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PITT-03-1-079

March 27, 2001

Project Number 6966

Mr. Jeff Perry
Anoka County Parks
1350 Bunker Lake Blvd.
Andover, MN 55304

Reference: CLEAN Contract No. N62467-94-D0088
Contract Task Order 0003

Subject: Response to Pilot Test Comments
NIROP Fridley, Fridley Minnesota

Dear Mr. Perry:

The Navy is in receipt of comments, *Background and Comments Regarding NIROP Groundwater Contamination Site and the Draft Work Plan for Field Application to Enhance In-Situ Bioremediation of Chlorinated Solvents via Vegetable Oil Injection at NIROP* (Background and Comments), pertaining to the Proposed Natural Attenuation via Vegetable Oil for Groundwater Contamination in Anoka County Park, prepared by Mr Bart Biernot and Ms. Laura Schmidt, also of Anoka County. Tetra Tech NUS, a Navy contractor at this site, is pleased to provide responses to these issues on the Navy's behalf. In this reply, we seek to address some apparent misinformation and respond to questions in the March 8 Background and Comments letter. In our responses, we have generally tried to follow the flow of ideas in the March 8 Background and Comments letter.

BACKGROUND

The Anoka County Community Health and Environmental Service Department (Anoka County), notes that an estimated 29,000 people obtain drinking water from public wells located within three miles of the site. The Navy replies that TCE contamination of drinking water in City of Fridley Municipal Well Field is well documented, and to date, it is the Navy's belief, that this contamination is not related to the NIROP/UDLP contamination. The Navy believes that the Minnesota Pollution Control Agency (MPCA) and Environmental Protection Agency (EPA) share this view. Fridley Well 13, adjacent to the NIROP site, is regularly monitored for contamination by the Navy. Despite the fact that the analytical results indicate that no contamination is currently detected in this well, it is the Navy's belief that the MPCA and EPA share the belief that the predominant threat to Fridley Well 13 is from another nearby manufacturing entity, versus NIROP. The Navy's position generally centers on groundwater flow characteristics and the differing depths of contamination (relatively shallow) versus the typical pumping depth for regional drinking water (several hundred feet).

On the second page of Anoka County's letter, Anoka County cites the Minnesota Department of Health Public Health Assessment (PHA). Please note that the Navy has cited numerous inaccuracies in the PHA, in our April 12, 1999 letter (attached) submitted during the public comment period. The Navy has never received a response to this letter, and as near as we can tell, our comments were not incorporated in a revised PHA. The Navy comments were provided within the specified public comment period ending April 15, 1999. The Navy letter cites inaccuracies related to the *italicized* items identified by Anoka County in their letter. Please see our attached letter, which explains why the Navy has never embraced the PHA.

The Navy would appreciate adding some information for clarity to the discussion in the final paragraph on Page 2 of the March 8 Background and Comments letter. The paragraph is based on the April, 2000 presentation to the community Restoration Advisory Board (RAB). As identified at that RAB meeting, the Summary was provided to briefly inform the community about the results of recent field activities and analytical results of groundwater investigation in Anoka Park. The entire report for this activity is several hundred pages in length with numerous illustrations, and so, was not completely capsulized in the Summary presentation. Anoka County's letter states that the Navy installed over 70 temporary groundwater collection wells (cone penetrometer), and that the results of the investigation determined that TCE contamination ranged from not detectable to 37,300 micrograms per liter. In actuality, the Summary and the full report [Field Investigation Report at the NIROP and Anoka County Riverfront Park] both state that forty-two new permanent wells were installed. By combining the results from the new wells with some existing wells, seventy-three total groundwater samples were collected. Approximately half of these samples were collected in Anoka Park. The Summary and the full report both state that the measured TCE concentrations ranged from 0.59 ug/l to 18,000 ug/l. The Navy cites this clarification for two principal reasons. First, the samples were collected from permanent groundwater monitoring wells, not cone penetrometer. Generally, samples from permanent wells are considered much more reliable than from cone penetrometer. Second, the actual maximum reported concentration from the permanent monitoring wells is less than half that cited by Anoka County.

