Harding Lawson Associates

February 23, 1996

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Ms. Sherrel Taylor-Domville
United States Environmental Protection Agency
Section II
Emergency and Remedial Response Division
290 Broadway
New York, New York 10007-1866

JOB NO.: ICC
JOB NAME: Cor
CATEGORY:
SUBMITTED BY: HARDING LAWSON ASSOCIATES

Response to Comments
Draft Phase II Remedial Investigation Work Plan
Island Chemical Company, St. Croix, U.S. Virgin Islands

Dear Ms. Taylor-Domville:

Enclosed are Harding Lawson Associates' (HLA) responses, on behalf of Island Chemical Company (ICC), to the Environmental Protection Agency's (EPA's) January 31, 1996 final comment letter regarding the Draft Phase II Remedial Investigation Work Plan (RIWP) for the subject site. The comments are listed below and are addressed in the order that they were presented in the January 31 letter. Because we realize EPA may have questions with regard to the following, HLA has not yet revised the Draft RIWP. Further, we would be happy to accept your offer of a meeting to address any issues EPA may raise. A revised Draft RIWP will be forwarded to EPA following this anticipated meeting.

GENERAL COMMENTS

EPA Comment 1 *EPA's primary concern regarding the data presented in Data Summary Report was the effectiveness of the monitoring well network, with regards to the site specific groundwater flow, to adequately characterize groundwater quality...*

ICC Response 1 Based on the relatively small size of the site, ICC believes that the present monitoring well network adequately characterizes the groundwater quality across the site, with the possible exception of the Process Pit Area. Except for the Process Pit Area, the monitoring wells were installed in each area of potential concern based on work performed prior to their installation. As part of the RIWP, HLA proposes to install the remaining monitoring well (MW-2) in the Process Pit area and, possibly, a second monitoring well in the AST area. After these wells are installed, groundwater samples collected from the monitoring well network should provide complete characterization of existing groundwater contamination, if present.

EPA states that "after several rounds of water level measurements, it has been determined that shallow groundwater flow is to the east-northeast."

This was not a conclusion of the Draft Data Summary Report. The report noted that shortly after a storm event, during which time several rounds of water level data were collected in a few days, shallow groundwater flow direction changed. It is highly probable that these changes were of short duration and a temporary result of flow in the River. However, the primary (most consistent) direction of shallow groundwater flow at the site is still

believed to be east-southeast, as stated in the original Work Plan. This assumption is premised on basic hydrogeologic principles, and agreed to by EPA in their approval of the Work Plan.

As discussed during the project meeting on October 6, 1995, HLA recommends that continuous water level data be collected to demonstrate the prevailing direction of groundwater flow under static conditions. HLA anticipates that data will have to be collected continuously for three to six months to confirm the primary groundwater flow direction. If additional wells are deemed necessary, final locations will be selected in concert with EPA and the wells will be installed at the time well MW-2 is installed.

EPA Comment 2 *...The proposed sampling program, which only evaluates surface soil quality, is inadequate as it will not characterize the extent of the tank farm contamination.*

ICC Response 2 Based on results of previous investigations within the AST area, it has been determined that the contamination detected in this area extends to the water table. Therefore, no further subsurface soil sampling is recommended. A soil sampling program will be conducted to investigate the surficial extent of impact in the AST area as proposed in the RIWP

The results of the surficial soil investigation will be evaluated to determine the location with the highest concentration of VOCs. The area of highest VOC concentrations at the surface should correspond to the horizontal location of the most highly concentrated source of groundwater contamination, if any, in subsurface soils. Unless this area coincides with the location of MW-1, ICC proposes to install a second monitoring well in this area. Consequently, either MW-1 or the new monitoring well, if installed, should provide water quality information directly beneath the area of highest soil contamination. This should adequately characterize the magnitude of contamination associated with the AST area. If this concentration is shown to be below levels that would pose a threat to human health or the environment, further delineation of chemicals in groundwater in this area will not be necessary.

