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October 18, 1995

OUR FILE NO.

19825-11917

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Cesar Lee
Remedial Project Manager
U.S. EPA - Region III
841 Chestnut Building (3HW21)
Philadelphia, PA 19107

**Re: Supplemental Comments to Superfund Program Proposed Plan, Metal Bank Superfund Site**

Dear Mr. Lee:

This and the accompanying report by Dr. Kleppinger are being sent to supplement the comments on the Proposed Plan for the Metal Bank Superfund Site previously submitted on behalf of U.C.O.-M.B.A., Inc. and The Union Corporation on September 18, 1995.

Dr. Kleppinger's report primarily addresses new data reported to EPA by the PRP Group on September 11, 1995, which was obtained during a test pit program conducted during August/September 1995. The report also considers additional information related to that PRP Groups' study, including laboratory data, field logs and annotated photographs of the field work not received until October 13, 1995.

In short, after considering the results of this study, Dr. Kleppinger's supplemental report concludes that the conclusions previously submitted on September 18 are not only still valid but are substantially reinforced by the new data. The evidence confirms that there are no conditions remaining at the Site which require any further remediation to protect public health and the environment.

Dr. Kleppinger's report also briefly addresses comments by certain government agencies which have been added to the Administrative Record since our September 18, 1995 submittal.

In addition to these supplemental technical comments, we note that EPA has failed to apply its own guidance in the remedy selection process by having failed to consider reasonable anticipated future land uses. Neither the alternatives developed and evaluated in the FS nor the Proposed Plan reflects reasonably anticipated uses, and it has not been determined how the goal of realizing such uses will be accomplished. See OSWER Directive No. 9355.7-04, Land Use in the CERCLA Remedy Selection Process [EPA 1995]; see also 60 Fed. Reg. 29595 (June 5, 1995).

We request that these comments, along with those previously submitted, be included in the Administrative Record, and fully and fairly considered in the remedy selection process. Again, we remain available to meet with the Agency to discuss this matter. In any event, we look forward to your written response as required by 40 CFR section 300.815(b).

Very truly yours,

MATTIONI, MATTIONI & MATTIONI, LTD.

John Mattioni

JM/tjt
HAND DELIVERED
cc: Dan J. Jordanger (w/encl. w/o attachments)
Jeffrey N. Martin (w/encl. w/o attachments)
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October 18, 1995

19825-11917

John Mattioni, Esquire
Mattioni, Mattioni & Mattioni, Ltd.
399 Market Street, 2nd Floor
Philadelphia, PA 19106

Re: Metal Bank of America - Cottman Avenue Site

Dear Mr. Mattioni:

Enclosed please find my supplemental report and comments to the EPA Cottman Avenue Site Proposed Plan. This supplement was requested because of the additional test pit exploration of the Site conducted by the PRP Group's consultants, Earth Tech. The data was not received by me early enough to have considered it in my September 15, 1995 comments.

I believe my report is self-explanatory. However, so that there is no misunderstanding and no possible misinterpretation of the importance of the data disclosed by the test pit results, let me state plainly, clearly and unequivocally that they support only a no further action conclusion.

The EPA Proposed Plan is based upon the assumption that there is a pool of free-phase oil under the ground at the southern portion of the Site. If EPA is correct, this means that excavation to the groundwater level must reveal the existence of this oil layer. The extensive open test pit excavation around the Site, in areas where any oil layer would be expected to be located, had to reveal the oil if it was, in fact, there.

The excavations, in the clearest and most unequivocal way possible, refute the EPA "belief" in the existence of the free-phase oil, LNAPL or DNAPL. Not one of the test pits encountered or found an oil layer or super-saturated soil in the ground, regardless of where pits were dug.

The RI/FS data established that an oil phase could not exist. No attempt had been made to dig up the ground to verify this lack of oil. However, now that Earth Tech has done just that, by digging 14 test pits (large excavations down to the groundwater and beyond). The results have confirmed what we already knew. There can be no doubt whatsoever, even in the EPA's "mind," that there is no free oil layer. Since this condition was the basis for the proposal for further NAPL remediation, the perceived need for addressing this component has now been unequivocally eliminated.

In summation, even prior to the test pit study there was no data evidencing the existence of NAPL at the Site since completion of oil recovery operation in 1989. EPA's perception to the contrary was pure conjecture. If any doubt remained on this issue, it was eliminated entirely by the test pit project which did not find NAPL conditions despite extensive excavation and biased sampling.

In addition to the NAPL issue, both Dr. Brown (who has supplemented his prior report) and I concur that the new data confirms that the worst-case groundwater at the site meets the PCB MCL, that any PCB discharge is extremely minimal (less than .0005 pounds per year), and that EPA's ostensible concerns for recontamination of the mudflats is unfounded. Therefore, the proposed remediation of subsurface PCB "hotspots" is not justified and would accomplish nothing.

If it views the test pit results properly, the EPA must reconsider and discard its present proposed remediation plan and adopt a no further action alternative.

Finally, I have briefly addressed comments filed by certain government agencies. As a general rule, the agencies' remarks do not contain independent reviews of the data, but blindly accept EPA's faulty conclusions and recommendations in the RI/FS and Proposed Plan. As these have been fully discredited by this and the prior set of comments, they are similarly flawed.

Very truly yours,

Edward W. Kleppinger, Ph.D.

EWK/smb
Enclosure

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# Supplemental Comments on

# Superfund Program Proposed Plan

Metal Bank Superfund Site
Philadelphia, PA July 1995

U.S. Environmental Protection Agency Region III

Edward W. Kleppinger, Ph.D.
October 17, 1995

# Table of Contents

## 1.0 INTRODUCTION:

These supplemental comments, prepared for the Administrative Record ("AR") in this matter, cover two main areas: the August/September 1995 site data obtained by the PRP Group and the comments filed by other governmental agencies such as the U.S. Fish and Wildlife Service ("F&WS").

## 2.0 SUMMARY:

EWK Consultants, Inc. ("EWK") has analyzed the results obtained by the PRP Group from a test pit program conducted at the Metal Bank of America Cottman Avenue Site ("Site"). The test pit program field work was ostensibly to obtain samples to determine the suitability of stabilization/solidification ("S/S") for soils at the Site. While somewhat higher levels of PCB and total petroleum hydrocarbons ("TPH") were obtained during the recent testing in some pits, than during the Remedial Investigation ("RI"), these results are well within levels predicted to be found in my comments to the AR of 15 September 1995[1], especially given the circumstances surrounding the collection of these samples.

