SUPPLEMENTARY RESPONSE TO PUBLIC COMMENTS SUMMARY
Identification and Listing of Hazardous Wastes
Organobromines Production Wastes

April 1998

I. Comments on the September 3, 1997 Notice Letter

In a notice published on May 11, 1994 (59 FR 24530) EPA proposed to list as hazardous solids and filter cartridges from the production of 2,4,6-tribromophenol (2,4,6-TBP). In response to comments, EPA reexamined the rationale for the listing decision, and sent letters of notice (dated September 3, 1997) to three parties who commented on the proposed rule and could be expected to have an interest in the final decision and the revised rationale. EPA received comments from the 3 entities that received the notice letter; one (EDF) supported the decision to list 2,4,6-TBP production wastes, and two (GLCC and CMA) opposed the listing.

Procedural Comments

1 One commenter challenged EPA's approach of sending notice letters to only three commenters on procedural grounds, and claimed that EPA was soliciting comments through a "selective notice procedure" that fails to give the general public opportunity to be heard on several issues. The commenter went on to say it would be irresponsible for EPA to issue a final rule without solicitation and consideration of further comments on the conclusion that the probability of releases from Subtitle C landfills should be considered in the plausible mismanagement scenario for any candidate hazardous waste. The commenter noted that, when an Agency action has "palpable effects" on a regulated industry and the public in general, the APA (Administrative Procedures Act) requires that the action be subjected to comment by the affected parties. The commenter argues that others should have a chance to comment on the idea that placement of waste in a Subtitle C landfill that is in compliance with appropriate regulations may be "mismanagement," because this may have significant ramifications for individuals who did not previously comment and has "far-reaching effects for those operating and using "hazardous waste facilities. (GLCC, p8)

Response--EPA does not agree that notice was inadequate. Pursuant to a consent decree in Environmental Defense fund (EDF) v. Browner (Civ. No. 89-0598 D.D.C.), EPA has committed to making a final listing determination for organobromines waste by April 15, 1998. Due to the limited time EPA has for completing this action, the Agency decided that letters of actual notice to the parties who commented on the proposed rule and could be expected to have a direct interest in the final rule decision was appropriate. Those receiving the letter included the only current generator of the waste, and the industry group and environmental group that commented on the proposed rule. These are the parties EPA decided were arguably affected by the recharacterization of the rationale for listing. EPA is not aware of any other generators of this waste or any other persons who would have a direct interest in this decision. The actual notice given in this case is sufficient.

No reasons offered by the commenter indicate any need to go beyond the actual notice EPA provided. The decision in this case does not have “palpable effects upon a regulated industry or the public in general.” Instead, it affects this wastestream, alone, and those that can argue they have an interest in the wastestream. To the extent a similar analysis may be used for other wastestreams EPA may consider listing in the future, the affected parties will have adequate opportunity to comment then. The commenter cited the case of National Helium Corp. v. Federal Energy Administration, 569 F.2d 1137 (Em. App. 1977), in support of the proposition that general public notice is required in this case. National Helium, however, only deals with the issue of whether notice was required for particular rules that applied to a broad sector of the economy. It does not deal with matters affecting whether particular parties may have an interest in a rule, such that they could challenge their failure to receive actual notice.

Also, there are no ramifications for individuals who did not previously comment. The fact of the matter is that the revised rationale described in the letter will not have "far-reaching effects" for those operating and using hazardous waste landfills. Rather, this decision is being made on the basis of risk for one specific waste with certain properties and does not reflect any new policy direction towards any other operators or users of hazardous waste landfills. No persons are expected to change their habits, for example, in changing the operations of their landfills, as a result of this decision. No persons who operate their landfills in accordance with Agency regulations will be affected by this decision. In any future circumstances in which EPA chooses to evaluate, as part of a listing decision, the risk basis of voluntarily putting a waste in a Subtitle C landfill ample opportunity for comment will be provided.

Further, the commenter’s concern that disposal in a Subtitle C landfill that complies with regulations may be mismanagement is misleading. Disposal in a Subtitle D landfill that complies with regulations could be considered mismanagement. No one would want highly dangerous materials, such as live explosives, voluntarily placed in a Subtitle C landfill. Clearly, wastes could be so dangerous that merely voluntarily placing them in a lined landfill would not be sufficient. EPA has simply decided that this is such a case.

2 One commenter argued that EPA cannot list wastes based on the theory that Subtitle C disposal constitutes "mismanagement" without amending its listing criteria. EPA must first propose and seek comment on the new theory of mismanagement and amend its regulations, before it can redefine its basic approach to the listing process (CMA, p 3).

Response--EPA does not agree that the listing criteria have to be modified in any way to allow the Agency to make the listing determination for the organobromine waste at issue. The regulations (see 261.11(3)) clearly permit EPA to render a listing decision based on a variety of factors. The factors most probative in this case are: the high

toxicity of the hazard constituent in the waste (261.11(a)(3)(I)); the high concentration of the hazardous constituent in the waste (261.11(a)(3)(ii)); and the high potential of the hazardous constituent to migrate into the environment (261.11(a)(iii)). These factors were weighed when considered with the plausible management scenario of voluntary disposal of the waste in a Subtitle C landfill without previous treatment. After balancing these factors EPA concluded that the 2,4,6-tribromophenol waste solids are capable of posing a substantial present or potential hazard to human health or the environment. It makes perfectly good sense to reason that, if voluntary Subtitle C landfilling (absent treatment) presents a substantial present or potential hazard, the practice constitutes improper management under 261.11(a)(3)(vii). This is, therefore, consistent with EPA's regulations and a regulatory change is definitely not needed prior to making the determination to list the waste in question.

Toxicity/Risk Issues Raised

3 Two commenters argued that the Agency's toxicity assumptions for 2,4,6-TBP are invalid. One stated that EPA failed to address comments on the use of Quantitative Structure Activity Relationships (QSAR) in its risk analysis, and incorporated its previous comments by reference. (GLCC, CMA).

Response -- EPA has not ignored the comments received on the Agency's us of Structure Activity Relationships for estimating the toxicity of 2,4,6-TBP. EPA responds fully to all comments related to this issue in a separate section of today's rule and in a separate "Response to Comment" document.

