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175 N. Corporate Drive
Suite 100
Brookfield, WI 53045
262-792-1282 FAX 262-792-1310

LETTER OF TRANSMITTAL

TO: Ms. Jennie Pelczar
WDNR/R & R Program
625 E. County Road Y, Ste. 700
Oshkosh, WI 54901-9731

DATE: 1-8-03
RE: FF/NN Landfill
JOB NO: N734

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Signed: Heidi W Yandy

cc:

GeoTrans, Inc.
A TETRA TECH COMPANY

175 N. Corporate Drive
Suite 100
Brookfield, WI 53045

www.geotransinc.com

262-792-1282 FAX 262-792-1310

WORK PLAN FOR

FOCUSED FEASIBILITY STUDY

SANDSTONE AQUIFER

FF/NN LANDFILL

RIPON, WISCONSIN

January 8, 2003

Prepared For:

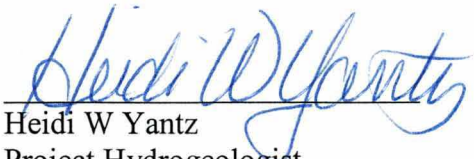
FF/NN Landfill PRP Group

Prepared By:

GeoTrans, Inc.
175 N. Corporate Drive, Suite 100
Brookfield, Wisconsin 53045

Project No. N734

Gerald L. DeMers, P.E.
Senior Engineer



Heidi W Yantz
Project Hydrogeologist

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1.0 INTRODUCTION

In 1994, a Feasibility Study (FS) was prepared for the FF/NN Landfill in Ripon, Wisconsin. The 1994 FS examined a number of landfill capping and leachate and gas extraction alternatives. In addition, it looked at several groundwater pumping and treatment alternatives for shallow groundwater. The Record of Decision (ROD) issued from the 1994 FS required the construction of a composite landfill cap and passive gas collection system. It did not require the active remediation of groundwater.

During routine groundwater monitoring in the fall of 2001, vinyl chloride was detected in two private drinking wells located in the sandstone aquifer located down gradient of the FF/NN Landfill. Following this detection, the Potentially Responsible Parties (PRP) Group conducted extensive groundwater monitoring that included the installation of three deep monitoring wells. Based on the results of the monitoring and additional hydrogeologic characterization of the site, the public water supply was extended to the two impacted homes to provide a permanent remedy.

With the immediate threat to human health and safety resolved, the PRP group is now addressing long-term remedies for the vinyl chloride impacts in the sandstone aquifer. Towards that goal, a Focused Feasibility Study will be prepared to evaluate remedial options. This Work Plan outlines the process by which the Focused FS will be prepared. It identifies the steps necessary to evaluate whether remedial alternatives will achieve groundwater restoration and meet the applicable or relevant and appropriate requirements (ARARs). This Work Plan also summarizes anticipated alternatives.

This Work Plan is being sent to the WDNR for comment. Because of the short time frame for completion of the FS, work on the FS will commence prior to receiving comments from the WDNR regarding the Work Plan. Comments from the WDNR regarding the Work Plan will be addressed in the FS.

1.1 FS Scope and Approach

As indicated above, the December 30, 1994 *Feasibility Study, FF/NN Landfill, Ripon, Wisconsin* discussed remedial alternatives for landfill capping, leachate and gas extraction and remediation of groundwater in the unconsolidated glacial deposits. The vinyl chloride impacts of concern are present in the sandstone aquifer underlying the unconsolidated deposits. Therefore, this FS will focus on the sandstone aquifer, including those permeable, unconsolidated deposits which may lie directly above the sandstone bedrock.

- But also in MW's @ landfill

Attachment A provides an outline for the Focused FS. It will be prepared in accordance with the *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA, 1988). GeoTrans will present remedial action objectives (RAOs), identify and screen the general response actions and remedial technologies, develop and screen the remedial alternatives, and provide a detailed analysis of the chosen remedial alternatives.

1.2 Background

The FF/NN Landfill occupies approximately 7.3 acres in the northwest corner of Fond du Lac County in the Town of Ripon, Wisconsin (SE ¼ of the SE ¼ of Section 7, T16N, R17E). Landfilling activities occurred at the site from 1967 to 1983. The land was leased from the property owner, Mr. Lyle Sauer, and subsequently, Mrs. Arline Sauer. In 1967, Speed Queen leased the property for disposal of wastes from its facility in Ripon. In 1968, the City of Ripon (City) leased the property. In 1978, the City and Town of Ripon (Town) were signatory to the lease. A license to operate the landfill (#467) was issued by the WDNR to the City of Ripon in 1969. In 1970, the City and Town contracted to share the costs of operating the landfill. The landfill was operated by the City and Town from 1970 to 1983. Throughout its 16-year history, the landfill accepted municipal, commercial, and industrial solid waste. After landfill operations ceased, the site was capped with a clay cap in 1985. The site was used for growing hay from 1985 to 1993.

