CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: May 31, 1996 FILE REF: 3200

TO: Jim Reyburn NER

FROM: Jim Ruppel WR/2
Kewaunee Marsh Study Team

SUBJECT: Update on Kewaunee Marsh Sampling Activities

During the week of May 20th, Water Resources personnel including Tom Janisch, Pat Trochlell, Clay Wible, Jim Killian and myself were on site at Kewaunee Marsh collecting soil and water samples as well as other information to support the biological impact assessment WDNR agreed to in the consent order. The following is a summary of the activities conducted, comments on some of the results, and a brief discussion of future plans.

Soil Samples

Eleven soil samples were collected to gain a more complete understanding of the distribution and concentration of As in the top 10 inches of soil primarily in the perimeter areas beyond STS's previous sampling locations. Six additional soil samples were collected and analyzed for bulk chemistry to support toxicity testing (see discussion below). The top 10 inches was selected to represent the biologically active zone since elevated As concentrations in this layer represent the greatest threat to the flora and fauna of the site. The sampling locations shown on the attached map were chosen to supplement existing data by filling in gaps between previously collected STS and WDNR samples, and to establish the boundary of the elevated As area. Soil samples primarily consisted of a homogenized composite of three soil samples taken within 5 feet of each other in the area surrounding the established sampling point. A 10 inch deep shovel core of soil was collected from each of the three subsampling sites. The top layers of coarse vegetative matter , fibrous roots, and rhizomes were discarded and the remaining muck soils retained for the sample. At three sites a single 10-12 inch "dug pit" was used to collect both a homogenized soil sample as well as a sample of the pore and/or surface water that filled the pit. The samples will be analyzed for total As concentrations and a subset of samples will be analyzed for secondary parameters (Fe, Al, Mg, Ca, S) that are known to influence the solubility and phase distribution of As in soils and sediments. Two soil samples were also submitted for a 21 element quantitative analysis to gain an understanding of the general chemical makeup of the soils.

Water Samples

Ten shallow (1-3 feet deep) point wells were placed in addition to the four wells placed in April. These wells consist of 1.5 inch I.D. PVC pipe with slots cut between 2 and 18 inches from the bottom of the pipe on either side. A filtered pore water sample was collected from wells 1-3 in April and wells 5-11 during the most recent trip. Six of the well locations were chosen to coincide with soil sampling locations. Unfiltered samples were also collected from wells 6 and 8 for comparison to the filtered samples. The intent of these wells is to collect water from the zone directly below the top sediment layers. This zone is likely to be anaerobic and, depending on the soil chemistry, may contain soluble/bio-available As concentrations above those seen in the surface waters directly above.

Although the location of some of the shallow point wells coincides with STS wells, this does not represent a duplication of efforts between the two studies. Water Resource efforts at the site are limited to the collection and assessment of information that will allow us to conduct a preliminary evaluation of the impact to the biota associated with the remaining uncapped areas with elevated As concentrations. The purpose of the shallow wells is to gain an understanding of the concentration of As in the water available to the site biota. It is the understanding of Water Resources that the purpose of the STS wells is to monitor the contaminant plume coming from the capped area and collect data to support the development of a numerical flow and transport model for the site. It is our expectation that this model will be capable of assessing the impact of seasonal variations in surface water and groundwater flows on the As plume as well as making predictions on the effects of potential actions that may be taken to limit the further spread of Arsenic. Information such as groundwater hydrology, delineation of the extent and movement of the As plume, partitioning coefficients, the influence of river stage fluctuations, and the effects of the interim measure on the mobility of the As in the capped area are the responsibility of STS.

Surface water samples were collected from the water that seeped and/or flowed back into the three dug pits immediately after the pit had been excavated and also after the pit had been allowed to stand for 1-2 days to allow particulate matter to settle out. Measurements of surface water quality parameters were also collected at the sampling locations as well as a number of other site locations. D.O., pH, conductivity, and temperature data was collected using a YSI 6000 sonde.

Filtered water from wells 7 and 11 was submitted for analysis of Fe, Al, Mg, Ca, & S in addition to As. Dug pits 1 and 2 included both filtered and unfiltered surface water samples analyzed for As, Fe, Al, Mg, & Ca. The unfiltered water from dug pit 3 was also analyzed for S.

Four unfiltered surface water samples were collected at locations SW1-SW4 shown on the attached map.