EPA Comment 3 *The additional site characterization activities that are to be conducted to assess the potential for conditions at the site to affect the coastal regions are not specified. These activities should include an assessment of historical site discharges to the River Gut from the site.*

ICC Response 3 EPA indicates that the potential contaminants of concern associated with this site are VOCs and metals. VOCs were not detected in soil and groundwater samples collected at locations near the River Gut (SBC2/MW-3, SBD4/MW-5, and SBD3) or in samples collected in the lab pit, identified as a potential VOC source area (SBD1/MW-4). Given the absence of detectable VOCs, the length of time since the site was active, and the volatile nature of VOCs, there is no reason to suspect that VOCs are present in the subsoil near the River Gut.

The issue with regard to metals detected at the site was addressed in a letter dated December 11, 1995 from Sills, Cummis, Zuckerman, Radin, Tischman, Epstein & Gross (Sills, Cummis), on behalf of ICC, to Ms. Carol Berns, Esq. at EPA. A copy of this letter is attached.

EPA Comment 4 *The relationship between the shallow and deeper aquifer zones, especially the potential for vertical migration of contaminants between the two zones, should be thoroughly examined.*

ICC Response 4 The EPA does not specify the basis of their concern regarding the deeper zone. The investigation performed to date indicates that concentrations of detected chemicals in shallow groundwater are not above regulatory standards. Therefore, ICC assumes that the basis of EPA's concerns are associated with chloroform detected in one groundwater sample collected by the EPA from a former production well in February 1991. HLA previously addressed the issue of chloroform contamination in a report attached to Sills, Cummis' March 21, 1994, concerning the proposed listing of the site on the National Priority List (NPL). Copies of this letter and report are attached.

In addition, chloroform was not detected in any of the groundwater samples from the groundwater monitoring wells installed during this Remedial Investigation. Because no other VOCs were reported in samples from the former production wells, there appears to be no justification to perform further investigation of the deeper groundwater zone.

SPECIFIC COMMENTS

EPA Comment 1 <u>Section 1.3, Page 2, Bullet 5:</u> *The Draft Phase II Work Plan does not address EPA's concerns regarding groundwater and effectiveness of the existing monitoring well network.*

ICC Response 1 As noted in the response to General Comment No. 1, the existing and proposed wells should provide adequate characterization of existing groundwater conditions at the site. As stated in Section 3.2.5 of the RIWP, ICC proposes to conduct additional groundwater elevation monitoring activities to confirm the primary groundwater flow direction at the site.

ICC proposes to install two additional continuous water level recorders in selected onsite wells. Installation of these recorders, in addition to the two recorders currently functioning onsite, will provide data across the majority of the site. These recorders will provide data regarding the percentage of time that groundwater flows in any given direction. Other influences on groundwater flow, such as precipitation and/or flow in the gut, will be evaluated based on the water level data obtained. The data will be evaluated to determine if additional monitoring wells are warranted, and if so, where they should be located.

EPA Comment 2

Section 2.0. Page 4. Item No. 2: *The Draft Phase II Work Plan does not specify the additional site characterization activities that will be conducted to assess the potential for conditions at the site to affect the coastal regions. At a minimum, these activities should include an assessment of site historical discharges to the River Gut from the known discharge pipes. Sampling previously conducted in the storm water drainage system indicated elevated levels of volatile organic compounds and metals in sediments. In addition, sampling conducted following the removal of the drain line (55-gallon drums) to the River Gut indicated elevated levels of volatile organic compounds in the surrounding soils. Subsurface soil sampling, should be conducted in the area of the two discharge pipes and the former laboratory pit discharge point (area beneath the existing loading dock), to delineate the nature and extent of volatile organic and metal contamination in these areas. The borings should be advanced to the top of the water table.*

ICC Response 2

See response to General Comment No. 3.