The RAB was advised that they have access to the Field Investigation Report, and RAB Community Co-Chair Richard Harris received a copy of this report in April 2000 as is typical with all major reports.

General Comments, Interrogatives, and Recommendations:

Comment (C#1): Anoka County Riverfront Regional Park (Anoka Park) is a large enough area that groundwater movement at differing locations (and depths) can vary. Factors that influence groundwater movement include (but are not limited to):

- Proximity to the NIROP groundwater pumping system
- Proximity to the Mississippi River
- Geologic variability
- Natural predominant groundwater flow gradient.

These factors vary in relative dominance in determining groundwater movement at different areas in Anoka Park. In the south area of Anoka Park, the Navy does feel that the relative contributions of these factors result in groundwater movement through Anoka Park from an area south of NIROP. For the proposed pilot test area, the Navy feels the relative contributions of these factors results in very slight groundwater movement towards the river (near stagnation). The Navy feels these statements are not contradictory.

Comment (C#2): Parsons Engineering Science has determined that groundwater movement characteristics at the proposed location are adequate to support the pilot test. Parsons has previously and is currently associated with numerous applications of this technology across the country.

Recommendation (R#1): See the response to Comment (C#2).

Interrogative (I#1): The Navy is asked if it is the intent of Navy/UDLP to utilize this groundwater remediation technology to cleanup the contaminated groundwater in Anoka Park. The Navy is evaluating potential remedies for addressing groundwater contamination in Anoka Park resulting from Navy sources. UDLP is not involved in this activity. After evaluation by a team of technical personnel consisting of engineers, geologists, and scientists (with participation by EPA and MCPA), the Navy selected the proposed treatment technology most likely to be successful. If the technology is successful in the pilot test, the Navy will evaluate the applicability of increasing the treatment area.

Interrogative (I#2): The Navy is asked if groundwater is stagnant in Anoka Park, how will the contaminated groundwater move toward and pass through the vegetable oil zone. Please see the responses for Comments (C#1 and C#2).

Interrogative (I#3): The Navy is asked if groundwater is not stagnant in Anoka Park, why has the contamination not dissipated as originally predicted. Prior to the installation of forty-two new wells in late 1999 and early 2000, the existing wells in Anoka Park were not optimally placed for evaluating the rate of dissipation (if any) of groundwater contamination. The new wells allow the Navy to better view the edges of the plume and the areas of highest contaminant concentrations in the center of the plume where evidence of dissipation would be most apparent. Since these wells have only been in place for one year, the Navy is not prepared to make any conclusion on the rate of plume dissipation, but does concur that if plume dissipation were occurring at any accelerated rate, we would not still see the current levels of contamination. Thus, the Navy is investigating alternate technologies so that the issue is resolved in a more realistic timeframe.

Anoka County notes that current remediation activities have failed to cleanup the groundwater. Please note that the pump and treat system installed at NIROP is a hydraulic containment remedy to keep further contamination from leaving the NIROP property, migrating into the Anoka County Park, and eventually discharging into the Mississippi River. The pump and treat system is largely effective in meeting this goal, and is currently being upgraded to increase effectiveness. As Anoka County claims, it is also true that there has been an expectation for the groundwater contamination in Anoka Park to dissipate over time. In fact, this expectation is still in place. The Navy feels that the groundwater contamination in Anoka Park is probably dissipating via several mechanisms, including natural attenuation, migration to the river, and others. But the Navy feels that based on the current level of contamination and the hydraulic conditions in the park caused by both natural factors and operation of the containment system, the rate of this dissipation is much too slow to be satisfactory without investigation of catalysts to accelerate the activity.