Dr. Kirk Brown has revised his earlier 15 September 1995 report[2] to reflect the new data as reported to EPA by the PRP Group on 11 September 1995. [Attachment 1.] The Brown report is attached to these comments. [Attachment 2.] The new data result in no changes to his conclusions:

- that there is no evidence of DNAPL at the site,
- that the worse case groundwater at the site meets the PCB MCL,
- that any flow of PCBs to the Delaware River under current conditions is extremely "minimal" and;
- that proposed EPA remedial actions would be expected to decrease the release of PCBs to the River by less than

0.0005 pounds per year.[a] Therefore, such remedial actions are unnecessary and totally unwarranted.

An analysis of comments from various governmental agencies shows that they are based upon the fiction that the Metal Bank Site is <u>the</u> source of PCBs in the Delaware River. An analysis of available factual data shows that the Metal Bank Site is not now nor has it been a significant source of PCBs to the Delaware River.

## 3.0 AUGUST/SEPTEMBER 1995 PRP GROUP DATA:

### 3.1 BACKGROUND:

By copy of a letter dated 18 July 1995, the PRP Group indicated to Metal Bank's counsel that it was planning additional, limited sampling at the Site for the ostensible purpose of determining if S/S technology could be less expensively used at the site rather than the excavation and off-site disposal option proposed by EPA. The letter had an attached, undated work plan by Earth Tech. [Attachment 3.] The PRP Group was of the opinion that EPA had underestimated the off-site disposal costs due to underestimating the extent of areas of >25 ppm PCB material to be addressed. The Earth Tech work plan called for collecting three samples for laboratory bench scale testing. Two soil samples were to be collected in the area of RI boring B-17, because of elevated lead and TPH values at that location, and B-23, because of elevated TPH values. One sediment sample was to be collected in the mudflat at RI location MF-107, because of a "high oil content" in that sample.

EPA sent a fax dated 2 August 1995 to the PRP Group's counsel authorizing entry at Metal Bank "for the purpose of conducting this [treatability] study." [Attachment 3.] On 3 August 1995, Metal Bank's counsel questioned EPA about the need

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[a] Assuming a $10,000,000 effort for this portion of the EPA's proposed remediation, this equates to $2,000,000,000 per pound of PCB removed from the River per year for the first ten years of remediation.

for the work. EPA never responded. However, by fax dated 3 August 1995, PRP Group's counsel supplied information about the purported purposes of the "treatability" study. Metal Bank's counsel sent EPA a letter on 4 August 1995 expressing concerns about the work proposed in the July Earth Tech work plan. It questions whether the potential harm to the Site and mudflat area was justified by any limited value of the proposed study. No response has been received. This correspondence relating to the proposed "treatability" study is attached as Attachment 3.

On 7 August, and again on the 24th to the 28th of August 1995, Earth Tech dug test pits at the Site and obtained samples. On 11 September 1995, the PRP Group's counsel wrote to EPA and sent along the initial results from the test pit program.[3] [Attachment 1.] These results were not immediately supplied to Metal Bank and were not available for review by the author until after my initial comments[4] had been completed on the 15th of September. The 11 September 1995 data were submitted to Dr. Kirk Brown for review on 21 September 1995.

Metal Bank's counsel attempted to obtain a complete set of the August/September 1995 data from the PRP Group's counsel. Additional, partial information was finally obtained for review on 13 October 1995. The information consisted of three sets of data: the formal laboratory report, the field logs, and annotated photos of the excavations and samples. [Attachments 4, 5, and 6.]

The sampling program reportedly actually conducted at the Site during August 1995 has absolutely no resemblance to the sampling program described in the Earth Tech work plan of July 1995.

## 3.2 KIRK BROWN REPORT:

Dr. Kirk Brown has revised his earlier 15 September 1995 report[5] to reflect the new data as reported by the PRP Group. The Brown report is attached to these comments. [Attachment 2.] Due to an increase in the highest PCB concentration reported at the site, the calculated maximum PCB possible in groundwater is only increased to 0.250 $\mu$g/L and the calculated discharge to the Delaware River is only 0.0054 lb/yr. Dr. Brown has not had the advantage of reviewing the data received on 13 October 1995 and the information that the sample with the highest PCB and TPH levels (TP-T-2-5') contained "large amounts of ground-up plastic." Dr. Brown considered the sample results at face value without this qualifying information. The apparent bias in sampling is discussed at § 3.3 of these comments.

Dr. Brown's analysis of the new data available to him, i.e. only Attachment 3, results in no changes to his conclusions:

- that there is no evidence of DNAPL at the site,
- that the worse case groundwater at the site meets the PCB MCL,
- that any flow of PCBs to the Delaware River under current conditions is "minimal" and,
- that proposed EPA remedial actions would be expected to decrease the release of PCBs to the River by less than 0.0005 pounds per year.

### 3.3 HIGH BIAS IN SAMPLING:

[AJ + CK]

During the August/September 1995 test pit program, the highest PCB and TPH levels reported, i.e. 230 ppm and 66,100 ppm respectively, were considerably higher than the equivalent values reported during the RI/FS, i.e. 42 ppm and 17,400 ppm respectively. In both cases, the Aroclor reported was 1260. An analysis of the available information shows that the 1995 PCB and TPH data are biased high.

A sampling program consisting of test pits from which small samples are taken from relatively large volumes of excavated soils and debris, the latter reported to be up to 70% in some samples from TP-16 [See Attachment 5.], is much more amenable to sampling bias than samples taken by split spoon boring techniques. The stated purpose of the sampling program was to show that EPA had underestimated the volume of soils on the Site at >25 ppm PCBs or >10,000 ppm TPH. Further, soils and sediments were supposedly being taken for S/S lab studies.[6] For the latter purpose, conservative scientific practice would be to take the most visibly contaminated soils and high TPH soils would therefore be selected for sampling while large, low TPH and PCB concentration debris would be rejected. However, as discussed and demonstrated below, this results in biased, unrepresentative results for the former purpose.

Sampling for treatability studies is designed to address a worst-case. As a result, the samples taken are of materials which appear to have characteristics of the contamination to be addressed by the treatment technology being studied. However, such sampling techniques are not appropriate for site characterization purposes. Because such sampling is not random for statistical purposes, the samples obtained are not representative of the general area being sampled. The samples so obtained cannot, therefore, be used as an indicator of site conditions in general since they are biased high. The PRP Group improperly attempts to use these same samples to accomplish both stated purposes. An example of this schizophrenic approach to sampling is seen in the field notes describing the sample taken at TP-9, 5 foot depth. After describing all of the various materials encountered in the 2 to 5 foot interval, black soil, rubber tubing/piping, fire hose, pieces of transformers, metal, plastic, "Paul collected 5' sample. Material sampled was a soil/slag mixture." [See Attachment 5, pages 27-28.] Thus, the sample was not representative of the materials encountered.