EPA Comment 3

Section 2.0. Page 4. Item No. 3: *The Draft Phase II Work Plan calls for the collection of 12 surface soil samples in Area B (Tank Farm) to determine extent of contamination identified. Surface soil samples are to be analyzed for benzene, toluene, ethyl benzene, and xylenes (BTEX) only. Contamination was previously detected at various depths to the water table. Acetone for example, was detected at a concentration of 19,000 parts per billion at a depth of six to eight feet below ground surface... Sampling should be advanced outwardly in all directions from boring SBB1/MW1 until the full delineation of the contaminants present has been achieved. The proposed sampling locations should be completed as borings that extend down to the water table. Samples should be analyzed for Target Compound List (TCL) volatile organic compounds.*

ICC Response 3

As discussed in the response to General Comment No. 2, a soil sampling program will be conducted to investigate the surficial extent of impact in the AST area as proposed in the RIWP. Based on results of previous investigations in the AST area it has been determined that the soil contamination detected in this area extends to the water table. Therefore, no further subsurface sampling is recommended.

The elevated concentration of acetone previously detected in soil the sample collected from the AST area is probably attributable to artifacts of field or laboratory decontamination procedures. No other VOCs, except BTEX compounds and acetone, have been detected in the AST area. Therefore, as proposed in the RIWP, the surficial soil samples will analyzed for BTEX compounds only. The possibility that acetone is present in this area will be evaluated through collection of groundwater samples, as discussed below.

The results of the surficial soil investigation will be evaluated to determine the location with the highest concentration of BTEX compounds. If this location has chemical concentrations in soils higher than those detected in soil samples from the boring for MW-1, ICC proposes to install an additional monitoring well at this location. Consequently, either MW-1 or the new monitoring well, if installed, should provide water quality information directly beneath the area of highest soil contamination. The groundwater samples will be analyzed for VOCs including acetone.

EPA Comment 4 — Section 2.0, Page 4, Item No. 7: *... the extent of communication between the shallow and deep groundwater zones must be defined. The Draft Phase II Work Plan proposes the collection of water level measurements from the on-site production wells only. At a minimum, the deep production wells should also be sampled concurrently with the shallow wells for comparison and documentation.. Information regarding the production wells' construction specifications and screened intervals should also be obtained via geophysical logging and/or downhole video methods.*

ICC Response — See response to General Comment No. 4.

EPA Comment 5A — Section 3.2.2, Page 5: *...the plan does not address that after two rounds of water level measurements, groundwater flow is reported to be to the east-northeast not the south-southeast as originally projected. Therefore several of the wells intended to monitor groundwater quality downgradient of several suspected source areas do not do so. Based on these findings, three additional shallow ground water monitoring wells should be installed...*

ICC Response — As discussed in Responses to General Comments 1 and 2, ICC proposes to evaluate the data from the new and existing continuous monitoring devices for three to six months to confirm the direction of groundwater flow during normal and extreme (drought and/or heavy precipitation) weather conditions. The data will be evaluated to determine if additional monitoring wells are warranted.

EPA Comment 5B — Section 3.2.2, Page 5: *Additionally, one deep groundwater monitoring well should be installed in the area of the discharge pipe for the central storm drain adjacent to the River Cut. The well should be installed to an approximate depth of 90 feet below the surface and should be comparably screened as the two on-site production wells. This well will be used to triangulate the direction of the deeper zone groundwater flow and to characterize any contamination potentially migrating from the site.*

ICC Response — See responses to General Comment and Specific Comment Number 4.

EPA Comment 6 — Section 3.24, Page 6: *...groundwater samples collected from the newly installed well must be analyzed for the full suite of parameters including pyridine. At this time no justification exists for submitting the samples for a reduced analytical list.*

ICC Response — Groundwater samples collected from the proposed monitoring well (MW-2) will be analyzed for TCL VOCs, TCL SVOCs, TCL Pesticides, TCL PCBs, and TAL Inorganics (total and dissolved).

