi. Idaho, Falls, ID: Idaho National Engineering Laboratory.

The primary purpose of my review was to determine if information and evidence provided in the 1989 addendum report, in conjunction with the data and information provided in the 1988 petition, supported the exclusion of this waste from the U.S. Environmental Protection Agency (EPA) list of hazardous waste, pursuant to 40 CFR 260.2.

I have reviewed the three documents listed above. The 1989 addendum report contains an exhaustive discussion on chemical analysis and QA/QC, in response to the assertions made in the EPA draft letter. However, the 1988 petition and the addendum report contain three shortcomings.

First, the 1988 petition and the 1989 addendum report do not identify and discuss technical flaws in the mathematical model utilized. More specifically, these reports have not identified and explained the fact that the VHS model, which EPA used to derive its compliance-point concentrations, failed to approximate real-world conditions. As a result, this model failed to predict reasonable TCDD concentrations in groundwater at a hypothetical compliance point.

Second, the addendum report has not addressed all of the reasons for which EPA has denied the original 1988 delisting petition. More specifically, the addendum report has not discounted EPA's non-analytical reasons for accepting the validity of the sample which contained the highest detected concentration of TCDD (Sample SBJH121687A).

Third, one inappropriate use of statistics was identified.

These reasons are discussed in greater detail in the following sections.

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THE VHS MODEL

The EPA draft letter clearly stated that EPA utilized their compliance-point concentration as a basis for rejecting the NCBC's delisting petition. In addition, this draft letter clearly stated that EPA utilized the VHS model "to predict the fate and transport of organic toxicants from the land-disposed wastes."

I have reviewed the technical basis for the VHS model. The VHS model is based on the work of Domenico and Placiauskas which was published in the journal Groundwater 20(3), May-June, 1982. The official EPA introduction for the VHS model appeared in the Federal Register 50 FR 7896, February 26, 1985.

EPA suggested in these publications that it will use the model as a tool for evaluating worst case impacts of a landfilled waste upon a receptor (a hypothetical drinking water supply well) based on the EPA's estimate of the concentration of the organic in leachate, generalized aquifer properties, and a generalized setting for a landfill and a receptor.

It is most important to note that EPA has developed and is utilizing a mathematical model that fails to approximate real-world conditions. The problems with the VHS model reside in four general areas.

First, the VHS model neglects dilution effects of recharge in an unconfined aquifer. If EPA had not neglected this process, the compliance-point concentration calculated by EPA would have been lower.

Second, the VHS model assumes minimal dilution via mixing with groundwater. If EPA had not adhered to this unrealistic assumption, the compliance-point concentration calculated by EPA would have been lower.

Third, the EPA has assumed a groundwater velocity of two meters per year is a reasonable worst case for groundwater flow rates (50 FR 48959). EPA's assumption is probably not representative of the actual aquifers in which wells are situated. If EPA had not adhered to this unrepresentative assumption, the compliance-point concentration calculated by EPA would have been lower.

Fourth, the EPA draft letter stated that the Agency considers the fate of the chemical of concern. The term "fate" typically encompasses the biological, chemical, and physical reactions affecting the chemical of concern in the soil system.

Contrary to the statement in the EPA draft letter, the VHS model does not consider the fate of the chemical of concern, and EPA did not consider the fate of TCDD when it derived it's compliance point concentrations. If EPA had considered the fate of TCDD, the compliance-point concentration calculated by EPA would have been lower by many orders of magnitude.