The 1995 test pit sampling data have been organized and compiled into Table 5.1, as attached. The high test pit PCB samples have been compared to previous split spoon samples obtained from areas surrounding the respective test pits. These data are presented in Tables 5.2 and 5.3. An examination of these tables demonstrates the high bias of the test pit samples as compared with the nearby split spoon samples. For example, the deep boring samples from B-17, B-103, B-104, and B-20 surrounding TP-T-1 and TP-T-2 average less than 3 ppm PCB while the two deep TP samples average 70 ppm PCB. The high bias situation is the same at TP-4. The B-18 and B-102 10' samples average approximately 13 ppm PCB while the TP-4 10' sample reportedly contained 50 ppm PCB. [See Tables 5.2 and 5.3, § 5.0.] This selective sampling results in samples which "represent" only the material chosen for sampling and in the sample bottle. Random sampling, on the other hand, is required to characterize the average conditions in an area.

An examination of the sampling logs and photos reveals why sample TP-T-2-5' (and probably sample TP-T-2-10') has a high PCB and TPH content as compared to the RI/FS soil boring data. [See Attachments 5 & 6.] It is because it consists of a large amount of ground up plastic. The fine plastic pieces will effectively sorb and hold PCBs as well as TPH. Some components of the plastic may also contribute to the non-specific TPH analysis. The TP-T-1-5' sample may be relatively high in PCBs because of the reported "oooze" and "oil horizon" in this test pit. Available pictures seem to show a very viscous, oil/tar material. One possibility is that this is a mixture of asphalt (or coal tar from the adjacent site) and PCB-contaminated mineral oil. Again, the obviously visually high organic content of this sampled area, although not necessarily equivalently high TPH, would be expected to sorb and concentrate highly lipophilic materials such as PCBs.

My September comments calculated a lower bound estimate of 20,000 ppm TPH and 70+ ppm PCBs for the residual **soil** values at the site based upon consideration of spilled oil distribution in geologic materials.[7] Considering that the test pit samples showing the highest TPH and PCB levels consist of significant amounts of anthropogenic materials which can sorb and retain PCBs and TPH, my September analyses and conclusions based upon same are reinforced by the 1995 test pit data.

## 3.4 ADDITIONAL EVIDENCE THAT THERE IS NO LNAPL, NO DNAPL:

[JAY & CL]

The test pits covered a relatively very large area as compared to the borings and monitor wells installed and tested during the RI/FS. At least in the July 1995 Earth Tech work plan, two test pits were to be installed in "high oil content areas." Even so, absolutely no LNAPL was found during this extensive field testing program. As was repeatedly demonstrated in my 15 September comments, LNAPL does not exist at the Site.

The test pit data simply reinforce that previously demonstrated fact.

Some observations which support the fact that there is no LNAPL at the Site include the following:

- While sheens[8] were observed at TP-1, TP-4, and TP-18, the bottom samples from these pits most likely to contain any LNAPL exhibited PCB concentrations of only 10 ppm, 50 ppm, and <2 ppm, respectively.
- Conversely, the one test pit with "oil" and "oooze" reported, TP-T-1, and with a sample containing uncharacterized "free liquid" had no sheen and contained only 57 ppm of PCBs with a reported 52,800 ppm TPH.[9]
- At TP-18, "oil [was] observed on soil in pile." However, no PCBs were found at this location and TPH averaged only 1,200 ppm.
- I previously calculated that a TPH of 100,000 ppm in site <u>soils</u> must be found in order to support the idea of a mobile LNAPL oil phase.[10] Even the biased high values from the test pit program do not approach this value. Of note is the fact that the highest TPH value sample, TP-T-2-5', is not visibly oil saturated and that the test pit samples in TP-T-1 at 2'-5' and 5'-10', where "oil" and "oooze" are reported to be encountered, contain only 28,900 ppm and 13,300 ppm TPH, respectively.

Digging holes at a site where there are high levels of residual oil, but no NAPL, typically releases oil to the groundwater or perched water in the hole. This oil, if left alone, slowly moves back into the soils and the oil is exhausted and trapped. It does not indicate NAPL. The fact that this phenomena was not even seen at this Site during this extensive test pit program demonstrates that the soils at the Site are well below the levels necessary to support NAPL.

In order for there to be DNAPL, soils from the release point downward must be residually saturated until the water table where there will be a "floating" phase accumulating to such an extent and height that the pore water pressure is overcome. Since no LNAPL, nor any other sign of NAPL is found at the Site, DNAPL cannot be reasonable postulated to exist. Several pits went to the underlying clay layer where any DNAPL would accumulate. None was found.[11]

### 3.5 ADDITIONAL EVIDENCE THAT THE UST IS NOT LEAKING:

[JAy & Ck]

The concrete pad associated with the UST was again easily located, this time during the test pit program. Three attempts were made to develop TP-T-2. The first two attempts found the concrete pad and no attempt was made to penetrate it. The third attempt was made to the south of the pad and avoided it. If any test pit should have observed LNAPL and the UST is the EPA's putative source, then it should have been observed in TP-T-2 which is directly, hydrologically down gradient of the UST. No LNAPL, or even a sheen, was observed while digging and sampling this test pit.

The UST is obviously not a source of oil and any action taken to further investigate and remove it is wasteful and completely unnecessary.

### 3.6 ADDITIONAL EVIDENCE THAT THE NATURE OF THE FILL AT THE SITE DICTATES THAT NO PCB TREATMENT OPTIONS WILL BE TECHNICALLY AND OPERATIONALLY FEASIBLE:

[Ck]

The photos and field notes made during the 1995 test pit sampling program illustrate the large amount of debris present at this site. Any treatment option for these materials would have to handle this debris. This is a technically difficult problem. For example, the wire would tend to wind around and stop moving pieces of equipment. Cinder blocks, hunks of concrete, large wood pieces, and pieces of steel, including crushed drums, would have to be separated and handled. See, for example, "Technical Evaluation of Remedial Alternatives for the Metal Bank Cottman Avenue Site, ESE, September 11, 1995, at pp. 11-13. Test pits contained debris estimated as high as 70%.