Please call either of the undersigned if you have any questions. Please contact us with a proposed date and time for a meeting.

Yours very truly,

HARDING LAWSON ASSOCIATES

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Principal Hydrogeologist

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This document was prepared for the sole use of the ICC and the regulatory agencies involved with the project, the only intended beneficiaries of our work. No other parties should rely on the information contained herein without the prior written consent of HLA.

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PLEASE REPLY TO NEWARK

December 11, 1995

VIA TELECOPY AND REGULAR MAIL

Carol Berns, Esq.
United States Environmental
Protection Agency
290 Broadway
New York, New York 10007

Re: Plot Q of Estate Bethlehem Middle Works off of Melvin Evans Highway (Route 66) in St. Croix, United States Virgin Islands (Vichem Site)
Supplemental Work Plan Issues

Dear Ms. Berns:

As you will recall, representatives of Berlex Laboratories, Inc. ("Berlex") and Island Chemical Company ("ICC"), including representatives of their environmental consultant, Harding Lawson Associates ("HLA"), met with the United States Environmental Protection Agency ("EPA") on October 6 to discuss the draft data summary report previously submitted to EPA by HLA in connection with the Berlex/ICC investigation of the above-captioned site. At that meeting, EPA expressed some concerns about "gaps" which EPA representatives perceived in the accumulated data.[1] As agreed with EPA during the October 6 meeting, and on behalf of

[1] It should be noted that the data were collected in strict accordance with the EPA approved workplan for the Vichem site.

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Berlex and ICC, HLA submitted a supplemental work plan for the site designed to respond to EPA concerns and provide the requested information as to site conditions. This letter is provided to address one of the data items that EPA has previously requested, but which Berlex and ICC respectfully decline to pursue--i.e., offsite soils and/or sediment sampling in the River Gut.

EPA has indicated its desire that Berlex and ICC test offsite, in the River Gut, to determine if there has been offsite migration of metals detected in onsite soil sampling. EPA is concerned about impacts to aquatic receptors downstream, as well as impacts to nearby flora and fauna. EPA specifically points to onsite concentrations of zinc, copper and lead as metals which may exceed background levels, and which may have the potential to adversely impact on and off site receptors.

HLA is in the process of evaluating whether or not the exceedances described above are truly above background concentrations. However, even if it is ultimately determined that the referenced metals are at elevated levels, Berlex and ICC are not responsible for these contaminants, or any damage that may have been caused by these contaminants on or off site. A review of extant ICC chemical inventories and process descriptions and interviews of people with knowledge confirm that at no time after Berlex's purchase of ICC, and up until ICC's assignment of the lease to Virgin Islands Chemical Co., Inc. ("Vichem"), did ICC store, use, release, or dispose of materials containing copper, lead or zinc at the Vichem site.

Pursuant to the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. § 9607 (a)(2), to be liable for the costs of environmental response, a prior owner or operator must have owned or operated the facility at which hazardous substances were disposed of "at the time of disposal of...[such] hazardous substances." Since the hazardous substances (i.e., metals) which prompt EPA risk-based concerns were not discharged during ICC's operation of the facility[2], neither ICC nor Berlex are liable for costs of response, damages or the costs of any health assessment carried out pursuant to CERCLA. Notwithstanding the foregoing, Berlex and ICC have made available to EPA, and will continue to make available to EPA, any non-privileged materials they have pertaining to site use before

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[2] For purposes of this letter, references to ICC's period of operations are limited to the period after Berlex's purchase of ICC's assets up until such time as the lease for the Vichem site was assigned to Vichem.

and after ICC's operations. In addition, during the course of the remedial investigation of the site, Berlex and ICC are willing to undertake to identify other potential sources of contamination in the vicinity and downstream of the site for the benefit of EPA.