4 The commenter also noted that a proposal by EPA to gather the data necessary to evaluate for 2,4,6-TBP was rejected by the Interagency Testing Committee (ITC). The commenter stated that, while the ITC originally proposed to include 2,4,6-TBP on the priority testing list under Section 4(e) of the Toxic Substances Control Act (TSCA), following receipt of exposure information from an industry group and the producer of 2,4,6-TBP, the ITC revised its position and removed 2,4,6-TBP from the priority list. The commenter stated that the rationale for removal of 2,4,6-TBP was based on the ITC's determination that "environmental and workplace monitoring indicate that 2,4,6-tribromophenol is not likely to result in substantial environmental releases or significant exposures to workers, consumers or the general population." (GLCC, p 3)

Response-- As the commenter noted, the ITC's 40th Report revised the TSCA section 4(e) Priority Testing List by removing 2,4,6,-TBP, which had previously been recommended for testing in its 39th report (62 FR 8578, February 25, 1997). The ITC stated that it removed 2,4,6-TBP after reviewing data that demonstrated that: (1) it is used as a chemical intermediate to produce flame retardants; (2) greater than 99% of

2,4,6-TBP used as an end-product is shipped overseas to be used as an intermediate in the production of brominated flame retardants; and (3) environmental and workplace monitoring indicate that 2,4,6-TBP is not likely to result in substantial environmental releases or significant exposures to workers, consumers, or the general public. Exposure and release information provided by industry and the CMA include an industrial hygiene survey from 1979, a historical prospective mortality study of workers, a pollution evaluation, and a determination of brominated organic compounds in environmental matrices (secondary effluents). The available exposure information pertains to workers and the potential for general population exposure from manufacturing sites. In deciding to list waste solids from the production of 2,4,6-TBP, however, EPA considered in detail the potential exposure and risks due to the disposal of *wastes* generated, not product use. EPA notes that none of the exposure studies deal with RCRA issues, i.e., the presence of TBP in waste streams, its subsequent disposal in a landfill, and the potential hazards associated with leakage from such a landfill or with any mismanagement scenario.

EPA further examined the rationale for the removal of 2,4,6-TBP from the Priority Testing List and does not agree that this action in any way undermines EPA's use of SAR to estimate the chemical's toxicity. 2,4,6-TBP was not removed from the ITC Priority Testing List because the ITC had found that TBP was not toxic; indeed, the chemical was originally included on the List because the NIEHS needed chronic toxicity and 2-year carcinogenesis study data. The availability of these data would preclude the use of a qualitative or quantitative SAR by EPA who would prefer to use actual data whenever possible. Among the studies cited by CMA and GLCC as available for EPA review are acute toxicity (oral, inhalation, and dermal), dermal sensitization, skin and eye irritation, 21-day inhalation toxicity, 28-day subacute dermal toxicity, clearance, teratogenicity, genotoxicity, and pharmacokinetics. None of these studies are sufficient to judge the carcinogenic potential of TBP, which is the primary endpoint of concern for this chemical. Therefore, EPA does not believe that the ITC decision to remove TBP from the Priority Testing List addresses EPA's determination that 2,4,6-TBP is highly toxic as indicated by SAR and that disposal of wastes containing high levels of this toxic chemical in a landfill (even a Subtitle C landfill) poses a substantial hazard that requires listing the waste as hazardous.

5,6,7 One commenter supported the proposed decision to list waste solids from the production of 2,4,6-tribromophenol, but argued that EPA underestimated the risks posed by disposal of the waste in a Subtitle C landfill for at least three reasons: (EDF, p 3-4)

- The TCLP understates the leaching potential of the waste in a Subtitle C landfill by at least an order of magnitude, because the waste may be exposed to solvents and other chemicals that encourage contaminant leaching. TRI data show that one of the landfills that received this waste also received over 1.2

million pounds of TRI chemicals in 1995, including toluene, xylene and other solvents. Also, the TCLP appears "uniquely ineffective" in leaching contaminants from the waste, e.g., only 0.08 and 9.4% of the 2,4,6-TPB was leached from the two samples.

- EPA's risk estimates are based on the presence of 2,4,6-TBP only, and ignore the presence of arsenic and other toxic contaminants in the waste and TCLP leachate. For the filter cartridge sample, the TCLP level was almost 2000 times EPA's health-based level for arsenic. While the TCLP value for the floor sweepings was lower, this may be attributed to the ineffectiveness of the TCLP, since the total concentration of arsenic in the solids was over three times the level found in the filter cartridges. Thus, proper consideration of arsenic and other contaminants would increase the estimated risk substantially.

- EPA's assumption of 95% containment efficiency for a Subtitle C landfill assumes a new composite cap is installed after 100 years. This is unreasonable given that owner/operator's post-closure responsibilities typically end after 30 years. Without a new cap, the containment efficiency (according to EPA's document) would drop to 60% at 100 years, reflecting decreasing performance of the bottom liner system. No estimates are available beyond 100 years, but additional declines can be expected. EPA must consider the long-term impact of waste disposal, even the 60% estimate is suspect.

Response-- As a general response to the argument that EPA underestimated the risks posed by Subtitle C disposal for the wastes in question, the Agency notes that these arguments have no practical effect and would not change EPA's decision to list the waste. However, EPA does not agree with some of the arguments put forth by the commenter, and is responding to them for this reason. EPA does not agree that the TCLP underestimates the leaching potential of the waste in question for reasons discussed below.

Absent any firm data to conclude otherwise, EPA finds no reason to conclude that the TCLP underestimates the leaching potential of the 2,4,6-TBP production wastes. As a preliminary matter, EPA notes that the commenter cites no basis for its quantified estimate that the leaching potential is underestimated by one order of magnitude. Moreover, there is no further indication that the TCLP is "uniquely ineffective" in leaching contaminants from this waste, as the commenter claims. The properties of 2,4,6-TBP indicate that the relatively low leaching efficiency is not unexpected. This chemical is not highly soluble in water (70 ppm; see *The Merck Index,* Ninth Edition, 1976) and would not be expected to leach from the organic waste matrix at very high levels. The octanol-water partition coefficient (Kow) for this substance is on the order of 17,000 (or in log form, 4.23); this coefficient is a measure of the tendency of the

chemical to partition into organic phases compared to water, and this value indicates the chemical is expected to be at 17,000-fold higher concentration in the organic phase compared to water. It, therefore, would be expected to remain bound in the organic phase and would tend to be less mobile. Furthermore, the lower leaching from the spent filter material is also logical, because the filter material is activated carbon. Activated carbon is used expressly to remove organic material from a process stream, and the 2,4,6-TBP is expected to be relatively tightly adsorbed to this matrix. Therefore, EPA has no reason to believe, despite the commenters assertions, that the TCLP results are not valid for this waste.