The seriousness of this omission can be illustrated by considering how TCDD adsorption to soil governs the TCDD migration rate to a compliance point. The velocity or migration rate, V_c , of TCDD in a soil-groundwater system under steady flow conditions can be estimated by utilizing the Retardation Equation (Dragun, 1988; Freeze and Cherry, 1979):

$$V_c = V [1 + K_d (b / P_T)]^{-1} \quad (1)$$

where:

- V_c = velocity or migration rate of TCDD
- V = velocity of groundwater
- K_d = adsorption or distribution coefficient of TCDD
- b = soil bulk density
- P_T = soil porosity

To estimate the migration rate of TCDD, the following input parameters can be utilized:

- V = 2 meters/year or 6.5 feet/year
- K_d = 22.6×10^5 ml/gram (Jackson et al., 1985)
(Note that this value is published in an EPA publication!)
- b = 1.5 gm/ml
- P_T = 0.25

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By utilizing these input parameters, the TCDD migration rate was estimated to be 4.79×10^{-7} feet/year (i.e. 0.000000479 feet/year). EPA has stated in its draft letter that it expects TCDD will migrate to a compliance point which is 500 feet downgradient of the disposal site. At a rate of 0.000000479 feet/year, it would take TCDD about one billion years to travel 500 feet. Please note that this one billion-year travel time does not take into account the time for TCDD to travel downward through the unsaturated zone to the water table.

Based on the above numbers, it should be very clear that TCDD is immobile, for all practical purposes. It should also be clear that the VHS model does not approximate real-world conditions, and that EPA has relied upon a technically-flawed approach to derive compliance-point concentrations for TCDD.

VALIDITY OF SAMPLE SBJH121687A

In Appendix A of the EPA draft letter, EPA presented their analysis of the validity of sample SBJH121687A. In their analysis, the Agency attempted to identify:

"similarities and incongruities among samples based on analytes detected and physical parameters."

They concluded that sample SBJH121687A was not significantly different from other ash samples. However, the technical basis for their conclusion is flawed.

First, the EPA compared results for other constituents (i.e. arsenic, barium, chromium, lead, mercury, selenium, etc.) to evaluate whether the 200 ppt TCDD sample was similar to or different from the untreated soil. Based on their observation that the concentrations of these inorganic chemicals in ash were similar to concentrations of these chemicals in sample SBJH121687A, EPA concluded that the disputed sample is ash.

EPA failed to recognize that the concentrations for arsenic, barium, chromium, lead, mercury, and selenium in all samples, including the disputed sample, fell within their native soil concentrations (Dragun, 1988). In other words, EPA concluded that the disputed sample was not untreated soil, when in fact the data they presented in Appendix A showed that the disputed sample had metal concentrations characteristic of soil.

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Second, EPA claimed in Appendix A that untreated soil pH was 8.4, while ash sample pH ranged from 10 to 12. Based on this claim, EPA concluded that the disputed sample was not soil.

EPA failed to recognize that southeastern U.S. soils typically possess pHs that are acidic to neutral. In other words, the typical untreated soil for the area is not expected to possess an alkaline pH. Because the disputed sample also had an alkaline pH, EPA has in fact presented data that untreated soil is similar to the disputed sample pH.

Third, EPA claimed in Appendix A that normal percentage moisture was about 12% in treated ash samples, 18% in the disputed sample, and 9% in the untreated soil sample. Based on these values, EPA concluded that the disputed sample was not soil.

EPA failed to recognize that moisture content is not a soil property, because it varies due to humidity and climate conditions. Moisture content can range from about 2% to greater than 50% in soil. Because the moisture content of the disputed sample falls in this range, EPA has in fact presented data indicating that the disputed sample is soil.

Fourth, EPA claimed in Appendix A that treated ash was

"typically considered black or black/brown. The untreated soil was the only sample noted only as brown. Thus, the color of SBJH121687A is consistent with ash samples, not the untreated soil."

EPA failed to recognize that:

"the typical descriptions of gross soil color are too subjective and are usually of little value. In other words, a soil that is "dark brown" to one individual may be "brownish black" or "black" to another. Soil colors should be measured by comparison with a color chart."
(Dragun, 1988)

As a result, EPA has committed a very basic error by relying upon a qualitative description of color to conclude that the disputed sample was not soil.