As EPA knows, Berlex and ICC have undertaken to perform the ongoing remedial investigation of this site, and have bound themselves to do so by Consent Order with the government, despite the fact that ICC operated only pilot scale operations at the site for about one year of a documented thirty year period of site operations. And to date, Berlex and ICC remain the only entities willing to address site conditions. Indeed, time and again Berlex has requested EPA's assistance in pursuing Pierrel S.p.A., and EPA has been largely unaccommodating. Instead, Berlex has been engaged in self-help, an expensive private cost recovery action, for almost ten years, without any cooperation from EPA.

Further, Berlex and ICC made it plain to EPA, from the inception of negotiations with EPA, that this remedial investigation would examine on site conditions only. In requesting that Berlex and ICC incur the expense of off site investigations, especially without any predicate for holding ICC liable for such conditions, EPA goes beyond the scope of the agreed upon investigation of the site, and Berlex has no choice but to decline.

If you have any comments or questions, please feel free to contact me.

Very truly yours,

Lori C. Singer

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PLEASE REPLY TO NEWARK

March 21, 1994

VIA FEDERAL EXPRESS

Docket Coordinator, Headquarters
United States Evnironmental Protection
Agency CERCLA Docket Office
5201 Waterside Mall
401 M Street, SW
Washington, DC 20460

Re: NPL, Proposed Rule No. 16,
Tuesday, 1/18/94 ("Proposed Rule")
Island Chemical Corp./Virgin Islands Chemical Corp.
St. Croix, Virgin Islands

Dear Sir or Madam:

Please accept these comments, submitted on behalf of Island Chemical Corporation ("ICC"), as formal objection to the above-captioned Proposed Rule as it pertains to the Island Chemical Corp./ Virgin Islands Chemical Corp. site in St. Croix, Virgin Islands ("the site"). In essence, ICC objects to the proposed listing of the site on the National Priorities List ("NPL") on the grounds that the site does not qualify as a "highest priority facility", nor does listing the site at this time serve the goals that listing on the NPL is intended to achieve.

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I. INTRODUCTION

The site has been owned for over twenty years by CHS Holding Corporation. Over the years a variety of chemical companies have leased the site and conducted operations there, ranging from manufacturing and distribution to research and development.

One such tenant, ICC, vacated the site in 1984. ICC sold its assets and assigned its lease to Virgin Islands Chemical Corp. ("Vichem"). Coincident with this transaction, the site was environmentally investigated and, at least, partially remediated by ICC. Vichem and other tenants occupied the site thereafter; however, the site has been unoccupied for approximately three years. In 1989, the United States Environmental Protection Agency ("EPA") conducted a preliminary assessment, site inspection, and removal action at the site.

The last soil and groundwater samples from the site were collected by EPA in 1991, and consisted of six groundwater, six sediment, and four soil samples. Some of the analytical results from these samples were rejected due to exceeded sample holding times; however, based upon these samples, EPA reports that chloroform was found in higher concentrations in the on-site and down-gradient wells than in upgradient wells. No analytical or remedial work has been conducted at the site since 1991.

Recently, ICC approached EPA to negotiate an Administrative Consent Order to conduct a more current site assessment. A draft ACO has been circulated and a draft Remedial Investigation Workplan has been prepared and submitted Region 2. In apparent disregard of the spirit of cooperation demonstrated by ICC and the age and questionable validity of the data last retrieved from the site, and after site contamination or threat of contamination has been addressed by both ICC and EPA and the site has been vacant for several years, EPA has proposed the site for listing on the NPL.

II. THE SITE DOES NOT REQUIRE HIGHEST PRIORITY REMEDIAL RESPONSE

The Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9601 et seq., defines the NPL as a list of the highest priority facilities at which there have been releases or threatened releases of hazardous substances. Id., § 105(a)(8)(B). A site may be included on the NPL if it scores sufficiently high on the Hazard Ranking system. Proposed Rule at 2.