EPA's decision to list this waste focused on 2,4,6-TBP because this chemical was found at levels that greatly exceeded the other constituents detected. While other constituents were detected in the waste, many were also found in blank laboratory QC samples (e.g., methylene chloride). The detection of constituents in the blank samples indicates that the detection of these volatile constituents in waste samples may have been due to some sample contamination, perhaps in the laboratory, making it difficult to determine that their detection was significant. Concerning arsenic, the analytical results are suspect due to known problems with measuring some metals in these type of waste matrices. (See Method 6020, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, third edition, 1994; OSW/USEPA). EPA's contract lab experienced problems in some metal analyses, most notably for selenium and arsenic, using the method employed, ICP-MS (Inductively Coupled Plasma--Mass Spectrometry). EPA confirmed that the extremely high amount of bromine in the sample (due in part to 2,4,6-tribromophenol) resulted in false positive results for selenium; reanalysis using another method did not detect selenium. While arsenic was not reanalyzed using another method, it is likely that the high bromine content in these samples makes the ICP-MS results unreliable. (See Hinners, T.A., Heithmar, E., Rissmann, E., and Smith, D., Winter Conference on Plasma Spectrochemistry, Abstract THP18; p. 237, San Diego, CA (1994)).

One of the samples (GL-08) showed the presence of other brominated phenols, notably 2,4-dibromophenol; however, EPA does not have any health-based levels to rigorously evaluate them. Analysis of the other sample (floor sweepings and off-specification product, GL-09) showed the presence several volatile constituents that were found in the blank samples. However, this sample also contained significant levels of 1,2-dibromoethane (also known as ethylene dibromide or EDB), which was not found in the blanks. The toxicity of this chemical has been well studied, and EPA has promulgated a drinking water standard (maximum contaminant level, or MCL) or 5×10^{-5} mg/L based on its carcinogenicity. The TCLP analysis of sample GL-09 indicated that EDB readily leached into the water phase, giving a TCLP concentration of 36 mg/L; this is not surprising given the relatively high water solubility of this chemical (0.4 %, or 4,000 mg/L; see *The Merck Manual,* 9th edition, 1978).

The carcinogenic potential of EDB is so high that after considering the dilution of the TCLP level that might occur in transport from an unlined landfill to a receptor well (100, as noted in the proposed rule), the exposure levels would be 7,200 times above the MCL. The protection afforded by disposal in a lined Subtitle C landfill would have to exceed 99.999% in order to avoid the potential for exposure to concentrations of EDB in the drinking water above the MCL. The Agency believes that the relatively high levels of this chemical in the waste (and the corresponding TCLP sample) further confirms that these production solids contain high levels of highly toxic chemicals and present a substantial hazard, even if managed in a Subtitle C landfill. The presence of EDB in the waste will be discussed further in Section II of this document.

In its reevaluation, EPA did not conclude that the containment efficiency for a Subtitle c landfill was necessarily 95%. The Agency's point was, *even if the efficiency was as high as 95%*, the potential release from 2,4,6-TBP production solids in a landfill may present risks at levels of concern. While estimating the long-term efficiency of containment is highly uncertain, EPA agrees that it may be less than 95%, thereby making the potential risk higher.

Comments that Purport to Deal with Plausible Mismanagement but Actually Question EPA's Risk Analysis

8. EPA's proposed listing is based on a management scenario that is unsupported and implausible. The commenter argued that the evaluation of future failure rates of Subtitle C landfill containment systems is arbitrary and capricious because it is not supported by evidence in the docket, and that EPA relies on one study in the docket to support EPA's failure rate evaluation. This study, the commenter stated, fails to account for the multi-component nature of liner systems, but instead assumes both liners fail at the same time and ignores the leachate collection system. The commenter also noted that the study does not specify how it accounts for these factors, making it impossible to determine the validity of the assigned failure rates, and thus, EPA's sole reliance on this study is arbitrary and capricious. The commenter stated that this study contains no specific information regarding the four C landfills actually used by the generator of the waste, and that EPA did not consider site-specific factors (e.g, liner type, soil type, annual precipitation) to determine if leachate will reach groundwater. The commenter claimed, therefore, that EPA has not made a reasoned determination that the long-term effectiveness evaluation is valid at these specific facilities. (GLCC, p 5-6)

Response-- The commenter is wrong for a number of reasons. The effectiveness-time relationships given in the reference used by EPA (*Indexing of Long-Term Effectiveness*

of Waste Containment Systems for a Regulatory Impact Analysis, USEPA, November 1992) was based on an examination of the technical literature on the subject, and an evaluation of many technical factors. However the limited information available makes any quantitative estimate uncertain. The document evaluated the effectiveness of various components of the containment system, and identified the likely degradation mechanisms. For example, landfill containment systems may leak due to improper installation, and may be degraded by subsidence, drying/cracking, freeze-thaw cycles, burrowing of animals, leachate incompatibility, and vehicle loads. This analysis considered the composite clay/geomembrane liners and caps required under RCRA Subtitle C regulations. The document also provided data and cited references showing that even configurations like RCRA Subtitle C liners do, in some cases, leak over time. Concerning the leachate collection system, EPA notes that the regulations require operation and maintenance of these collection and leak detection systems for 30 years after closure of the landfill (see 40 CFR § 264.117). Over the long-term, therefore, EPA cannot rely on leachate collection systems to prevent the eventual release of leachate from the landfill if the liner system fails.

EPA generally feels that failures of the redundant landfill design and release monitoring systems are reasonably unlikely during the initial years of a landfills operation and its active management during the 30 years after closure. However, EPA believes landfill systems may not be effective enough over the long term to justify not listing this quite concentrated and toxic waste, particularly after the phase of active management of the landfill, maintenance of its cover, and operation of release monitoring systems. In the long-term, EPA believes one cannot assume that leachate collection systems or ground-water monitoring systems will be actively managed and under those conditions the sole landfill design and operation component that prevents ground water contamination is the integrity of the cover for which Federal rules do not require long-term care and maintenance after the post-closure period.

A landfill goes through various stages, during which different aspects of landfill design and operation are most important.

> (1) The first phase is when waste is being place in the landfill cell. While there may be daily cover with a material like soil, there is not a cover or cap designed to minimize rainfall into the waste. During this period, the liners and leachate collection system are the primary landfill containment features (other than treatment of the waste prior to its disposal) for protection of the environment. Leak-detection and ground-water monitoring systems are designed to detect significant releases and allow corrective action should the containment system fail.
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> (2) The second phase is when an engineered cap or cover is placed on top of the cell. During this phase, both the cover and the liner serve to contain waste

constituents. The cover is designed to minimize rainfall or other precipitation onto the waste (and thus leachate generated as that precipitation percolates through the waste). The liner serves to capture whatever leachate continues to migrate downward before the cover minimizes the infiltration of precipitation into the landfill cell and a leachate collection system allows the landfill operator to remove that leachate and manage it appropriately. Eventually, a well-operated landfill cell should dry out as the cover prevents infiltration and the leachate collection system allows removal of residual liquid. For 30 years after the covering of the landfill, the regulations also require that ground water monitoring take place to detect significant releases that might occur.