### 3.7 ADDITIONAL POINTS:

[JAL]

Analysis of data obtained during the 1995 test pit sampling program shows that:

- PCBs are localized at the Site, generally in the area hydrologically downgradient of the UST and in the 1981-1989 recovery well drawdown area.
- The Aroclor pattern found at the site continues to show a predominance of Aroclor 1260. The significance of this is discussed in my 15 September 1995 comments.
- Chlorobenzenes which would indicate the presence of high concentrations of PCB transformer oils denser than water, e.g. Askarel, Interteen, were again not found. Specifically, hexachlorobenzene and 1,4-dichlorobenzene were found to be not detectable.

## 4.0 GOVERNMENTAL AGENCY COMMENTS:

[CK]

### 4.1 CORPS OF ENGINEERS:

These comments, dated 1 June 1995, are found at AR302302-302306. In general, these comments have to do with the economic and technical feasibility of the proposed remediation and assume the necessity for it.

The Corps' comments also point out deficiencies in the analysis of alternatives and components. As the comments are based on the erroneous assumption that remediation is necessary, they should not be viewed as concurring with that conclusion but only addressing real impediments to implementing the Proposed Plan.

[KEVIN]

### 4.2 PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES:

These comments, dated 14 June 1995, are found at AR302308-302310. The issues raised by PaDER have been addressed in the various technical comments filed on behalf of Metal Bank on 18 September 1995.

### 4.3 U.S. DEPARTMENT OF THE INTERIOR: [Rot]

These comments, dated 28 July 1995, are found at AR302398-302411. The comments contain requirements that the PRPs implement alternative C-7A, restore wildlife habitat, and compensate for past allegednatural resource damage. As demonstrated in my 15 September 1995 comments and other technical comments by ESE Inc. and ERM Inc. filed with EPA on behalf of Metal Bank on 18 September 1995, these requirements are not valid. The Department of the Interior ("DOI") makes no attempt to analyze the basis of EPA's proposed remediation. The restoration of wildlife habitat is nonsensical when it is considered that the present wildlife habitat at the Site is solely due to remedial efforts by Metal Bank and that the Site is presently zoned for heavy industrial use. Future reuse would eliminate the area as available habitat.

There is no demonstrated past damage from the Site to natural resources. Indeed, the U.S. Coast Guard's own consultant calculated that in 1979, before any remediation, only 0.05 gallons a day of oil were discharged or a total of only 0.15 pounds per year.[12] In 1979, EEA calculated the contribution of PCBs to the River from the Metal Bank Site to be 0.000431 pounds per year.[13] Given the size of other historic and on-going PCB discharges to the Delaware River system, the allegation that there is natural resource damage from Metal Bank is pure nonsense based completely on some fictional concept of the Site as a major PCB source.

While the report by the F&WS and Geological Survey attached to the DOI comments is primarily copied from the RI/FS, it does allege that the Site is responsible for the PCB contamination found 20 miles downstream at the John Heinz National Wildlife Refuge at Tinicum. There is no basis for this claim. This contradicts DOI/F&WS's own technical report that dye tests exhibit a potential influence of at most 15 miles downstream. [See AR302409.] The inclusion of this claim in the DOI comments is but one example that their comments are not based upon facts but upon fiction and a blind acceptance of the Site as a substantial PCB source to the River.

### 4.4 DELAWARE RIVER BASIN COMMISSION: [JAG & DRBC]

These comments, dated 18 August 1995, are found at AR302412-302414. The comments are inaccurate. There has been a detailed analysis of the PCB discharge to the River from the Site. The Site is not a significant source of PCBs to the River nor has it ever been. The Delaware River Basin Commission ("DRBC") has not examined the available data. They state that the Site "must be considered a significant source of PCBs [to the River]" merely because it is close to the River and there are fish advisories in the River. This is hardly a scientific analysis.

## 5.0 TABLES:

### 5.1 SELECTED AUGUST/SEPTEMBER 1995 TEST PIT PCB RESULTS:

| Location[b] | Sample Description & Comments | TPH (ppm) | Total PCB (ppm) | Aroclor (ppm) | | | |
|---|---|---|---|---|---|---|---|
| | | | | 1242 | 1248 | 1254 | 1260 |
| Northeast Corner TP-14, TP-16, TP-21 | | | <2 | | | | |
| Southeast Corner TP-9, TP-11, TP-12 | | | | | | | |
| TP-9-5" | Groundwater Encountered @ 13'<br>The underlying fill material contained plastic, rubber, electrical cord, wood, and "other electrical devices." 15-25% debris | 3,040 | 35 | 35 | | | |
| TP-11-13' | Free Liquid | 8,200 | <2 | | | | |

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[b] Reported depth sample of 5' is collected from the 2' to 5' interval, the 10' depth sample from the 5' to 10' interval, and the 15' depth sample from the 10' to 15' interval. See Attachment 1, Earth Tech memo, 11 September 1995, page 2. Samples between 10' and 15' are assumed to be composites of the actual depth below 10' sampled, e.g. TP-X-13' is assumed to be a composite of materials between 10' and 13'.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| TP-12-5' | | 1,730 | 4.4 | | | | 4.4 |
| TP-12-10' | Free Liquid | 2,190 | 7.7 | | | | 7.7 |
| Remediated Area Sample Locations from North to South | | | | | | | |
| TP-8-15' | Free Liquid.<br>Appears Groundwater not Encountered. | 1,210 | 2 | | | 2 | |
| TP-7-13' | Groundwater Encountered | | <2 | | | | |
| TP-18-12' | Free Liquid<br>Sheen on Water<br>Oil Observed on Soil in Pile | 930 | <2 | | | | |
| TP-4-5' | Underlying material contains ground-up plastic, plastic an rubber material, wood, electrical cord, and "other electrical devices." 15-25% debris. | 52,000 | 36 | | | | 36 |
| TP-4-10' | | 12,000 | 45 | | | | 45 |
| TP-4-11.5' | Sheen on Water<br>Appears Groundwater Encountered | 28,000 | 50 | | | | 50 |
| TP-T-3-5' | | 6,420 | 0.77 | | | | 0.77 |
| TP-T-3-15' | Appears Groundwater not Encountered | 2,240 | 0.87 | | | | 0.87 |
| TP-T-1-5' | Oil @ 4' Horizon | 28,900 | 108 | 42 | | | 66 |
| TP-T-1-10' | Oooze @ ≈ 8' Northern Side T.P. | 13,300 | 10.5 | 3.5 | | | 7.0 |
| TP-T-1-15' | Free Liquid.<br>Appears Groundwater not Encountered. | 52,800 | 41(sic) | 16 | | | 41 |
| TP-T-2-5' | Contained Large Amounts of Ground-up Plastic.<br>Material is speckled with multi-colored plastics material.<br>Sample Appears Dry. | 66,100 | 230 | | | | 230 |
| TP-T-2-10' | | 51,200 | 150 | | | | 150 |
| TP-T-2-12' | Appears Groundwater Encountered | 16,000 | 77 | | | | 77 |
| TP-1-10' | | 7,000 | 22 | | 16 | | 6 |
| TP-1-12' | Free Liquid. Sheen on Water. | 24,000 | 10 | | 4 | | 6 |