Toxicity Testing

Soil and water was collected from the six locations, five of which are shown on the attached map and submitted to the Wisconsin State Laboratory of Hygiene (SLOH) for acute and chronic toxicity testing. The reference site locations not shown on the map are upstream (south) of County Highway E. Six to eight shovel cores were taken at each location to fill a five gallon bucket 3/4 full. Again coarse vegetative material, fibrous roots, and rhizomes were not included in the sample. Water for toxicity testing was collected with a Pyrex beaker and used to fill a cubitainer (cubic foot of water). Care was taken not to disturb the area of water collection to keep the amount of suspended solids in the sample as low as possible. Subsamples of the water and soil collected were submitted to SLOH to be analyzed for As concentrations. The soil samples will also be analyzed for particle size, total solids content and total volatile solids content. The reference soil sample and one other soil sample will also be submitted for a 21 element quantitative test.

Animal Tissue Collection

Twelve insect emergence traps were placed in three different areas in an attempt to collect insects for analyses of As concentrations. Insects were observed within the study area, however, the traps in all three areas failed to collect the minimum quantity of insects needed for laboratory analysis. Possible reasons for the lack of insects trapped are that the traps were not in place for a sufficient amount of time, insects were not emerging at the time that the traps were in place or there were very few insects within the study area.

Forty small mammal snap traps (mouse traps) were set within the study area. Traps were set within areas most likely to be utilized by small mammals. They were located within the wetland (seven), along the north side of the railroad ballast-wetland border (seven), along the south side of the railroad ballast-wetland border (twelve) and on dredge spoil islands within the wetland (fourteen). For three trapping days of effort, a single mammal (*Zapus hudsonius*) was captured. This and a previously collected mammal (*Clethrionomys gapperi)* will be submitted for analysis for As concentration. As with the insect emergence traps, the low collection rate for the small mammal trapping effort may have many reasons. Further study is anticipated.

Positioning

A land survey was conducted using a geodetic total station to fix locations on the insect, water, and soil sampling points, and for the delineation of wetland plant community boundaries. A tape measure and popper and was also used to establish the elevation of the water table at each of the shallow point wells. The survey data will be tied to local USGS or USCOE controls and a computer generated site map will be constructed showing the location of sampling points, site topography, and wetland plant communities. Depending on the variation in water table elevations, a contour map of the water table surface may also be generated. (or contour maps of As concentration, surface/well water parameters, etc.)

Future plans

Additional soil and/or water samples may be needed in the future depending on the results of the latest round of sampling. In order to evaluate the risk to the biota associated with the site, the total area of surface soil with As concentrations above background must be established. In instances where the soil samples taken along the outer perimeter of the known area of contamination contain elevated As levels, additional samples will be taken further away from the capped area until the boundary of the area of elevated As levels is located. Additional surface water samples may be collected in areas that continue to contain surface water during summer dry periods.

Plant tissue will be collected in late summer/early fall of 1996 and analyzed for total As concentrations. Additional animal tissue collections may be attempted later in the summer of 1996 and analyzed for total As concentrations. We may also try using an emergent insect trap of a different design . Twelve styrofoam insect trap floats were secured and left on site inside the chain link fence. These floats may be reused later in the summer of 1996 and will be removed by the end of the 1996 sampling season along with all of our station stakes and groundwater wells.

Because the small mammal trapping effort produced a smaller than expected collection outcome, an additional small mammal study will be proposed. This study will analyze the catch per unit effort within the study area as compared to that of a suitable reference site. This study will help address whether there are lower than normal populations of small mammals within the study area.

Health and Safety Concerns

All WDNR personnel allowed onto the site followed proper health and safety practices. Pat Trochlell has attended the OSHA 40 hour training course and is serving as the project safety coordinator. Detailed information on the specific health and safety practices followed can be found in the project health and safety plan available from Pat.

Project Plan

We are currently in the process of updating the Preliminary Ecological Risk Assessment Project Plan to reflect changes made in response to our April and May sampling activities. I will forward a copy of this plan to you as soon as we are finished with the changes. However, you should be aware that this plan will continue to change in response to the results of activities taken to date, and further ongoing

literature research. We will keep you informed of any major changes to the project plan as they come about and continue to notify you in advance when we intend to make a site visit. In the mean time, if you have any questions please contact Tom Janisch (at 608-266-9268) or myself (608-266-2554).

c.

Duane Schuettpelz	WT/2
Dennis Weisensel	NER
Bob Strous	RR/3
Dale Patterson	WT/2
Paul Strom	WT/2
Lee Liebenstein	WT/2