(3) The final phase occurs after active management of the leachate collection system and the ground-water monitoring ceases. During this phase, the cover is essentially the sole containment system component of significance. If the liner works but the cover fails during the post-closure period, the landfill can fill like a bathtub allowing precipitation to leach hazardous constituents from the waste and then overflow the liner system once the leachate collection system is no longer being operated to remove and manage any leachate. If the cover fails and the liner has also failed to a similar or greater extent, the leachate generated by the cover failure will leave the bottom of the landfill unimpeded. Federal landfill regulations do not require that ground-water monitoring continue after the post-closure monitoring period, so there is not necessarily going to be the ability to detect and remedy a release.

EPA is not trying to predict exact failure modes or probabilities in this rulemaking. Because the untreated waste for which a determination is being made is so concentrated and is believed to be so toxic, there is a wide range of failure rates that would leave EPA with an estimated risk greater than 1E-5 such that EPA believes the waste meets the listing criteria even if it were always managed in a Subtitle C landfill.

EPA did place in the record a report by Hilary L. Inyang and Guy Tomassoni from 1992 in which the authors provided expert judgements as to the likelihood that liner and cover systems would be effective many years after their installation. In that paper, the authors suggest that effectiveness by their definition of a RCRA C Composite Liner System might be 98% at installation and might decline to 85% in 30 years and to 60% after 100 years. The authors also suggested that a synthetic and clay cap might be 95% effective at installation and decline to 80% after 30 years and to 15% after 100 years unless it is replaced.

In this rulemaking, EPA is not trying to quantify the exact long-term effectiveness of liners or covers or complete landfill design and operation systems. There is are a

range of degrees of failure and probabilities of different levels of failure that are possible during all phases of the landfill operation.

EPA did two calculations to test how sensitive this listing decision was to the effectiveness of a landfill in reducing risk. First, EPA took what it believed was a reasonably high estimate of long-term effectiveness that Subtitle C landfill systems might reduce risk by 95% relative to a landfill without a engineered liner or cover. We used that figure in a letter to affected parties to solicit comment on the proposition that even if Subtitle C landfill systems were 95% effective in reducing risk, the estimated lifetime cancer risk from this waste (without treatment prior to landfill disposal) would still exceed 1E-05 and thus EPA proposed to list the waste. In responding to comments, EPA also did a different calculation in which EPA compared its estimated risk attributable to ground water contamination at a landfill without an engineered cover and liner of 7E-04 and divided that by the central point (1E-05) in the range of cancer risks that EPA believes justify listing a waste as "hazardous". That results in a calculation that a landfill system would have to allow less than or equal to 1/70th of the risk of a landfill without engineered systems in order to keep the estimated lifetime cancer risk below 1E-05. Or, put in the converse, the landfill design would need to be 98.6% effective at reducing risk.

EPA is not sure how to estimate the effectiveness of landfill design and operation systems during placement and active management of the landfill and its monitoring systems. It is difficult to judge whether a landfill during this phase would be more than 98.6% effective.

However, EPA believes it is highly reasonable to conclude that once the active management of a landfill ceases, the long-term effectiveness of landfill design will decrease to well below that level of effectiveness. Once active management of the leachate collection system ends, the sole significant protective means of containment is the cover. If the cover fails (partially or totally) and the liner does not, the landfill will fill with liquid. Without active leachate collection and management there is then a high probability of leachate overflowing and affecting groundwater or surface water at the rate at which the liner allows infiltration. If the liner fails, the cover is the sole containment component of the system. In addition, the Federal regulations do not require on-going ground-water monitoring after the post-closure period, so there is not the additional protection of possible detection and remedial action.

It is difficult to quantify the extent of likely failure and the probabilities of different levels of failure. However, EPA believes that at least after the post-closure care period it is reasonable to assume that landfill systems are not 95% or 98% effective at reducing risk. Thus, while landfill designs provide a significant increment of environmental protection, EPA believes that for a waste of this concentration and toxicity the long-term risks even if managed in a Subtitle C hazardous waste landfill are high enough to justify

listing this waste as “hazardous”.

As discussed elsewhere, EPA also believes there is policy support for encouraging treatment of highly concentrated and highly toxic waste in the policy rationales underlying the 1984 amendments to RCRA, in particular the requirement that EPA promulgate treatment standards for waste and restrict the placement on the land of hazardous wastes that have not met those treatment standards.

EPA agrees that the degradation of a containment system depends to some extent on the systems design and other site-specific factors. However, the commenter provided no specific data indicating what site-specific factors would prevent release of constituents from the wastes disposed, or what the long-term containment efficiencies might exist for the landfills at the sites in question. Therefore, EPA has no reason to alter its analysis on this basis. Furthermore, EPA does not believe that such a site-specific analysis is appropriate in this case, because the generator may use many different landfills for disposal. In fact, the history of the generator’s disposal practices (See letter from Great Lakes Chemical Corporation to EPA dated April 23, 1997) shows that the generator changed disposal sites quite often (e.g., the generator sent the waste to three different landfills between 1994 and 1997).

9 One commenter stated that EPA has turned this inquiry from determining whether dangerous "mismanagement" is plausible into an inquiry into whether it can be ruled out completely, and cites EPA’s admission that there is at least a 95% chance that C landfills will not leak. The commenter argues that this type of logic was unacceptable in the Dithiocarbamate case, in which the court stated that EPA’s should not disregard its regulations by turning an evaluation of whether mismanagement scenarios are "plausible" into "an inquiry into whether they have been ruled out absolutely." The commenter claims EPA argues that "nothing lasts forever," and therefore Subtitle C disposal can be mismanagement; using this logic, there is no limit to the disposal practices EPA could label as "mismanagement." The commenter states that EPA effectively writes the requirement of a “plausible mismanagement scenario” out of the listing rule, and that recent court decisions do not allow EPA to evaluate such a factor so as to drain it of all content. (GLCC, p 7)

Response -- As a preliminary matter, EPA points out that this listing is not inconsistent with any case law. Consistent with Dithiocarbamate Task Force, the Agency has found that the common practice of the only generator of the waste over more than 15 years is the plausible management scenario. The assessment of all relevant factors under 261.11(a)(3) led the Agency to conclude that voluntary Subtitle C landfill disposal is improper management.

