WHITE PAPER NO. 5C – EVALUATION OF REMEDIAL ALTERNATIVES FOR LITTLE LAKE BUTTE DES MORTS PROPOSED BY WTMI AND P.H. GLATFELTER

Response to a Document by CH2M HILL

FOCUSED FEASIBILITY STUDY FOR OPERABLE UNIT 1 LOWER FOX RIVER SITE

2002

and

Response to a Document by Blasland, Bouck, and Lee, Inc.

LITTLE LAKE BUTTE DES MORTS DEPOSIT A/B REMEDIATION PROPOSAL

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ABSTRACT

This White Paper evaluates the remedial proposals presented by WTMI Company (formerly Wisconsin Tissue Mills, Inc.) and P.H. Glatfelter (PHG) for Operable Unit 1 (OU 1) of the Lower Fox River (Little Lake Butte des Morts). WTMI's proposals are contained in the document entitled *Focused Feasibility Study for Operable Unit 1, Lower Fox River Site* (CH2M HILL, 2002), and PHG's remedial proposal, defined in the *Little Lake Butte des Morts Deposit A/B Remediation Proposal* (BBL, 2002). Both proposals appear to have been developed in tandem, and with consideration of the Appleton Paper, Inc. (API) Panel Report entitled *Ecosystem-Based Rehabilitation Plan – An Integrated Plan for Habitat Enhancement and Expedited Exposure Reduction in the Lower Fox River and Green Bay* (Panel Report) (The Johnson Company, 2002) (see *White Paper No. 5A – Responses to the API Panel Report* and *White Paper No. 5B – Evaluation of API Capping Costs Report*). The central tenant for their proposal is that active remediation is only required for Deposit A/B, portions of Deposit POG, and that active remediation for the remainder of OU 1 is not required.

The following conclusions are presented in this White Paper:

- The WTMI and PHG remedial proposals do not provide a level of risk reduction equivalent to the *Proposed Remedial Action Plan, Lower Fox River and Green Bay* (Proposed Plan) (WDNR and EPA, 2001). The combined proposals would allow for a continued level of risk that is a full order of magnitude greater than that set by the Wisconsin Department of Natural Resources (WDNR) and United States Environmental Protection Agency (EPA).

- The WTMI and PHG proposal includes natural attenuation for Deposit E, which is not supported by the data and does not include the recommendations of the API Panel that stated that natural attenuation will not result in acceptable levels of risk reduction in a reasonable timeframe.

- The concept-level remedial proposals are technically feasible and implementable. The dredge proposal is equivalent to that conducted at Sediment Management Unit (SMU) 56/57, including dredge rates and water treatment equivalent what was done at the demonstration projects. The WTMI and PHG proposals do not include the water treatment restrictions listed by the API Panel.

- The proposed cap designs are not based upon site-specific engineering considerations, and are likely inadequate for their intended purpose.

- The WTMI proposal includes capping within a federal navigation channel, which will require an Act of Congress to permit.

- Neither the WTMI or PHG proposal considers long-term operating, monitoring, maintenance, institutional controls, or fiduciary responsibilities.

- The habitat benefits purported by the respective plans cannot be achieved with the proposed capping materials at those specific locations.

PURPOSE

This White Paper evaluates the remedial proposals represented by WTMI and PHG for OU 1 of the Lower Fox River (Little Lake Butte des Morts). The proposals developed by WTMI and PHG are presented in their respective comments to the Proposed Plan (WDNR and EPA, 2001). Both proposals appear to have been developed in tandem, and with consideration of the Panel Report (The Johnson Company, 2002). The central tenant for their proposal is that active remediation is only required for Deposit A/B, portions of Deposit POG, and that active remediation for the remainder of OU 1 is not required.

This White Paper evaluates the combined proposal for OU 1 relative to risk reduction, technical feasibility, barriers to implementation, and potential alterations to habitat.