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In determining the final hazard ranking score for the site, EPA has predicated its analysis on the three year old data previously collected by EPA. Based on the chloroform concentrations discovered in the groundwater in 1991, EPA has assigned the site a groundwater migration pathway score of 100, resulting in an overall site score of 50. Thus, EPA maintains that the site should be listed.

As demonstrated by the report attached hereto by Harding Lawson Associates, Inc. ("HLA"), an environmental consultant retained by ICC to evaluate site contamination, EPA's analysis of pertinent risk factors for chloroform is seriously flawed and its conclusions invalid. Even apart from this technical critique of EPA's scientific method, which in itself warrants that the site not be listed, it is clear from the facts of the matter that this is not a high priority site.

No entity has operated at the site for about three years, so there has been no recent contribution to any extant contamination. Further, the site has already been at least partially remediated, as well as the subject of an EPA removal action. Finally, notwithstanding its early involvement in the site, EPA has not found it necessary to address potential site contamination for at least three years. This is so in spite of EPA's possession for all that time of the data upon which it now relies to propose the site for listing. None of these details point to a site requiring priority response.

III. GOALS OF THE NPL ARE NOT MET BY LISTING THE SITE

The purpose of the NPL is to determine which sites warrant further investigation of the extent of health and environmental risks associated with contamination, to determine what remedial action is necessary, and to serve as notice to potentially responsible parties that the EPA may require remedial action at the site. Proposed Rule at 6. Listing on the NPL also makes a site eligible for publically funded remediation. Id. at 7.

In this instance, it is abundantly clear that the site requires futher investigation. Indeed, ICC has already stepped to the plate and volunteered to negotiate an ACO to fund and to conduct such an investigation. Similarly, ICC has already identified and noticed potentially responsible parties of their potential liability for site remediation through the institution of a private cost recovery action which it is actively prosecuting in the District Court for the District of the Virgin Islands. Thus, no useful purpose is served by listing the site on the NPL.

Indeed, there is substantial reason why this site should not be proposed for listing. Listing this site is a waste of limited government resources which can be put to more effective use:

> Given the limited resources available in the Trust Fund [i.e., Superfund], the Agency [i.e., EPA] must carefully balance the relative needs for response at the numerous sites it has studied.

Id. at 8. There are certainly more pressing needs at sites which threaten imminent health and environmental risks. Further, at this site, private parties' participation is already underway. Thus, government resources should be directed elsewhere to maximize the number of sites addressed. Finally, listing at this time prematurely highlights a site which investigation may prove does not warrant the attention. The impact that this unnecessary emphasis could have on site investigation cannot be calculated.

IV. CONCLUSION

For these reasons, ICC objects to the listing of the ICC/Vichem site on the NPL. Similarly, ICC hereby joins in and incorporates herein by reference the comments submitted under separate cover by Semmes, Bowen & Semmes on behalf of CHS Holding Corporation.

Very truly yours,

Lori G. Singer

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Harding Lawson Associates

March 21, 1994

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Re: NPL, Proposed Rule No. 16, 11894 Island Chemical Corp./ Virgin Islands Chemical Corp., St. Croix, Virgin Islands

This letter has been prepared in regard to the VI Chemical Site located in the southwest portion of St. Croix, U.S. Virgin Islands. Preliminary groundwater analyses for chloroform indicated the presence of concentrations of 31 ug/L in an on-site production well (February 28, 1991) and 11 ug/L and 39 ug/L in downgradient wells (June 25, 1990). These results are given in the "Final Hazard Ranking System Documentation" report (EPA Region 2, June 17, 1992) and are compared to a "benchmark concentration" for chloroform of 5.7 ug/L. The 5.7 ug/L value is an EPA policy value that is used as a cancer risk screening concentration, and is obtained from the Superfund Chemical Data Matrix (1993).