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STATISTICS

Page 2 of the EPA draft letter stated that:

"The compliance-point concentration calculated using the 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) equivalent concentrations for twelve different samples (collected between December 16, 1987 and July 15, 1989) exceed the health-based levels used for delisting decision-making."

The purpose of generating a series of numbers is to characterize the distribution of a population of numbers. However, the Agency admitted that it selected only 12 numbers for its purposes and deliberately discarded the remaining 18.

It is my professional opinion that EPA's use of only 12 total 2,3,7,8-TCDD equivalent concentrations (as listed in Table 1 of the EPA draft letter) and discarding 18 concentrations was a statistically erroneous practice.

SUMMARY & CONCLUSIONS

I have reviewed the three documents dealing with the delisting of NCBC waste. I have concluded that the 1988 petition and the addendum report contain three shortcomings.

First, the 1988 petition and the 1989 addendum report have not identified and explained the fact that the VHS model, which EPA used to derive its compliance-point concentrations, failed to approximate real-world conditions. As a result, this model failed to predict reasonable TCDD concentrations in groundwater at a hypothetical compliance point.

Second, the addendum report has not discounted EPA's non-analytical reasons for accepting the validity of the sample which contained the highest detected concentration of TCDD (Sample SBJH121687A).

Third, regarding statistics, the addendum report did not identify, as a statistically erroneous practice, EPA's use of only 12 total 2,3,7,8-TCDD equivalent concentrations while discarding 18 concentrations during its compliance-point concentration analysis.

As a result, it is my professional opinion that the original petition and its addendum report do not contain sufficient data and information to support the exclusion of this waste from EPA's list of hazardous waste.

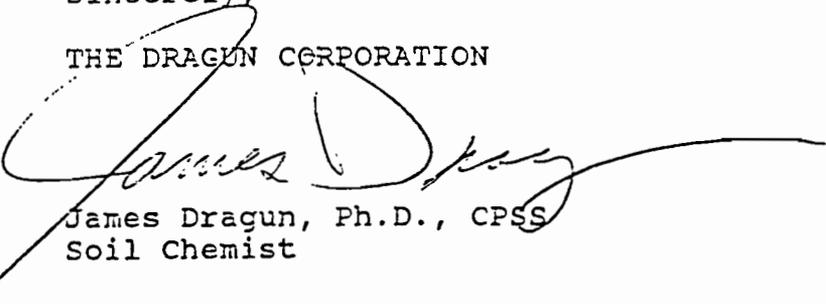
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Additional information, as illustrated above, can be combined with the addendum report to create a submission to the Agency that supports the exclusion of this waste from EPA's list. In my opinion, the creation of this submission will require several months to complete. Significant amounts of time will be needed to analyze in detail (a) EPA's initial technical basis for the VHS Model and the OLM, (b) EPA's discussion on its use of statistics, and (c) EPA's initial technical approach to assessing data and information provided in delisting petitions, and (d) how the Agency did/did not follow or adhere to its initial technical basis and procedures involving (a) through (c). Data and information on these topics are published in several Federal Register articles.

I trust that the above information is useful to you. Please phone me if you have any questions regarding the above.

Sincerely,

THE DRAGON CORPORATION



James Dragun, Ph.D., CPSS
Soil Chemist

REFERENCES

Dragun J. 1988. The Soil Chemistry of Hazardous Materials. Silver Spring, MD: Hazardous Materials Control Research Institute.

Freeze RA and Cherry JA. 1979. Groundwater. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Jackson DR, Grotta HM, Rust SW, Warner JS, Arthur MF, DeRoos FL, and Roulier MM. 1985. Leaching potential of 2,3,7,8-TCDD in contaminated soils. IN Land Disposal of Hazardous Waste. Proceedings of the Eleventh Annual Research Symposium. EPA-600/9-85-013. Cincinnati, OH: U.S. Environmental Protection Agency.