Furthermore, the Agency has not turned this into an inquiry about whether "mismanagement" can be ruled out completely. Rather, the Agency has evaluated this particular waste under the conditions of plausible management and reached a conclusion that there is a substantial present or potential risk. The commenter is attempting to turn the Agency's risk analysis into a narrow inquiry into plausible mismanagement. This is simply incorrect.

With respect to the EPA's analysis of risk, the Agency did not state that there is at least a 95% chance that C landfills will not leak. Rather, EPA was indicating that *even if the containment system was 95% effective*, the potential risks from the waste in question are so high that it would still present a risk at levels of concern. The actually long-term efficiency is extremely difficult to estimate, given the highly uncertain long-term integrity of liners/leachate collection systems and landfill caps. The document cited by EPA that attempts to evaluate the effectiveness of liner systems estimated it would degrade to an efficiency well below 95% over the long term (e.g., one hundred years). EPA is not attempting to absolutely rule out certain management scenarios, but rather is attempting to account for the likely degradation of a Subtitle C containment system over the long-term. Certainly the available data (cited in the document used by EPA) clearly show that the materials that make up liners and caps are expected to degrade over time. EPA is not saying "nothing lasts forever," but rather that the available data indicate there are many mechanisms by which landfill containment systems can degrade with time. Therefore, given this fact, in conjunction with the available estimates of long-term effectiveness, EPA believes that the highly toxic waste in question may present a significant risk when placed in *any* landfill, even a Subtitle C unit.

10 One commenter stated that EPA's legislative references do not support the idea that disposal in Subtitle C landfills constitutes mismanagement, but rather relate to historic problems caused by *unregulated* disposal, and expressed support for minimizing the quantities and toxicity of wastes that must be disposed. The commenter claims EPA's decision suggests that the principal reason for defining Subtitle C disposal as improper management is to extend the land disposal restriction program to additional wastes, and states Congress did *not* require all wastes to be treated before land disposal, but only wastes that are hazardous. The commenter noted that the fact that treatment might reduce the hazardousness of a waste is not a relevant factor in EPA's listing criteria. (CMA, p 3 and 6)

Response -- EPA disagrees with the claim that Congress was concerned only with unregulated land disposal. The statute itself clearly states Congressional intent: "certain classes of land disposal facilities are not capable of assuring long-term containment of certain hazardous wastes....and land disposal, particularly landfill and surface impoundment, should be the least favored method for managing hazardous

wastes." (See RCRA, Section 1002(b)(7)). EPA agrees that Congress did not require all wastes to be treated prior to land disposal, however, in this case EPA believes the waste in question presents a substantial hazard when landfilled in the form in which it is generated (i.e.,untreated), even in a Subtitle C landfill. Therefore, EPA believes the waste *is*, in fact, hazardous and should be subject to full regulation under Subtitle C, including the land disposal restrictions.

11 One commenter stated that, while EPA is not relying on projecting new management practices in this listing decision, the Dithiocarbamates decision is still controlling (*Dithiocarbamate Task Force v. EPA*, 98F.3d 1394; D.C. Cir. 1996). The commenter noted that when the court struck down the K160 listing, it did not remand it to allow EPA to reevaluate whether disposal in a Subtitle C landfill constitutes "plausible mismanagement," as EPA is attempting to do here. The commenter went on to say that, in striking down 24 other waste listing (U-listings) in the Dithiocarbamates decision, the court refused to accept as examples of mismanagement various past or future accidents, and stated that EPA assertions that "accidents will happen" does not constitute "plausible mismanagement." The commenter claimed this analysis is equally applicable to EPA's assumption that all landfills will leak eventually, and the fact that some unquantified uncertainty exists regarding long-term risks from Subtitle C disposal does not mean that such disposal is mismanagement. The commenter stated the Dithiocarbamates decision questioned how listing the U-wastes as hazardous would avert accidents, and in this case the generator is already sending the waste to Subtitle C landfills. The commenter argued, therefore, that the only change listing the waste would cause would be to require compliance with land disposal treatment standards and it is difficult to see how a listing would substantially reduce risks. The commenter stated that EPA did not address the question of how much risk reduction would result from treatment, however the commenter also noted that the fact that treatment might reduce the hazardousness of a waste is not a relevant factor under §261.11(a)(3) in deciding whether to list a waste as hazardous. (CMA, p 4-5)

Response -- The commenter's reference to Dithiocarbamate Task Force is not relevant to this case. In Dithiocarbamate Task Force, the court did not address the issue of Subtitle C management in any substantive way. The court stated that it was vacating the listing of K160 "[b]ecause EPA failed to identify a plausible mismanagement scenario...." (98 F.3d at 1404*)* and did not reach the issue of whether voluntary disposal in a Subtitle C landfill (absent treatment) would present a substantial risk. The decision in no way limits the Agency from considering potential risks from Subtitle C management. EPA had not raised the issue in rulemaking because the Agency had determined that the plausible management scenario was an unlined landfill. The

Agency did not conduct a risk assessment on the Subtitle C landfill because it did not believe it had to.

The reference to consideration of the U wastes in Dithiocarbamate Task Force is also irrelevant to this case. The commenter is confusing EPA's acknowledgment in the uncertainty in quantitatively estimating the long-term efficiency of Subtitle C containment systems as being equivalent to assertions that "accidents happen," referenced by the court in Dithiocarbamates Task Force. As noted in response to other comments in this proceeding, EPA's evaluation attempted to account for the likely degradation of a Subtitle C containment system over the long-term. The available data indicate that landfill liners and caps are expected to degrade over time. Therefore, EPA continues to believe that it is logical and appropriate to assume that the containment efficiency of landfills will degrade sufficiently so that, *for this highly toxic waste,* disposal of the untreated material in a Subtitle C landfill may present a substantial present or potential hazard.

As noted in the commenter's own statements, unlike in Dithiocarbamate Task Force, in which the court did not see how U-listings would avert accidents, a listing of the 2,4,6-TBP waste solids *would*, in fact, prevent the placement of untreated wastes in the landfill. Further, the treatment standards for this newly listed waste (see the land disposal restrictions section of today's rule) require levels for nonwastewaters to be no greater than 7.4 mg/kg. This level equates to a reduction of up to a 50,000-fold reduction in the level of 2,4,6-TBP in the waste. It is reasonable to suppose that such a reduction in 2,4,6-TBP levels would result in significant risk reduction -- a clear benefit of the listing. Furthermore, the section 261.11(a)(3) criteria, as noted by the commenter, does not require the Agency to consider risk reduction. Section 261.11 is promulgated under the authority of section 3001 of RCRA, which requires EPA to identify criteria for listing. Once listed, the wastes would become subject to the management requirements of Subtitle C. The regulations for management requirements are promulgated under other sections of RCRA, like sections 3002 (generator standards), 3003 (transportation standards), 3004 (standards for treatment, storage and disposal facilities), and 3005 (permits for treatment, storage or disposal).