## 5.2 DISTRIBUTION OF PCBs NEAR TEST PITS T-1 AND T-2:

| Depth (feet) | PCB Concentration by Aroclor (ppm) | | | | | | |
|---|---|---|---|---|---|---|---|
| | B-17 | B-103 | B-104 | B-20 | B-19 | TP-T-1 | TP-T-2 |
| 2.5/3.0 | 26 (1260) | | | ND | 1.7 (1242)<br>1.9 (1254) | | |
| 5.0 | | | | | | 42 (1242)<br>66 (1260) | 230 (1260) |
| 6.0/6.5 | 42 (1260) | | | 4.3 (1248)<br>5.6 (1254) | 6.3 (1260) | | |
| 8.0/8.5 | | 10-50[c] | | 2.1 (1242)<br>1.5 (1254) | ND | | |
| 10/11 | ND | 5-10 | 10-50 | | | 3.5 (1242)<br>7.0 (1260) | 150 (1260) |
| 12/12.5 | 3 (1260) | | 10-50 | | | | 77 (1260) |
| 14/15 | | .75 (1254) | 7.3 (1260) | | | 16 (1242)<br>41 (1260) | |
| 16 | | | | .37 (1254) | | | |

---

[c] A range such as this indicates a non-Aroclor specific screening test result.

## 5.3 DISTRIBUTION OF PCBs NEAR TEST PIT 4:

| Depth (feet) | PCB Concentration by Aroclor (ppm) | | |
|---|---|---|---|
| | B-18 | B-102 | TP-4 |
| 5.0 | | | 36 (1260) |
| 8.0/8.5 | 0.14 (1254) | | |
| 10 | 0.43 (1242)<br>0.54 (1260) | 2.6 (1242)<br>22 (1260) | 45 (1260) |
| 11.5/12 | 3.2 (1260) | | 50 (1260) |
| 14 | 0.85 (1242)<br>6.7 (1260) | | |

## 6.0 ATTACHMENTS:

6.1 Martin, J. N. and D.J. Jordanger: Metal Bank Cottman Avenue Site Second Request for Extension of Comment Period on Proposed Plan and Notification of Dispute Resolution Claim; Letter and attachments to C. Lee, U.S. EPA Region III; 11 September 1995.

6.2 Brown, K.W.: Letter report to E. Kleppinger; 17 October 1995.

6.3 Jordanger, D.J.: Letter to C. Lee, U.S. EPA with attached Earth Tech Work Plan; 18 July 1995.

Lee, C.: Fax and Letter to D.J. Jordanger; 2 August 1995.

Minihan, J.E.: Letter to C. Lee; 2 August 1995.

Jordanger, D.J.: Fax and Letter to J. Minihan; 3 August 1995.

Mattioni, J.: Letter to C. Lee; 4 August 1995.

6.4 Jordanger, D.J.: Letter to J. Mattioni with attached laboratory data; 12 October 1995.

6.5 Anon.: Field Notes; August 1995.

6.6 Anon.: Photos and text re. August 1995 Metal Bank Cottman Avenue Sampling.

C:\WPWIN60\WPDOCS\METALBNK\SUPCOMNT.WPD October 14, 1995
October 17, 1995

## 7.0 REFERENCES AND NOTES:

1. Kleppinger, E.W.: Comments on: U.S. EPA Superfund Program Proposed Plan Metal Bank Superfund Site July 1995; 15 September 1995.

2. See Attachment #50 to Kleppinger, E.W.: *op cit*; 15 September 1995.

3. Curiously, the PRP Group's counsel took the position that they were operating under the RI/FS Administrative Order by Consent ("ACO"). Curious, since EPA took the position that the ACO "...is what is completed at this point in time." See AR302367; line #5.

4. Kleppinger, E.W.: *op cit*; 15 September 1995.

5. Attachment #50: *op cit*; 15 September 1995.

6. The field notes log contains no information that on-site soils and sediments were actually sampled for testing. [Attachment 5.] However, the 12 October 1995 letter from the PRP Group's counsel to Metal Bank's counsel notes that "reports of the treatability studies conducted on site soils" will be sent when available. [Attachment 4.]

7. Kleppinger, E.W.: *op cit*; 15 September 1995; § 3.0, pp.17 ff.

8. Sheens can represent oil or biological activity. A visible sheen may be produced by a very small amount of oil. Its absence is dispositive regarding the absence of oil. Its presence is not evidence that any significant amount of oil is present since only such a small amount of oil is necessary to put a sheen on water and since biological activity can generate sheens which can easily be mistaken for oil sheens. There is evidence that the sheens observed during the 1995 test pit sampling program may be of biological origin. The TP-1-12" water is reported to have

"bubbles of off gas" which indicates significant biological activity. The TP-8 sheen is reported to be "pos(sic) organic" by Earth Tech. The water in the TP-7 pit is also reported as "off-gassing."

9. Despite the reported "free liquid" apparently groundwater was "not encountered" in this test pit.

10. Kleppinger, E.W.: *op cit*; 15 September 1995; § 3.4.2, pp.20 ff.

11. Note that digging a hole or boring a borehole effectively provides a path for any oil to escape residual saturation and accumulate. See § 4.2.2.2.1, 15 September 1995 comments at page 56ff.

12. 0.05 gal/day X 365 days/yr X 8.33 lb/gal X 1,000 ppm X 10E-06/ppm = 0.15 lb/yr PCB.

13. Energy and Environmental Analysis, Inc.: Evaluation of Metal Bank of America; 8 May 1979. Supplied for the AR by Metal Bank on 18 September 1995.

**KWBES**

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[JAG, BRUCE & CK]

October 17, 1995

OCT 18 1995

Edward W. Kleppinger, Ph.D.
EWK Consultants, Inc.
407 North Street, SW
Washington, DC 20024-3701

Re: Metal Bank Superfund Site, Revision of September 15, 1995, Letter Report

Dear Dr. Kleppinger:

At your request, I have reviewed additional information on the subsurface contamination at the Metal Bank/Cottman Avenue site.

The review focused on two questions: (1) What is the maximum potential concentration of PCB in the groundwater? and (2) Will the groundwater transport significant PCB to the river? This review was initially complete via a letter report dated September 15, 1995. This letter is a revised version of that initial letter report which incorporates the additional PCB and TPH data submitted by the PRP Group.