DESCRIPTION OF THE WTMI/PHG ALTERNATIVES

WTMI's proposals are contained in the document entitled *Focused Feasibility Study for Operable Unit 1, Lower Fox River Site* (CH2M HILL, 2002). WTMI proposed to actively manage only those areas defined as "hot spots." "Hot Spots" are defined as surface sediments (0 to 10 cm) with polychlorinated biphenyl (PCB) concentrations that exceed 10 milligrams per kilogram (mg/kg). According to the WTMI document, only Deposit A/B, the southwest area in Deposit POG, and the northern position within the federal navigation channel of POG meet that criterion. WTMI's remedial action would be limited to the hot spots at Deposit POG. Three specific alternatives were proposed:

- Dredge surficial sediment hot spots with off-site disposal;

- Dredge surficial sediment hot spots to a nearshore confined disposal facility constructed at Arrowhead Park; and

- Cap surficial sediment hot spots using 6 inches of sand for isolation and 6 inches of fine gravel to provide hydraulic stability.

WTMI's apparent preferred remedy is the capping alternative.

PHG's remedial proposal, defined in the *Little Lake Butte des Morts Deposit A/B Remediation Proposal* (BBL, 2002), is confined solely to Deposit A/B in the south end of OU 1. The proposal would remove sediments where the surface PCB concentrations

exceeded 10 mg/kg, down to "depths necessary" to remove all sediments greater than 10 mg/kg. There is insufficient information provided to determine "depths necessary." Removal, dewatering, and water treatment would follow the same as those that occurred during the demonstration projects at Deposit N and SMU 56/57. The proposal describes the dredge and disposal of 32,500 cubic yards (cy), of which approximately 1,000 cy would require disposal in a Toxic Substances Control Act (TSCA) facility. Dredged areas would be backfilled with 6 inches of sand to promote "establishment of aquatic habitat." Areas within Deposit A/B that are greater than 1 mg/kg, but less than 10 mg/kg, will be covered with a 6-inch sand layer, and where "appropriate," a gravel/cobble armoring layer would be laced to prevent erosion and habitat enhancement.

Both WTMI and PHG in their respective reports make the assertion that the combined efforts at deposits A/B and POG will result in a surface-weighted average concentration (SWAC) below 1 mg/kg. For OU 1, the capping areas correspond to those areas where PCB concentrations were greater than 5 mg/kg, with the exception that the API Panel did propose capping a larger section of Deposit E that included some portions where concentrations exceeded 1 mg/kg.

EVALUATION OF RISK REDUCTION

The WTMI/PHG proposal allows for a higher level of risk than that listed in the Proposed Plan. To be protective of both recreational and high-intake fish consumers, WDNR and the EPA established a reasonable maximum exposure (RME) cancer risk of 1 in 100,000, or 10^{-5}, in the Proposed Plan. To achieve that, the Proposed Plan defined a Remedial Action Level (RAL) of 1 mg/kg. The WTMI report lists a target RME of 10^{-4}, which is an order of magnitude less stringent than that defined by the resource agencies. Without developing or defending a specific argument, both proposals state that the *de facto* RAL is 10 mg/kg. This order of magnitude difference is reflected throughout the entire risk reduction evaluation.

Risk reduction within the *Remedial Investigation for the Lower Fox River and Green Bay, Wisconsin* (RI) (RETEC, 2002a) and *Feasibility Study for the Lower Fox River and Green Bay, Wisconsin* (FS) (RETEC, 2002b), and the Proposed Plan is directly tied to reducing exposure of benthic organisms and fish to PCBs in the sediments of OU 1. The relationship between sediment concentrations of PCBs and their direct link to risks were documented within the *Baseline Human Health and Ecological Risk Assessment for the Lower Fox River and Green Bay, Wisconsin, Remedial Investigation and Feasibility Study* (BLRA) (RETEC, 2002c). Both the Proposed Plan and the Panel Report (The Johnson Company, 2002) embraced the concept of SWAC as the appropriate metric for surface sediment PCB reduction. A range of RALs were formulated in the FS, and from those the WDNR and EPA selected an RAL of 1 mg/kg to achieve a SWAC of 0.19 mg/kg for OU 1. The relationship between the RAL, the SWAC, and risk reduction is described in detail in *White Paper No. 11 – Comparison of SQTs, RALs, RAOs, and SWACs for the Lower Fox River* (WDNR, 2002a).

The API Panel proposed that a SWAC of 0.5 mg/kg be used as a design criterion. The API-proposed SWAC was not based on a site-specific assessment of risk, but rather on an

engineering "implementation efficiency" estimation, and the API Panel developed their proposed capping areas and their report on that SWAC. Neither WTMI nor PHG went through an analysis similar to the API Panel; rather they appeared to focus solely on alternatives to deposits A/B and POG. This section compares the WTMI/PHG SWAC to those defined by both the Proposed Plan and the Panel Report.