12 While one commenter supported EPA's decision to list the 2,4,6-TBP solids and filter cartridges, the commenter stated that EPA assumes in its reevaluation that the wastes at issue will always be landfilled in a Subtitle C facility, even though the regulated community is under no legal or technical mandate to do so in the absence of a hazardous waste listing. The commenter claimed that EPA's proposed listing rationale based on Subtitle C landfilling substantially understates the risks, and argues that EPA should not assume past disposal practices represent the only plausible mismanagement practice for at least four reasons (EDF, p 1-2):

- There is no technical or other bar to additional companies producing 2,4,6-TBP and generating the wastes at issue, either at existing organobromine chemical production facilities or at new locations. Therefore identification of plausible mismanagement scenarios should involve more than an analysis of one company's historic disposal practices.

- The wastes at issue (floor sweepings and filter cartridges) are frequently observed in the organobromine chemical industry, and in many cases are landfilled onsite in nonhazardous units. Thus, EPA should consider how similar wastes from other organobromine production processes are managed when identifying plausible mismanagement scenarios.

- The company currently generating these wastes has used at least four different Subtitle C landfills, including three different landfills since 1994. This frequent shifting strongly suggests cost is the overriding factor in the company's disposal decision. It is not unreasonable for EPA to assume the cost differential between Subtitle C and Subtitle D landfills may cause the company to use a nonhazardous waste landfill.

- The production facility's 1995 TRI report reveals that half of the 203,130 pounds of TRI chemicals sent offsite for disposal were sent to a nonhazardous landfill. Thus, even at this one facility Subtitle C landfilling is not uniformly practiced.

Response -- As a general response to these comments, the Agency notes that these argument have no practical effect and would not change EPA's decision to list the waste. In the original proposal to list the 2,4,6-TBP production solids, EPA estimated the risks from disposal in an unlined landfill would warrant listing the waste (see proposed rule, 59 FR 24530, May 11, 1994). As noted in the September 3, 1997, notice letter, the risks from such disposal would be mitigated in a Subtitle C landfill, but would still be at levels of concern. Therefore, EPA does not need to rely on projecting new management practices in this listing decision. EPA thanks the commenter for his comments on this issue, and EPA intends to address the more general issue of how to weigh potential changes in management practice in the future.

Existing Landfill Regulations

13,14,15 Two commenters argued that EPA did not fully consider the impact of the existing RCRA Subtitle C regulations in its analysis of potential risks from disposal in such a regulated landfill. One argued that the proposed mismanagement scenario presumes that all landfill operators are in

violation of RCRA regulations, and noted that the regulations require that liner/leachate collection systems prevent migration out of landfills during the active life (including the closure period) of the landfill (see 40 CFR 264.301(a)(1)). The commenter stated that EPA has recognized that well designed landfills significantly reduce risks posed by these wastes (57 FR 21456; May 20, 1992), and argues that the resources spent on landfill design and construction have resulted in more than a 20-fold decrease in risk posed by the waste disposed. The commenter stated that if EPA is concerned with releases from landfills, the proper place to address this is through the regulations governing land disposal units, and that use of the listing criteria is both ineffective and "underhanded". (GLCC, p 6-7).

The other commenter stated that comprehensive landfill regulations prevent the release of hazardous constituents from the waste into the environment by: double liners and leachate collection systems, monitoring by groundwater wells, and corrective action requirements in case of a release due to liner failure. The commenter also noted that the performance of Subtitle C landfills is guaranteed by operating, closure, and post-closure permits, but stated that none of these safeguards were addressed in EPA's reevaluation (CMA, p 3-4).

Responses -- EPA agrees that the regulations governing Subtitle C landfills are stringent and are designed to prevent releases from the unit, to detect if such leaks occur, and to take corrective action if necessary. However, EPA is not assuming that all landfill operators will be in violation of RCRA, rather EPA is simply recognizing that such standards are not protective in perpetuity nor for every possible waste. EPA is not saying that voluntary Subtitle C landfilling is always improper, just that there are wastes that should not go into them if they are not treated.

EPA agrees that properly installed liner systems and final covers can substantially reduce the potential for releases during the operating life and post-closure period (see 52 FR 20270, May 29, 1987). EPA also agrees that permits for landfills help to ensure the implementation of stringent requirements for groundwater monitoring and corrective action. However, containment systems may only delay releases of persistent and mobile compounds until after the post-closure period, when the cap and liner system degrade. After closure of the landfill, the RCRA regulations require a 30 year post-closure period, during which the unit is maintained and monitored (see 40 CFR § 264.117). After the post-closure monitoring ends, the release of highly toxic wastes may not be detected or corrected. While extending the post-closure period might be one way to decrease potential risks from Subtitle C landfills, EPA notes that treatment under the land disposal restrictions program is another way (and perhaps a more direct way) of ensuring long-term risks are minimized. Listing the waste solids and filter cartridges from the production of 2,4,6-TBP ensures that this highly toxic waste will be

treated prior to landfill disposal.

Demonstration of a Substantial Hazard

19,20 One commenter claimed that EPA's approach does not demonstrate that the TBP wastes managed in Subtitle C landfills pose a *substantial* hazard as required by the statute and EPA's rules (261.11(a)(3)). The commenter argued that no human health or environmental damage has ever occurred as a result of improper management of TBP wastes (factor (ix)), and the quantity of the TBP waste (35 tons per year) is inconsequential (factor (viii)). The commenter noted that EPA implies that the wastes' highly toxic nature offsets the small quantity, however EPA has no direct evidence regarding the toxicity of TBP. The commenter also stated that the Dithiocarbamates court indicated that EPA must balance the toxicity of the chemicals with other factors specified in EPA's listing criteria, and that the issue is "how this toxicity would manifest itself in the context of mismanagement." Finally, the commenter stated that EPA's estimate of risks above 10^{-5} from TBP wastes in Subtitle C landfills is "based on improper extrapolation from Subtitle D risk modeling." (CMA p 5-6)

Response -- EPA disagrees with the commenter's assessment of the hazard posed by the TBP wastes. First, the regulatory criteria for listing wastes as hazardous is that the wastes may . . . pose a substantial present or potential hazard. These wastes certainly meet that criteria. While EPA has not, as the commenter noted, found damage cases that document health or environmental damage from disposal of this waste, this is only one of the factors EPA must consider in its listing decisions. While damages may not have occurred for this waste, EPA has explained how it considered the other factors under section 262.11(a)(3). The risk assessment, after consideration of all of these factors shows individual risk numbers to be above EPA's level of concern. Furthermore, by listing a waste as hazardous, EPA hopes to *prevent* such damage from occurring, and the Agency has often listed wastes in the absence of definitive damage cases.