Operation of the NIROP hydraulic containment system largely restricts additional contaminated groundwater from leaving NIROP and entering Anoka Park. The hydraulic containment system does also impact the rate of groundwater movement through Anoka Park. However, it seems to the Navy that it is implied in Anoka County's letter that if the Navy discontinued operation of the hydraulic containment system, the contamination in Anoka Park could abate. The Navy does not believe this would work this simply for the following reasons. First, the highest levels of contamination are still on the NIROP property and could then migrate to Anoka Park. Second, contaminated groundwater could migrate into the Mississippi River at a rate that would cause the TCE concentration in the river to exceed drinking water standards. Third, the hydraulic conditions in the park are caused by natural factors (e.g. hydrogeologic variability, see C#1).

Comment (C#3): It is suggested that another possible explanation for the high concentration of TCE in groundwater is the existence of a contaminant source in the park. The Navy feels that results of several investigations in the park indicate that there are no unknown sources of groundwater contamination in Anoka Park. The EPA and MPCA have reviewed the results of these investigations and have not rejected this conclusion. Documentation of these investigations is available to the public.

Recommendation (R#2): Anoka County suggests consideration of placement of extraction wells in Anoka Park. The Navy, EPA, and MPCA evaluated this proposal at the time the original extraction wells were constructed. Placing groundwater extraction wells nearer to the river was rejected because the wells would pull more river water than groundwater. Further, Pump-and-Treat remains viewed as an effective groundwater containment remedy, but a less effective groundwater remediation remedy. The Anoka Park groundwater contamination does not appear to require containment as much as remediation. It is possible that the newest groundwater extraction wells currently being installed at NIROP could pull some TCE out of Anoka Park back towards the extraction wells. It is noted that the Navy, along with the EPA and MPCA believe that groundwater on the eastern edge of the park is partially being captured by the current extraction well system.

Recommendation (R#3): It is recommended that before the bioremediation technology is expanded in the park, that a detailed studyof groundwater flow patterns be undertaken. Further, the full-scale work plan should include an estimated time for treatment and a monitoring plan to assess progress of the project. Finally, Anoka County recommends that the work plan should include a contingency to install extraction wells if the full-scale project can not adequately remediate the plume. The Navy is in agreement on nearly all these points, based on the following:

- As a part of the pilot scale study in the park, new wells will be installed for injection and monitoring purposes. Prior to injection, these wells will be used to better define the local groundwater flow system for optimal placement and orientation of the pilot study.
- The Groundwater Annual Monitoring Report (AMR) is compiled yearly based on analyses of samples from many wells and water level measurements from most all wells. The AMR is a detailed study of stagnant, radial, and complex groundwater flow patterns, updated by one year, each year. The Navy does not see any end to annual production of the AMR.
- Prior the scale up of the pilot system to full-scale, the Navy would need to include schedule and monitoring plans in a draft work plan; which would require EPA and MPCA approval prior to finalization.
- For reasons discussed in Recommendation (R#2), the Navy does not anticipate placing groundwater extraction wells in Anoka Park. However, the Navy is committed to evaluating alternate groundwater remedies if it is found that the vegetable oil enhanced natural attenuation is not suitable for application at full-scale.

Recommendation (R#4): The recommendation is based on the PHA description of a dump on the park site. The PHA characterization of the dump on the park site is not accurate. Please see the attached letter, provided to MDH to assist in correcting inaccuracies in the PHA. The EPA is currently evaluating the extent and significance of tornado damage debris placed by FMC (UDLP's predecessor at the site) in a small area of the park, by permission of MPCA. Note that Anoka County agrees, based on the second paragraph of the March 8 Background and Comments letter, that FMC/UDLP owned the land at that time. Based on locating a groundwater monitoring well as near as possible to the tornado debris location, the Navy affirmed that no groundwater contamination sources are present in this area.

The Navy reiterates that all supporting documentation identified in this reply is available to the public. The Navy further appreciates the interest in the NIROP remedial activities as evidenced by the understanding of these issues exhibited in RAB members' Mr. Biernat and Ms. Schmidt questions, herein. Please contact us if we can provide any further information.

