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NIROP FRIDLEY
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DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 190010
2155 EAGLE DRIVE
NORTH CHARLESTON, S.C. 29419-9010

5090
Code 1868
29 September 1999

Mr. David Douglas
Minnesota Pollution Control Agency
Site Remediation Section
520 Lafayette Road
St. Paul, MN 55155-4194

Subj: NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT (NIROP), FRIDLEY – PROJECT PROPOSAL, FIELD TEST: APPLICABILITY OF WATER-FILLED POLYETHYLENE DIFFUSION SAMPLERS FOR LONG-TERM MONITORING OF VOLATILE ORGANIC COMPOUNDS IN GROUND WATER DATED AUGUST 3, 1999

Dear Mr. Douglas:

Please find attached Navy responses to MPCA comments on the subject Project Proposal. We plan to coordinate these Field Tests in conjunction with the Basewide Groundwater sampling in November 1999. By delaying the Basewide groundwater sampling to November 1999, we should be able to include the new wells being installed at NIROP.

Should you have any questions or comments, please contact me at (843) 820-5562.

Sincerely,

JOEL R. SANDERS, PE
Remedial Project Manager
Installation Restoration II Division

ENCL:
(1) Attachment I to MPCA letter dated September 8, 1999 – NIROP Superfund Site

Copy to: (w/encl)
US EPA (Thomas Bloom)
Tetra Tech NUS, Inc (Mark Sladic)
NIROP (Kerry Morrow)
USGS Columbia, SC (Don Vroblesky)

Subj: NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT (NIROP), FRIDLEY – PROJECT PROPOSAL, FIELD TEST: APPLICABILITY OF WATER-FILLED POLYETHYLENE DIFFUSION SAMPLERS FOR LONG-TERM MONITORING OF VOLATILE ORGANIC COMPOUNDS IN GROUND WATER DATED AUGUST 3, 1999

Copy to: (w/o encl)
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RESPONSE TO MPCA COMMENTS DATED SEPTEMBER 8, 1999

PROJECT PROPOSAL, FIELD TEST: APPLICABILITY OF WATER-FILLED POLYETHYLENE DIFFUSION SAMPLERS FOR LONG-TERM MONITORING OF VOLATILE ORGANIC COMPOUNDS IN GROUND WATER DATED AUGUST 3, 1999.

1. Comment: Please identify the Quality Assurance Project Plan that will be used for this work.

Response: The Quality Assurance Project Plan that will be used for this work will be the plan currently in use or in preparation by Tetratech, the prime contractor at the site.

2. Comment: Please identify the parameter list for the study.

Response: The parameter list for investigation of diffusion samplers for use in obtaining representative samples of VOCs will be the EPA method 8260 list. A smaller number of samplers will be used to examine methane, CO, dissolved iron, manganese, sulfate, chloride, and nitrate.

3. Comment: When using deionized water, a field blank must be taken before the
water is introduced to the diffusion sampler for the parameters of sample analysis.

Response: We will collect such a sample.

4. Comment: A sample blank must be taken to ensure that the low-density polyethylene does not leach any of the VOCs.

Response: We will collect such a sample.

5. Comment: Please identify what will be done regarding duplicates.

Response: At least 10 percent of the VOC samples collected from diffusion samplers will be done in duplicate.

6. Comment: Please explain why the removed diffusion sampler is allowed to sit for 30 minutes prior to sample draw.

Response: The sample will be withdrawn from the sampler within 2 to 3 minutes of sampler recovery. The 30 minutes refers to the window of time available for sample transfer; however, it is prudent to transfer the sample with a minimum of delay.

7. Comment: Samples must be cooled to 4 degrees Centigrade immediately after collection.

Response: This will be done.

8. **Comment:** Are there any expected differences in using these samplers for water table wells versus submerged screen wells?

Response: There are no expected differences as long as the diffusion samplers are fully submerged. If part of the sampler is exposed above the water table, then lower-than-actual concentrations of VOCs would be expected.

9. **Comment:** How was 14 days established for the interval of equilibration?

Response: The equilibration time was established using field and laboratory methods and by examining equilibration times of other types of diffusion samplers. Laboratory testing showed that the time required for concentrations of the several tested VOCs to equilibrate was approximately 24 hours at 21 oC in the vapor-filled diffusion samplers and about 48 hours in the water-filled diffusion samplers. Recovery of the well following the disturbance of sampler deployment, however, may take longer. The time required for a well to equilibrate after a disturbance may be approximated by considering results of bore-hole dilution studies used to estimate aquifer hydraulic conductivity. In bore-hole dilution studies, a tracer is injected and mixed in an isolated section of well screen, and tracer concentrations and time are measured until background levels are reached. Tracers typically include radioactive compounds, chloride salt, and deionized water. The rate of dilution of the tracer is proportional to the ground-water velocity and is largely dependent on the geology of the tested interval. In general, tracer dilution approximately follows a semi-logarithmic decay curve. Measurements indicated that 90 percent of an injected tracer was diluted in 20 minutes in a gravel aquifer well, and in 70 minutes in a sand aquifer well. Poorly permeable aquifers may require 100 to 1,000 hours to recover 90 percent of the predisturbance conditions. Although wells in poorly permeable aquifers comprised of very fine loamy sand, clays, or poorly permeable fractured-rock may require a substantial time to equilibrate, most wells tend to be screened in permeable parts of the aquifer. A variety of investigations using water-filled diffusion samplers in wells in overburden, bedrock, and sand aquifers have reported adequate equilibration within 14 to 17 days. The laboratory and field data and results of bore-hole dilution studies imply that approximately 2 weeks of equilibration should be adequate for water-filled diffusion samplers in most wells screened in sandy formations. Less permeable formations may require longer equilibration times.

10. **Comment:** How will line stretch be addressed?

Response: A stainless-steel weight will be attached to the end of the rope. The weight will rest on the bottom of the well. The sampler target horizon will be measured from the bottom end of the weight upward. In general, this distance will be less than 10 feet. Thus, line stretch is not likely to have a significant effect on sampler location.

11. **Comment:** How will algae, iron, and other well coatings affect the samplers ability to absorb VOCs? What are the consequences of finding these coatings on the samplers?

Response: Investigations of potential biofouling of semi-permeable membrane devices (SPMD) have shown that biofouling impedes but does not stop uptake of chemicals by SPMDs. Laboratory studies show that chemical uptake by HEAVILY fouled SPMDs is reduced by as much as 70 percent. If a light coating is observed on the diffusion samplers, then the diffusion of VOCs into the sampler probably is not significantly affected. If an obvious heavy coating is observed on the samplers, then the concentrations can be considered as minimums.

12. **Comment:** Please describe the statistical method that will be used to compare diffusion sampling results with conventional sampling results.

Response: A paired t-test will be used to compare the two data sets.