Contrary to the comment, EPA does not concede that the volume of waste at issue (34 tons annually) is necessarily "inconsequential." The volume of waste must be examined in conjunction with the concentration of toxic constituents present. In this case, the relatively small quantity of waste contains very high concentrations of a highly toxic constituent, 2,4,6-TBP. To illustrate this point, the existing 34 tons of a highly concentrated waste containing up to 400,000 ppm of 2,4,6-TBP would correspond to 3400 tons of a less concentrated waste containing up to 4000 ppm of this chemical. This level of a toxic constituent would continue to be unusually high for discarded waste material.

As noted elsewhere in today's rule, EPA continues to believe that the SAR results demonstrate that 2,4,6-TBP is highly toxic. Furthermore, EPA has shown how this toxic chemical, in a highly concentrated waste, may potentially cause a substantial risk even if managed in a Subtitle C landfill. The waste in question is so toxic and concentrated that release may occur at levels of concern, even if the containment system of a Subtitle C landfill were very high (e.g., 95%). Given this result, EPA believes that listing is warranted.

Other Legal and Policy Issues

21 The commenter that supports EPA's decision to list the waste at issue noted that the disposal of wastes with high concentrations of organic contaminants is precisely the scenario Congress sought to restrict through the Land Disposal Restrictions program, because Congress found landfills to be among "certain classes of land disposal facilities are not capable of ensuring long-term containment of hazardous wastes". (Section 1002(b) of RCRA). The commenter further argued that a hazardous waste listing for these wastes is appropriate to ensure Congressional objectives of the LDR program are achieved, and that landfilling these wastes without prior treatment is contrary to Congressional intent. The commenter claims EPA would undermine this Congressional directive by allowing the continued disposal of highly concentrated organic wastes without treatment, and that EPA must consider these expressions of "proper" management when applying its criteria for listing hazardous waste (EDF, p 4-5).

Response -- EPA agrees that in establishing the Land Disposal Restrictions program, Congress found land disposal to be incapable of ensuring long-term containment of hazardous waste. However, EPA does not agree that the high content of organic contaminants is, by itself, sufficient to require listing. The listing decision is based on the highly toxic nature of the constituent in question (2.4,6,-TBP), in conjunction with potential risks associated with its release, even if placed in a Subtitle C landfill. Therefore, EPA agrees that listing, and the associated treatment required under the land disposal restrictions program, are appropriate because of the chemicals high toxicity and potential mobility in groundwater. EPA does not agree that listing is appropriate merely to comply with Congressional intent for treatment of hazardous waste, because a waste must first be determined to be hazardous before the LDR program applies.

22 EPA's reevaluation could be read as an indictment of the Agency's long-standing comprehensive, conservative, redundant Subtitle C program for managing hazardous wastes in landfills. If Subtitle C disposal is not protective and constitutes mismanagement, then EPA's landfill standards are inadequate. The

commenter does not believe this is the case and doubts that EPA does either. Instead, the commenter believes the criticism of the long-term integrity of landfills is an effort to avoid the implications of the Dithiocarbamates decision. Even if some uncertain degree of risk is posed in the long term by such disposal, this uncertainty is not a sufficient basis for listing these wastes. (CMA, p 6)

Response -- As noted elsewhere in response to other related comments, EPA believes the extensive regulatory controls provide management that reduces the potential for releases to the environments. EPA's decision to list the solids from the production of 2,4,6-TBP is in not an indictment of the Agency's Subtitle C program, but is based on the specific nature of this waste and the potential risks that would occur if the long-term containment systems in a Subtitle C landfill degrade over time, as expected.

II. Comments on the January 14, 1998 Letter

As a result of the commenter's arguing that the EPA underestimated the risks, the Agency reexamined the analytical data for the waste samples from the 2,4,6-tribromophenol production waste. Based on that reexamination, EPA found that the waste contained another toxic constituent (ethylene dibromide) that appeared to further support the listing. EPA provided additional notice of this additional constituent to the interested parties (i.e., the sole generator of the waste and EDF, the commenter that originated the comment about additional constituents being present in the waste) in a letter dated January 14, 1998. The generator submitted comments on this second notice letter. The Agency's responses to these comments are discussed below.

Ethylene Dibromide

Comment: "The Agency abused its discretion by alleging that the levels of 1,2-dibromoethane (also known as ethylene dibromide (EDB)) contained in a single sample of TBP floor sweepings justify the proposed hazardous waste listing. . . . EDB is not used as a raw material or produced as a by-product in the TBP process. EPA allegedly found EDB in a single sample analysis which is highly suspect in light of the recent sampling of the TBP process materials conducted by GLCC. These samples did not detect any EDB."

Response: It is true that EDB is not used in the TBP process, however, EDB is used elsewhere at the Great Lakes facility as a raw material and may have been present in the TBP process floor sweepings and off-spec product sample (GL-09) due to cross-

contamination. The detection of EDB in sample GL-09 was confirmed by laboratory analyses performed in quadruplicate. In addition, EDB was also identified in the associated TCLP leachate for GL-09. Even though EDB was not detected recently by the facility in the TBP process materials, a cross-contamination possibility exists and EDB, while the EPA is not using EDB as a basis for listing, the Agency believes it should be noted as further evidence considered in the hazardous waste listing determination. Refer to response below for justification of the proposed hazardous waste listing.

Comment: 1) "Even if minute quantities of EDB were detected, it does not provide a basis for listing TBP solids and filter cartridges or for proposing land disposal restrictions for TBP. Since EDB is not present in the TBP process, its alleged presence would have to be the result of a mixture of TBP and EDB. Listing TBP based on this alleged mixture is an unauthorized and unjustified use of the mixture rule. 2) In addition, since EDB was allegedly only found in floor sweeping, it would only provide a basis for listing the floor sweepings, and not any other material associated with the TBP process or TBP itself."

Response: EPA only used the presence of EDB as a further indication that the wastestream should be listed. The consideration of EDB in the listing process is not related to the mixture rule, and EPA does not agree that the mixture rule is relevant. The listing is not "based" on the presence of EDB, but rather on the fact that there is significant toxicity concern with TBP itself. The TBP concentration therefore, is the primary "basis" of the proposed listing. Given that EDB is not used in the TBP process, we assume a potential for cross-contamination exists and should be considered in the listing decision. Secondly, it is true EDB was found only in the TBP process floor sweepings (GL-09). Therefore, using EDB as the "basis" for listing the waste category K140, in which two waste streams are combined (i.e., GL-09 and filter cartridges (GL-08)) would be inappropriate. Thus, as noted, EPA is basing the listing on the presence of 2,4,6-TBP, which was found in high concentrations in both samples.