Thank you for your consideration of Draft Work Plan for Field Application to Enhance In-Situ Bioremediation of Chlorinated Solvents via Vegetable Oil Injection at NIROP. The Navy looks forward to working with the Anoka County Community Health and Environmental Service Department to improve Anoka County Riverfront Regional Park. Please feel free to call me at (412) 921-8216 to discuss any information in this letter.

Sincerely,



Mark Sladic PE
Project Manager
Tetra Tech, NUS

cc: Joel Sanders, SOUTHDIV
Dave Douglas, MPCA
Tom Bloom, US EPA
Venky Venkatesh, CH2MHill

Mr. Jeff Perry
Anoka County Parks
March 27, 2001 – Page 5

Mary Stauffer, Parsons Engineering Science
Richard Harris, NIROP RAB co-chair
Laura Schmidt, NIROP RAB
Hal Davis, USGS
Keith Henn, TtNUS
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PITT 04-9-084

April 12, 1999

Ms. Lisa Pogoff
Community Relations Coordinator
Minnesota Department of Health
121 E. 7th Place
P.O. Box 64975
St. Paul, Minnesota 55164-0975

Subject: U.S. Navy Comments to the Public Health Assessment
for the Naval Industrial Reserve Ordnance Plant
Fridley, Minnesota

Dear Ms. Pogoff:

On behalf of the US Navy, Southern Division NAVFACENCOM, Tetra Tech NUS is providing the following comments to the Public Health Assessment for the Naval Industrial Reserve Ordnance Plant, located in Fridley Minnesota. The document was published on December 24, 1998.

1. Cover page – 'Cercdis' is an acronym and should be capitalized: 'CERCLIS'
2. Summary: Fourth Paragraph, Third Sentence - It has not been positively identified to date that the plumes do combine. Therefore, it is misleading to say that 'a portion of the ground water plume has reached MWW property', in reference to a plume being described as 'migration underground from NIROP and the UDLP/FMC property.' This statement is inaccurate if the plumes do not meet. Please clarify this statement.
3. Summary: Fourth Paragraph, Fourth Sentence – The meaning of the statement 'nearer to the MWW than the overland distance' is unclear.
4. Summary: Fifth Paragraph – Since the Prairie duChien is discussed, it would be helpful to provide the proper context. That is, to identify the routine non-detects at four of five on-site wells, plus the likelihood of contamination from a neighboring site being responsible for PCE detects at the fifth (upgradient) well.
5. Summary: Sixth Paragraph – The last two sentences are irrelevant to the OU-2 discussion and should be discussed under a separate heading. Further, the classification of 'buried drums' to characterize the waste is misleading since it is most likely that the material is a result of a 1965 cleanup action following severe tornado damage to the plant. A review of plant photos after the tornado shows that it is highly likely that some drums were in fact mixed into the substantial volume of debris, which included structural members, roofing materials, and other massive items. Note that drums are frequently used in a manufacturing plant setting without any hazardous waste association. Finally, per documentation on site at UDLP, the 'dump' was originally permitted in 1971 to FMC only, for foundry sand placement, and not in any way to the Navy, and is not necessarily even associated with the tornado debris emplacement action. MDH has not effectively described the current state of affairs in Anoka Park, potentially leaving the reader to wonder if a large cache of drums with liquid material is present, leaching into groundwater aquifers or the Mississippi River. Neither EPA, MPCA, or the Navy thinks this is likely based on the current information, and the Health Assessment would do a service to the reader to say so.
6. Summary: Seventh Paragraph – The TCE concentrations identified were collected from temporary well points. MDH would be providing a useful context to identify that the concentrations identified were not found to be wide-spread. Additionally, ug/L is not a viable unit of measurement for soil contamination.
7. Figure 4 – (Although this is the first figure in the report, it is titled Figure 4.) The scale for this map should be checked – if it is accurate, the main NIROP building is only 500 x 500.