Kewaunee Marsh Study Team

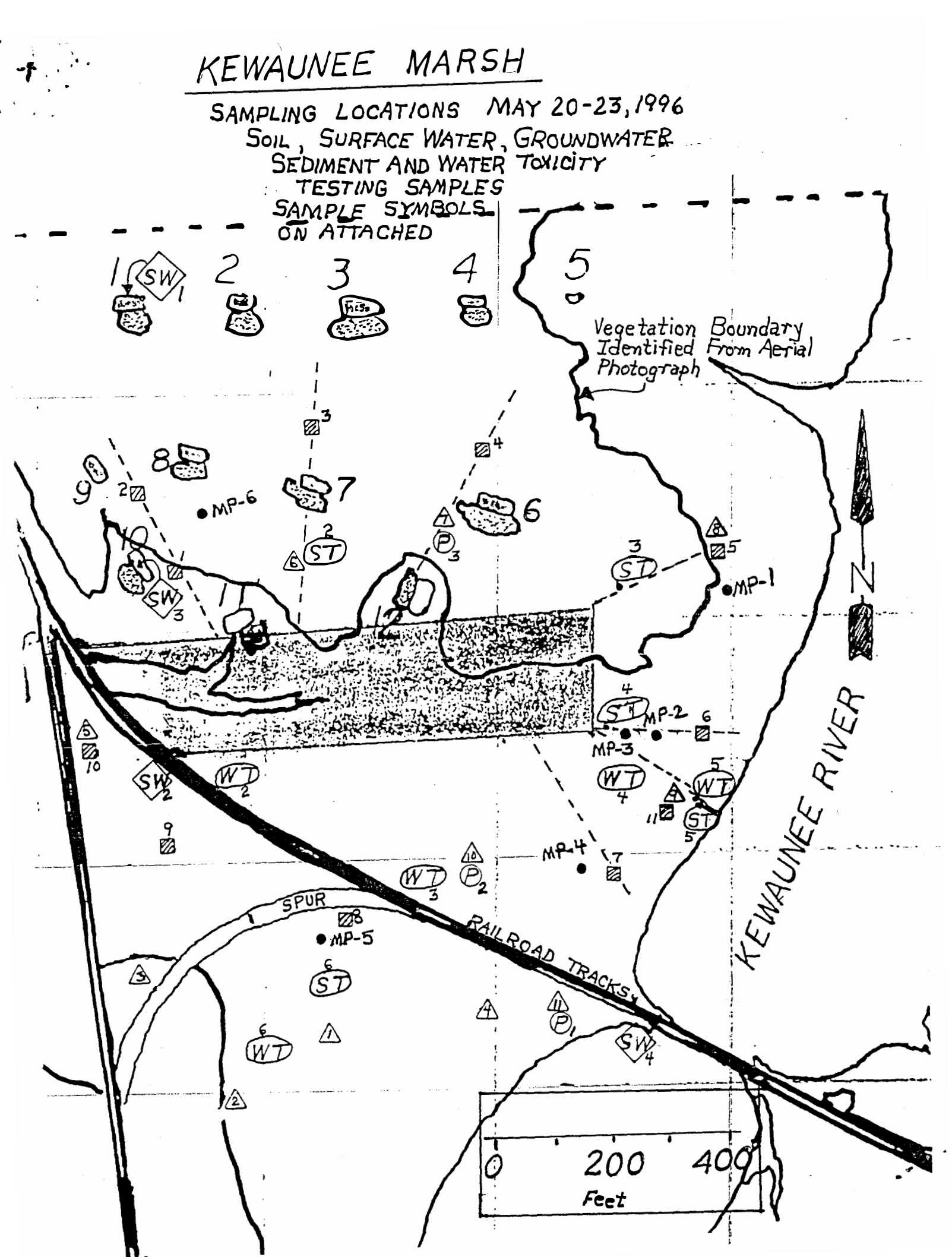
Jim Killian	WT/2
Pat Trochlell	WT/2
Tom Janisch	WT/2
Clay Wible	WT/2

Attachments

Kewaunee Marsh Sampling Locations Map
Kewaunee Marsh Sampling Locations Map Key

KEWAUNEE MARSH

SAMPLING LOCATIONS MAY 20-23, 1996
SOIL, SURFACE WATER, GROUNDWATER
SEDIMENT AND WATER TOXICITY
TESTING SAMPLES
SAMPLE SYMBOLS
ON ATTACHED

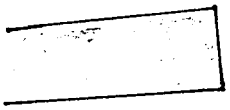


KEWAUNEE MARSH

Sampling locations for May 20 -23, 1996. All locations are approximate. Sampling locations and other site features were surveyed in during the May 20 -23 period. A later generated map will show exact locations. The reference site locations for the soil and water toxicity testing samples were upstream, just to the south of County Highway E and in a sedge area east of the river. These reference site locations are not on the accompanying map. The map symbols are identified as follows:

1. 

Existing dug ponds assigned a sequential number.

2.  Capped area.

3. 

Sediments collected for toxicity testing.

4. 

Surface water collected for toxicity testing.

5. 

Driven point wells for groundwater samples.

6. 

STS driven point wells.

7. 

Surface water sampling locations.

8. 

Soil sampling locations.

9 

Dug pits. Soils from dug pits and groundwater that entered pits sampled.