## BACKGROUND

Initial investigations at the site indicated the presence of a light, nonaqueous phase liquid (LNAPL) floating on the water table (Weston, 1978). In places, the NAPL layer was several feet thick and contained concentrations of PCB ranging from 780 to 1,570 mg/Kg (Arochlor 1254) (Table 3.1; Weston, 1978). These data are consistent with the one oil sample collected from MW-6 in 1991, which had PCB concentrations of 1,090 mg/L (430 mg/L for Arochlor 1248 and 660 mg/L for Arochlor 1260) (Table 4-29, Earth Tech, 1994). These low concentrations of PCB in the LNAPL indicate that they are not present in sufficient concentrations to saturate the NAPL layer or to form their own dense NAPL (DNAPL) layer. Furthermore, there have never been any reports of a DNAPL layer at this site.

The LNAPL recovery was successfully completed in 1989. Well sampling has not demonstrated any LNAPL layer since the recovery ended. Oily sheens have been seen (1991 and 1992) in a few wells (MW-4, MW-5, MW-6, MW-7, and PW-10), and except for MW-6, they are not seen at sequential sampling times (Figure 1 and Table 1). Further, Earth Tech reports that sheens were not present for some time after the well was bailed nor was LNAPL present during the 1993 groundwater measurements (Earth Tech, 1994).

## WHAT IS THE POTENTIAL CONCENTRATION OF PCB IN THE GROUNDWATER?

Two methods which can be used to estimate the potential concentration of PCB in the groundwater are: (1) the effective solubility of PCB, and (2) the soil-water partition coefficient for soil PCB data. Both of these methods are discussed below.

Table 1. Summary of Oil Sheen Detection and PCB Concentrations in Monitoring Wells for 1991 and 1992, and NAPL Detections in 1993

| | 1991 | | 1992 | | 1993 |
|---|---|---|---|---|---|
| Well | Oil Sheen | PCB (μg/L)* | Oil Sheen | PCB (μg/L) | NAPL |
| MW-1 | - | <0.51 - <1.0 | - | -- | - |
| MW-2 | - | <0.51 - <1.0 | - | -- | - |
| MW-3 | - | <2.6 - <5.1 | - | -- | - |
| MW-4 | + | <0.51 - <1.0 | - | -- | - |
| MW-5 | + | <0.51 - <1.0 | - | -- | - |
| MW-6 | + | 12.3 | + | 25.6 | - |
| MW-7 | - | <0.51 - <1.0 | + | 1.3 | - |
| MW-8 | - | <0.51 - <1.0 | - | -- | - |
| PW-9 | - | <0.51 - <1.0 | - | -- | - |
| PW-10 | - | <1.0 - <2.0 | + | -- | - |
| MW-11 | - | <0.51 - <1.0 | - | -- | - |
| MW-12 | - | <0.51 - <1.0 | - | -- | - |
| MW-13 | - | <0.51 - <1.0 | - | -- | - |
| MW-14 | - | <0.51 - <1.0 | - | -- | - |
| MW-15 | - | <0.51 - <1.0 | | -- | - |

*PCB analyzed - 1016, 1221, 1232, 1242, 1248, 1254, 1260.
- = Oil sheen or NAPL not detected.
+ = Detected.
-- = Not detected, detection limits not available.

EFFECTIVE SOLUBILITY

Solubility is the equilibrium concentration of a solute in a solution saturated with respect to that solute at a given temperature and pressure. It is the maximum dissolved quantity of a compound in pure water.

A total of 209 distinct PCB compounds (congeners) are possible, all of which are recognized by the formula $C_{12}H_{10-n}Cl_n$. The range of solubilities for PCB in pure water at room temperature is 0.003–0.06 mg/L (Montgomery, 1989). Specific analysis for seven congeners are listed in the Remedial Investigation (RI) soil and groundwater data tables; these include 1016, 1221, 1232, 1242, 1248, 1254, and 1260.

Oil is comprised of a mixture of chemicals which will affect the solubility of the specific organics within that given oil. To evaluate the solubility of PCB within the oil fraction, the effective solubility concept should be employed (EPA, 1992). The effective solubility is described as the upper level dissolved phase concentration of a constituent in equilibrium with mixed NAPLs. It may be expressed as:

$$Si^e = XiSi$$

Where:

$Si^e$ = the effective solubility of compound
$Xi$ = the mole fraction of compound *i* in the NAPLs mixture
$Si$ = the pure phase solubility of compound

The mole fraction is calculated as follows:

$$\text{PCB concentration in oil} \times \frac{\text{the molecular weight of the NAPL}}{\text{molecular weight of PCB}}$$

The concentration of PCB in the oil was analyzed in 1978 and 1991. The same range of PCB was detected in the oil phase. The 1991 concentration was 1,090 mg PCB/L oil. The range for solubility for PCB in water is 0.003–0.06 mg/L. The average molecular weight of PCB congeners 1242, 1248, 1254, and 1260 is 311. The typical average molecular weight for NAPL is 150 (Brown, 1995). Therefore, the equation is as follows:

$$1{,}090 \text{ mg/Kg} \times \frac{100 \text{ gm/mole of NAPL}}{311 \text{ gm/mole of PCB}} = 0.0004$$

The effective solubility for PCB in the groundwater would range between $2 \times 10^{-5}$ to $1 \times 10^{-6}$ mg/L, as calculated below:

$$Si^{e} = 0.0004 \times 6 \times 10^{-2} \text{ mg/Kg} = 0.000024 \text{ mg/L or } 2.4 \times 10^{-5} \text{ mg/L}$$
$$Si^{e} = 0.0004 \times 3 \times 10^{-3} \text{ mg/Kg} = 0.000001 \text{ mg/L or } 1 \times 10^{-6} \text{ mg/L}$$

For purposes of these calculations, the higher value is used ($2.4 \times 10^{-5}$ mg/L).

Historically, several of the groundwater samples have had concentrations of PCB in excess of their effective solubilities, indicating that the samples included droplets of oil in the water which were not identified by the laboratory. The detection limits for the 1991 groundwater data are between 0.5 and 1.0 µg/L for the various PCB analyzed. (The RI appendix for the 1992 groundwater data did not include the detection limits, but are assumed to be the same as for the 1991 data). Based on the effective solubility, PCB would not be detected in the monitoring wells, since the detection limit is higher than the effective solubility. Therefore, any PCB dissolved in the groundwater are present at less than 1 µg/L. In some wells, such as MW-6 and -7, the PCB concentrations are higher than the effective solubility of 0.024 µg/L, with a maximum value of 25.6 µg/L. Both MW-6 and -7 had a "sheen" observed during sampling. Therefore, the groundwater sample was likely contaminated by the "sheen" or mixed with a micro drop of oil.