8. Figure 2 – The scale for this map also should be checked. The legend states that 'one inch = 2000 feet', yet, compared to the graphic bar, one inch equals only 1600 feet.
9. Page 8, Fourth Paragraph, First Sentence – The sentence states that the plumes do mix. We do not believe that any technical evaluation has determined to date that the plumes do mix.
10. Page 10, A.1.a – We believe the NIROP ROD was signed on March 25, 1991 by the Navy, March 26, 1991 by MPCA, and March 27-28, 1991 for the US EPA.
11. Page 10, A.1.a, Second Paragraph – The text identifies the 'current' status of remedy to be an operating Phase I. In fact, Phase II is operating. Also, the discussion of Phase I ignored the fact that a pretreatment system was originally required for the extracted groundwater prior to discharge to the sanitary sewer.
12. Page 12, Second Paragraph – The text should clarify that the trenches were various lengths, but were typically eight to ten feet deep.
13. Page 14, A.1.c – The text states that remedial investigation and feasibility study field work is complete. Actually, the Navy feels that remedial investigation work is complete, but EPA and MPCA have not concluded their review and concurred to date. Also, feasibility study field work could yet be required in the form of pilot testing or treatability studies, for OU-2 and/or OU-3.
14. Page 14, A.1.d, Second Paragraph – It is more accurate to say that 'The soil gas extraction system began operating in 1993...'
15. As the Navy's contractor, we are not tasked with reviewing the portions of this report solely addressing UDLP/FMC, therefore we are not indicating either agreement or disagreement with this discussion.
16. Page 30, B – We suspect that the site visit occurred on April 22, 1998 (instead of 1997).
17. Page 31, C, First Paragraph – In the fifth sentence, it is not appropriate to describe the material in the park as 'NIROP foundry sand'. In a 1991 letter addressed solely to FMC, MPCA grants FMC permission to deposit foundry sand in the park. Neither the Navy or NIROP is the addressee of the letter, and therefore the material cannot be accurately referred to as NIROP foundry sand.
18. Page 31, C, Third Paragraph – It is not apparent that the NIROP ROD determines that site related contaminants were impacting the MWW's water supply intakes, only that there were 'releases and threatened releases to the environment.'
19. Page 33, Second Paragraph – The information that two river samples had peaks present for vinyl chloride is not meaningful. Potential contaminant concentrations that are not quantifiable are speculative and are not appropriate for inclusion in a fact-based discussion. If there are no measured concentrations, the text should say so.
20. Page 33, D, First Paragraph – The discussion is not suitably developed and can leave the reader with the impression that MDH has concluded that NIROP contamination has been identified in Fridley Well 13 groundwater. Additionally, the discussion should add that Fridley Well 13 is located upgradient from NIROP, and should identify specific contaminants and concentrations detected in this well, since it is a drinking water production well, and is therefore of heightened interest to the public.
21. Fridley Well 13 is not shown on Figure 17, and this would be helpful to the reader.
22. Page 33, Second Paragraph – There is no Figure 20.
23. Page 33, Second Paragraph – There is no Figure 21.
24. Page 37, First Paragraph – There are no Figures 22 and 23.
25. Page 38, First Paragraph – The text again discusses NIROP contamination identified at the MWW intakes. We would again assert that the NIROP FFA does not make mention of this situation.
26. Page 43, Conclusions, 1 – In this discussion, the MDH would do the reader a service to reiterate that the maximum detection of TCE in intake water was only 1.3 ug/L, in comparison to the MCL of 5 ug/L.
27. References – The text throughout the report identifies information collected from the 1996 and 1997 Annual Monitoring Reports for the NIROP monitoring wells, yet the reference list does not identify these.

Ms. Lisa Pogoff
Minnesota Department of Health
April 12, 1999 – Page Three

28. Appendix D – Data is provided with accompanying qualifiers. There is no key or explanation to help the reader interpret the qualifiers or their significance.