The use of this policy value (which is over 17-fold lower than the MCL) as a health-based target cleanup level is inappropriate and would be challenged by Island Chemical Corporation if it were identified as such by EPA Region 2. The scientific basis for our challenge is below.

EPA's Lack of Consideration of Carcinogenic Mechanism in Assigning Cancer Potency Values

EPA and other regulatory agencies have adopted the policy that all carcinogens be regulated as genotoxic (directly acting with DNA) chemicals, even when mechanistic data are available to conclude otherwise. This assumption is the basis for the use of the linearized multistage (LMS) model to extrapolate from high dose (e.g., a maximum tolerated dose) response in animals to theoretical low dose responses in humans, for all known or suspected carcinogens. There are a number of factors that are not addressed in using this approach that lead to gross overestimations in the assessment of health risk.

In recent years, the scientific community has generally concluded that for nongenotoxic carcinogens, a level of exposure should exist below which no appreciable risk would be present. Examples of such chemicals include dioxin, phenobarbital, and chloroform. It has been recognized that dose-response models for genotoxic carcinogens, which are based on the assumption of direct interaction with DNA and therefore the lack of a threshold effect, are inappropriate for nongenotoxic carcinogens The increased acceptance of this phenomenon is evidence by EPA's recent position that the LMS model is inappropriate for

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dioxin and similar nongenotoxic chemicals. For these types of chemicals, a threshold model is more appropriate.

Overestimation in the Cancer Potency Values for Chloroform

The scientific literature provides evidence for a nongenotoxic mechanism for chloroform. Several researchers believe that the carcinogenicity of chloroform is correlated with the recurrent cytotoxicity observed in chronic bioassays (Reitz et al., 1982; Eschenbrenner and Miller, 1945; Larson et al., 1992). In addition, the majority of tests for genotoxicity have been negative (IRIS, 1994). These data suggest a nongenotoxic mechanism of cancer induction, i.e., a cancer risk is produced only by repeated exposure to high doses that leads to repeated tissue injury and repair.

The International Agency for Research on Cancer (IARC) and the EPA have both classified the evidence for cancer resulting from exposure to chloroform as inadequate; chloroform has not been categorized as a "known human carcinogen" (IARC, 1979; IRIS, 1993). Further, the EPA risk estimation is based on an administered dose that not only fails to consider the mechanisms of chloroform toxicity, but also the potential kinetic differences in absorption, the metabolism of chloroform leading to relevant tissue dose, the physical and chemical properties of chloroform, and the physiological differences between animals and humans (Corley et al., 1990; Reitz et al., 1990). Consideration of this information through a PB-PK model can reduce uncertainty associated with risk assessments by more accurately predicting does-response. PB-PK models are capable of making high dose/low dose, dose route, and interspecies extrapolations by using physiological and biochemical information that is specific to the animal species, as well as to humans, in addition to physical and chemical information specific to the environment (Corley et al., 1990).

Reitz et al (1990) developed a risk assessment for chloroform that used the PB-PK approach to describe the metabolism of chloroform and the induction of cell toxicity in the liver following inhalation, gavage, and drinking water exposures. Reitz and coworkers derived a relationship between delivered doses calculated by the PB-PK model and liver tumor incidence in the NCI (1976) study using the conservative LMS model. The fitted curves derived by Reitz et al. were used to calculate risk-specific doses (RSD) that correspond to a 1E-5 risk. Based on two different endpoints, it was shown that the EPA cancer potency values for chloroform are overestimated by at least one to two orders of magnitude.

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In summary, we would challenge the use of an EPA policy-derived benchmark concentration for chloroform of 5.7 ug/L as a groundwater cleanup criterion. Alternatively, we would propose a risk-based target cleanup concentration for chloroform that is based on consideration of physiological and mechanistic data reported in the literature.

Yours very truly,

HARDING LAWSON ASSOCIATES

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94VICC01.ml

Attachment: References

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