## SOIL-WATER PARTITION COEFFICIENT

The soil-water partition coefficient can be used to calculate the concentration of PCB dissolved in the groundwater. The PCB are partitioned into the soil such that at equilibrium, the concentration of PCB in the soil will be 10,000 times greater than that in water. In addition, PCB will partition into oil much greater than into soil, and the concentration in the oil phase will be 1,000,000 times greater than that in water. Thus the soil, but even more so, the sorbed oil, will cause the concentration of PCB in the water to be extremely low.

The combined sorptive coefficient (K) for soil and the residual petroleum phase (Boyd and Sun, 1990) may be expressed as:

$$K = f_{oc}K_{oc} + f_{oil}K_{oil}$$

where:

$f_{oc}$ = the fraction of organic carbon in soil
$K_{oc}$ = organic carbon-water partition coefficient
$f_{oil}$ = the fraction of petroleum hydrocarbon in soil
$K_{oil}$ = oil-water partition coefficient, approximately equal to $K_{ow}$

The site data developed during the RI is used to calculate the K for the soils. The subsoil sample TP-T-2, collected at 6.5-ft depth, represents the highest $f_{oil}$ (TPH 66,100 mg/Kg) and PCB (230 mg/Kg) concentration in the soil. In addition, Arochlor 1260 represents the congener which was detected at the highest concentration, and was the only congener detected in the soil samples above 25 mg/Kg. These data were used for this calculation.

$f_{oc}$ = 0.05 (Earth Tech, 1994)
$K_{oc}$ = $2 \times 10^5$ (Schwarzenbach and Geiger, 1985)
$f_{oil}$ = 0.066 (Earth Tech, August 1995)
$K_{oil}$ = $1.37 \times 10^7$ (Arochlor 1260, Earth Tech, 1994)

$$\begin{aligned} K &= (0.05) \times (2 \times 10^5 \text{ mg/Kg soil/mg/L water}) + (0.066) \times (1.37 \times 10^7 \text{ mg/L oil/mg/L water}) \\ &= 1 \times 10^4 + 90.42 \times 10^4 \\ &= 9.142 \times 10^5 \end{aligned}$$

Given that the highest PCB concentration in the soil is 230 mg/Kg, and the site soil coefficient is $9.142 \times 10^5$, the PCB concentration dissolved in groundwater will be less than 0.5 μg/L.

$$230 \text{ mg/Kg}/(9.142 \times 10^5) = 0.25 \times 10^{-3} \text{ mg/L or } 0.25\ \mu\text{g/L}$$

Using this formula, one sample over 25 ppm PCB has a calculated dissolved PCB concentration >0.5 μg/L (Sample TP-9, 0–5 ft, 0.677 μg PCB/L). At this depth, the PCB would be expected to attenuate in the soil prior to migrating to groundwater. The other samples with 25 ppm PCB had a range of dissolved PCB concentration from 0.055 to 0.472μg/L. Therefore, using either the effective solubility method or the soil-water partition method to calculate the concentration of PCB dissolved in the groundwater, the values range from 0.024 to 0.472 μg/L. These values are both below the EPA maximum contaminant level (MCL) for PCB (EPA, 1993).

## WILL THE GROUNDWATER TRANSPORT SIGNIFICANT PCB TO THE RIVER?

There are several factors which will influence the transport of PCB in groundwater. The primary factors are: (1) the concentration of PCB in the groundwater, which is controlled by the solubility of PCB in both water and oil; (2) the groundwater flow rate; and (3) the retardation factor related to the groundwater flow velocity.

The potential for discharge of PCB to the river can be estimated using both the groundwater concentrations and the soil concentrations. These calculations use some of the same coefficients discussed earlier, in addition to site groundwater characteristics.

The rate of movement of PCB in groundwater is influenced both by the aquifer characteristics and the retardation factors for a specific compound. The partition coefficients of $K_{ow}$ (octanol-water partition) and $K_d$ (soil-water partition) are high ($10^7$ and $10^4$, respectively). The PCB will reside in the oil and/or be adsorbed by the soil matrix, instead of solved in the groundwater.

In order to calculate the potential volume of PCB discharged to the river, the first step is to calculate the groundwater discharge to the river (gallons).

$$Q = K i A$$

where:

Q = discharge rate (gal/day)
K = conductivity (gal/day/$ft^2$)

i = groundwater gradient (ft/ft)
A = discharge area (ft$^2$)

The site data from the RI provide the data needed to calculate the groundwater discharge:

K = average value of 588 gal/day/ft$^2$ (Exhibit M)
i = approximately 0.0035 at mean tide (southern edge of the site near the Delaware River (Exhibit M)
A = The area groundwater discharge to the river from the site is calculated from the projected length of the groundwater flow direction multiplied by the average saturated thickness of the southern zone. The length is 900 ft and the height is 7.38 ft (8.5 ft at high tide and 6.25 ft at low tide)
Q = 588 x 0.0035 x 900 x 7.38
= 13,669 gal/day

or

$4.99 \times 10^6$ gal/yr

or

0.021 cfs

This discharge rate is close to the 0.016 cfs reported by HMM Associates, Inc. (1993). The following equation can be used to demonstrate the potential for PCB in the groundwater to be discharged into the river.

$$M = Q \times C \times 8.33 \times 10^{-6}$$

where:

M = total PCB to river (lb/day)
Q = groundwater discharge rate (gal/day)
C = PCB concentration in groundwater (mg/L)
$8.33 \times 10^{-6}$ = conversion factor mg/L to lb/gal

The most reasonable case would be if the groundwater PCB concentration were equal to the effective solubility (0.024 ppb):

$$M_{\text{most reasonable}} = 13{,}669 \times 0.024 \times 10^{-3} \times 8.33 \times 10^{-6}$$
$$= 0.0027 \times 10^{-3} \text{ lb/day or } 0.001 \text{ lb/yr}$$

The second method to estimate the potential weight of PCB discharged to the river would be to use the measured PCB concentrations in the soil and the combined soil and residual petroleum phase coefficients.