Please feel free to call me at (412) 921-8216 with any questions or to provide clarification regarding these comments. Thank you for the opportunity to review this document.

Sincerely,



Mark Sladic, P.E.
Project Manager

MS/gp

cc: Joel Sanders, Southdiv
Dave Douglas, MPCA
Tom Bloom, EPA
Kerry Morrow, NAVSEA

Mark Sladic 4 pages

Anoka County
Community Health and
Environmental Service Department

B.F. Biernat
L.M. Schmidt

Background and Comments Regarding
**NIROP Groundwater Contamination Site and the DRAFT
Work Plan for Field Application to Enhance *In-Situ*
Bioremediation of Chlorinated Solvents via Vegetable
Oil Injection at NIROP
Fridley, Minnesota
February 2001**

RECEIVED

MAR 12 2001

March 8, 2001

On Monday, March 5, 2001 the Department received the referenced draft work plan from the Navy's consultant, Mary Stauffer (Project Manager, Parsons Engineering & Science, Inc.). Ms. Stauffer requested that our comments on the draft work plan be submitted by March 26, 2001.

BACKGROUND

The 80-acre NIROP site and adjacent 46-acre United Defense LP (UDLP) site is located in the southern part of the City of Fridley just 700 feet from the Mississippi River. UDLP previously owned the Anoka County Riverfront Regional Park (immediately west of the NIROP site). The Navy, and its contractors, have produced advanced weapon systems at the NIROP facility since 1940. Over 200,000 people live within three miles of the site. An estimated 29,000 people obtain their drinking water from public wells located within three miles of the site. The City of Minneapolis river water intake and treatment plant is located within 1,500 feet of the site.

NIROP is made up of two operating facilities. The US Navy operates on the northern part of the building complex/site and United Defense (formerly FMC) operates on the southern part of the building complex/site. In the past hazardous waste was generated by both operations. The US Navy no longer generates hazardous waste.

In 1980, the Minnesota Pollution Control Agency (MPCA) issued a hazardous waste facility permit to the US Navy and FMC. The permitting and inspection of hazardous waste facilities were delegated to Anoka County Community Health and Environmental Services Department in 1982. United Defense (EPA ID# MN3170022914) is licensed as a "large quantity" hazardous waste generator (County License #HW4039) under the Anoka County Hazardous Waste Management Ordinance (Ordinance 85-4, 86-3, 87-1, 94-3, and 99-3).

In 1981, trichloroethylene (TCE) was discovered in NIROP groundwater wells and in the City of Minneapolis drinking water treatment plant's river intake that is located approximately 1,500 feet downstream of the site. The three wells on the site may not be used for drinking. In 1983, pits and trenches used to dispose of drummed hazardous waste were determined to be the source of well and river contamination. Other contaminants have been found in the soils and groundwater, but TCE is the most prevalent and widespread. Groundwater concentrations of TCE range between not detected to over 140,000 micrograms per liter (µg/L).

In August 1988, a study indicated that groundwater contaminated with TCE was flowing into the Mississippi River at a concentration six times the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act. The combination of river water with contaminated groundwater reduced the concentration to below the MCL. The MPCA added this site to their Permanent List of Priorities (PLP). On November 21, 1989 the NIROP site was added to the federal National Priorities List (NPL or Superfund) program.

Post-it* Fax Note	7671	Date	3-14-01	# of pages	4
To	Joel Sanders	From	David Douglas		
Co./Dept.	Navy	Co.	MPCA		
Phone #					

Comments Regarding:

Page 2

DRAFT Work Plan for Field Application to Enhance *In-Situ* Bioremediation of Chlorinated Solvent via Vegetable Oil Injection at the Naval Industrial Reserve Ordinance Plant (NIROP), Fridley, Minnesota

The MPCA serves as the state agency for the investigation and cleanup of PLP sites under the Minnesota Environmental Response and Liability Act (MERLA). The US Environmental Protection Agency (USEPA) is responsible for the investigation and cleanup of Superfund sites under the Federal Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA). The soils and groundwater cleanup of this site is being addressed through State and Federal actions.