Methods for recalculating the SWAC are defined in *White Paper No. 5A – Responses to the API Panel Report* (WDNR, 2002b). The three remediation areas proposed by WTMI and PHG include Deposit A, the southwestern area in Deposit POG, and the northern portion of the navigation channel in Deposit POG (Figure 1). These three proposed remediation areas were digitized from the figures presented in the two reports, and imported into ArcView GIS software. Upon overlaying the digitized remediation areas on the interpolated PCB concentration maps, adjustments were made as needed to the location of the areas to the best extent possible to match the remediation areas specified by WTMI and PHG. Upon overlaying the WTMI-proposed remediation areas on the interpolated PCB concentration map, SWAC calculations were completed.

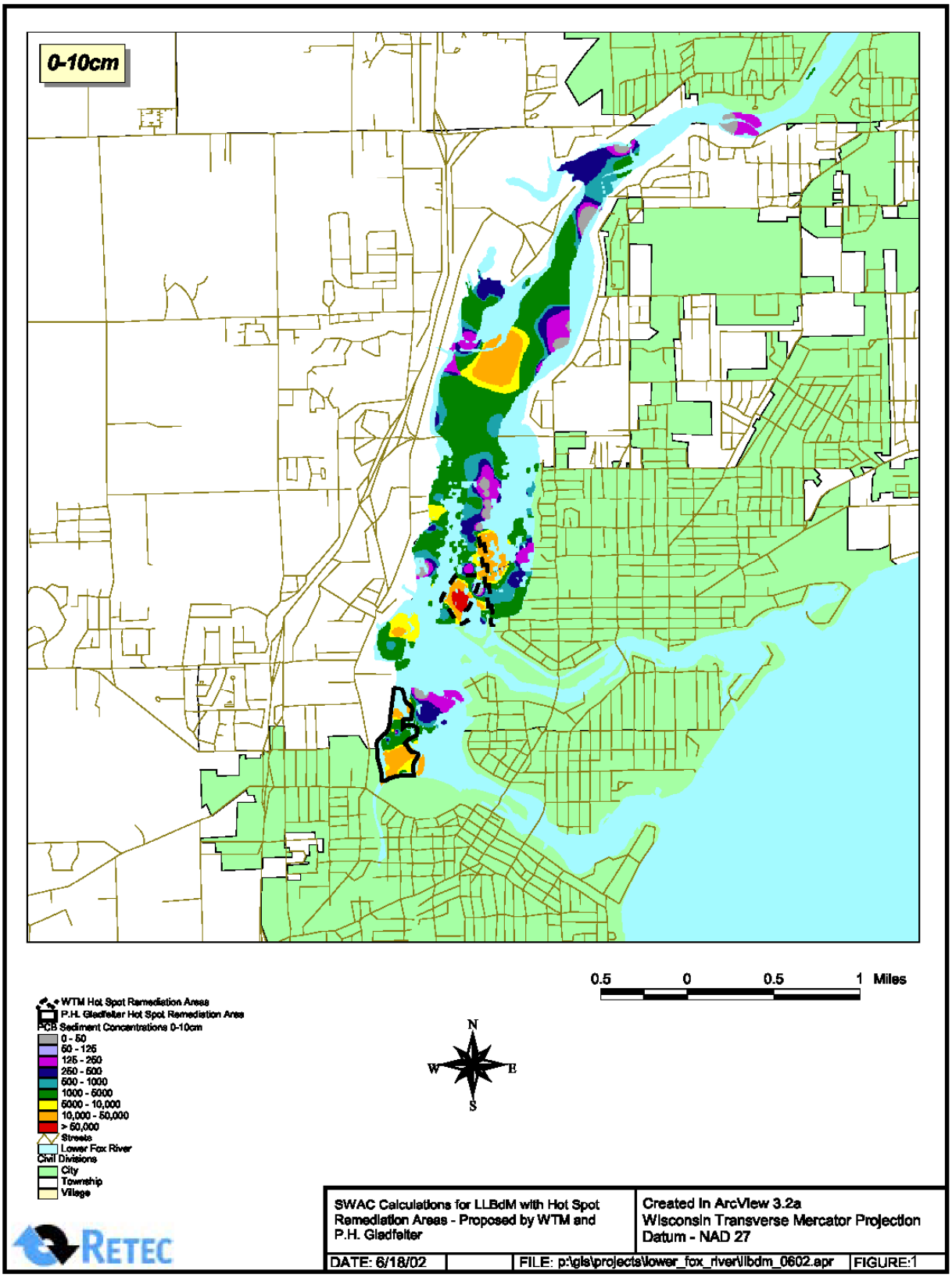
0-10cm
0.5 0 0.5 1 Miles
WTM Hot Spot Remediation Areas
P.H. Gladfelter Hot Spot Remediation Area
PCB Sediment Concentrations 0-10cm
0 - 50
50 - 125
125 - 250
250 - 500
500 - 1000
1000 - 5000
5000 - 10,000
10,000 - 50,000
> 50,000
Streets
Lower Fox River
Civil Divisions
City
Township
Village
N
W
E
S
SWAC Calculations for LLBdM with Hot Spot Remediation Areas - Proposed by WTM and P.H. Gladfelter
Created in ArcView 3.2a
Wisconsin Transverse Mercator Projection
Datum - NAD 27
DATE: 6/18/02
FILE: p:\gis\projects\lower_fox_river\llbdm_0602.apr
FIGURE:1
RETEC