In 1982, the WDNR began evaluating the landfill for possible inclusion on the federal National Priorities List (NPL). In 1993, the FF/NN Landfill was proposed for listing on the NPL by the USEPA and was officially listed on May 31, 1994. An RI/FS was conducted at

the site by the PRP Group and a Record of Decision (ROD) was established for the site in 1996.

In 1996, in compliance with the ROD for this site, a membrane cap was constructed on top of the existing clay cap. In addition, a passive gas collection system was installed within the landfill boundaries.

Semi-annual groundwater monitoring with annual monitoring of private homes was conducted from 1996 to 2001. In October 2001, routine sampling detected vinyl chloride in a residential well (Altnau, N8798 S. Koro Rd.). Follow-up sampling detected vinyl chloride in a second well installed for a recently built home (Ehster, W14271 Charles St.). Four subsequent quarterly sampling events have confirmed no detections in any other private drinking wells located down gradient of the landfill.

As part of the 2002 investigation of vinyl chloride impacts in the sandstone aquifer, three deep monitoring wells were installed at two locations downgradient of the landfill. In November 2002, the public water supply was extended along South Koro Road up to and along Charles Street. The two homes with impacted wells were connected to this water supply, as well as a third home (Miller, N8756 S. Koro Rd.) that was not impacted. Municipal water was also offered to the other residents on Charles Street; at this time, no other residences have connected to the municipal water system.

1.3 Site Status

A ROD was issued for this site on February 26, 1996. Specifically, the ROD describes the selected remedy as follows:

> "The Department of Natural Resources has evaluated remedial alternatives for two operable units at the site: a source control operable unit and a groundwater operable unit. The selected source control remedy is Alternative O, Composite Landfill Cap and Passive Gas Venting in conjunction with a groundwater monitoring plan. Details of the selected source control operable unit remedy can be found in the Feasibility Study. The specific components of the source control operable unit remedy include:
>
> - constructing a composite landfill cover (i.e. a landfill cap made with both a plastic membrane and soil materials) over the entire landfill.

- installing a passive landfill gas venting system as part of the composite cap to effectively vent landfill gas from the waste
- monitoring of the groundwater quality to determine the effectiveness of the landfill cap towards improving groundwater quality
- monitoring the landfill gas probes around the landfill to make sure that landfill gas is not migrating away from the site in an uncontrolled manner
- maintenance of the landfill cap to repair erosion that may develop
- a deed restriction prohibiting disturbing the landfill cap except for maintenance purposes
- fencing of the landfill perimeter to restrict access

"For the groundwater operable unit, the Department has selected Alternative A, the No Action Alternative. The groundwater contamination that has migrated from this landfill is not severe enough to warrant active groundwater remedial measures to restore groundwater quality. The implementation of the source control operable unit remedy will result in decreased migration of contaminants from the landfill to the groundwater."

As a result of that ROD, a composite cap was constructed in 1996. Since that time, groundwater monitoring occurred on a semiannual basis, until vinyl chloride was detected in a private well. Since that time, groundwater monitoring has been performed quarterly.

The PRP group has cooperated fully with the WDNR in responding to the recent vinyl chloride detections. This included the installation of an air stripper and granular activated carbon treatment system at the two residences with impacted groundwater, as an interim measure, until the wells were hooked up to the municipal water supply. In addition, numerous residential wells and monitoring wells were added to the monitoring program as well as additional laboratory analyses, such as indicator analyses.

1.4 Potential Exposure Pathways

There are three potential exposure pathways for the vinyl chloride impacts detected in groundwater. These three pathways are:

- Ingestion through drinking ground water from the sandstone aquifers,
- Inhalation of vapors volatilizing from vinyl chloride-impacted groundwater and
- Direct contact through use of groundwater for household consumption.

These three potential exposure pathways were considered when the WDNR established health-based groundwater standards in NR140. Therefore, there is no need to perform a Baseline Risk Assessment to establish cleanup levels for these exposure pathways.