The NIROP cleanup project is being address under three "operable units." Operable Unit 1 (OU1) consists of a facility wide contaminated groundwater cleanup project, including off site contamination in the Anoka County Riverfront Regional Park.

In 1992 an OU1 groundwater extraction well system was started and later modified (in 1995) to hydraulically contain the TCE contaminant plume. From 1993 to 1997 nearly one billion gallons of contaminated groundwater has been pumped and treated. In September of 1993, additional waste drums were discovered on the site and studies have continued to determine if additional sources of groundwater contamination are located on the site.

The Anoka County Riverfront Regional Park is located immediately west of the NIROP site and hydraulically down-gradient of the NIROP site. Groundwater flows from the site through the park and discharges in the Mississippi River bed. During the eight years that the hydraulic containment system has operated - TCE contaminated groundwater has persisted under the park. The Navy and its contractors believe that the presence of TCE contaminated groundwater beneath the park is a relatively stagnant plume trapped between the hydraulic containment system and the river. The greatest TCE concentrations detected are found near a monitoring well (MS-46S) in the southern part of the park.

In December 1998, the Minnesota Department of Health (under a cooperative agreement with the US Agency for Toxic Substances and Disease Registry) prepared a Public Health Assessment (PHA) of the NIROP site¹. The PHA states:

"However, during a Mississippi River sampling event in 1997, buried drums were discovered in the Anoka County Riverfront Park. The drums are part of an old NIROP/UDLP dump with has not been characterized." (pg. 2)

And concludes:

"Annual fluctuation of TCE concentrations in the wells nearest the river at the NIROP site have been considerable. The off-property groundwater plume migration and concentration at FMC Superfund Site have not been well characterized." (pg. 44)

The PHA concludes that the buried drums found in the park are part of an old dump that has not been characterized. The PHA implies that all sources of groundwater contamination have not been identified and that delineation of off-property plume migration should be performed as part of a assessment's Public Health Action Plan.

In April 2000, a preliminary report "Additional Investigation at the NIROP and Anoka County Riverfront Park" was prepared by Navy Consultant Tetra Tech (Mark Sladic). The report summarizes the results of a detailed groundwater investigation by installing over 70 temporary groundwater collection wells (cone penetrometer) throughout the southern portion of the park. The result of the investigation determined that TCE contamination ranged from not detectable to 37,300 micrograms per liter. An objective of the investigation was to *"better define the extent of the Anoka Park anomaly for future remedial measures."* The results of the soils evaluation stated "no source area for organic compounds was identified in the surface and subsurface soil at ACP [Anoka County Riverfront Regional Park]." A conclusion of the report was that it is believed (based on hydraulic data) that contamination in the southern end of Anoka County Riverfront Regional Park may have originated off-site.

Comments Regarding:

Page 3

DRAFT Work Plan for Field Application to Enhance *In-Situ* Bioremediation of Chlorinated Solvent via Vegetable Oil Injection at the Naval Industrial Reserve Ordinance Plant (NIROP), Fridley, Minnesota

❖ **General Comments, Interrogatives, and Recommendations**

- ❖ This technology is principally intended to address remediation of contaminated groundwater from an identified source. In the case of NIROP, the identified source is Operable Unit #3 (contaminated soils under the NIROP plant). If this pilot project is successful it will likely to be used to remediate the contaminated groundwater coming from sources under the plant before it reaches the hydraulic containment system. The critical elements in utilizing this remediation technology include determining the spatial extent of the contaminant source, the location of the contaminant plume, and the direction(s) and speed of groundwater movement.

COMMENT (C# 1): This remediation technology can improve the groundwater cleanup where a contaminant source and steady-state flow is identified - such as in Operable Unit #3. However, in the case of the contaminated groundwater in the Anoka County Riverfront Regional Park, a contaminant source is not identified. Tetra Tech states that the contamination in the southern end of Anoka County Riverfront Regional Park may have originated off-site². This work plan indicates that groundwater movement is stagnant "prohibiting contaminant flux to the Mississippi River."