The PCB concentration in groundwater at each subsurface soil sample location was calculated, using the combined soil-water partition coefficient equation. For samples which were reported as nondetect (ND), a concentration equal to the typical detection limit of 0.5 mg/Kg of PCB was assumed. A total of 165 samples were used (shown in Appendix C from the RI Report and Earth Tech, 1995) to calculate the average. The calculated average PCB concentration in groundwater in equilibrium with the soil samples is 0.130 µg/L. Since discharge to the river must flow through the mud flats, discharge from discrete locations will be commingled. If samples were taken at the point of discharge, they would be close to or below the average since PCB will be further sorbed by the sediments in the mud flats. The total PCB amount discharged to the river as a result of the average concentration of 0.130 µg/L is 0.0054 lb/yr.

If the soil with PCB concentrations >25 mg/Kg were excavated, the average PCB concentration in groundwater calculated from the remaining 152 samples would be 0.118 µg/L. With this soil removed, the discharge of PCB to the river would be 0.0049 lb/yr. Thus, the calculated release both with and without soil >25 ppm PCB removed is very small. The removal of soil >25 ppm PCB would result in a decrease in PCB release to the river of less than 0.0005 lb/yr, or less than 10% of the total.

## COMPARISON OF THE RESULTS WITH SEPTEMBER REPORT

The calculated PCB concentration in groundwater and potential discharge to the river are compared with September report. The comparison is listed in Table 2.

Table 2. Comparison Between October Revised Report and September Report

| | September Report | October Report |
|---|---|---|
| Groundwater Concentration at Highest PCB Concentration Locations | 0.180 μg/L* | 0.251 μg/L |
| Average PCB Concentration in Groundwater to the River | 0.139 μg/L | 0.130 μg/L |
| Total PCB Discharged to the River: Existing Conditions | 0.00579 lb/yr | 0.0054 lb/yr |
| Average PCB Concentration in Groundwater to the River After >25 ppm Removed | 0.130 μg/L | 0.118 μg/L |
| Total PCB Discharged to the River: After >25 ppm Removed | 0.00557 lb/yr | 0.0049 lb/yr |
| Removal Effectiveness | 0.00022 lb/yr | 0.0005 lb/yr |

* Recalculated number is 0.169.

The additional August data result in little change from the September report. As discussed above, PCB concentration in groundwater is not directly proportional to the total amount of PCB in soil, but is proportional to the PCB concentration in the oil phase. Therefore, the TPH concentration is very influential on the PCB concentration in groundwater. Soil samples with PCB concentration >25 mg/Kg are listed in Table 3, along with the TPH concentration and the PCB concentration in the groundwater. This table demonstrates the influence of TPH on the PCB concentration in the groundwater.

Table 3. Samples with PCB Concentrations >25 mg/Kg

| Well # | PCB Concentration in Soil (µg/Kg) | TPH (%) | Soil-Water Partition (K) | PCB Concentration in Water (µg/L) |
|---|---|---|---|---|
| B1 | 28,000 | 0.0036 | 59,320 | 0.472 |
| B10 | 29,000 | 0.0042 | 67,540 | 0.429 |
| B17 | 26,000 | 0.0115 | 167,550 | 0.155 |
|  | 42,000 | 0.0174 | 248,380 | 0.169 |
| TP-4 | 36,000 | 0.0520 | 722,400 | 0.050 |
|  | 45,000 | 0.0120 | 174,400 | 0.258 |
|  | 50,000 | 0.0280 | 393,600 | 0.127 |
| TP-9 | 35,000 | 0.0030 | 51,648 | 0.678 |
| TP-T-1 | 108,000 | 0.0289 | 405,930 | 0.266 |
|  | 41,000 | 0.0528 | 733,360 | 0.056 |
| TP-T-2 | 230,000 | 0.0661 | 915,570 | 0.251 |
|  | 150,000 | 0.0512 | 711,440 | 0.211 |
|  | 77,000 | 0.0160 | 229,200 | 0.336 |

## COULD A DNAPL LAYER HAVE FORMED?

The densities of the various PCB detected in the RI can be used to obtain a crude estimate of the density the PCB at this site. The densities of 1016, 1221, 1232, 1242,1248, 1254, and 1260 are 1.33, 1.15, 1.24, 1.39, 1.41, 1.51, and 1.57 g/cc at 25°C, respectively. This is an average of 1.37 g/cc. The typical densities of oil range from 0.83 to 0.905 g/cc. We conservatively assume that the density of the oil that formed the NAPL was 0.9 g/cc. We assumed that the density of groundwater $\rho_W$ was 1.0 g/cc. We also assumed that there were no other dense contaminants besides PCB present at the 1,000 ppm level. Using these assumptions, we obtained the critical content of PCB in the LNAPL above which a separate dense phase could form. If ρ is density and X is content

$$\rho_w = X_1\rho_1 + X_2\rho_2$$

and

$$\sum_{i=1}^{2} X_i = 1$$

where the subscripts 1 and 2 refer to the PCB and the oil, respectively. Therefore, the NAPL would have to be at least 21.2% PCB for it to be denser than water. Since the PCB concentrations were not homogeneous, we consider one-tenth of this value, or 2.1% to be a rule-of-thumb conservative cut-off concentration for PCB in the LNAPL, below which the formation of a separate DNAPL would not be expected. RI data show that the highest PCB concentration in any NAPL at the site was 1,500 ppm, or 0.15%. Thus, the concentrations of PCB in the LNAPL are far lower than 20,000 ppm which would be the absolute minimum needed to result in the formation of a separate DNAPL.

## CONCLUSIONS

Five conclusions can be drawn from this review and they are discussed below:

1. The equilibrium PCB concentration dissolved in groundwater is below the MCL (0.5 μg/L). Even if a monitoring well was located at the site with the highest soil PCB concentration (230 mg/Kg), the dissolved PCB concentration in the groundwater (0.25 μg/L) would be less than the MCL.
2. Transport to the river is minimal. Based on effective solubility, the potential dissolved PCB contribution to the river, using reasonable assumptions, is 0.001 lb PCB/yr. Based on partition coefficients, this potential contribution to the river is about 0.006 lb/yr.
3. There is no need to excavate the soils with soil PCB concentrations >25 ppm. Concentrations >25 ppm, which occur in small, isolated areas, do not represent a threat to the river. Removal of the locations with soil >25 ppm PCB would result in less than a 10% reduction of the already very low release to the river. Therefore, removal of these soils, as proposed by the EPA, is not necessary.
4. The concentrations of PCB detected in the LNAPL are far lower than those which would be needed to result in the formation of a separate DNAPL.
5. The new data presented by the PRP group on August 15, did not substantially change the results arrived at in my September 15, 1995, letter report.

Sincerely,

Kirk Brown, Ph.D.
Principal Consultant

KWB:dr
Attachment
File: 587095019
via Fax & US Mail