1.5 Report Organization

Attachment A provides an outline for the Focused FS. In summary, the Focused FS will present available remedial technologies and the initial screening of those technologies. Technologies that pass this initial screening will be used to create remedial alternatives for this site.

The remedial alternatives will be screened for effectiveness, implementability and cost. Those alternatives that are considered viable will, in turn, be evaluated using the nine criteria that are outlined in the National Contingency Plan.

2.0 REMEDIAL ACTION OBJECTIVES AND REMEDIAL REQUIREMENTS

2.1 Remedial Action Objectives for Groundwater

This Focused FS will address remedial options for vinyl chloride-impacted groundwater in the sandstone aquifer. The Remedial Action Objective (RAO) for the Focused FS will be to meet the Chapter NR140 ground-water quality standards.

↖ where? @ LF boundary? w/i 1200' of LF? where?

2.2 Applicable or Relevant and Appropriate Requirements

A comprehensive listing of Potential Applicable or Relevant and Appropriate Requirements (ARARs) for the FF/NN Landfill site was identified in the 1994 FS.

The ARAR which has necessitated further remedial actions at the site since the ROD is NR140 of the Wisconsin Administrative Code. Specifically, NR140 contains health-based ground water quality criteria, and vinyl chloride exceeded its Enforcement Standard (ES) in two private wells located downgradient of the landfill. NR140 is the primary ARAR for any future action at the FF/NN Landfill.

what about NR 507 for methane monitoring outside the boundary of waste? And the installation of actual gas probes instead of MW's!

3.0 IDENTIFICATION AND SCREENING OF GENERAL RESPONSE ACTIONS AND REMEDIAL TECHNOLOGIES

Possible technologies will be identified to remediate impacted groundwater in the sandstone aquifer. The technologies will be screened based on effectiveness, implementability, and cost. Given the extensive field investigations conducted and the information gathered from the original Remedial Investigation (RI), FS, and subsequent investigation, ten alternatives have been identified that will be included in the screening process. These are described briefly below.

3.1 No Further Action

This alternative allows the Site to remain in its present condition, with groundwater monitoring. Evaluation of this alternative is required by CERCLA guidance to provide a baseline to use for comparison against other alternatives. This alternative will include a discussion of the extension of the municipal water supply to Charles Street, which was recently completed by the PRP Group. Inclusion of this action is important for establishing a basis for any change to the ROD for the site because the NCP includes providing municipal water within the definition of "final remedy."

3.2 Institutional Controls

This alternative restricts potential exposure to impacted water through legal and administrative constraints. Restriction of future groundwater use alone would not be effective in reducing contaminant concentrations, but it would be effective in reducing potential human exposure when implemented with other remedial actions. Practical institutional controls for the FF/NN Landfill would be to require specific well casing depths for any new wells installed downgradient of the site, or requiring WDNR review and approval of any new wells within a specified distance south of the site.

DNR is getting a drinking water advisory together,

3.3 Extension of Municipal Water

Municipal water was recently extended to the west end of Charles Street. This alternative would include two options—connecting additional homes on Charles Street to the existing

water line, and extending the municipal water supply westward on South Koro Road, south of Charles Street.

3.4 Monitored Natural Attenuation

This alternative allows the Site to remain in its present condition, with groundwater monitoring to assess the effectiveness of vinyl chloride attenuation resulting from physical, chemical, and biotic processes. Based on the results of sampling since 1993, it is apparent that chlorinated solvents like trichloroethene (TCE) are readily degrading anaerobically to 1,2-dichloroethene (DCE) and vinyl chloride in and near the landfill. By the time the contaminants are 400 feet from the landfill at P-107 and P-107D, all of the TCE has been degraded, and nearly all of the DCE has also broken down. Beyond these wells, only vinyl chloride remains, and it is only in the sandstone aquifer (i.e., not at the water table nor in the shallow piezometers 25 feet below the water table). Vinyl chloride readily degrades under aerobic conditions, and to a lesser extent under anaerobic conditions. Low dissolved oxygen readings taken in May 2002 suggest anaerobic conditions are present.

NOT! Private wells just got hit! How can it be receding?

Showing that Monitored Natural Attenuation will adequately address the remaining vinyl chloride requires that conditions for anaerobic breakdown of vinyl chloride are present, and that the vinyl chloride plume is either stable or receding. The main focus of this alternative will be to address whether the conditions that are present in the sandstone aquifer are sufficient to result in a stable or decreasing plume of vinyl chloride. Analytical results from samples collected in December 2002 that were analyzed for Natural Attenuation parameters will be used as a part of the evaluation of this alternative.