COMMENT (C# 2): The pilot project has distinct possibilities where a source location is identified and steady laminar flow conditions exist. However, in the Anoka County Riverfront Regional Park, a specific source has not been identified and flow is described as stagnant and radial.

RECOMMENDATION (R# 1): The flow in the proposed area of the "groundwater mound" may not present the ideal conditions to determine if this technology will adequately remediate contaminated groundwater. Consideration should be given to locating a site down gradient of a contaminant source with steady-state flow conditions.

INTERROGATIVE (I# 1): Is it the intent of the Navy/UDLP to utilize this groundwater remediation technology to cleanup the contaminated groundwater in the Anoka County Riverfront Regional Park?

INTERROGATIVE (I# 2): If groundwater is stagnant in the Anoka County Riverfront Regional Park - how will contaminated groundwater move toward and pass through the vegetable oil zone?

INTERROGATIVE (I# 3): If groundwater is not stagnant in the Anoka County Riverfront Regional Park contaminated groundwater zone - why has it not dissipated as originally predicted?

- ❖ Significant concentrations of TCE contaminated groundwater exists in the Anoka County Riverfront Regional Park. Current remediation activities have failed to cleanup the groundwater. The NIROP parties have installed and operated a hydraulic containment system on the NIROP site for over seven years. Originally, the NIROP parties indicated that the contamination was residual and would naturally dissipate over time. This belief has been replaced with others including a stagnant zone (groundwater does not move) and currently (in this work plan) the presence of a "groundwater mound" causing radial flow in the area of the highest TCE concentrations.

The Navy and UDLP have indicated that the system effectively contains the contaminated groundwater on the site. However, the NIROP parties claim that it is the operation of this containment system that is causing contaminated groundwater to remain in the Anoka County Riverfront Regional Park.

COMMENT (C# 3): Another possible explanation for the high concentrations of TCE contaminated groundwater is the existence of a contaminant source in the park.

Comments Regarding:

Page 4

DRAFT Work Plan for Field Application to Enhance *In-Situ* Bioremediation of Chlorinated Solvent via Vegetable Oil Injection at the Naval Industrial Reserve Ordinance Plant (NIROP), Fridley, Minnesota

RECOMMENDATION (R# 2): Based on the Navy's information and interpretations, consideration should be given to the placement of extraction wells in the Anoka County Riverfront Regional Park to collect the contaminated groundwater plume establishing an uncontaminated zone between the NIROP property and the river. After which, the groundwater in the park can be monitored to determine the downgradient effectiveness of future hydraulic containment or *in-situ* remediation.

RECOMMENDATION (R# 3): Before the use of this *in-situ* bioremediation technology is expanded to remediate the park groundwater - a detailed study of "stagnant", "radial", and complex groundwater flow patterns should be performed to determine proper downgradient placement of treatment zones. The full-scale work plan should include an estimated time for treatment and a monitoring plan to assess progress of the project. Finally, the work plan should include a contingency to install extraction wells if it is determined that the full-scale enhanced bioremediation project can not adequately remediate the contamination plume.

- ❖ The Public Health Assessment¹ of the NIROP site emphasizes the presence of a Navy/UDLP dump on the park site that has not been adequately investigated and characterized.

RECOMMENDATION (R# 4): Before a full-scale groundwater bioremediation project takes place in the park - the dumpsite should be investigated to determine whether potential sources are present.

Reference:

¹ Public Health Assessment - Naval Industrial Reserve Ordinance Plant (CERCLIS MN3170022914) Anoka County, Minnesota (December 24, 1998).

² Additional Investigation at the NIROP and Anoka County Riverfront Park - Summary, Prepared for the Restoration Advisory Board, April 27, 2000.

This document was sent to:

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