Table 1 compares the Proposed Plan SWAC at the 1 mg/kg RAL with those proposed by the API and by WTMI/PHG. Those SWACs are 0.19, 0.71, and 1.7 mg/kg, respectively. The WTMI/PHG remedial proposal results in a risk level that is twice that proposed by the API Panel, and an order of magnitude greater than at presented in the Proposed Plan. Essentially, the WTMI/PHG proposes an RAL of greater than 10 mg/kg to achieve a SWAC of 1.7 mg/kg.

TABLE 1 COMPARISON OF PROPOSED PLAN RAL AND SWAC WITH THOSE PROPOSED BY THE API PANEL AND BY WTMI/PHG FOR OPERABLE UNIT 1 (ALL UNITS IN MG/KG)

Proposed Plan		API Panel		WTMI/PHG	
RAL	SWAC	RAL	SWAC	RAL	SWAC
1	0.19	5	0.71	10	1.7

As an additional check, the more recent sediment data submitted by WTMI and PHG were also evaluated, relative to the conclusions in the RI/FS and the Proposed Plan. *White Paper No. 2 – Evaluation of New Little Lake Butte des Morts PCB Sediment Samples* (WDNR, 2002c), showed that these newer data generally support the conclusion of the RI/FS and the Proposed Plan. Surface sediments within Little Lake Butte des Morts exceed the RAL of 1,000 ppb, and do not substantively alter the current SWAC for OU 1. The Proposed Plan defined remedial actions at deposits A/B, C, POG, and E that exceeded the 1 mg/kg RAL; these newer data support that position.

FEASIBILITY EVALUATION

At a concept level, the technical proposals for deposits A/B and POG are, in concept, feasible. Full removal, partial removal followed by application of a cap, or capping only, are all technically implementable. Both reports present solely concept-level proposals; neither presents an in-depth engineering analysis, and/or sufficient detail to examine the basis for the claims of the efficacy of alternative application.

For evaluating the dredging portion of their proposals, the WTMI/PHG evaluations propose to remove sediments in a manner consistent with the previously conducted at SMU 56/57. The PHG discussion provides more detail the WTMI, and is technically achievable. Within the discussion of dredging, the water treatment proposed is identical to that used at SMU 56/57, and makes no reference to the limits on water treatment (and hence dredging rates) limits alleged by the API Panel. The schedule specifically identified in the PHG report for that volume is achievable.

Both proposals rely on the cap thickness and design estimates provided by the Panel Report, without presenting an evaluation of post-dredge conditions. As noted in *White Paper No. 6A – Comments on the API Panel Report* (Palermo, 2002), a deficit of the API Panel capping proposal is that the API Panel did not present the rationale in selecting total cap thickness, the basis of design for the chemical isolation component, consolidation-induced advection, potential mixing of contaminated sediments and cap material, and constraints on capping in shallow water areas. There is no basis to support

an engineering design for the 6-inch cap proposed by WTMI/PHG on bedded sediments, much less on sediments that have been disturbed by dredging. According to Dr. Palermo's professional judgment, even a total cap thickness of 12 inches seems non-conservative for a major Site like the Lower Fox River.