3.5 Extraction Wells with Treatment and Discharge

Extraction wells pump groundwater to the surface for *ex-situ* treatment and discharge. Proven technologies exist for *ex-situ* treatment of vinyl chloride impacted groundwater. In order to evaluate this alternative, we will utilize a two-dimensional groundwater flow computer model such as Winflow™ to determine the spacing and pumping rates necessary to remediate water in the sandstone aquifer. The alternatives for discharge were evaluated in the 1994 FS, and that information will be simply referenced and the costs updated.

3.6 Groundwater Circulation Wells

This alternative incorporates in-well air stripping circulation to remediate groundwater. This is a proven technology to remediate vinyl chloride in groundwater and can be less costly than conventional extraction and treatment approaches. Circulation wells can be deployed as a barrier technique and as a method to actively and effectively reduce concentrations of vinyl chloride. This technology can also be used as a means of delivery of chemical or biological treatment agents.

3.7 *In*-situ Chemical Oxidation

This remediation technology involves the injection of chemical oxidants such as permanganate, Fenton's Reagent and hydrogen peroxide into the subsurface to oxidize (degrade) organic contamination to carbon dioxide and water. The technology has been used to treat chlorinated solvent constituents. The technology is typically applied for the treatment of source area, and has only been applied to large-scale sites on a limited basis.

3.8 Engineered *In Situ* Bioremediation

This technology enhances natural processes that degrade or breakdown constituents of concern. Anaerobic conditions can be improved by injecting lactate or hydrogen release compound (HRC), and bacteria (bioaugmentation) can be added to develop a passive biobarrier perpendicular to the groundwater plume. This technology has been successfully demonstrated at the pilot scale.

A variation of this alternative is to introduce aerobic conditions in the aquifer, which would promote the rapid degradation of vinyl chloride. Two technologies capable of introducing oxygen to groundwater are Oxygen Release Compound (ORC), and introduction of dissolved oxygen through horizontal or vertical wells.

3.9 Reactive Barrier Walls

This technology remediates groundwater as it flows through the reactive barrier wall, which is installed perpendicular to the groundwater flow direction. Reactive barriers that contain zero-valent iron or activated carbon have been shown to effectively address vinyl chloride.

3.10 Thermal Treatment

This technology involves injecting a heat source, such as steam or hot water, to drive the VOCs toward extraction well(s) for treatment and discharge. This technology has been applied at only a handful of sites with VOCs, with varying levels of success. Thermal treatment is quite costly and is generally applied at sites with a significant mass of contaminant within a confined source area.

3.11 Technology/Process Option Screening Summary

The ten technologies presented above will be evaluated to determine which are appropriate for the site to most effectively address the vinyl chloride impacts.

The technologies evaluated as appropriate for the site will be developed into remedial alternatives for addressing the vinyl chloride impacts in groundwater. As indicated in the National Contingency Plan (NCP), the design concepts of each alternative will be described, and it will then be evaluated for effectiveness, implementability and cost.

4.0 DETAILED ANALYSIS OF ALTERNATIVES

A detailed analysis will be performed on those remedial alternatives that remain viable after that screening is completed. This final analysis will utilize nine criteria offered in the NCP. These critera are listed below.

Threshold Criteria

- Overall Protection of Human Health and the Environment
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Primary Balancing Criteria

- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost

Considerations

- Federal and State Agency Acceptance
- Community Acceptance

This detailed evaluation of alternatives will be done in the format of a matrix.