Comment: "The Agency claims that a single sample of floor sweeping and off-specification product, GL-09, was found to contain EDB. The alleged presence of EDB in GL-09 was not noted in the 1992 sampling results, the 1994 proposed rule, the 1995 land disposal restriction proposal for TBP, or the Agency's September 1997 letter to GLCC regarding plausible mismanagement scenarios. Apparently, this is because the Agency believes that the original analytical results incorrectly identified EDB as 1,2-dibromoethene, but included the correct CAS number for EDB. It is entirely possible, however, that the original analytical results stated the correct name of the analyte as 1,2-dibromoethene, but included the wrong CAS number.

Response: It is important to note that EDB was correctly reported in all documentation pertaining to the total volatiles analysis of sample GL-09. The

laboratory also correctly reported EDB in the TCLP leachate of GL-09, however, this compound was erroneously identified as 1,2-dibromoethene (using the correct CAS number for EDB) in all previously reported documentation. This error was recently discovered after a review of the original analytical data where it was confirmed the omission of EDB in the GL-09 leachate published results was due to a typographical error. This finding was presented to GLCC in our letter dated January 14, 1998. As noted above, EPA is confident that the analytical data clearly indicated EDB is present in the waste sample.

Public Notice Concerns

Comment: "The Agency did not provide public notice of its intent to list TBP based on the presence of EDB, in violation of the Administrative Procedures Act and Shell Oil."

Response: Due to the limited time EPA has for completing this action, the Agency decided that letters of actual notice to the parties who commented on the proposed rule and could be expected to have a direct interest in the final rule decision was appropriate. Those receiving the letter included the only current generator of the waste, and the environmental group that commented on the apparent presence of other constituents in the waste. These are the parties EPA decided were arguably affected by EPA's evaluation of EDB in the waste. EPA is not aware of any other generators of this waste or any persons who would have a direct interest in this decision. Therefore, the actual notice given in this case is sufficient.

Use of OSAR

Comment: "GLCC has not received any response to its comments on three previous occasions challenging the use of QSAR as a basis for alleging that TBP itself is toxic."

Response: Response to GLCC's comments made concerning QSAR (i.e., during the public comment period to the proposed rule and in response to the Subtitle C letter) has been added as appendices to the background document. EPA has informed GLCC of this process several times. The latest comments in response to the EDB letter dated January 14, 1998, have already been addressed in the aforementioned documents.

Analytical Methods

Comment: The Agency's analytical methods that resulted in the detection of EDB are highly suspect. The lack of reproducibility demonstrated by the significant divergence in values obtained in duplicate analysis for the same compounds (such as bromoform and EDB) in the same sample suggests that the analytical results reflect laboratory error."

Response: As stated previously, EDB was detected in all attempted total and TCLP laboratory volatiles analyses of sample GL-09 using SW-846 Method 8260. This analytical method using GC/MS instrumentation is very reliable in detecting trace (ppb) and high (ppm) level sample concentrations and is considered the most appropriate for the organobromine wastestreams. The calibration linear range is a major limiting factor of all analytical instrumentation in characterizing and quantitating target analytes. For this reason analytical dilutions (such as those performed for GL-09, 25,000 and 5,000) are sometimes necessary in order to quantitate the predominant constituents within the established linear calibration range. However, a major disadvantage of this dilution technique is the potential for increased data variability with the larger dilution factors. In this case the analytical precision for bromoform and EDB as measured by the % reproducibility (% RPD) was 43% and 61%, respectively. Generally, duplicate analyses with % RPD values less than 25% are regarded as acceptable analytical precision, however, given the large dilution factors that were required for GL-09 and the difficulty in performing replicate analyses using a different dilution factor, the % RPD values obtained for bromoform and EDB are not unreasonable. The comparison of analytical data using two different dilution factors almost always will yield poor precision data and for this reason, the results from a lower dilution analysis (assuming all the responses are within the linear range) are considered more representative of the actual sample concentration. Therefore, since the lower dilution (5,000) for the duplicate analysis of GL-09 with higher concentrations of bromoform, EDB, and 1,1,2-tribromoethane is considered more representative, the imprecision obtained for bromoform and EDB is minimized after the sample and duplicate analysis results are combined and reported as an average concentration. The overall affect of using the average concentration is that the values for the three predominant target analytes (bromoform, EDB, and 1,1,2-tribromoethane) are lower than the duplicate analysis results that are considered more representative.

The laboratory analytical data from the organobromine characterization analyses were also independently validated to confirm reported sample concentrations, accuracy, precision, and method-specific quality assurance compliance. There were no significant deficiencies or errors noted during the data review and validation process.

Comment: "The chromatographic columns used in the analysis were overheated. This would explain the presence of tetradecycloxirane, which is often used as a column coating material. Reaction of brominated materials with this compound at high temperatures can result in brominated methanes and ethanes as reaction products. Alternatively, these materials could also be residuals from previous runs of unrelated samples desorbing from the columns. GLCC made this point five years earlier in its January 8, 1993 comments on the <u>original</u> analytical results.

Response: GLCC's comments on the original analytical results dated January 8,

1993, were addressed in an EPA letter dated January 21, 1993, which is available for public review located in the RCRA Information Center docket. The temperature of the chromatographic columns used for Method 8260 analyses are controlled using a temperature-programmable gas chromatograph interface. Any deviations in the pre-set method-specified temperature conditions will result in an invalid and terminated analytical sequence. As noted in the attachment to the EPA letter dated January 21, 1993, tetradecycloxirane is not siloxane column material, and is not an indicator of column breakdown. Tetradecycloxirane is a three-membered ring with an oxygen atom, and therefore is not associated with the gas chromatographic solid-phase chemical composition or column breakdown, as suggested by the commenter. The presence of siloxanes in some other samples was primarily due to some bleeding of the solid phase chromatographic column. However, this would not indicate that sample analyses performed using this specific column are questionable, as asserted by the commenter. See the January 21, 1993 EPA letter for further discussion.

Since bromoform, EDB, and 1,1,2-tribromoethane were not detected in the laboratory method blank data, it is highly unlikely that these compounds were present in sample GL-09 due to carryover from unrelated samples. In addition, high concentration samples are screened and segregated from trace level concentration samples to prevent the possibility of cross-contamination and carryover analytical bias.