The report states that there is no indication of potential seepage (advection) due to groundwater flow, and so this was not considered in the model runs. However, the process of consolidation-induced advection will occur, and does not appear to be considered in the cap design.

LEGAL AND REGULATORY CONSIDERATIONS

The alternative proposals for residual capping (after partial dredging), or capping, have not addressed, or do not consider the institutional/regulatory constraints associated with capping. This includes capping TSCA materials, lake bed grants, federal navigation channels, riparian owner issues, deed restrictions, fiduciary responsibility, and long-term liability. These issues are addressed in *White Paper No. 6B – In-Situ Capping as a Remedy Component for the Lower Fox River* (Palermo et al., 2002).

Some of the specific elements from White Paper No. 6B that the WTMI/PHG proposal does not address include, but are not limited to:

- The overall remedy must manage all sediments within the 1 mg/kg contour, and should achieve a SWAC of 0.250 mg/kg.

- Capping cannot occur in designated navigation channels, with an appropriate setback in areas, which could require dredging in the future. This could occur only with an Act of Congress.

- A permanent *in-situ* capping (ISC) or residual cap will require either addressing riparian owner rights under Wisconsin Statutes Chapter 30 or a Lake Bed Grant that will require an Act from the State Legislature.

- The liability for maintenance of a capping alternative will need to be maintained in perpetuity. Some type of financial mechanism will be required that would need to cover long-term operating and maintenance, consideration for maintenance of the dams, as well as any permanent institutional controls that would need to be enforced under the plan, etc.

There is no plan or contingency allowed for any of these issues in either plan.

HABITAT RESTORATION AND ENHANCEMENT

Both proposals indicate that habitat restoration and enhancement will occur as part of their placement of sand/gravel during capping. PHG's plan states that materials will be selected so that the resultant cap surface will create habitat that enhance the quality of benthic aquatic habitat. PHG maintains that "Other valuable habitat such as submerged

aquatic vegetation beds, emergent vegetation and shoreline wetlands will be created or restored to expedite the recovery of the aquatic communities following remediation." As detailed in *White Paper No. 8 – Habitat and Ecological Considerations as a Remedy Component for the Lower Fox River* (WDNR, 2002d), sand is poor substrate for benthic infaunal recolonization, or the establishment of submerged or emergent aquatic vegetation. While appropriately sized cobble can support the larval stages of emergent insects such as mayflies, caddisflies, stoneflies, or even dragonflies, these species are typically found in clear, fast-moving streams or rivers. In short, placement of sand, gravel, or cobble only would likely result in a habitat that is hostile to the very ecological communities the proposals seek to replace.

CONCLUSIONS

The following conclusions can be drawn from this analysis:

- The WTMI/PHG remedial proposals do not provide a level of protection equivalent to the Proposed Plan. The combined proposals would allow for a continued level of risk that is a full order of magnitude greater than that determined by EPA/WDNR. Furthermore, the WTMI/PHG proposal does not even include the recommendations of the Panel Report.

- The concept-level remedial proposals are technically feasible and implementable. The dredge proposal is equivalent to that conducted at SMU 56/57, including dredge rates and water treatment equivalent what was done at the demonstration projects. The proposals apparently ignore the water treatment restrictions listed by the API Panel.

- The proposed cap designs are not based upon site-specific engineering considerations, and are likely inadequate for their intended purpose. More than 12 inches of cap will be required to achieve PCB isolation.

- The WTMI proposal includes capping within a federal navigation channel. Unless an Act of Congress is granted, this is prohibited by law.

- Neither plan considers long-term operating, monitoring, maintenance, institutional controls, or fiduciary responsibilities.

- The habitat benefits purported by the respective plans cannot be achieved with the proposed capping materials at those specific locations.

REFERENCES

BBL, 2002. *Little Lake Butte des Morts Deposit A/B Remediation Proposal*. Prepared for P.H. Glatfelter Company by Blasland, Bouck, and Lee, Inc. January 21.

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