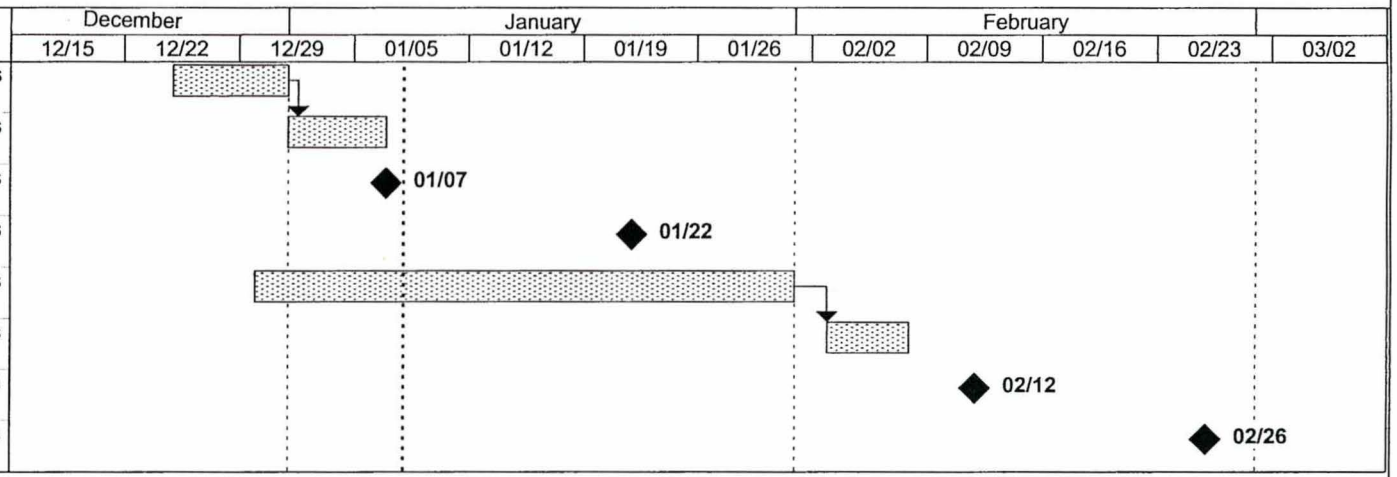
5.0 PROPOSED SCHEDULE FOR PREPARATION OF FEASIBILITY STUDY

Figure 6-1 shows the proposed schedule for the preparation of this Focused FS. The preparation of the FS will proceed while the WDNR is reviewing this Work Plan. The FS is expected to be submitted to the WDNR by February 12, 2003.

FIGURE

Figure 6-1 Schedule - Focused Feasibility Study Sandstone Aquifer
FF/NN Landfill, Ripon, WI

ID	Task Name	Duration
1	Work Plan	5 days
2	Review Work Plan by PRPs	4 days
3	Submit Work Plan to WDNR	0 days
4	Meet with WDNR to Discuss Work Plan (If Necessary)	0 days
5	Prepare Feasibility Plan	25 days
6	Review Feasibility Study by PRPs	5 days
7	Submit Feasibility Study to WDNR	0 days
8	Meet with WDNR to Discuss Work Plan (If Necessary)	0 days



Project: RiponFSproposal02
Date: Wed 01/08/03

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress
Split
External Tasks
Project Summary
Group By Summary

ATTACHMENT A
PROPOSED OUTLINE FOR
FOCUSED FEASIBILITY STUDY
SANDSTONE AQUIFER

PROPOSED OUTLINE FOR
FOCUSED FEASIBILITY STUDY
SANDSTONE AQUIFER
FF/NN LANDFILL, RIPON, WI

1.0 Introduction
- 1.1 FS Scope and Approach
- 1.2 Background
- 1.3 Site Status
- 1.4 Potential Exposure Pathways\Risk Assessment
- 1.5 Report Organization

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- 2.1 Remedial Action Objectives for Groundwater
- 2.2 Applicable or Relevant and Appropriate Requirements
- 2.3 Spatial Extent of Impacted Groundwater
- 2.4 Achieving Remedial Action Objectives

3.0 Identification and Screening of General Response Actions and Remedial Technologies
- 3.1 No Further Action
- 3.2 Institutional Controls
- 3.3 Extension of Municipal Water
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- 3.5 Extraction Wells With Treatment and Discharge
- 3.6 Groundwater Circulation Wells
- 3.7 *In-Situ* Chemical Oxidation
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  - Bioaugmentation
  - Anaerobic Degredation
  - Aerobic Degredation
- 3.9 Reactive Barrier Walls
- 3.10 Thermal Treatment
- 3.11 Technology/Process Option Screening Summary

4.0 Development and Screening of Remedial Alternatives
- 4.1 Development of Remedial Alternatives
- 4.2 Screening of Remedial Alternatives
- 4.3 Cost Analysis
- 4.4 Summary of Remedial Alternatives Screening

5.0 Alternative Remedial Strategy - Detailed Analysis of Alternatives
- 5.1 Identification and Description of Remedial Alternatives
- 5.2 Detailed Analysis of Remedial Alternatives
- 5.3 Comparative Analysis of Alternatives

6.0 Conclusion

7.0 References